Chapter 3
Affected Environment

The affected environment includes the physical and natural environment around each of the sites where mercury management activities would take place and the relationship of people with that environment. Descriptions of the affected environment provide a basis for understanding the potential direct, indirect, and cumulative impacts of implementation of each of the three alternatives described in Chapter 2, Alternatives for the Management of Mercury. The level of detail presented for each environmental resource (for example, water, air, ecosystems) depends on the likelihood of the resource to be affected by mercury management activities. The affected environment is described for the four existing mercury storage locations (New Haven, Somerville, and Warren depots and the U.S. Department of Energy's Y–12 National Security Complex) and the other candidate consolidation storage sites (Hawthorne Army Depot, PEZ Lake Development, and Utah Industrial Depot). The candidate sites afford a wide variety of environmental conditions, and because they are in different parts of the country, enabled analysis of a wide range of transportation distances.

3.1 APPROACH TO DEFINING THE AFFECTED ENVIRONMENT

In accordance with the Council on Environmental Quality's (CEQ) National Environmental Policy Act (NEPA) regulations on preparing an environmental impact statement (EIS), the affected environment is "interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment" (CEQ 1986). The affected environment descriptions presented in this chapter provide the context for understanding the environmental consequences described in Chapter 4, Environmental Consequences. As such, they serve as a baseline from which any environmental changes that may be brought about by implementing the proposed action and alternatives can be identified and evaluated. For this *Mercury Management Environmental Impact Statement* (MM EIS), the baseline conditions are the existing conditions.

The resources that are described for the potentially affected sites are meteorology, air quality and noise, waste management, socioeconomics, human health, geology and soils, water resources, ecological resources, cultural resources, land use and visual resources, infrastructure, and environmental justice. The potentially affected sites for mercury management activities are the four current storage locations and the three potential consolidated long-term storage sites. The mercury is currently stored at the New Haven Depot near New Haven, Indiana; the Somerville Depot near Somerville, New Jersey; the Warren Depot near Warren, Ohio; and the U.S. Department of Energy's (DOE's) Y–12 National Security Complex (Y–12) in Oak Ridge, Tennessee. The Hawthorne Army Depot near Hawthorne, Nevada; PEZ Lake Development near Romulus, New York; and the Utah Industrial Depot near Tooele, Utah, are also being considered as candidate locations for consolidated storage.

Selected Characteristics of the Potentially Affected Sites for Mercury Management Activities

Site	Area (acres)	Population: Health Risk ROI[a]	Population: Socioeconomic ROI[b]	Site Workforce
New Haven	268	144,400	331,849	13
Somerville	77	297,700	297,490	17
Warren	160	248,500	225,116	13
Y–12	811	88,110	71,330	8,900
Hawthorne	147,236	3,903	5,071	480
PEZ Lake	850	16,200	33,342	120
Utah	1,700	34,971	40,735	827

[a] Population residing within 10 miles of the storage site.
[b] Population for the county in which the storage site is located.
Key: ROI, region of influence; Y–12, U.S. Department of Energy's Y–12 National Security Complex.

The affected environments for potential producers and users under the mercury Sales Alternatives are not described. As described in Section 2.2.3, neither Sales Alternative evaluated in this MM EIS would unduly disrupt the world mercury market. Therefore, there would be little change in the price or supply of mercury and no appreciable impacts at producer or user locations. An exception is that impacts could occur at the mercury mine from storing additional mercury under the Sale of Mercury to Reduce Mercury Mining Alternative. The affected environment for the mercury mining location is not described because the mine location is not known, the affected environment is likely to be bounded by the six possible consolidated storage locations that are evaluated, and the impacts from reduced mercury mining would be largely beneficial.

The truck, rail, and ocean transportation routes analyzed in the *Draft Human Health and Ecological Risk Assessment Report for the Mercury Management Environmental Impact Statement* (DLA 2003) are representative routes. The actual routes used to transport the mercury may be different from the routes analyzed in this document. Therefore, the affected environments along the transportation routes are not described in this MM EIS.

The Defense National Stockpile Center (DNSC) evaluated the environmental impacts of the mercury management alternatives within defined regions of influence (ROIs) at each of the potentially affected sites and along transportation routes. The ROIs are specific to the type of effect evaluated and encompass geographic areas within which any significant impact would be expected to occur. For example, human health risks to the general public from exposure to airborne contaminant emissions were evaluated for an area within a 50-mi (80-km) radius of the proposed facilities. Infrastructure impacts, such as impacts on utilities, were evaluated within the site boundaries and include the local infrastructure supporting the site. Brief descriptions of the ROIs are given in Table 3.1–1. More detailed descriptions of the ROI and the methods used to evaluate impacts are presented in Appendix E, Impact Assessment Methods.

In addition to NEPA, the proposed action must comply with other environmental laws, regulations, and Executive orders. The CEQ NEPA regulations (40 Title 40 Code of Federal Regulations [CFR] 1502.25) specifically require agencies to prepare draft EISs concurrently with and integrated with environmental impact analyses and related surveys and studies required by the Clean Air Act, Clean Water Act, Fish and Wildlife Coordination Act, Archaeological and Historical Preservation Act, American Indian Religious Freedom Act, Farmland Protection Policy Act, Endangered Species Act, and other environmental laws and Executive orders. Executive orders (EOs) considered in this MM EIS include:

- Protection and Enhancement of the Cultural Environment (EO 11593)
- Protection of Wetlands (EO 11990)
- Floodplain Management (EO 11988)
- Environmental Effects Abroad of Major Federal Actions (EO 12114)
- Federal Actions to Address Environmental Justice in Minority and Low-Income Populations (EO 12898)
- Protection of Children from Environmental Health Risks and Safety Risks (EO 13045)

The requirements of these laws, regulations, and Executive orders were considered when collecting affected environment information for this chapter and when performing the impacts analysis presented in Chapter 4. These requirements are described in more detail in Chapter 5, Environmental Regulations, Permits, and Consultations. A status of consultations with Federal, state and local agencies, and Indian tribes is also included in Chapter 5.

Table 3.1–1. Resources Evaluated and Regions of Influence for the Affected Environment

Resource	Affected Environment	Region of Influence
Meteorology and air quality	Meteorological conditions (e.g., temperature, precipitation, severe weather) and pollutant concentrations in the air	The site, offsite areas within the local air quality control regions, and transportation corridors
Noise	Noise sources and levels that commonly occur during the day and night	The site, offsite areas, access routes to the sites, and transportation corridors
Waste management	Hazardous and nonhazardous solid waste and wastewater generation and management practices	Waste management activities on site and commercial treatment, storage, and disposal facilities
Socioeconomics	The regional population, housing, labor market, and community services	County or counties that border the site
Human health	The health of site workers and the public	The site, offsite areas within 50 mi of the site, and transportation corridors
Geology and soils	Geologic and soils characteristics, geologic hazards, including seismic activity, mineral and energy resources, and important farmland soils	The site and adjacent areas
Water resources	Surface water and groundwater features, water supply sources, and water quality	The site and adjacent areas
Ecological resources	Plants and animals, special status species, and nonsensitive and sensitive habitats (including wetlands)	The site and adjacent areas
Cultural resources	Historical and archaeological resources and Native American concerns	The site and adjacent areas
Land use and visual resources	Land ownership information, land-use practices, policies, and controls, and viewsheds of the site and surrounding region	The site and adjacent areas
Infrastructure	The transportation corridors and utilities that service the site and site security	The site infrastructure and local infrastructure supporting the site
Environmental justice	The presence of minority and low-income populations	Offsite areas within 10 mi of the site and along the transportation corridors

3.2 NEW HAVEN DEPOT

The New Haven Depot is a 268-acre (108-ha) site located in Allen County, Indiana. It is slightly over 7 mi (11 km) west of the border between Indiana and Ohio. Entrance to the New Haven Depot is on the north side of Dawkins Road (formerly, State Route 14), approximately 3 mi (4.8 km) east of New Haven, Indiana (USACE 2000a:2-1). The depot is bordered to the south by the Norfolk Southern Railroad and Dawkins Road and to the north by Edgerton Road and a small industrial park. Farmland borders the western portion of the depot, and property owned by Jefferson Township borders the eastern side of the depot (USACE 2000a:2-1, 2-2).

Figure 2–2 shows the layout of warehouses at the depot and its relationship to its surroundings. Six warehouses, each covering about 172,800 ft^2 (16,054 m^2), are located in the north-central portion of the depot. The mercury storage warehouse has a concrete floor, solid block wall construction, ceiling air vents, and a dry-pipe (water supply) fire suppression system. Although the building is vented, there are no floor drains through which leaked or spilled materials could escape. The floor in the mercury storage building is sealed.

There are 614 tons (557 metric tons) of mercury stored in 16,151 76-lb (34-kg) low carbon steel flasks. The flasks, which are from several different sources and are not all of the same construction, are stored in 30-gal (114-l) low carbon steel drums, six flasks to a drum. The drums are stored in containment pans on wooden pallets, five drums to a pallet, with pallets singly stacked.

3.2.1 Meteorology, Air Quality, and Noise

3.2.1.1 Meteorology

Based on data and climate information for Fort Wayne International Airport, the climate of the New Haven area is typical of northeastern Indiana and is influenced to some extent by the Great Lakes. The average annual rainfall, 34.75 in (88.27 cm), is fairly well distributed over the year with somewhat larger monthly amounts in the late spring and early summer. Damaging hailstorms occur about twice a year. Snow usually covers the ground for about 30 days during the winter months, but heavy snowstorms are not frequent. The average annual snowfall is 34.8 in (88.4 cm); however, the maximum snow depth, 20 in (51 cm), occurred in 1982 (NCDC 2001a).

Four tornadoes were reported in Allen County between January 1993 and May 2000. Several occurrences of high winds usually associated with thunderstorm activity typically occur every year (MCC 2000). The mean number of days per year with thunderstorm activity is 38.5 (NCDC 2001a). The mean number of days per year with one or more tornadoes within 25 mi (40 km) of the depot is 1.0 (NSSL 2002). The average annual wind speed is 9.9 mph (4.4 m/s) (NCDC 2001a). The maximum recorded wind speed (based on the minimum for 1 mile of wind to pass) is 65 mph (29 m/s) (NOAA 2000).

The average annual temperature is 50.1 °F (10 °C); temperatures range from a monthly average minimum temperature of 15.3 °F (-9.3 °C) in January to a monthly average maximum of 84.6 °F (29.2 °C) in July. The minimum recorded temperature is -22 °F (-30 °C). The maximum recorded temperature is 106 °F (41 °C) (NCDC 2001a).

3.2.1.2 Air Quality

The New Haven Depot is in an area of Allen County that is designated as better than national standards for sulfur dioxide and better than national standards or unclassifiable for nitrogen dioxide. The area is unclassifiable regarding attainment of the standard for carbon monoxide. Under the U.S. Environmental Protection Agency's (EPA) rule change, which reinstated the 1-hr ozone standard, the area is unclassifiable regarding attainment of the standard for ozone (EPA 2000a). EPA has not assigned an attainment status designation for lead, and the attainment status for particulate matter less than or equal to 10 microns in diameter (PM_{10}) is unclassifiable (EPA 2000b).

There are no prevention of significant deterioration (PSD) Class I areas within 100 mi (161 km) of the New Haven Depot. A Class I area is one in which very little increase in pollution is allowed due to the pristine nature of the area. New Haven and its vicinity are classified as a Class II area in which more moderate increases in pollution are allowed. No PSD permits are required for any emission source at the New Haven Depot (DNSC 2001a). PSD permits are those required for major new sources modifications subject to the PSD regulations.

The primary sources of criteria pollutants at the New Haven Depot are natural gas fired boilers and a forced-air heating system, diesel fire pump, and material handling equipment (i.e., front-end loader, railcar mover, sweeper, and forklifts). There are no active air emissions sources at the New Haven Depot that are required to be permitted under the Federal Clean Air Act or companion State of Indiana regulations (DNSC 2001a). In addition, little fugitive particulate emissions are generated during stockpile loading or unloading activities (USACE 1999a:3-7).

The closest offsite monitors are operated by the State of Indiana in Allen County. In 2000, these monitors reported a maximum 8-hr average carbon monoxide concentration of 5,180 $\mu g/m^3$ and a maximum 1-hr average concentration of 7,480 $\mu g/m^3$. For PM_{10}, an annual average concentration of 20.2 $\mu g/m^3$ and a maximum 24-hr average concentration of 51 $\mu g/m^3$ were reported. A 1-hr average ozone concentration of 206 $\mu g/m^3$ was reported (EPA 2001a). There are no nearby monitors for lead, mercury, nitrogen dioxide, or sulfur dioxide. Monitored concentrations in the region are well below ambient standards.

Mercury vapor concentrations are routinely measured inside the warehouse during periodic inspections (see Section 3.2.4.2). Ambient air monitoring for mercury outside the warehouse is not routinely performed.

3.2.1.3 Noise

Major noise emission sources within the New Haven Depot include various equipment and machines—heating, ventilation, and air conditioning equipment, material-handling equipment (i.e., forklifts and loaders), and vehicles. Most noise sources are limited to daytime during normal working hours. Levels of activity at the depot are low, and noise levels produced are expected to be compatible with the adjoining industrial, commercial, agricultural, and recreational uses. The nearest noise sensitive receptors are farmsteads south of the depot. The closest farmstead is approximately 250 ft (76 m) south of the property fence. No noise complaints have been received from the public in the last 5 years (DNSC 2001a).

The State of Indiana and Marion County have not established community noise standards, which specify acceptable noise levels applicable to the depot.

Sound-level measurements have not been recorded near the depot; however, it is expected that the acoustic environment near the site boundary ranges from that typical of rural to industrial locations. Traffic and nearby industry, such as the Superior Alloys factory that borders the depot to the west, are the primary sources of noise at the site boundary. Traffic is the primary source of noise at residences located near roads (DLA 2000a). The traffic generated by the depot (typically 10 to 15 trips per day), including employee vehicles (13 employees in 2001) and trucks used for shipping, has little effect on traffic on nearby roads and the associated traffic noise. Roads that provide access to the New Haven Depot include Dawkins Road, Doyle Road, Ryan Road, and Edgerton Road for which average daily traffic flows (vehicles per day) are 3,050; 275; 1,365; and 1,020, respectively (Allen County 2001). Railroad activity related to the depot (i.e., delivery or removal of railcars) is occasional, varying from none to 100 railcars per year, and would result in short-term increases in sound levels near the depot.

3.2.2 Waste Management

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

The New Haven Depot generates and manages sanitary, nonhazardous, and hazardous wastes. The facility is a conditionally exempt small quantity generator of hazardous waste, as defined under the Resource Conservation and Recovery Act (RCRA) at 40 CFR 261.5 (DLA 2000a; USACE 2000a). This means that less than 220 lb (100 kg) of hazardous waste or 2.2 lb (1 kg) of acutely hazardous waste are generated each month by activities at the site.

RCRA-regulated wastes generated at the New Haven Depot include used oil, paints, solvents and cleaning compounds from facility maintenance and operation and mercury-contaminated materials from cleanup activities. Approximately 100 lb (45 kg) of hazardous waste are generated annually. Used oil and hazardous wastes are accumulated in 55-gal (208-l) drums until removed by a commercial hazardous waste management contractor for offsite recycling, treatment, or disposal, as appropriate to each waste type (DLA 2000a:3-6; Olszewski 2002).

Nonhazardous wastes generated by office, construction, and maintenance activities are collected in a 20-yd^3 (15-m^3) dumpster. The dumpster is emptied by a waste disposal contractor and the contents disposed of at the National Serve-All Landfill in Fort Wayne (DLA 2000a:3-6). Approximately 100 yd^3 (76 m^3) of nonhazardous waste are generated annually (Olszewski 2002).

Sanitary wastewater is discharged to sewers leading to the city of New Haven sanitary wastewater treatment facility (DLA 2000a:3-6). Approximately 59,500 gal (225,231 l) of sanitary wastewater are estimated to be discharged to the sanitary sewer annually. The sanitary sewer is estimated to have a capacity of 50 gal/min (189 l/min) (Olszewski 2002).

3.2.3 Socioeconomics

The New Haven Depot is located in Allen County, Indiana. Therefore, all statistics for the local economy, population, housing, and community services as defined in Appendix E will be presented for Allen County. In 2001, the New Haven Depot employed 13 persons (about 0.01 percent of the county's 2000 civilian labor force) (DOL 2001; Lynch 2001a).

3.2.3.1 Regional Economic Characteristics

From 1990 to 2000, the estimated civilian labor force in Allen County increased by 8.0 percent to 174,169 persons. In 2000, the estimated unemployment rate for the county was 3.0 percent, which was less than the 2000 unemployment rate for Indiana (3.2 percent) (DOL 2001).

3.2.3.2 Population and Housing

In 2000, the estimated population of Allen County totaled 331,849. From 1990 to 2000, the county's population grew by 10.3 percent, compared with the 9.7 percent growth in Indiana (DOC 2001a, 2001b, 2001c). The percentage of the county's population under the age of 5 is 7.7 percent with women age 18 to 40 comprising 19.7 percent (DOC 2001d). There were 138,905 housing units in the county in 2000, of which 65.8 percent were owner occupied; 26.9 percent, renter occupied; and 7.3 percent, vacant (DOC 2001a).

3.2.3.3 Community Services

3.2.3.3.1 Education

In 1997, student enrollment in Allen County was 60,425, and there were 3,470 teachers for an average student-to-teacher ratio of 17.4:1 (Fort Wayne/Allen County 1997).

3.2.3.3.2 Public Safety

In 2001, 510 sworn police officers served Allen County, with a ratio of 1.6 officers per 1,000 persons (Sawyer 2001a, 2001b, 2001c). If a mercury incident should occur at the New Haven Depot, the New Haven Fire Department would be notified as well as the Allen County Emergency Management Agency and the Indiana Department of Environmental Management (Lynch 2001b). In 2001, about 800 firefighters provided fire protection services in the county (Sawyer 2001d). The average ratio was 2.5 firefighters per 1,000 persons.

3.2.3.3.3 Health Care

In 1996, 824 physicians served Allen County (Sawyer 2001e). The average ratio was 2.6 physicians per 1,000 persons. In 2000, there were three hospitals in the county, with a total of 1,124 hospital beds (Medical-Net 2001).

3.2.4 Human Health Risk

3.2.4.1 Health Effects Studies

According to the Allen County Department of Health, the Maumee River Basin Commission, the New Haven Depot manager, and the DNSC environmental manager no known studies on the health effects of mercury have been conducted in the vicinity of the New Haven Depot. However, the health of the DNSC New Haven Depot workers has been monitored for over 15 years through a medical surveillance program conducted by the U.S. Public Health Service. The surveillance program includes periodic physical examinations and an occupational exposure history. For a period of 1 year, biological monitoring was conducted for mercury levels in all stockpile employees; no elevations of mercury were detected. Currently, biological monitoring is only performed in cases of reported exposure. As of 2001, no adverse health effects from mercury exposure in any New Haven Depot worker have been documented by the U.S. Public Health Service (Holland 2001).

3.2.4.2 Accident History

Prior to May 2002, the mercury was stored in flasks on wooden pallets with metal drip pans underneath. Free mercury (elemental mercury droplets) on flasks, pallets, and drip pans was a potential source of accidental mercury releases at the mercury storage sites. Information obtained from inspection reports from June 1993 to July 2000 indicates that free mercury was first reported in December 1997. In 1998, it was determined that 137 of the 267 pallets (51 percent) were contaminated, although no flasks were identified as leakers. It is assumed that this mercury was from residual contamination that may have occurred before it was shipped to New Haven in 1964. In 1998, all flasks were cleaned with a mercury absorbent material, inspected, and then placed in 6-mil thick plastic bags and placed on new pallets. In 1999, one confirmed leaking flask and five suspected leaking flasks were found. The confirmed leaking flask was found to have a pinhole leak resulting from corrosion, which apparently penetrated a weld defect (Lynch 2000; TVA 2000). Although 36 lb (16.3 kg) of mercury leaked from the flask, the mercury was not a reportable quantity because it collected in the containment tray located at the base of the pallets and was not released into the environment. The mercury was recovered and the area was cleaned; however, since January 2000, free mercury, ranging in size from drops to pinheads, was found on flasks in seven different pallets. One hundred and forty flasks have been identified as having droplets either on the flask itself or in the plastic bag surrounding it (Lynch 2000). The mercury from these incidents has been promptly cleaned up with no mercury released to the environment. As a method of ensuring safe storage of the mercury and to prevent any potential source of accidental mercury releases to the environment, the mercury storage flasks were packed into lined, 30-gal (114-l) steel drums (overpacks). This was completed in May 2002. During overpacking, eight defective flasks were identified. These flasks were replaced without incident (Surface 2002).

The warehouse is monitored periodically for mercury vapors. Review of mercury inspection reports showed that between September 1999 and the end of November 1999, occasional readings exceeded the National Institute of Occupational Safety and Health's threshold limit value of 0.025 mg/m^3. Some exceeded the Occupational Safety and Health Administration's permissible exposure limit of 0.1 mg/m^3; 0.364 mg/m^3 was the highest reading. However, these readings were associated with the leaking flasks and cleanup activities described previously. Since the beginning of 2000, with one exception in March, which registered 0.028 mg/m^3, mercury vapor readings have either been below the limits of detection of the instrument or below the threshold limit value.

There have been no accidents at the New Haven Depot during mercury handling activities that have resulted in exposures to facility workers or releases outside the building.

3.2.4.3 Emergency Preparedness

The New Haven Depot has established an onsite emergency response plan for its trained onsite response organization to follow in the event of an accident or release. The Distribution Facilities Manager is responsible for designating and training onsite responders, establishing initial response procedures and conducting remediation actions, and summoning outside aid from local fire and response departments or organizations to support emergency response, including medical assistance as necessary.

The New Haven Distribution Facilities Manager is the first to be notified of any mercury release. If necessary, the Allen County Emergency Response Agency would be notified and could respond within 30 minutes or less. The Indiana Department of Environmental Management would be notified to monitor the incident and could respond to the depot within 2 hours or less (Nemeth 2002a). Elevated mercury vapor levels detected by instrument would prompt a search for a leaking mercury flask before any visible mercury is noticed. Small leaks are handled on site by trained mercury response technicians. If a large leak or release occurs, the New Haven volunteer fire department would be requested to assist, including evacuation support as necessary. The New Haven Fire Department should respond to the depot within 5 minutes (Nemeth 2002b). There is a mutual aid agreement with the full-time Fort Wayne, Indiana, fire department and emergency medical technicians, which provides in-depth assistance for emergency response and action. However, in over 50 years of mercury management experience, there has been no need for outside emergency assistance.

In the event of any mercury leak, the affected site and surrounding areas would be surveyed for potential mercury contamination and remedial actions, including excavation and hazardous waste disposal; efforts would be coordinated by the Distribution Facilities manager. Commercial contractors would be used to support recovery and remediation if mercury enters the soil or waters near the site as a result of a release. state and/or regional officials from the EPA would monitor activities to ensure that public health and safety are protected.

3.2.5 Geology and Soils

The New Haven Depot lies within the Central Lowland Physiographic Province (Lloyd and Luke 1995:K2). The depot is specifically located on the relatively flat and poorly drained Maumee Lacustrine (Lake) Plain, which developed on deposits associated with ancestral Lake Erie (Fleming 1994:36, 37, 90; USACE 1999a:3-1). Topography across the New Haven Depot is essentially flat with a maximum elevation of 770 ft (235 m) above mean sea level near the southwestern corner of the depot and a minimum elevation of about 760 ft (232 m) above mean sea level along the northern boundary of the site (USGS 1994a).

The New Haven Depot is primarily underlain by glacial tills of the Lagro Formation. Tills of the Lagro Formation are typically light grey, medium to very stiff, silty clays and clay loams. This formation generally attains a thickness of 10 ft (3 m), but it is capped locally by lacustrine silt and clay (mud) as much as 15 ft (4.6 m) thick. The surficial sediments and the Lagro Formation rest atop the older till, sands, and gravel of the Trafalgar Formation (Fleming 1994:14, 21, 23, 37, plates 5, 10). In total, these unconsolidated sediments attain a total thickness of approximately 60 to 70 ft (18 to 21 m) atop the bedrock surface. Bedrock units present beneath the site include the interbedded limestones, dolomites, and shales of the Traverse and Detroit River Formations and the interbedded, massive dolomites of the Salina Group. Total thickness of the Traverse and Detroit River Formations is approximately 60 ft (18 m) beneath the site. The underlying Salina Group has a total thickness of between 400 and 600 ft (122 and 183 m) in southern Allen County. These bedrock units generally dip to the north toward the Michigan Basin structural feature (Fleming 1994:12, plates 2, 10).

Allen County's principal nonfuel mineral products include crushed stone, construction sand and gravel, and peat (USGS 1999a). Two stone quarries have operated near the depot. One quarry is located about 5 mi (8 km) due east of the depot and has workings that expose the Traverse and Detroit River Formations. The second quarry is located about 4 mi (6.4 km) northeast of the depot along the Maumee River (Bleuer and Moore 1978:21, 28). Numerous gravel pits have also been developed across the lake plain. Three abandoned pits mapped in the vicinity may correspond to the three small ponds located on the site. In addition, the weathered glacial till comprising the Lagro Formation is suitable for manufacturing tile and brick (Bleuer and Moore 1978:21, 28, 31). Oil and gas fields of generally limited production have been operated throughout the county, with the first oil field discovered near New Haven around 1899 (Bleuer and Moore 1978:32, 33).

Two faults have been inferred to cut the bedrock beneath Allen County. The closest is a northeast-southwest trending fault that is mapped as terminating approximately 3 mi (4.8 km) northeast of the depot. The date of the last movement along this fault is not known (Fleming 1994:plate 2). The closest active faults have been inferred to be associated with the Wabash Valley fault system located approximately 300 mi (483 km) from the depot in southeastern Illinois and southwestern Indiana (Crone and Wheeler 2000:4, 53, 54). Earthquakes associated with the New Madrid fault zone located approximately 470 mi (756 km) from the depot have also affected parts of Indiana in the past (Kirby 2000:1).

Indiana has experienced the effects of several strong earthquakes over the last 200 years, including the New Madrid earthquakes in 1811 and 1812 and the Charleston, South Carolina, earthquake of 1886 (see Section 3.5.5) (Kirby 2000:1, 4). Geologic evidence also indicates that at least seven earthquakes with a maximum magnitude of 7.5 have occurred in the Wabash Valley region of southwestern Indiana between about 2,000 to 12,000 years ago (Crone and Wheeler 2000:53; Kirby 2000:2, 4). Within a radius of 100 mi (161 km) of the New Haven Depot, a total of nine significant earthquakes (i.e., having a magnitude of at least 4.5 or a Modified Mercalli Intensity (MMI) of VI or larger) have been documented since 1875. Two of these, including the strongest of the nine recorded, occurred on March 2 and

March 9, 1937, had magnitudes of 5.0 and 5.4, and produced MMIs of VII and VIII, respectively (USGS 2001a). Located near Anna, Ohio, these earthquakes reportedly cracked plaster and shook pictures and books from shelves in Fort Wayne, Indiana (USGS 2001b).

Earthquake-produced ground motion is expressed in units of percent "g" (force of acceleration relative to that of the earth's gravity). Two differing measures of this motion are peak (ground) acceleration and response spectral acceleration (see Appendix E, Section E.6.1). New seismic hazard metrics and maps developed by the U.S. Geological Survey (USGS) have been adapted for use in the *International Building Code* and depict maximum considered earthquake ground motion of 0.2- and 1.0-second spectral acceleration, respectively, based on a 2 percent probability of exceedance in 50 years (ICC 2000; USGS 2001c). This corresponds to an annual probability of occurrence of about 1 in 2,500. Section E.6.1 provides a more detailed explanation of these maps. The New Haven Depot lies within the 0.17 g to 0.18 g mapping contours for a 0.2-second spectral response acceleration and the 0.06g to 0.07g contours for a 1.0-second spectral response acceleration. The calculated peak ground acceleration for the given probability of exceedance at the site is approximately 0.08g (USGS 2001d). Based on the maximum considered earthquake ground motions, the New Haven Depot is located in a region of negligible seismicity with very low probability of collapse of structures. On a design basis, the probability of life-threatening damage to or collapse of structures in such regions is very low even for the most vulnerable types of structures. The seismic hazard in these regions is controlled by earthquakes with a body-wave magnitude less than or equal to 5.5 with MMIs of up to V. Life-threatening structural damage or collapse would not be expected from earthquake shaking of either MMI V or VI (BSSC 2001:381, 382, 387). For comparison, a peak ground acceleration of about 0.10g roughly marks the approximate threshold of damage to older (pre-1965) structures and roughly corresponds to a MMI of VI (USGS 2002a). Table E–11 in Appendix E shows the approximate correlation between MMI, earthquake magnitude, and peak ground acceleration.

There are no volcanic hazards at the New Haven Depot. The Central Lowland Physiographic Province has been stable for at least the last 650 million years with no known volcanism within the last 1 billion years (Rupp 1997).

Surface and near-surface soils (down to a depth of 2 ft [0.6 m]) consist of natural soils (primarily clayey silt) and fill materials, including sand, gravel, and some manmade materials (e.g., brick pieces) (USACE 2000a:3-20). The majority of the natural soils across the New Haven Depot are mapped as Hoytville silty clay (USDA 1969). An area that includes the southeastern corner of the depot is mapped as a borrow pit (USDA 1969:plates 63, 64). Hoytville-series soils consist of very deep, very poorly drained, nearly level and depressional soils with surface soil textures predominantly ranging from clays and silty clays to silt and clay loams. Permeability is moderately slow. Seasonal perched water tables occur with these soils from as high as 1 ft (0.3 m) above the surface (USDA 2001). While wetness is the major limitation of the Hoytville silty clay, this soil, when drained, is a prime farmland soil (7 CFR 657.5[a]) (USDA 1992a). Nonetheless, land that otherwise qualifies as prime or other important farmland acquired by a Federal agency prior to August 4, 1984, or originally acquired for national defense purposes, is specifically exempted from the provisions of the Farmland Protection Policy Act (7 CFR 658.2(c) and 658.4(e)).

A preliminary assessment was initiated in 1998 to assess the potential for hazardous substance releases to the environment as a result of depot operations (USACE 1999a). As part of a subsequent focused site investigation, soil samples were collected from 13 locations by hand auger. Two additional locations served as comparative background soil sampling locations. Soil samples were analyzed for 14 metals. Significantly elevated parameter concentrations relative to background samples were found in one or more surface and subsurface samples for arsenic, barium, chromium, copper, lead, and nickel. No elevated concentrations of mercury were detected in the soil samples (USACE 2000a:3-2–3-4, 3-28–3-33). Soil sample concentrations were also compared to State of Indiana soil closure standards (Tier 1) for residential land use. Concentrations above the residential standards were found in all 32 samples (including the 4 background samples) for arsenic, 3 samples for total chromium, and 2 samples for lead (USACE 2000a:3-5, 3-37–3-44). The final site investigation report completed in February 2001 recommended additional sampling to determine the lateral and vertical extent of soil, sediment, surface water, and groundwater contamination as part of a subsequent remedial investigation. This work is planned for fiscal year 2003/2004 (Lynch 2002a).

3.2.6 Water Resources

3.2.6.1 Surface Water

The major surface water feature in the vicinity of the New Haven Depot is the Upper Maumee River that is located approximately 1.9 mi (3.1 km) northwest of the site (USGS 1994a). From Ft. Wayne, the Maumee River flows 134 mi (216 km) northeast into Lake Erie (IDNR 1996a:69). The Upper Maumee River has a mean annual flow of 1,772 ft^3/s (50 m^3/s) at New Haven, Indiana. The river drains an area of 1,967 mi^2 (5,095 km^2) in Indiana and Ohio (USGS 2001e).

Surface water drainage from the site is collected and conveyed by a series of swales, ditches, and underground storm sewers. Two drainage ditches located in the western and eastern portions of the site convey runoff north and off the property and discharge to a drainage channel that runs along Edgerton Road (Edgerton Road Ditch). The discharge points represented by these ditches have been designated storm water Outfalls 001 and 004, respectively, in the facility's Storm Water Pollution Prevention Plan. Drainage from the central portion of the site is collected in storm sewers and discharged to two outfalls represented by sewer manholes near the northern depot boundary. These discharge points have also been designated as storm water Outfalls 002 and 003. As-built plans for the depot indicate that the storm sewer lines from these manholes continue underground off the depot property and discharge near the Edgerton Road ditch (USACE 2000a:3-10, 3-11). The Edgerton Road Ditch runs east along Edgerton Road to its confluence with a larger, engineered drainage ditch (Lomont Ditch) (see Figure 3.2–1). The Lomont Ditch joins Gar Creek, which discharges into the Maumee River approximately 2.4 mi (3.9 km) north of the depot (USGS 1994a). The Huguenard Ditch borders a portion of the southern depot boundary but is not believed to receive direct runoff from the depot. The only other surface water bodies on or immediately adjacent to the depot include three small ponds located in the southeast portion of the site and Ashley Lake (see Figure 3.2–1). The three small ponds are relatively shallow and may be associated with historic gravel and sand quarrying operations. Ashley Lake is a manmade recreational lake used for sport fishing and is located on township property (USACE 2000a:3-6, 3-7, 3-10, 3-11).

Surface water is not used as a water supply for the New Haven Depot; two onsite wells provide water for the site (USACE 2000a:2-2). However, the nearby cities of New Haven and Fort Wayne obtain their water supply from the St. Joseph River. No drinking water intake structures are located within 15 mi (24 km) downstream of the New Haven Depot (USACE 2000a:3-8, 3-12). Water supply and use are discussed further in Section 3.2.10.

The New Haven Depot is not within the mapped 100- or 500-year floodplains of Martin Ditch, Gar Creek, or the Maumee River. No floodplains are mapped for either the Edgerton Road, Huguenard, or Lomont ditches (FEMA 1990). Reportedly, Lomont Ditch, located just to the east of the site, floods on occasion creating a flow path between the ditch and Ashley Lake (see Figure 3.2–1) (USACE 2000a:3-11).

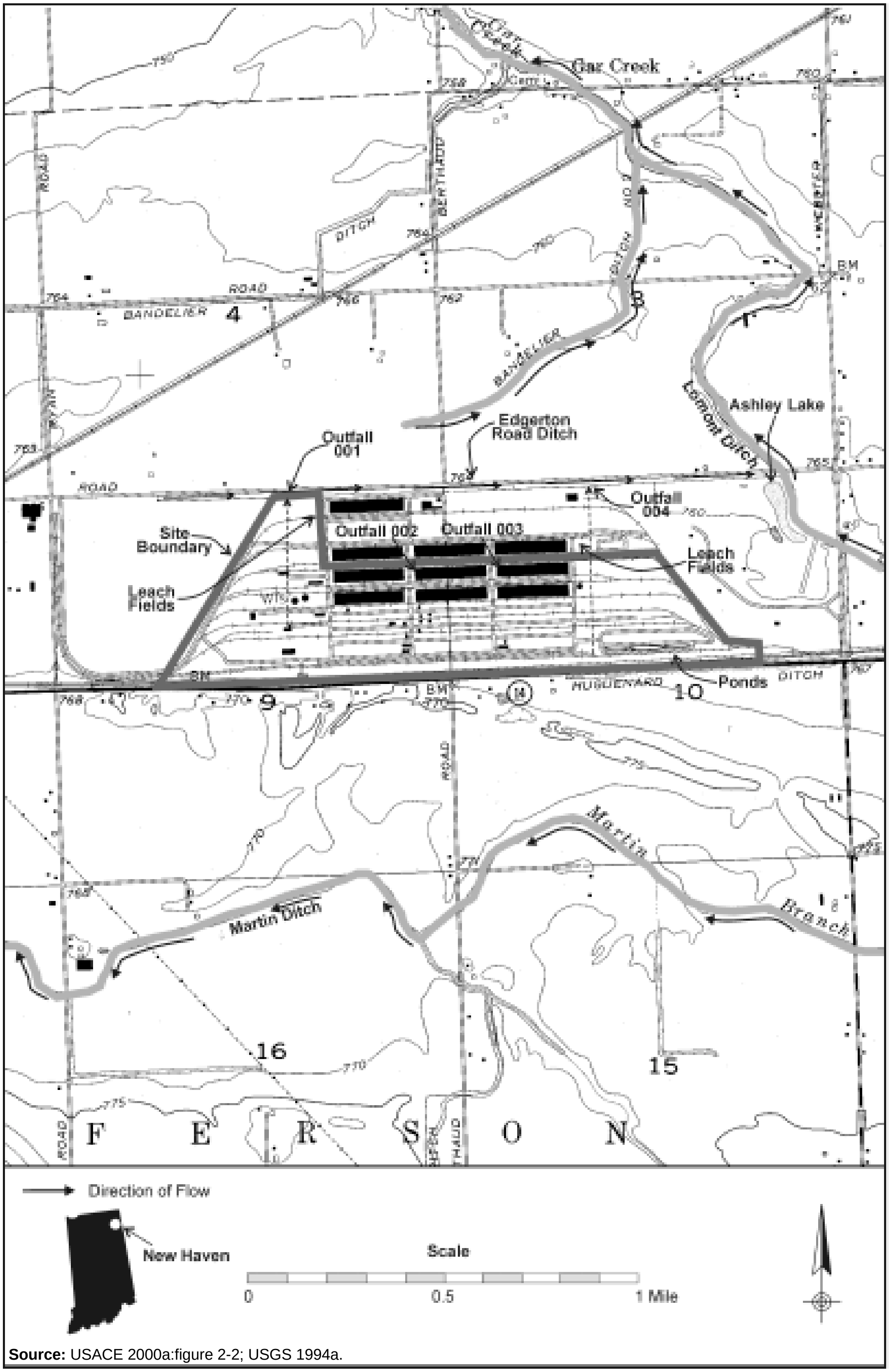


Figure 3.2–1. Surface Water Features at the New Haven Depot, Indiana

All waters of the State of Indiana, including surface and underground water bodies, are subject to the state rules that establish water quality standards and designated uses adopted by the Indiana Water Pollution Control Board and administered by the Indiana Department of Environmental Management. Surface waters of the state that are located within the Great Lakes drainage basin, which include the Maumee River and tributaries, are designated for full-body contact recreation and for supporting a warm water aquatic community (327 IAC 2-1.5). The Maumee River is on the state's Clean Water Act Section 303(d) list as being impaired relative to attaining water quality standards and designated uses due to mercury and polychlorinated biphenyl contamination from unidentified sources (EPA 2001b; IDEM 2001a).

Wastewater that is subject to regulation under the Clean Water Act or Indiana regulations is not discharged from the depot (A.D. Little 2000:7; USACE 2000a:2-5). Sanitary wastewater generated as a result of current depot operations is discharged to the municipal sewer system that serves the site. This interconnection replaced the four onsite septic fields used prior to 1999 (A.D. Little 2000:12). Wastewater management is further discussed in Section 3.2.2. Storm-water runoff is discharged via four outfalls, as discussed above. Although a Notice of Intent was submitted to the Indiana Department of Environmental Management to cover the depot's storm-water discharges under the state's National Pollutant Discharge Elimination System (NPDES) General Permit Rule Program (327 IAC 15-1-1 et seq.) (IDEM 2001b), it was determined that the depot was not subject to Federal or state regulations governing storm-water discharge. Nevertheless, DNSC decided to characterize the depot's storm-water discharges and develop and implement a Storm Water Pollution Prevention Plan (USACHPPM 1996a:1; 1996b). Storm-water characterization conducted in April 1996 found that concentrations for several metals and total suspended solids from at least one outfall exceeded EPA benchmark levels. The study concluded that the elevated metals were likely associated with the elevated suspended sediment loading (USACE 2000a:2-6, 3-11; USACHPPM 1996b).

As part of the 1999 site investigation previously discussed in Section 3.2.5, a total of five surface water samples and nine sediment samples were collected from depot drainage channels, storm sewers, and the Edgerton Road Ditch. The surface water results were compared to the lowest exposure water quality standards contained in 327 IAC 2-1.5 (IDEM 2001c). Arsenic exceeded the standard in all five surface water samples. One surface water sample contained concentrations of six metals (antimony, barium, total chromium, copper, nickel, and zinc) above the standards. Levels of barium, lead, nickel, total chromium, and zinc were found to be elevated in the sediments. No elevated concentrations of mercury were detected in either the surface water or sediment samples (USACE 2000a:3-13, 3-14, 3-54–3-57). As stated in Section 3.2.5, the final site investigation report recommended further site characterization work to determine the extent of sediment contamination (Lynch 2002a).

3.2.6.2 Groundwater

Across northeastern Indiana, groundwater generally occurs both in the bedrock aquifer system and in overlying surficial materials (surficial aquifer system) (Fleming 1994:90, 91; Lloyd and Lyke 1995:K6). The relatively thin surficial aquifers consist of lenses of sand and gravel, either lying above or between till deposits or on the contact between the bedrock surface and overlying glacial till (Fleming 1994:90, 91). One such unit that is part of the Aboite Aquifer System in Allen County is mapped as encompassing the western half of the depot. This unit occurs along the contact between the Lagro and Trafalgar Formations and has a thickness between 5 and 40 ft (1.5 to 12 m). As groundwater producers, these deposits are relatively unproductive (Fleming 1994:42, plate 6). Large diameter wells in the thicker sand and gravel units of the Aboite Aquifer System can yield between 150 and 500 gal/min (568 to 1,893 l/min) of groundwater. In addition, perched aquifers are common throughout the Southern Lake Plain and may first be encountered at depth atop the fine-grained till of the Lagro Formation and the deeper, lower-permeability tills of the Trafalgar Formation. The clayey texture of these till confining units also serves to retard the downward migration of contaminants (Fleming 1994:43, 60, 65).

Beneath the Southern Maumee lake plain region, the bedrock aquifer system is the principal source of groundwater with the overlying tills acting as confining units (aquitards). The bedrock aquifer system consists of the carbonate rock (e.g., limestone and dolomite) comprising the Traverse and Detroit River Formations and the underlying Salina Group (Fleming 1994:50, plates 6, 10). Groundwater within the system generally occurs under confined conditions and moves primarily along fractures and karst features such as solution cavities. Yields from large-diameter wells tapping the bedrock aquifer system typically range from 75 to 250 gal/min (280 to 950 l/min) (Fleming 1994:91).

Groundwater residing within the bedrock aquifer system is recharged principally by precipitation to the south of Allen County where the bedrock lies near the surface. Local recharge within the county is believed to be minimal and limited to some leakage through overlying till-confining units. The direction of groundwater flow is to the north across Allen County. The Maumee River basin serves as a discharge area for groundwater within the bedrock aquifer system (Fleming 1994:47, 50, 51, plate 7). Depth to the water table at the New Haven Depot ranges from 50 to 70 ft (15 to 21 m) below ground surface (USACE 2000a:3-7).

The New Haven Depot obtains its water supply from two onsite wells. The primary supply well, completed in 1992, was drilled to a depth of 396 ft (121 m) below-ground surface. Upon completion, a water depth of 29.5 ft (9.0 m) was recorded (USACE 2000a:2-2, 3-7). This water level and the associated well depth are indicative of a well under confined conditions tapping the bedrock aquifer system. Surrounding farms and small businesses also use groundwater supply wells for potable water. Based on U.S. census data, there are 1,141 private wells within 4 mi (6.4 km) of the depot (USACE 2000a:3-8). A plot of water wells shows a number of supply wells developed in both bedrock and surficial materials immediately to the north of the depot, with bedrock wells predominately to the south of the depot (Bleuer and Moore 1978:36). All aquifers in the region would be considered Class II aquifers (current or potential sources of drinking water or other beneficial use). There are no designated Class I sole-source aquifers in the area (EPA 2001c). Water supply and use are further discussed in Section 3.2.10.

Groundwater obtained from both the surficial and bedrock aquifer systems across the Southern Lake Plain is hard to very hard. Total dissolved solid concentrations generally exceed the Federal drinking water secondary maximum contamination level of 500 mg/l. Sulfate and iron concentrations often exceed applicable drinking water standards (IDNR 1996a:150–155, 161, 162; 1996b:6, 7). Hydrogen sulfide gas is locally present in groundwater from the bedrock aquifer system and imparts an objectionable odor to the water (Fleming 1994:91). Strontium, a metal for which no drinking water standard has been established, occurs in relatively high concentrations (IDNR 1996a:158–160).

Sampling conducted in 1990 and 1993 revealed no detectable concentrations of pesticides, radionuclides, or volatile organic compounds in depot water supply wells. Samples collected in 1997 revealed unsatisfactory levels of total coliform bacteria in a sample from the backup well (USACE 2000a:2-6). The limited sampling does not indicate any impacts on the bedrock aquifer underlying the site (USACE 2000a: 2-6, 3-7). As a regulated, transient, non-community water system, the depot continues to regularly monitor its water supply in accordance with the National Primary Drinking Water Regulations (40 CFR 141) and State of Indiana regulations (A.D. Little 2000:6, 9; IDEM 2002).

Soil sampling conducted as part of the 1999 site investigation included an evaluation of the potential for migration of contaminants to groundwater at the depot. The results suggest that a downward migration potential exists for chromium (USACE 2000a:3-9, 3-10, 4-1). As stated in Section 3.2.5, the final site investigation report recommended further site characterization work to determine the extent of groundwater and other media contamination, with this work planned for fiscal year 2003/2004 (Lynch 2002a).

3.2.7 Ecological Resources

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

3.2.7.1 Nonsensitive Habitats and Species

Principal tree species for the area surrounding the New Haven Depot include oak and hickory species, several species of ash, and red maple. Several ornamental trees (i.e., cottonwood and maples) are located throughout the site and are among the small patch of woodlands located near the pond-like areas on the eastern side of the site. The woodland area is approximately 200 ft (61 m) long and is 100 to 125 ft (30 to 38 m) wide. The trees are pioneer species—light seeded species that typically grow on previously disturbed areas and are common to the surrounding area (Cash 1998a:9).

In 1995, native wildflowers, including the compass plant and rattlesnake master plant were planted on the northern side of the main office in an area measuring approximately 250 ft (76 m) long and 30 ft (9.1 m) wide. The purpose of vegetating the area with native wildflowers is to help eliminate noxious weeds and restore native plants to the site. At the same time, prairie grasses, including Indian grass, bluestem, side oats grama, switch grass, along with 42 forbs were used to establish prairie areas at the northwest and southwest sections of the site, although the southwest portion failed to germinate. Therefore, the New Haven Depot predominately consists of mowed lawn, gravel, paved areas, and planted wildflowers and prairie grasses (Cash 1998a:10, 11).

There are three manmade ponds near the eastern perimeter of the depot. The ponds could serve as amphibian breeding grounds in those years when water is present from late winter to early summer. These amphibians provide a temporary food source to opportunistic feeders such as blue heron (Cash 1998a:7, 8).

As a result of the restored prairie area and intermittent water sources, many common wildlife species such as blue heron, ducks, groundhogs, hawks, kestrels, killdeer, red fox, skunks, snapping turtles, various songbirds, and other wildlife are frequently observed on site. It is important to note that the wildlife community associated with the prairie area may change over time by attracting new varieties of small animals like rabbits and game birds, but large animals, such as deer, will be kept out by the depot's fence. The remainder of the site does not contain suitable habitat for wildlife (Cash 1998a:8, 9).

3.2.7.2 Sensitive Habitats and Species

The U.S. Department of the Interior, Fish and Wildlife Service identified wetland areas adjacent to and on site of the New Haven Depot. A number of small wetland areas (approximately 14) were identified in the eastern portion of the site. With the exception of one small pond, they are classified as PUBFx, palustrine or marsh system (P) with an unconsolidated bottom (UB), semi-permanently flooded (F), and formed by excavation (x). The pond is classified as PEMCx, where EM stands for emergent vegetation and C for seasonally flooded. To the east of the site, Ashley Lake and an immediate adjacent area are classified as PUBGx wetlands, where G stands for intermittently exposed. The Lomont Ditch and Gar Creek are classified as R2UBHx, designating a lower perennial riverine or stream habitat (R2), with an unconsolidated bottom, permanently flooded (H), and formed by excavation. Three small scattered wetlands were also identified in the far western portion of the site and were classified as PUBFx and PEMCx. A larger wetland is located in a wooded area to the west of the site. It was classified as palustrine, wetlands that are forested with broad-leaved deciduous trees (FO1), and temporarily flooded (A), or PFO1A (USACE 2000b:3-11, 3-12). However, no endangered, threatened, or rare species have been reported to be either located on site or in the vicinity of the depot, neither is there suitable habitat to support such species (Cash 1998a:12; Hellmich 2001).

3.2.8 Cultural Resources

The New Haven Depot is a heavily built-up landscape that experienced intensive preparation for its mission to process troop supplies during World War II, and later, to stockpile strategic materials. A pedestrian survey was completed for the entire depot in 1997 and all exposed soils were inspected for cultural resources. No historic or prehistoric archaeological sites were discovered (DeLeon and Whetsell 1999a:17).

The architectural survey conducted during the cultural resources assessment found no structures, buildings, or objects that appear eligible for listing, pending State Historic Preservation Officer (SHPO) concurrence, on the National Register of Historic Places (NRHP). The depot is not eligible as a historic district because fragmentation of the property precludes its historic district eligibility. The existing buildings were not found to be unique or exceptionally significant examples of World War II building design or use (DeLeon and Whetsell 1999a:18, 19).

An offsite survey conducted in 1991 identified 22 structures that fall within a 1-mi (1.6-km) radius of the depot and meet the minimum age requirement for consideration to the NRHP. To date, no determination of NRHP eligibility has been made for these structures (DeLeon and Whetsell 1999a:5).

Historic American Indian tribes occupied, and inspired the state's name—Indiana, the land of the Indians. However, the United States acquired Native American land through treaties and by the 1840s most of the Native Americans had been forcibly removed (IHB 2000). At the time of the 2000 census, there were 11,012 Native Americans residing in Indiana, of whom 858 were residing in Allen County (DOC 2001e, 2001f). While there are currently no federally recognized tribes in Indiana, three are pending such a distinction with the closest, the Indiana Miami Council, residing in the adjacent county of Huntington (AIHF 2000).

3.2.9 Land Use and Visual Resources

3.2.9.1 Land Use

Land use at the New Haven Depot is predominantly light industrial. Six warehouses are present on the site, one of which (Building T–210) is currently operated by the General Services Administration and is not considered part of the depot. Various other smaller structures are located throughout the depot, including two pumping stations, two pump houses, an office building, a guardhouse, and a maintenance building. South of the warehouses, within the central and eastern portions of the depot, are a number of storage areas. Other storage areas are located along the rail spur lines in the western portion of the depot (Cash 1998a:2; USACE 2000a:2-1, 2-2).

Land use surrounding the area is predominantly agricultural. There are seven farmsteads located south of the depot, immediately opposite Dawkins Road. The closest farmstead is approximately 250 ft (76 m) south of the south property fence. A small industrial park is situated immediately adjacent to the north central portion of the depot, south of Edgerton Road. A park, a model airplane flying field, and an antique railroad club occupy the land immediately to the east of the depot. A small recreational lake used for sport fishing is also located in the area east of the depot (USACE 2000a:2-3).

DNSC currently anticipates turning over the New Haven Depot to the General Services Administration landlord by 2019 (Lynch 2002b). However, formal plans for the potential closure, disposal, or reuse of the facility have not been developed (Caswell 2001).

3.2.9.2 Visual Resources

The developed areas of the New Haven Depot are consistent with the Bureau of Land Management's (BLM's) Visual Resource Management (VRM) Class III or IV. Class III includes areas in which there have been moderate changes in the landscape that could attract attention, but do not dominate the view of the casual observer. Class IV includes areas in which major modifications to the character of the landscape have occurred. These changes may be dominant features of the view and the major focus of viewer attention (DOI 1986:app. 2). The tallest structure located at the depot is a 160-ft (49-m) water tower (DNSC 2001b:3). The viewshed around the New Haven Depot mainly consists of rural land that is used for farming, residences, and light industry. It is generally consistent with VRM Class II (where visible changes to the character of the landscape are low and do not attract the attention of the casual observer) and Class III (DiMarzio 2000a).

3.2.10 Infrastructure

Site infrastructure includes those utilities and other resources (see Table 3.2–1) required to support modification and continued operation of mission-related facilities identified under the various proposed alternatives.

Table 3.2–1. New Haven Depot-Wide Infrastructure Characteristics

Resource	Current Usage	Site Capacity
Transportation		
Roads (mi)	3.0	3.0
Railroads (mi)	7.0	7.0
Electricity		
Energy consumption (MWh/yr)	1,368	3,500
Fuel		
Natural gas (ft^3/yr)	0	0
Oil (gal/yr)	8,000	8,900[a]
Coal (ton/yr)	0	0
Gasoline (gal/yr)	2,500	1,900[b]
Water (gal/yr)	36,500	42,000,000[c]

[a] Includes the capacity of five underground storage tanks.
[b] Includes the capacity of one refillable, underground storage tank.
[c] Assumes 80 gallons per minute total flow from onsite wells.
Source: Bourn 2002; DLA 1999; Lynch 2001a; Olszewski 2002.

3.2.10.1 Transportation

The New Haven Depot is located in a rural area just east of the city of New Haven. The depot is bordered by Dawkins Road on the south. U.S. Route 24 is approximately 2 mi (3.2 km) to the north, U.S. Route 30 is approximately 2 mi (3.2 km) to the south, and the recently constructed I-469 bypass is approximately 2 mi (3.2 km) west of the depot. The major roadway access to this area is excellent. The area is also served by a mainline rail of Norfolk Southern (Royce 2001).

3.2.10.2 Electricity

Electricity is purchased from the American Electric Power Company and is transmitted to the site aboveground. The depot is responsible for repairs to electric lines within its fence line (Brooks 2000).

3.2.10.3 Fuel

Fuel oil is provided by various contractors and is used for equipment operation. Gasoline is also stored on site in one underground storage tank and is used to operate site equipment, such as forklifts, etc. These tanks are refilled throughout the year depending upon demand (Brooks 2000). A small number of forklifts use propane, but the total amount of propane used is small and there is no bulk storage on site (Bourn 2002).

3.2.10.4 Water

Two water wells are currently located on site and are used to supply potable water and standby water for fire fighting. One well, drilled in 1992, is used as the primary source. The second well, dating back to 1942, is used only as a secondary source (USACE 1999a).

3.2.10.5 Site Safety Services

Security for the facility is provided by a private security firm. An armed security guard is present at the depot 24 hours a day, and regular patrols are made of the property. Security fencing surrounds the depot. Access is only through one gate, which is a controlled-access point (DLA 1999; USACE 2000a:2-2). Persons seeking entry to the depot must present valid identification and be properly badged (DLA 1999).

Access to the mercury storage warehouse is under strict control. Entry to the warehouse is through either a personnel or roll-up door, both of which are padlocked when the warehouse is unoccupied. Security tags are also attached to the doors to ensure that unauthorized access to the warehouse has not been attempted (DLA 1999). In addition, an entrance log is maintained.

Facilities and materials stored at the depot are inspected weekly and after incidents of severe weather. Results of the inspections and the resolutions of problems are recorded on site inspection reports, which are readily available to local, state, and Federal authorities. The New Haven volunteer fire department is located approximately 5 mi (8 km) from the depot and would be the primary responder to any incident—fire, hazardous spill, and accident—at the depot (Olszewski 2002). There is a mutual aid agreement with the full-time Fort Wayne, Indiana, fire department and emergency medical technicians to provide in-depth emergency response. The Allen County Emergency Management Agency, located in Fort Wayne, is the lead agency in the event of an emergency incident at the depot. The Indiana Emergency Response Commission would also be notified.

3.2.11 Environmental Justice

Under Executive Order 12898 (59 FR 7629), DNSC is responsible for identifying and addressing disproportionately high and adverse impacts on minority or low-income populations. As discussed in Appendix G, Environmental Justice, minority persons are those who identify themselves as American Indian or Alaska Native, Asian, Black or African American, Hispanic or Latino (of any race), Native Hawaiian or Other Pacific Islander, or multiracial (CEQ 1997). Persons who report that their income is less than the Federal poverty threshold are designated as low-income persons.

Figure 3.2–2 shows populations residing in Allen County as reported in the 1990 census and the 2000 census (DOC 1992, 2001g). In this figure, lightly shaded bars show populations in 1990, while the darker bars show those in 2000. In the decade between 1990 and 2000, the percentage minority population in Allen County increased from approximately 13 percent to 18 percent. The 2000 census found that Blacks/African Americans and Hispanics/Latinos comprised slightly over 80 percent of the total minority population. Persons who declared that they are multiracial and not Hispanic comprised approximately 7 percent of the total minority population in Allen County. As discussed in Section 3.2.8, there are no American Indian Reservations in Allen County.

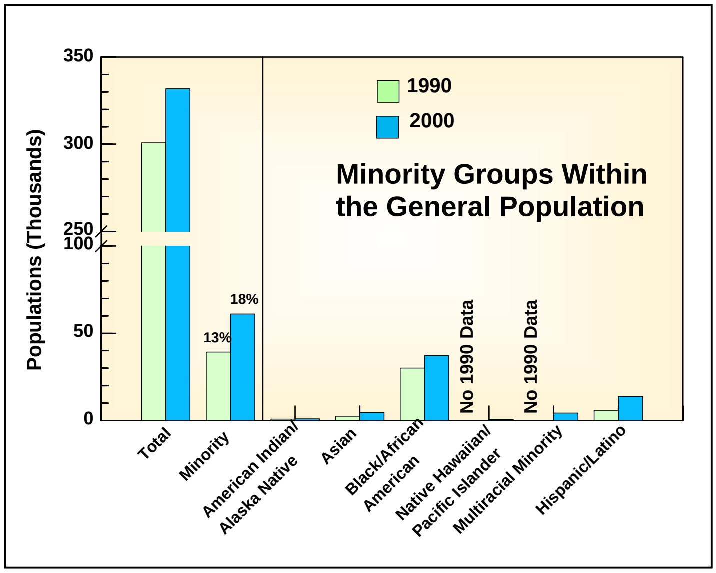


Figure 3.2–2. Populations Residing in Allen County, Indiana, in 1990 and 2000

The 2000 census was the first decennial census in which multiracial selections were counted. There is no data for this category available from the 1990 census. Also, during the 1990 census, Asian and Pacific Islander designations were placed together in a single category, whereas during the 2000 census, Native Hawaiians and Other Pacific Islanders were counted separately from Asian respondents. Therefore, direct comparison of 1990 census data and 2000 census data for these two categories is not possible.

The minority population residing in Allen County is reasonably representative of the State of Indiana as a whole. Minority residents of the State of Indiana comprised approximately 14 percent of the total resident population. Black or African American and Hispanic residents comprised approximately 84 percent of the total minority residents of the state. State residents who declared that they are multiracial and not Hispanic comprised approximately 7 percent of the total minority population.

Approximately 34,900 minority individuals and 14,700 low-income persons lived within 10 mi (16 km) of the New Haven Depot in 2000 (DOC 2001g, 2002a). The non-minority population residing in the same area in 2000 was approximately 149,000 persons. Figure 3.2–3 shows the cumulative percentage of these populations residing at a given distance from the New Haven Depot in 2000. For example, 50 percent of the non-minority population lived less than 8 mi (13 km) from the depot, while 50 percent of the minority population lived within 9 mi (14 km).

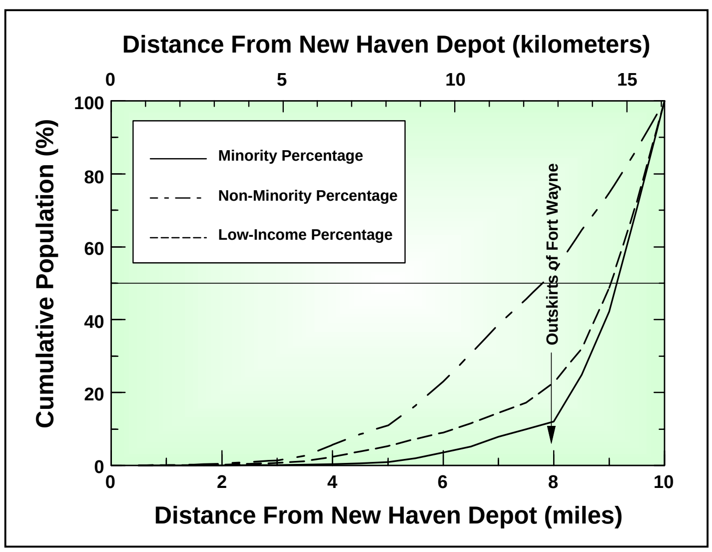


Figure 3.2–3. Percent Resident Populations Within 10 Miles of the New Haven Depot

3.3 SOMERVILLE DEPOT

The Somerville Depot is located in Somerset County, New Jersey. It consists of approximately 77 acres (31 ha) of land owned by the Federal Government (General Services Administration). The depot is located to the west of the 165-acre (67-ha) Veterans Administration site, and to the northeast of 113 acres (46 ha) occupied by the U.S. Postal Service, Somerset County, and Hillsborough Township (USACE 2000c:3-1, 3-4). The entrance to the depot is through the Veterans Administration property on the western side of Route 206 (USACE 2000c:3-1). The depot is bordered to the north by the Duke Estate, approximately 3,000 acres (1,200 ha) of undeveloped woodland, and a firing range that was once part of the depot. Land bordering the west and south supports a combination of residential and commercial development. A park and recreational area is present southeast of the depot (USACE 2000c:3-4).

Figure 2–3 shows the layout of warehouses at the depot and its relationship to its surroundings. Warehouse storage at the Somerville Depot consists of four ground-level concrete buildings. Each warehouse is 200,000 ft^2 (18,581m^2). The warehouses have concrete floors, solid block wall construction, ceiling air vents, and dry-pipe (water supply) fire suppression systems. Although the buildings are vented, there are no floor drains through which leaked or spilled materials could escape (USACE 1998).

There are 2,887 tons (2,619 metric tons) of mercury stored in 75,980 76-lb (34-kg) low carbon steel flasks at the Somerville Depot. The flasks, which are from several different sources and are not all of the same construction, are stored in 30-gal (114-l) low carbon steel drums, six flasks to a drum. The drums are stored in containment pans on wooden pallets, five drums to a pallet, with pallets singly stacked.

3.3.1 Meteorology, Air Quality, and Noise

3.3.1.1 Meteorology

Based on data and climate information for Newark International Airport, the climate of the Somerville area is influenced by ridges to the west and the Atlantic Ocean. The average annual rainfall, 44 in (112 cm), is fairly well distributed over the year. The average annual snowfall is 27 in (69 cm); however, the maximum snowfall depth, 25 in (64 cm), occurred in 1961. Frequency and duration of snow cover is somewhat greater west of Newark (NCDC 2001b).

Three tornadoes were reported in Somerset County between January 1950 and December 2000. Several occurrences of high winds usually associated with thunderstorm activity typically occur every year (NCDC 2001c). The mean number of days per year with thunderstorm activity is 26.2 (NCDC 2001b). The mean number of days per year with one or more tornadoes within 25 mi (40 km) of the depot is 0.8 (NSSL 2002). The average annual wind speed is 10.2 mph (4.6 m/s) (NCDC 2001b). The maximum recorded wind speed (based on the minimum for 1 mile of wind to pass) is 82 mph (37 m/s) (NOAA 2000).

The average annual temperature is 54.8 °F (12.7 °C), the minimum recorded temperature is -8 °F (-22 °C), and the maximum recorded temperature is 105 °F (40 °C). The highest monthly average maximum temperature is 87 °F (30.5 °C) in July. The lowest monthly average minimum temperature is 23.4 °F (-4.8 °C) in January (NCDC 2001b).

3.3.1.2 Air Quality

The Somerville Depot is located in an area of Somerset County that is designated as better than national standards for sulfur dioxide and better than national standards or unclassifiable for nitrogen oxide. The area is in attainment for carbon monoxide. Under the EPA's rule change, which reinstated the 1-hr ozone standard, the area is in severe nonattainment for ozone (EPA 2000a). EPA has not assigned attainment status designation for lead or PM_{10} (EPA 2000c).

The nearest PSD Class I area is Brigantine National Wilderness Area, which is more than 80 mi (129 km) south. A Class I area is one in which very little increase in pollution is allowed due to the pristine nature of the area. Somerville Depot and its vicinity are classified as a Class II area in which more moderate increases in pollution are allowed. No PSD permits are required for any emission source at the Somerville Depot (DNSC 2001b). PSD permits are those required for major new sources or modifications subject to the PSD regulations.

The primary sources of criteria pollutants at the Somerville Depot are two natural gas heating units, one oil fired heating unit, and material handling equipment (i.e., front-end loaders, trucks, a grader, forklifts, and tractors). There are no active air emissions sources at the Somerville Depot that are required to be permitted under the Federal Clean Air Act or companion State of New Jersey regulations (DNSC 2001c).

The closest offsite monitors are operated by the State of New Jersey in Morris County. In 2000, these monitors reported a maximum 8-hr average carbon monoxide concentration of 3,800 $\mu g/m^3$ and a maximum 1-hr average concentration of 11,400 $\mu g/m^3$. Annual, 24-hr, and 3-hr average sulfur dioxide maximum concentrations of 7.9 $\mu g/m^3$, 47.2 $\mu g/m^3$, and 121 $\mu g/m^3$, respectively, were also reported in 2000. A 1-hr average ozone concentration of 231 $\mu g/m^3$ was reported (EPA 2001d). Monitored concentrations in the region were well below ambient standards. There are no nearby monitors for mercury.

Mercury vapor concentrations are routinely measured inside the warehouse during periodic inspections (see Section 3.3.4.2). Ambient air monitoring for mercury outside the warehouse is not routinely performed.

3.3.1.3 Noise

Major noise emission sources within the Somerville Depot include various equipment and machines—heating, ventilation, and air conditioning equipment, materials-handling equipment (i.e., forklifts and loaders), and vehicles. Most noise sources are limited to daytime during normal working hours. Levels of activity at the depot are low and noise levels produced are expected to be compatible with the adjoining industrial, commercial, residential, and recreational uses. The nearest noise sensitive receptor is a residence west of the depot on Roycefield Road, approximately 250 ft (76 m) from the property fence. No noise complaints have been received from the public in the last 5 years (DNSC 2001c).

Somerset County and the Township of Hillsborough have not established community noise standards that specify acceptable noise levels applicable to the depot (Borngesser 2001). The State of New Jersey limits noise from industrial, commercial, and public service or community service facilities at residential properties and at other commercial properties as shown in Table 3.3–1 (New Jersey 1995).

Table 3.3–1. New Jersey Maximum Allowable Noise Levels from Industrial and Commercial Activities

	At Residential Property		At Commercial Property
	7 a.m.–10 p.m.	**10 p.m.–7 a.m.**	
A-weighted	65	50	65
Octave Band			
31.5	96	86	96
63	82	71	82
125	74	61	74
250	67	53	67
500	63	48	63
1000	60	45	60
2000	57	42	57
4000	55	40	55
8000	53	38	53

Note: Impulsive sound is limited to 80 dBA.
Source: New Jersey 1995.

Sound-level measurements have not been recorded near the depot. However, it is expected that the acoustic environment near the site boundary ranges from that typical of rural to industrial locations. Traffic is the primary source of noise at the site boundary and at residences located near roads. The traffic generated by the depot, including employee vehicles (16 employees in 2001) and trucks used for shipping, has little effect on traffic on nearby roads and the associated traffic noise. Access to the Somerville Depot is primarily by U.S. Route 206 for which average daily traffic flow (vehicles per day) is 27,690 (NJDOT 2001). Railroad activity related to the depot (i.e., delivery or removal of railcars) is occasional and would result in short-term increases in sound levels near the depot. The Somerset County firing range to the north of the depot may also be a source of noise (USACE 1998).

3.3.2 Waste Management

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

The Somerville Depot generates and manages sanitary, nonhazardous, and hazardous wastes. The facility is a small quantity generator of hazardous waste, as defined under RCRA at 40 CFR 260.1. This means that less than 2,205 lb (1,000 kg) of hazardous waste or 2.2 lb (1 kg) of acutely hazardous waste are generated each month by activities at the site (USACE 2000c:3-5).

RCRA-regulated wastes generated at the Somerville Depot include used oil, paints, solvents, and fluorescent light bulbs from facility and vehicle maintenance and operation (A.D. Little 2000; USACE 2000c:3–5). Approximately 110 gal (416 l) of used oil and 100 to 200 gal (380 to 760 l) of hazardous waste are generated annually (DLA 2001; Lynch 2001b). Assuming a density of 20 lbs/ft^3 (2.7 lbs/gal), 100 to 200 gal (379 to 757 1) of hazardous waste equals 270 to 540 lbs (122 to 245 kg). Used oil and hazardous wastes are accumulated until removed by a commercial hazardous waste management contractor for offsite recycling, treatment, or disposal, as appropriate to each waste type (DLA 2001).

Approximately 150 yd^3 (115 m^3) of nonhazardous solid waste are disposed of off site annually (Farley 2002a). Nonhazardous solid waste consisting of typical office trash and maintenance wastes are collected by a commercial refuse company and disposed of off site at a Bridgewater Resources Incorporated landfill (DLA 2001). Sanitary wastewater is collected by a septic system that flows to a leach field on adjacent Somerset County property. Approximately 72,700 gal (275,199 l) of sanitary wastewater are estimated to be discharged to the leach field annually**.**

3.3.3 Socioeconomics

The Somerville Depot is located in Somerset County, New Jersey. Therefore, all statistics for the local economy, population, housing, and community services as defined in Appendix E, will be presented for Somerset County. In 2001, the Somerville Depot employed 17 persons (about 0.01 percent of the county's 2000 civilian labor force) (DOL 2001; Guida 2001).

3.3.3.1 Regional Economic Characteristics

From 1990 to 2000, the estimated civilian labor force in Somerset County increased by 24.8 percent to 173,243 persons. In 2000, the estimated unemployment rate for the county was 2.1 percent, which was less than the 2000 unemployment rate for New Jersey (3.8 percent) (DOL 2001).

3.3.3.2 Population and Housing

In 2000, the estimated population of Somerset County totaled 297,490. From 1990 to 2000, the county's population grew by 23.8 percent, compared with the 8.9 percent growth in New Jersey (DOC 2001a, 2001b, 2001c). The percentage of the county's population under the age of 5 is 7.5 percent with women age 18 to 40 comprising 20.1 percent (DOC 2001d). In 2000, there were 112,023 housing units in the county, of which 75.1 percent were owner occupied; 22.2 percent, renter occupied; and 2.7 percent, vacant (DOC 2001a).

3.3.3.3 Community Services

3.3.3.3.1 Education

In 1999, student enrollment in Somerset County was 44,279, and in 1998, there were 3,950 teachers, for an average student-to-teacher ratio of 11.2:1 (NJDOL 2001; Somerset County Planning Board 2001).

3.3.3.3.2 Public Safety

In 1998, 450 sworn police officers served Somerset County, with a ratio of 1.56 officers per 1,000 persons (NJDOL 2001). If a mercury incident should occur at the Somerville Depot, the Hillsborough Office of Environmental Management and the Hillsborough Volunteer Fire Department would respond (Guida 2001). There is a mutual aid agreement with the Hillsborough Board of Fire Commissioners to provide fire protection. In 2002, 1,474 firefighters provided fire protection services in the county (Nemeth 2002c). The average ratio was 20.2 firefighters per 1,000 persons.

3.3.3.3.3 Health Care

In 1998, 350 physicians served Somerset County, with an average ratio of 1.21 physicians per 1,000 persons (NJDOL 2001). In 2000, there was one hospital in the county, with a total of 355 hospital beds (Medical-Net 2001).

3.3.4 Human Health Risk

3.3.4.1 Health Effects Studies

According to the Hillsborough Township Board of Health, the Somerville Depot manager, and the DNSC environmental manager, no known studies on the health effects of mercury have been conducted in the vicinity of the Somerville Depot. However, the DNSC Somerville Depot workers' health has been monitored for over 15 years through a medical surveillance program conducted by the U.S. Public Health Service. The surveillance program includes periodic physical examinations and an occupational exposure history. For a period of 1 year, biological monitoring was conducted for mercury levels in all stockpile employees; however, no elevations in mercury were detected. Currently, biological monitoring is only performed in cases of reported exposure. As of 2001, no adverse health effects from mercury exposure in any Somerville Depot worker have been documented by the U.S. Public Health Service (Holland 2001).

3.3.4.2 Accident History

Prior to February 2002, the mercury was stored in flasks on wooden pallets with metal drip pans underneath. There are no records to indicate that a flask has leaked in the storage area at Somerville; however, spills have occurred at other sites where the flasks were previously stored prior to being shipped to Somerville. Because mercury droplets were found on pallets and flasks, it is suspected that the flasks and pallets were not thoroughly cleaned from spills at other sites. Therefore, the mercury droplets were unintentionally brought on site when the flasks were brought to Somerville for storage. As a method of ensuring safe storage of mercury and to prevent any potential source of accidental mercury releases to the environment, the mercury storage flasks were packed into lined, 30-gal (114-l) steel drums (overpacks). This was completed in February 2002. No defective flasks were found during overpacking (Surface 2002).

The warehouse is monitored periodically for mercury vapors. In addition, monitoring was performed before overpacking of the flasks with a new high sensitivity mercury vapor analyzer. This monitoring showed an average mercury air concentration in the storage area of about 2,700 ng/m^3, with a maximum of 17,000 ng/m^3; the background concentration was reported to be 10 ng/m^3. These concentrations can be compared to the Occupational Safety and Health Administration's limit of 50,000 ng/m^3 for 8-hr shifts in a 40-hr workweek.

There have been no accidents at the Somerville Depot during mercury handling activities that have resulted in exposures to facility workers or releases outside the building.

3.3.4.3 Emergency Preparedness

The Somerville Depot has established an onsite emergency response action for their trained onsite response organization to follow in the event of an accident or release. The depot manager is responsible for designating and training onsite responders, establishing initial response procedures and conducting remediation actions, and for summoning outside aid from local fire and response departments or organizations to support emergency response, including medical assistance as necessary.

In the event of any visible mercury, the Somerville Distribution Facilities Manager is notified and directs trained response personnel using long-standing mercury recovery procedures to mitigate the hazard and restore a safe condition. Notification of mercury leaks is also made to the local emergency planning commission in Somerville, New Jersey, and to the New Jersey Bureau of Chemical Release Information and Prevention in Trenton, New Jersey. If the mercury release threatens to overwhelm the onsite response team, or if personnel are injured and require medical assistance, the Hillsborough Township fire department is called for assistance and will respond within 4 to 8 minutes (Nemeth 2002c). However, in over 50 years of mercury management experience, there has been no need for assistance.

Following any mercury leak, the affected site and surrounding areas would be surveyed for potential mercury contamination and remedial actions, including excavation and hazardous waste disposal. These efforts would be coordinated by the Distribution Facilities manager. Commercial contractors would be used to support recovery and remediation if mercury enters the soil or waters near the site as a result of a release. State and/or regional officials from the EPA would monitor activities to ensure that public health and safety are protected.

3.3.5 Geology and Soils

The Somerville Depot lies within the New Jersey lowland portion of the Piedmont Physiographic Province (USDA 1989:111, 112; Trapp and Horn 1997:L2). Site topography is generally flat to gently undulating with a maximum elevation of approximately 100 ft (30 m) above mean sea level near the northwestern corner of the depot boundary and a minimum elevation of about 90 ft (27 m) above mean sea level in the south-central portion of the site (USGS 1981, 1995).

In the vicinity of the Somerville Depot, surficial geologic materials are mapped as weathered shale and mudstone deposits, consisting of a mixture of angular chips of red shale in reddish brown, red, and reddish-yellow silty clay to clayey silt. This unit ranges in thickness from less than 3 ft (0.9 m) to more than 10 ft (3 m) on older erosional surfaces (Stanford 1992). Rocks of the Passaic Formation (Brunswick Group or Brunswick Shale) form the bedrock surface beneath the depot (NJGS 1999; USACE 2000c:4-20). It is one of the three principal units deposited in the Newark Basin rift feature (Trapp and Horn 1997:L16). Together, these three stratigraphic units constitute the Newark Supergroup. The Passaic Formation locally consists of non-marine, fine-grained, thin-bedded, clayey red shale with siltstone beds of black, gray, greenish, or bluish shales (USACE 2000c:4-20). The Passaic Formation also includes sandstone and conglomerate and in some areas is locally intruded by diabase or basalt interbeds (NJGS 1999; Trapp and Horn 1997:L16). The rocks of the Passaic Formation generally strike northeast southwest and dip toward the northwest in the general direction of a large fault zone (USACE 2000c:4-20, 4-21). Deep drill cores completed in Somerset County reveal that the Passaic Formation attains a thickness of as much as 3,000 ft (914 m) (NBCP 2001).

Somerset County's principal mineral products consist of clay and crushed stone (USGS 1999b). Alluvial deposits that are comprised of silt, sand, clay, and pebble to cobble-size gravel are mapped in association with the Raritan River north of the depot and in association with Dukes and Royce Brooks. These are suitable for aggregate production. Several quarries are located along the main stem of Royce Brook, approximately 1.5 mi (2.4 km) southeast of the depot (Stanford 1992).

The most notable geologic fault in the state is the Ramapo fault of north-central New Jersey that is actually a segment of a system of northeast-striking faults that extend into southeastern New York State (Crone and Wheeler 2000:260; Dombroski 1998:5). However, review by the USGS has found no evidence of fault slippage within this system during the Quaternary; thus, it is not considered active. The closest currently active faults have been inferred to be associated with the Newbury fault system located approximately 250 mi (402 km) away in northeastern Massachusetts (Crone and Wheeler 2000:4, 95, 260).

Earthquakes that have affected New Jersey include three that were located near New York City in 1737, 1783, and 1884. These events were reported to have produced maximum intensities of up to MMI VII in New Jersey. An earthquake located off Cape Ann, Massachusetts in 1755 produced MMIs of up to IV in

New Jersey. Several other significant earthquakes originating well outside the northeast region have been felt in New Jersey, including the Mississippi Valley or New Madrid earthquakes of 1811 and 1812 and the Charleston, South Carolina, earthquake of 1886. These events produced MMIs of up to V in New Jersey (see Section 3.5.5) (Dombroski 1998:6, 7). Within a radius of 100 mi (161 km) of the Somerville Depot, a total of 19 significant earthquakes (i.e., having a magnitude of at least 4.5 or a MMI of VI or larger) have been documented going back to the 1737 New York earthquake. The closest significant earthquake was in March 23, 1957, which was located about 9 mi (14 km) northwest of the depot (USGS 2001f). Equivalent to a MMI VI, this earthquake damage included cracked chimneys, broken windows and dishes, and pictures knocked from walls (USGS 2001g). A magnitude of 3.8 was calculated for this event based on the felt area (USGS 2001f).

Earthquake-produced ground motion is expressed in units of percent "g" (force of acceleration relative to that of the earth's gravity). Two differing measures of this motion are peak (ground) acceleration and response spectral acceleration (see Appendix E, Section E.6.1). New seismic hazard metrics and maps developed by the USGS have been adapted for use in the *International Building Code* and depict maximum considered earthquake ground motion of 0.2- and 1.0-second spectral acceleration, respectively, based on a 2 percent probability of exceedance in 50 years (ICC 2000; USGS 2001c). This corresponds to an annual probability of occurrence of about 1 in 2,500. Section E.6.1 provides a more detailed explanation of these maps. The Somerville Depot lies within the 0.38g to 0.39g mapping contours for a 0.2-second spectral response acceleration and the 0.08g to 0.09g contours for a 1.0-second spectral response acceleration. The calculated peak ground acceleration for the given probability of exceedance at the site is approximately 0.20g (USGS 2001d). Based on the maximum considered earthquake ground motions, the Somerville Depot is located in the broadly defined region of low and moderate to high seismicity. Ground motions in these regions are controlled by earthquake sources that are not well defined with estimated maximum earthquake magnitudes having relatively long return periods. Maximum considered earthquake ground motions encompass those that may cause significant structural damage to buildings, thus presenting safety concerns for occupants (equivalent to MMI VII and up). Specifically, maximum considered earthquake ground motions of about 0.50g at 0.2 seconds and 0.20g at 1.0 second are representative of MMI VII earthquake damage (BSSC 2001:381, 383, 387). Table E–11 in Appendix E shows the approximate correlation between MMI, earthquake magnitude, and peak ground acceleration.

There are no volcanic hazards at the Somerville Depot. The Piedmont Physiographic Province of New Jersey has not experienced volcanism for more than 200 million years (NBCP 2001).

Soils across the Somerville Depot and the adjacent Veterans Administration complex are mapped as urban land (USDA 1989). Such mapping units include areas where most of the natural soils have either been removed or buried to a depth of 1 to 5 ft (0.3 to 1.5 m) due to construction or covered by impervious surface. As a result, the soil materials of such areas have highly variable engineering properties. Areas mapped as urban land cannot be prime farmland (7 CFR 657.5(a)) nor are they subject to the Farmland Protection Policy Act (7 CFR 658). Approximately 10 percent of the area includes natural soils belonging to the Penn-Klinesville-Reaville association. Penn soils comprise 50 percent of this association and consist of moderately deep, well-drained silt loams and shaly silt loams. Soil permeability is moderate across most of the association and the depth to bedrock ranges from 18 to 30 in (46 to 76 cm). Some soils of the association develop a seasonal perched water table (USDA 1989:4, 5, 25, 40, 44, sheet 24).

A preliminary assessment was initiated in 1998 to assess the potential for hazardous substance releases to the environment as a result of depot operations (USACE 1998). As part of a subsequent site investigation, soil samples were collected from 14 potentially contaminated areas and from 4 locations representative of background conditions by hand auger. Soil samples were analyzed for 14 metals.

Samples from two locations (i.e., former incinerator and fueling area) were also analyzed for select semivolatile organics and total petroleum hydrocarbons, respectively. Soil sample concentrations were compared to both background soil concentrations and to the New Jersey Department of Environmental Protection soil cleanup criteria for non-residential and residential land use. In summary, one or more parameter concentrations exceeded both the maximum background concentration and one or both of the soil cleanup criteria in 15 of the 26 non-duplicate samples analyzed. Established criteria were exceeded in 1 sample for antimony, 11 samples for arsenic, 3 samples for barium, 1 sample for copper, 4 samples for lead, 1 sample for nickel, 4 samples for thallium, and in 1 sample for zinc. No elevated concentrations of mercury were detected in the soil samples (USACE 2000c:4-5, 4-7–4-13, 4-17, 4-26, 5-1). Subsequently, remedial investigation field studies were performed in 2001, including additional soil, sediment, surface water, and groundwater characterization. Results indicate the need for further sampling and analysis for six areas of concern to better define the lateral extent of metals impacts as well as impacts from semivolatile organics and petroleum hydrocarbons on site soils. This work is planned for fiscal year 2003 (Lynch 2002a; USACE 2002:2-1, 5-1–5-3).

3.3.6 Water Resources

3.3.6.1 Surface Water

The Raritan River and its major tributary, the Millstone River, are the major surface water features in the area of the Somerville Depot. At its closest point, the Raritan River flows easterly approximately 1.5 mi (2.4 km) northeast of the depot. The Millstone River then joins the Raritan River some 3.5 mi (5.6 km) east of the depot (USGS 1981, 1995). From its confluence with the Millstone River, the Raritan River continues to flow eastward into Raritan Bay on the Atlantic Ocean, more than 20 mi (32 km) downstream of the depot (USACE 2000c:4-26). The Raritan River has an annual average flow of 776 ft^3/s (22 m^3/s) as measured at Manville Brook and drains an upstream area of 490 mi^2 (1,270 km^2). The Millstone River has an annual average flow of 384 ft^3/s (11 m^3/s), as measured at Blackwells Mills, and drains an upstream area of 258 mi^2 (668 km^2) (USGS 2001h).

The depot is located on a surface water divide between two tributary drainage systems to the Millstone and Raritan Rivers. Surface water drainage from the depot is collected by a system of drainage ditches and storm drains. Site drainage, including storm water runoff from the northern portion of the depot is conveyed through two storm water outfalls (Outfalls 003 and 004) (see Figure 3.3–1). Outfall 003 collects runoff mainly from the northwestern portion of the depot and discharges directly to the north beneath Dukes Patrol Road and toward an unnamed tributary of Dukes Brook. Outfall 004 is the discharge point for a storm water pond located just beyond the northern corner of the depot property. This pond collects runoff from most of the central and eastern portions of the depot, including from the warehouse facilities and open storage areas. Overflow from the pond is conveyed through two culvert pipes beneath Dukes Patrol Road and north toward Dukes Brook. Dukes Brook passes approximately 0.5 mi (0.8 km) north of the depot boundary and flows downstream generally east to the Raritan River. The southern portion of the depot drains through storm water Outfalls 001 and 002 toward a tributary of Royce Brook (see Figure 3.3–1). Royce Brook discharges to the Millstone River at a point approximately 2 mi (3.2 km) east of the depot (USACE 1998:2-3, 2000c:3-3, 4-26, 4-28, C-11).

The nearest downstream surface water intake, located about 5 mi (8 km) from the depot on the Raritan River, is used by the Elizabethtown Water Company to supply drinking water (USACE 2000c:4-28). Potable water for the depot is obtained through this public utility (USACE 2000c:3-4). Water supply and use are further discussed in Section 3.3.10.

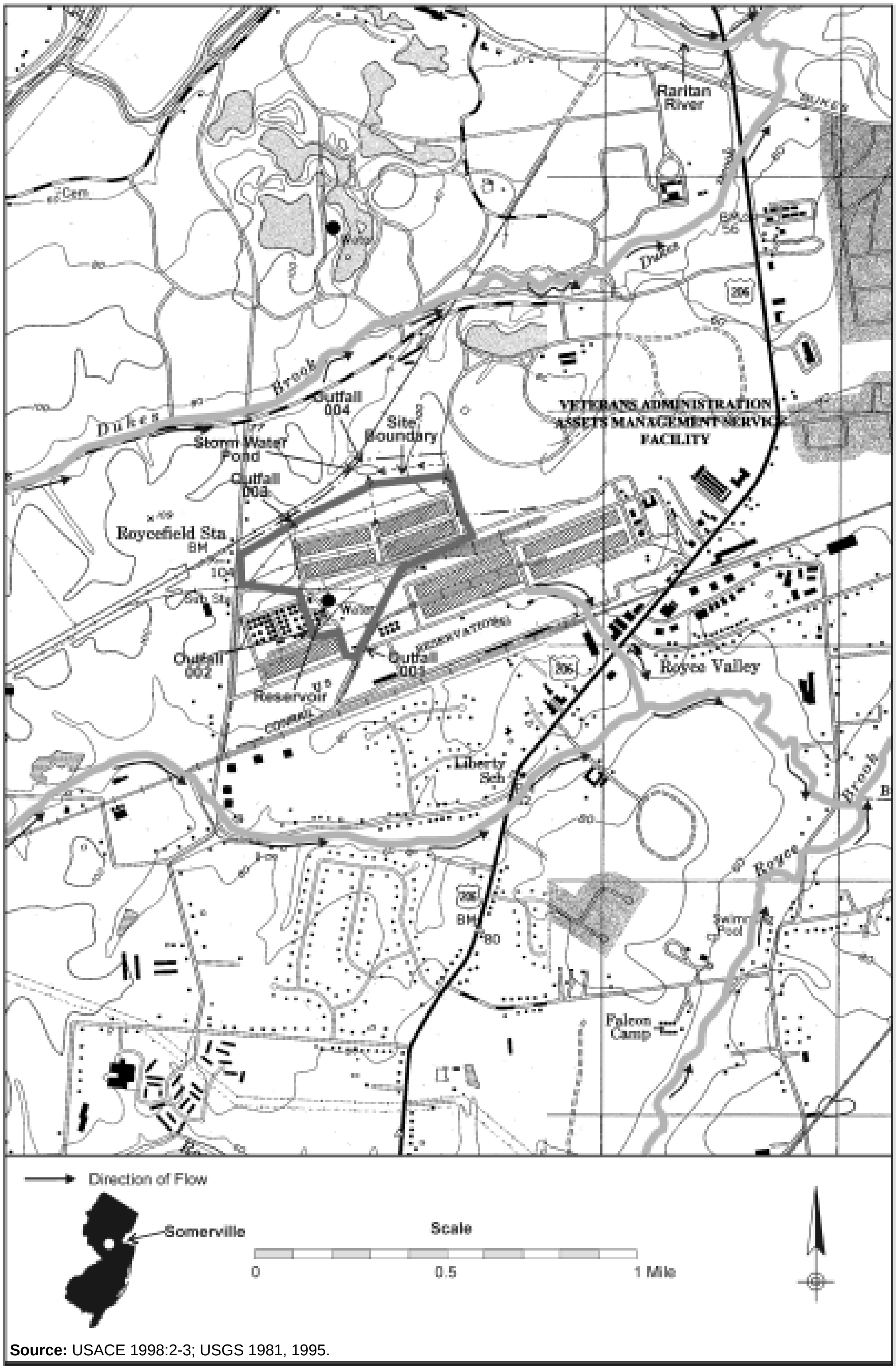


Figure 3.3–1. Surface Water Features at the Somerville Depot, New Jersey

The Somerville Depot is not within the mapped 100- or 500-year floodplains of either Dukes Brook, Royce Brook, or their tributaries. The closest delineated floodplain to the depot boundary is associated with Dukes Brook to the north of the site (see Figure 3.3–1) (FEMA 1981). There is no history of riverine or tidal flooding at the Somerville Depot (USACE 2000c:4-26).

New Jersey has designated specific uses and water quality criteria for all surface waters of the state. The main stem of the Raritan River near the Somerville Depot and its tributaries, including Dukes Brook, Royce Brook, and Millstone River have been classified use in the maintenance, migration, and propagation of the natural and established biota; primary and secondary contact recreation; industrial and agricultural water supply; public potable water supply after conventional filtration treatment; and for other reasonable uses (NJDEP 1998). The Raritan River, Millstone River, Dukes Brook, and Royce Brook are listed on the state's Clean Water Act Section 303(d) list as being impaired relative to attaining water quality standards and designated uses. Parameters of concern for the main stem of the Raritan River include ammonia, fecal coliform, pH, and total phosphorous. Identified concerns for the Millstone River include dissolved oxygen, fecal coliform, pH, select toxic/heavy metals, and total phosphorous, in addition to moderate biota impairment. Dukes and Royce Brooks are listed for moderate biota impairment (EPA 2001e).

Sanitary wastewater and storm water runoff are discharged as a result of current depot operations. Sanitary wastewater is discharged to a septic system located on the adjacent easement to Somerset County property. Wastewater management is further discussed in Section 3.3.2. Storm water runoff from the material storage areas is collected by storm drains that lead to one of the four storm water outfalls as described above (see Figure 3.3–1). These storm water discharges are subject to a NPDES permit (#NJ6470000500) issued by the New Jersey Department of Environmental Protection (USACE 2000c:3-5, 4-28). Inspections and compliance monitoring are conducted routinely in accordance with the permit and the depot's Storm Water Pollution Prevention Plan. Since 1997, compliance sampling at each of the outfalls has been performed at 6-month intervals (USACE 2000c:4-28).

As part of the 1999 site investigation previously discussed in Section 3.3.5, five surface water and sediment samples were collected from the depot's four storm water outfalls. Surface water results were compared to the State of New Jersey ambient water quality criteria (NJDEP 1998). Sediment results were compared to soil background sample results and state sediment quality guidance relating to impacts on aquatic life. At three outfall sampling locations (i.e., for outfalls 001, 003, and 004), concentrations of six metals—antimony, arsenic, copper, lead, nickel, and zinc—exceeded the severe aquatic effect levels established for sediments. No elevated concentrations of mercury were detected in the sediment samples. Surface water samples collected and analyzed about 6 weeks after sediment sampling revealed that the concentrations of antimony, arsenic, lead, and thallium exceeded the applicable water quality criterion at one or more locations; mercury was not analyzed (USACE 2000c:4-29–4-33, 5-8). As stated in Section 3.3.5, remedial investigation field studies were performed in 2001 to further characterize the extent of sediment, surface water, and other media contamination. The results indicated that depot operations have not impacted surface water quality off site either in Royce or Dukes Brooks although site activities have impacted drainage ditch sediments on site as well as offsite sediments between Outfall 004 and the storm water pond. Sediment quality in Dukes Brook may have been impacted as a result (USACE 2002:5-4, 5-5).

3.3.6.2 Groundwater

Groundwater generally occurs in the sedimentary rock aquifers of the Newark Basin and in the overlying till and glacial-lake deposits of the surficial aquifer system. The surficial materials near the Somerville Depot are generally thin and limited to alluvium deposited in lowlands, terrace deposits adjacent to stream valleys, and other unconsolidated materials, including weathered bedrock that lie on eroded surfaces (see Section 3.3.5). Thus, the sedimentary rock aquifers of the Newark Basin are the principal source of groundwater across the southern portions of north-central New Jersey (Trapp and Horn 1997:L6, L15, L16).

In general, groundwater within the Newark Basin sedimentary units occurs within a series of aquifers of the "tabular" form that alternate with confining units (aquitards). Groundwater movement within these water-bearing rocks occurs via joints, fractures, and along bedding planes. However, while the fractures and bedding planes within each individual aquifer can be considered continuous, interconnection between individual aquifers across confining units is poor. Yields from large-diameter wells in the Newark Basin range from 5 to 80 gal/min (19 to 303 l/min) depending on rock type. Yields of wells completed in shale and clayey shale, such as that comprising the Passaic Formation underlying the depot, are typically in the 12 gal/min (45 l/min) range (Trapp and Horn 1997:L17).

The aquifers of the Passaic Formation are some of the most extensive and important in New Jersey and underlie portions of 10 counties in the state, including Somerset County (USACE 2000c:4-21). Specifically, the depot lies near the delineated boundaries of the Millstone River and North Branch Raritan River basin aquifer systems that are part of the Fifteen Basin Aquifer Systems. As such, the groundwater within these systems is almost exclusively from precipitation falling over the basins with groundwater discharging in topographically low areas. This discharge occurs primarily to the major surface water drainages and tributaries occupying each drainage basin (EPA 2001f). The direction of groundwater flow beneath the Somerville Depot has not been precisely established as the depot is on a drainage divide between Dukes Brook and Royce Brook, which may both influence the direction of groundwater flow in the vicinity of the depot. Groundwater within the aquifers of the Passaic Formation is reported to be under both unconfined (water table) and confined conditions. Depth to groundwater beneath the depot has been inferred to range from about 150 to 250 ft (46 to 76 m) below ground surface in the vicinity of the depot (USACE 2000c:4-21, 4-24).

Groundwater is not directly used as a source of potable water at the Somerville Depot. Historically, four supply wells were used on the Veterans Administration complex. No completion records or other data are available for these wells. Five public-supply wells, used by the city of Manville, are positioned about 2.5 mi (4.0 km) northeast of the depot. These five wells range in depth from 206 to 340 ft (63 to 104 m). Available U.S. census data indicates the presence of 3,451 private wells within 4 mi (6.4 km) of the depot (USACE 2000c:3-4, 4-21–4-25). The three aquifer systems that together underlie most of Somerset County and the Somerville Depot, including the Millstone River, North Branch Raritan River, and South Branch Raritan basin aquifer systems, are part of the Fifteen Basin Aquifer Systems of northwest New Jersey, as previously discussed. The Fifteen Basin Aquifer Systems are designated as a Class I sole-source aquifer (EPA 2001f, 2001g). Groundwater quality in the basin aquifers is generally suitable for most purposes, although concentrations of iron, manganese, and sulfate may be high locally. The water is generally hard, and concentrations of particular ions (e.g., chloride, sulfate) generally increase with depth. The total dissolved solids concentration averages 230 mg/l (Trapp and Horn 1997:L18). Water supply and use are further discussed in Section 3.3.10.

As part of the 1999 site investigation (see Section 3.3.5), the potential for surface contamination to reach groundwater was evaluated by sampling subsurface soils and determining metals concentrations by depth. However, soils beneath the metal and ore stockpiles were found to be extremely dense and compacted, limiting soil sampling to a depth of about 1 to 2 ft (0.3 to 0.6 m). Metal concentrations in the subsurface samples that were collected were not found to be consistently lower than the surface sample concentrations. Although not definitive as to the potential for the downward migration of metals to groundwater, results obtained indicate the need for further investigation of the groundwater pathway at the site (USACE 2000c:4-22, 4-26). Remedial investigation field studies performed in 2001 included the installation of 10 pairs of shallow/deep monitoring well pairs, which were sampled in August 2001. Organic compounds, including carbon tetrachloride, trichloroethylene, and chloroform, were detected at concentrations exceeding New Jersey groundwater quality criteria in several onsite well pairs. Previously, residential well sampling was performed by the Hillsborough Township Department of Health, and funded by DNSC, in December 2000 which revealed the presence of volatile organic compounds exceeding drinking water standards in several offsite wells located west of the depot along Roycefield Road. Nevertheless, the remedial investigation concluded that the volatile organic compound concentrations are related to offsite groundwater contamination that has been known in the Somerville area for many years (USACE 2002:1-5, 1-6, 4-22–4-24). However, DNSC plans to perform a follow-up groundwater investigation in fiscal year 2003 (Lynch 2002a).

3.3.7 Ecological Resources

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

3.3.7.1 Nonsensitive Habitats and Species

The dominant forest types in the area surrounding the Somerville Depot include Appalachian oak, sugar maple-mixed hardwoods, hemlock-mixed hardwoods, and oak-chestnut. There are woodlands covering 2,700 acres (1,093 ha) north of the site. However, there are no woodlands within the perimeter of the depot, which consists of mowed lawn, gravel, and pavement (Cash 1998b:8).

The surrounding woodlands provide habitat for wildlife such as the gray fox, raccoons, squirrels, wild turkeys, various birds, and waterfowl that have been frequently observed at or passing through the site. However, within the perimeter of the site, no known suitable habitat exists to support permanent populations of animal species, despite incidental use by some wildlife (Cash 1998b:8).

A reservoir measuring 0.8 acre (0.3 ha) is located at the southwestern end of the depot and is surrounded by manicured lawn. The 2-million gal (7.6-million l) aboveground-level reservoir was constructed for onsite fire suppression; it does not support fish life and it does not function as a natural aquatic ecosystem (Cash 1998b:8).

3.3.7.2 Sensitive Habitats and Species

There are no wetland areas present at the Somerville Depot, but several wetland areas are located approximately 1,500 ft (457 m) from the site (Cash 1998b:8; USACE 2000c:3-4). As shown in Table 3.3–2, several state-listed species were identified as being within a 2-mi (3.2-km) radius of the depot. While potential habitat necessary to support threatened, endangered, or rare species exists on the Duke Estate north of the depot, such habitat does not exist within the perimeter fencing (Cash 1998b:8; USACE 2000c:3-4).

Table 3.3–2. Threatened and Endangered Species, Species of Concern, and Sensitive Species Occurring in the Vicinity of the Somerville Depot

Common Name	Scientific Name	State Status
Reptiles		
Wood turtle	*Clemmys insculpta*	T
Birds		
Bobolink	*Dolichonyx oryzivorus*	T
Grasshopper sparrow	*Ammodramus savannarum*	T
Savannah sparrow	*Passerculus sandwichensis*	T
Upland sandpiper	*Bartramia longicauda*	E

Key: E, endangered in New Jersey; T, threatened in New Jersey.
Source: Cash 1998b:8; NJDFW 2001.

3.3.8 Cultural Resources

No prehistoric or historic archaeological properties were identified through an archaeological survey at the Somerville Depot. The property for the depot was purchased in 1942 and used as a supply depot and a prisoner of war camp during World War II. In 1962, a portion of the original site was dedicated to manage supplies for all four branches of the armed services. Due to loss of site integrity through the removal of original buildings, structures, and materials, all buildings and structures located on the 104-acre (42-ha) site are determined as ineligible for listing on the NRHP (McLeod and Whetsell 1998:8, 12).

A pedestrian archaeological survey was conducted on approximately 3 to 5 acres (1.2 to 2.0 ha) of undisturbed land on the Somerville Depot; no archaeological material was found. Shovel testing was not warranted because the majority of the depot has been leveled, paved, or covered with buildings or aggregate material. Subsurface testing was not conducted at the facility due to extensive ground disturbance, shallow soil depth, and lack of natural features that normally attract prehistoric settlement. Although the absence of nearby water features lessens the likelihood of prehistoric settlement being present on the depot, the possibility of buried archaeological resources remains. If any historic or cultural artifacts are uncovered during the course of any management activities, all work activities would stop until a professional archaeologist could examine the artifacts in their original location (McLeod and Whetsell 1998:11, 12).

The Duke Estate, which is located directly north of the depot and includes the mansion and grounds, is eligible for listing on the NRHP and was identified as a historic site by the New Jersey SHPO and the New Jersey Department of Transportation. The integrity of the Duke Estate should, therefore, be considered and the New Jersey SHPO should be contacted when planning future activities within the depot's boundaries (McLeod and Whetsell 1998:7, 12, 13).

Central New Jersey was populated by a tribe of American Indians referred to as Raritan during the period of the first European contact in North America. As early as 1640, it is believed that nearly 90 percent of the Raritan people died of European-introduced diseases such as smallpox, malaria, measles, and the bubonic plague. The indigenous population was also decimated by several wars—the Govoner Kieft, Peach, and Esopus wars—fought from 1640 to 1666. By 1679, the Native American population in central New Jersey was reduced to only a small number living along the Millstone River and in European settlements (McLeod and Whetsell 1998:5). At the time of the 2000 census, there were 9,907 Native Americans residing in New Jersey; 229 resided in Somerset County (DOC 2001e, 2001f).

3.3.9 Land Use and Visual Resources

3.3.9.1 Land Use

Land use at the Somerville Depot is consistent with that of light industry. Facilities on site include four warehouses, a small vault, an administration building, maintenance building, decontamination trailer, pump house, scale house, switchgear house, and vault. Open storage areas cover approximately 455,000 ft^2 (42,271 m^2) of the depot (USACE 2000c:3-1, 3-4).

Land use beyond the perimeter fencing includes the Duke Estate to the north, a tract of 3,000 acres (1,214 ha) of largely undeveloped woodlands, and a firing range on land which was once part of the depot. A park and recreational area are present to the southeast. To the west, land use reflects a mixture of residences and commercial businesses. Land to the south is primarily residential, with some commercial businesses (Cash 1998b:2; USACE 2000c:3-4).

DNSC currently anticipates turning over the Somerville Depot to the GSA landlord by 2012 (Lynch 2002b). However, formal plans for the potential closure, disposal, or reuse of the facility have not been developed (Kayler 2001).

3.3.9.2 Visual Resources

The developed areas of the Somerville Depot are consistent with BLM's VRM Class III or IV. Class III includes areas in which there have been moderate changes in the landscape that could attract attention, but do not dominate the view of the casual observer. Class IV includes areas in which major modifications to the character of the landscape have occurred. These changes may be dominant features of the view and the major focus of viewer attention (DOI 1986:app. 2). The tallest structures located at the depot are six emptied storage tanks that reach a height of 68 ft (21 m) (DNSC 2001c:7). The viewshed around the Somerville Depot consists mainly of woodlands, residences, and light commercial areas and is generally consistent with VRM Class II (where visible changes to the character of the landscape are low and do not attract the attention of the casual observer) and Class III (DiMarzio 2000b).

3.3.10 Infrastructure

Site infrastructure includes those utilities and other resources (see Table 3.3–3) required to support operation of mission-related facilities.

3.3.10.1 Transportation

The area around Somerville Depot is served by several major roads. Interstate 287 is less than 5 mi (8 km) to the north of the depot and is a major north/south route around the western suburbs of New York City. Interstate 287 intersects with Interstate 78, 8 mi (13 km) north of Somerville. Additional major highways include U.S. Routes 22 and 202. Access to the site via rail is from a spur served by the Norfolk and Southern and CSX Railroads (Farley 2000).

3.3.10.2 Electricity

Electricity is purchased from the Public Service Electric and Gas Company and is transported to the site underground up to the gear house and then aboveground to the various buildings. The depot is responsible for repairs to electric lines within its fence line (Farley 2000).

Table 3.3–3. Somerville Depot-wide Infrastructure Characteristics

Resource	Current Usage	Site Capacity
Transportation		
Roads (mi)	4.3	4.3
Railroads (mi)	1.5	1.5
Electricity		
Energy consumption (MWh/yr)	989	(a)
Fuel		
Natural gas (ft^3/yr)	84,400	(a)
Oil (gal/yr)	600	1,000[b]
Coal (gal/yr)	0	0
Gasoline (gal/yr)	6,000	1,000[b]
Water (gal/yr)	10,400	788,400,000

[a] Local utility provided, no capacity available.
[b] Includes the capacity of one refillable, aboveground storage tank.
Source: Farley 2002a, 2002b; Guida 2001; Gulino 2002.

3.3.10.3 Fuel

Fuel oil is provided by Agway and is used for heating and material handling equipment (Farley 2000). It is stored on site in one aboveground storage tank. Gasoline is also stored on site in one aboveground storage tank and is used to operate site equipment, such as forklifts, etc. Propane is not used on site. Natural gas is used by boilers for heating offices at the depot. These tanks are refilled throughout the year, depending upon demand (Gulino 2002).

3.3.10.4 Water

Water is supplied to the depot by the Elizabethtown Water Company via underground water mains. Additional fire protection water is available from a 2 million-gal (7.6 million–l) man-made, concrete-lined reservoir on site (USACE 2000c).

3.3.10.5 Site Safety Services

Entrance to the depot is controlled by a security fence, which surrounds the depot property, and by personnel from a contracted security firm. There are six entrance gates and two railroad entrances that are kept locked when not in use. The main gate is open during working hours; access is controlled (USACE 2000c:3-4).

Inspections of facilities and materials stored at the depot are performed twice weekly. Results of the inspections and the resolution of problems are recorded on site inspection reports. The Hillsborough Township Fire Department is located approximately 2.5 mi (4.0 km) from the depot and would be the primary responder to any incident (e.g., fire, hazardous spill, accident) at the depot (Farley 2002a). The Somerset County Emergency Management Agency, located in Piscataway, is the lead agency in the event of an emergency incident at the depot. The New Jersey Bureau of Chemical Release Information and Prevention in Trenton would also be notified.

3.3.11 Environmental Justice

Under Executive Order 12898 (59 FR 7629), DNSC is responsible for identifying and addressing disproportionately high and adverse impacts on minority or low-income populations. As discussed in Appendix G, minority persons are those who identify themselves as American Indian or Alaska Native, Asian, Black or African American, Hispanic or Latino (of any race), Native Hawaiian or Other Pacific Islander, or multiracial (CEQ 1997). Persons who report that their income is less than the Federal poverty threshold are designated as low-income persons.

Figure 3.3–2 shows populations residing in Somerset County as reported in the 1990 census and the 2000 census (DOC 1992, 2001g). In this figure, lightly shaded bars show populations in 1990, while the darker bars show those in 2000. In the decade between 1990 and 2000, the percentage minority population in Somerset County increased from approximately 15 percent to 26 percent. The 2000 census found that Blacks or African Americans, Asians, and Hispanics comprised approximately 95 percent of the total minority population residing in Somerset County. Persons who declared that they are multiracial and not Hispanic are included in the minority population shown in Figure 3.3–2. They comprised approximately 5 percent of the total minority population.

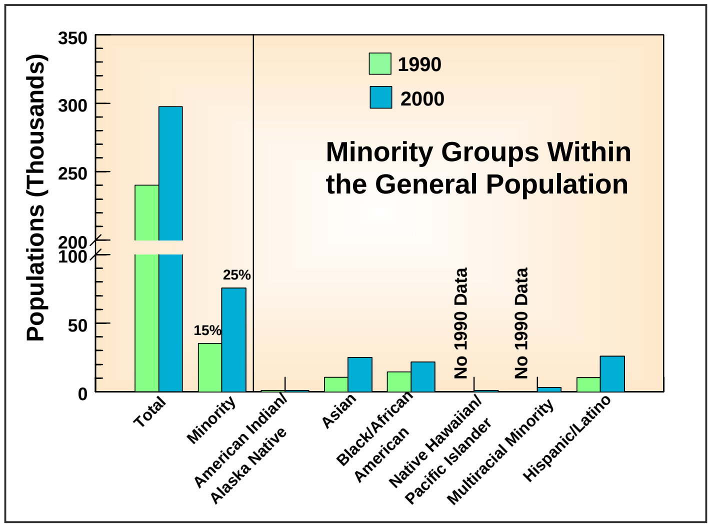


Figure 3.3–2. Populations Residing in Somerset County, New Jersey, in 1990 and 2000

The 2000 census was the first decennial census in which multiracial selections were counted. There is no data for this category available from the 1990 census. Also, during the 1990 census, Asian and Pacific Islander designations were placed together in a single category, whereas during the 2000 census, Native Hawaiians and Other Pacific Islanders were counted separately from Asian respondents. Therefore, as indicated in Figure 3.3–2, direct comparison of 1990 census data and 2000 census data for these two categories is not possible.

The minority population of Somerset County is reasonably representative of that for the State of New Jersey as a whole. According to the results of the 2000 census, minority residents of the State of New Jersey comprised approximately 34 percent of the total resident population. Black or African American, Asian, and Hispanic residents of New Jersey comprised approximately 95 percent of the total minority residents of the state. New Jersey residents who declared that they are multiracial and not Hispanic comprised approximately 5 percent of the total minority population.

Approximately 102,061 minority individuals and 17,275 low-income persons lived within 10 mi (16 km) of the Somerville Depot in 2000 (DOC 2001g, 2002a). The majority population residing in the same area in 1990 was approximately 356,002 persons. Figure 3.3–3 shows the cumulative percentage of these populations residing at a given distance from the Somerville Depot. For example, Figure 3.3–3 indicates that 50 percent of the total majority population of 356,002 persons lived within 7 mi (11 km) of the Somerset Depot. Minority and low-income populations were concentrated in Somerset and New Brunswick.

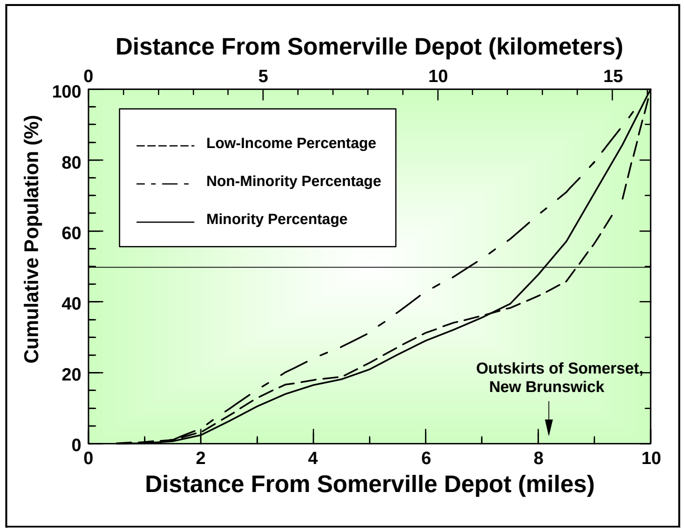


Figure 3.3–3. Percent Resident Populations Within 10 Miles of the Somerville Depot

3.4 WARREN DEPOT

The Warren Depot is located in Trumbull County, Ohio. It is approximately 15 mi (24 km) west of the border that separates northeastern Ohio and Pennsylvania. The Warren Depot consists of approximately 160 acres (65 ha) of land leased from American Premier Underwriters, Inc. (formerly the Penn Central Corporation) (Stacey 2000) (USACE 2000d:2-1, 2-2). The entrance to the Warren Depot is on the west side of Niles-Warren River Road, approximately 950 ft (290 m) north of DeForest Road. The depot is bordered on the east by the Conrail Railroad (formerly the Penn Central Railroad); on the northeast by WCI Steel; and on the northwest, west and south by the Mahoning River (USACE 2000d:2-1).

Figure 2–4 shows the layout of warehouses on the depot and its relationship to its surroundings. There are seven warehouses at the Warren Depot. Each warehouse is 200,000 ft^2 (18,581 m^2) (USACE 1999b). The warehouses have concrete floors, solid block wall construction, ceiling air vents, and dry-pipe (water supply) fire suppression system. Although the buildings are vented, there are no floor drains through which leaked or spilled materials could escape.

There are a 621 tons (563 metric tons) of mercury stored in 16,355 76-lb (34-kg) low carbon steel flasks at the Warren Depot. The flasks, which are from several different sources and are not all of the same construction, are stored in 30-gal (114-l) low carbon steel drums, six flasks to a drum. The drums are stored in containment pans on wooden pallets, five drums to a pallet, with pallets singly stacked.

3.4.1 Meteorology, Air Quality, and Noise

3.4.1.1 Meteorology

Based on data and climate information for Youngstown Regional Airport, the climate of the Warren area is influenced to some extent by the Great Lakes. The average annual rainfall, 37.3 in (94.7 cm), is fairly well distributed over the year with somewhat larger monthly amounts in the late spring and summer. Winter months are characterized by persistent cloudiness and intermittent snow flurries. Severe snowstorms typically occur several times a year, but the bulk of the snow falls as occurrences of 2 in (5 cm) or less. Average annual snowfall is 57.2 in (145 cm); however, the maximum snow depth, 25 in (64 cm), occurred in 1950 (NCDC 2001d).

Five tornadoes were reported in Trumbull County between January 1993 and May 2000. A tornado passed through the Warren Depot in 1985 damaging two warehouses and two other buildings. The mercury storage area was not damaged. Several occurrences of high winds typically occur every year (MCC 2000). The mean number of days per year with thunderstorm activity is 34.8 (NCDC 2001d). The mean number of days per year with one or more tornadoes within 25 mi (40 km) of the depot is 0.6 (NSSL 2002). The average annual wind speed is 9.7 mph (4.3 m/s) (NCDC 2001d). The maximum recorded wind speed (based on the minimum for 1-mile of wind to pass) is 58 mph (26 m/s) (NOAA 2000).

The average annual temperature is 48.3 °F (9.1 °C); temperatures range from a monthly average minimum temperature of 16.4 °F (-8.7 °C) in January to a monthly average maximum temperature of 81.3 °F (27.4 °C) in July. The minimum recorded temperature is -22 °F (-30 °C). The maximum recorded temperature is 100 °F (38 °C) (NCDC 2001d).

3.4.1.2 Air Quality

Warren Depot is located in an area of Trumbull County that is designated as better than national standards for sulfur dioxide and better than national standards or unclassifiable for nitrogen dioxide. The area is unclassifiable regarding attainment of the standard for carbon monoxide. Under EPA's rule change, which reinstated the 1-hr ozone standard, the area is in attainment for ozone (EPA 2000a). The EPA has not assigned attainment status designation for lead and the attainment status for PM_{10} is unclassifiable (EPA 2000d).

There are no PSD Class I areas within 100 mi (161 km) of the Warren Depot. A Class I area is one in which very little increase in pollution is allowed due to the pristine nature of the area. Warren Depot and its vicinity are classified as a Class II area in which more moderate increases in pollution are allowed. No PSD permits are required for any emission source at the Warren Depot (DNSC 2001d). PSD permits are those required for major new sources or modifications subject to the PSD regulations.

The primary sources of criteria pollutants at Warren Depot are six furnaces, one boiler, a diesel fuel-fired pump, a water heater, and material handling equipment (i.e., forklifts and trucks). There are no active air emission sources at the Warren Depot that are required to be permitted under the Federal Clean Air Act or companion Ohio regulations (DNSC 2001d). Fugitive particulate emissions from truck traffic along gravel roads are possible as well as during the loading and unloading of the various materials to and from outdoor stockpiles. However, a water truck is employed on site during dry periods to control fugitive dust (USACE 1999b:3-4).

The closest offsite monitors are operated by the State of Ohio in Trumbull and Mahoning Counties. In 2000, for PM_{10} an annual average concentration of 24.3 $\mu g/m^3$ and a maximum 24-hr average concentration of 53 $\mu g/m^3$ were reported. Annual, 24-hr, and 3-hr average sulfur dioxide maximum concentrations of 18.3 $\mu g/m^3$, 68.1 $\mu g/m^3$, and 173 $\mu g/m^3$, respectively, were also reported in 2000. A 1-hr average ozone concentration of 196 $\mu g/m^3$ was reported (EPA 2001h). Monitored concentrations in the region were well below ambient standards. There are no nearby monitors for mercury.

Mercury vapor concentrations are routinely measured inside the warehouse during periodic inspections (see Section 3.4.4.2). Ambient air monitoring for mercury outside the warehouse is not routinely performed.

3.4.1.3 Noise

Major noise emission sources within the Warren Depot include various equipment and machines—heating, ventilation, and air conditioning equipment, materials-handling equipment (i.e., forklifts and loaders), fire alarms and vehicles. An emergency siren at Building 9 is tested periodically. Most noise sources are limited to daytime during normal working hours. Levels of activity at the depot are low and noise levels produced are compatible with the adjoining industrial and recreational uses. The nearest noise sensitive receptor is a residence to the northeast of the depot on Deforest Townline Road, which is approximately 1,000 ft (305 m) from the property fence (USACE 1999b:2-7, C-115). No noise complaints have been received from the public in the last 5 years (DNSC 2001d).

The State of Ohio and Trumbull County have not established specific community noise standards that specify acceptable noise levels applicable to the depot.

Sound-level measurements have not been recorded near the depot. However, it is expected that the acoustic environment near the site boundary ranges from that typical of rural to industrial locations. Traffic and nearby industry, such as the steel mill north of the depot, are the primary sources of noise at the site boundary (DiMarzio 2000c). Traffic is the primary source of noise at residences located near roads. The traffic generated by the depot (10 to 20 trips per day), including employee vehicles (13 employees in 2001) and trucks used for shipping (typically 3 per day), has little effect on traffic on nearby roads and the associated traffic noise. Access to the Warren Depot is primarily by Niles-Warren River Road (Route 169) for which average daily traffic flow (vehicles per day) near the depot is 9,570 (OHDOT 2000). Railroad activity related to the depot (i.e. delivery or removal of railcars, and would result in short term increases in sound levels near the depot) is occasional (none in fiscal year 2000).

3.4.2 Waste Management

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

The Warren Depot generates and manages sanitary, nonhazardous, and hazardous wastes. The facility is a conditionally exempt small quantity generator of hazardous waste, as defined under RCRA at 40 CFR 261.5 (DLA 2000a:3-10). This means that less than 220 lb (100 kg) of hazardous waste or 2.2 lb (1 kg) of acutely hazardous waste are generated each month by activities at the site.

RCRA-regulated wastes generated at the Warren Depot include used oil and oil filters, parts-washing solvent, paints, solvents and cleaning compounds from maintenance and operation, and mercury-contaminated plastic or Tyvex from cleanup activities (DLA 2000a:3-10; Lynch 2001c). Used oil and hazardous wastes are accumulated in 55-gal (208-l) drums until removed by a commercial hazardous waste management contractor for offsite recycling, treatment, or disposal, as appropriate to each waste type (DLA 2000a:3-10). In 2000, approximately 70 gal (265 l) of solvent were recycled, and 240 lb (109 kg) of hazardous waste were disposed (Lynch 2001c).

Nonhazardous solid waste is collected in a 6-yd^3 (4.6-m^3) container located in Area 1. In 2000, approximately 300 yd^3 (229 m^3) of nonhazardous solid waste was disposed of at the BFI Landfill in Poland, Ohio (DLA 2000a:3-10; Lynch 2001c).

Sanitary wastewater is collected by a septic system that flows to a leach field (DLA 2000a:3-10; USACE 2000d:sec. 2.5.2.3). Approximately 31,800 gal (120,376 l) of sanitary wastewater are estimated to be discharged to the leach field annually (Pittano 2001).

3.4.3 Socioeconomics

The Warren Depot is located in Trumbull County, Ohio. Therefore, all statistics for the local economy, population, housing, and community services as defined in Appendix E, will be presented for Trumbull County. In 2000, the Warren Depot employed 13 persons (about 0.02 percent of the county's 2000 civilian labor force) (DOL 2001; Lynch 2001a).

3.4.3.1 Regional Economic Characteristics

From 1990 to 2000, the estimated civilian labor force in Trumbull County increased by 0.41 percent to 110,884 persons. In 2000, the unemployment rate for the county was 5.1 percent, which was higher than the 2000 unemployment rate for Ohio (4.1 percent) (DOL 2001).

3.4.3.2 Population and Housing

In 2000, the estimated population of Trumbull County totaled 225,116. From 1990 to 2000, the county's population decreased by 1.2 percent, compared with the 4.7 percent growth in Ohio (DOC 2001a, 2001b, 2001c). The percentage of the county's population under the age of 5 is 6.1 percent with women age 18 to 40 comprising 17.5 percent (DOC 2001d). In 2000, there were 95,117 housing units in the county, of which 69.5 percent were owner occupied; 24.1 percent, renter occupied; and 6.4 percent, vacant (DOC 2001a).

3.4.3.3 Community Services

3.4.3.3.1 Education

In 1998, student enrollment in Trumbull County was 40,720, and there were 2,287 classroom teachers, for a student-to-teacher ratio of 17.81:1 (ODD 1999).

3.4.3.3.2 Public Safety

In 2001, about 444 sworn police officers served Trumbull County, with a ratio of 1.97 officers per 1,000 persons (Sawyer 2001f). If a mercury incident should occur at the Warren Depot, the Weathersfield Fire Department would respond and the Ohio National Response Center would be notified (Lynch 2001c). In 2001, 1,239 paid and volunteer firefighters provided fire protection services in the county (Sawyer 2001g). The average ratio was 5.5 firefighters per 1,000 persons.

3.4.3.3.3 Health Care

In 1997, 335 physicians served Trumbull County. The average ratio of physicians to the county population was 1.49 physicians per 1,000 persons. In 1997, there were five hospitals in the county, with a total of 881 hospital beds (ODD 1999).

3.4.4 Human Health Risk

3.4.4.1 Health Effects Studies

According to the Trumbull County Health Board, the Warren Depot manager, and the DNSC environmental manager, no known studies on the health effects of mercury have been conducted in the vicinity of the Warren Depot. However, the health of the DNSC Warren Depot workers has been monitored since 1990 through a medical surveillance program conducted by the U.S. Public Health Service. The surveillance program includes periodic physical examinations and an occupational exposure history. For a period of one year, biological monitoring was conducted for mercury levels in all stockpile employees; no elevations of mercury were detected. Currently, biological monitoring is only performed in cases of reported exposure. As of 2001, no adverse health effects from mercury exposure by any Warren Depot worker have been documented by the U.S. Public Health Service (Holland 2001).

3.4.4.2 Accident History

Prior to March 2002, the mercury was stored in flasks on wooden pallets with metal drip pans underneath. Information obtained from semi-annual inspection reports from January 1969 through July 2000, indicates that there were two confirmed leaking flasks in 1970 and 1976, and suspected leaking flasks were found in 1979, 1986, and 1998. In 1998, the five suspected leaking flasks, located in three pallets, were placed in plastic bags to prevent any further migration. The analysis of a suspected leaking flask in 1998 indicated that the plug weld on the bottom center of the flask may have failed. Free mercury has also been observed on pallets and drip pans but has not been linked with any leakers. Therefore, it is assumed that it is residual contamination, possibly arising before the mercury was shipped to the Warren Depot in 1968. It is estimated that 30 percent of the pallets are contaminated (Lynch 2000; TVA 2000). Leaking mercury from these incidents has been promptly cleaned up with no mercury released to the environment. As a method of ensuring safe storage of the mercury and to prevent any potential source of accidental mercury releases to the environment, the mercury storage flasks were packed into lined, 30-gal (114-l) steel drums (overpacks). This was completed in March 2002. No defective flasks were found during overpacking (Surface 2002).

The warehouse is monitored periodically for mercury vapors. Review of the mercury inspection reports since December 1999 showed that all mercury vapor readings have been below the instrument's limit of detection (approximately 0.005 mg/m^3).

There have been no accidents at the Warren Depot during mercury handling activities that have resulted in exposures to facility workers or releases outside the building.

3.4.4.3 Emergency Preparedness

The Warren Depot has established an onsite emergency response action for their trained onsite response organization to follow in the event of an accident or release. The Distribution Facilities Manager is responsible for designating and training onsite responders, establishing initial response procedures and conducting remediation actions, and for summoning outside aid from local fire and response departments or organizations to support emergency response, including medical assistance as necessary.

The Warren Depot Distribution Facilities Manager is summoned to marshal the trained onsite response technicians in the event that there is a visible mercury leak. The Distribution Facilities Manager would also communicate the situation to the local emergency planning commission in Trumbull County. The Weatherfield Fire Department would be summoned to support the onsite responders if the situation escalated to a point for the potential for an offsite release and could respond within 5 minutes (Nemeth 2002d). The fire department would also provide emergency medical support and transportation of injured parties to the local hospital. The Trumbull County Hazardous Materials Bureau could respond within 3 to 10 minutes if needed (Nemeth 2002e). However, in over 50 years of mercury management experience, there has been no need for outside emergency assistance.

In the event of any mercury leak, the affected site and surrounding areas would be surveyed for potential mercury contamination and remedial actions, including excavation and hazardous waste disposal; efforts would be coordinated by the depot manager. Commercial contractors would be used to support recovery and remediation if mercury enters the soil or waters near the site as a result of a release. State and/or regional officials from the EPA would monitor activities to ensure that public health and safety is protected.

3.4.5 Geology and Soils

The Warren Depot lies within the Glaciated Allegheny Plateaus Section of the Appalachian Plateaus Physiographic Province (Brockman 1998; Lloyd and Lyke 1995:K2). The interior of the depot property is almost uniformly flat and lies at an elevation of approximately 890 ft (271 m) above mean sea level. The highest portion of the property is located in the northwest corner of the depot at about 900 ft (274 m) above mean sea level. However, elevations along the western boundary of the depot with the Mahoning River fall off rapidly to an elevation of about 850 ft (259 m) along the river bank (USGS 1994b). Site topography generally reflects the deposition of fill materials to artificially elevate the central portion of the site above the floodplain of the Mahoning River (USACE 2000e:3-5).

Surficial materials immediately underlying the Warren Depot consist of manmade fill. The fill is comprised of cinders, slag, and other solid waste material typical of historical steel mill operations in the area (USACE 2000e:2-2, 3-5). This material is reported to range from between 19 and 24 ft (5.8 to 7.3 m) thick beneath the depot (Cash 1998c:4, 2; USGS 1994b). The natural, surficial stratigraphy of the area consists of clay and loam till with glacial outwash deposits prevalent along the major water courses. Outwash deposits generally tend to consist of well-sorted sand and gravel (Brockman 1998; OGS 1997). Till and outwash deposits along the major surface drainages typically range from 2 to 5 ft (0.6 to 1.5 m) in thickness on underlying bedrock and locally capped by a relatively thin layer of recent alluvium, especially near and within the floodplain of the Mahoning River (USDA 1992b:139, 233–235). The total thickness of fill and natural materials underlying the depot is estimated at 45 ft (14 m) at the center of the depot. The uppermost bedrock unit mapped as present in the immediate vicinity of the depot is the Cuyahoga Formation (Larsen 1998; OGS 1996). The Cuyahoga Formation in Trumbull County consists of shale with interbedded sandstone and siltstone that attains a maximum thickness of 180 ft (55 m) (Swinford et al. 2000:2). Geologic mapping also shows the Cuyahoga Formation contacting the Berea Sandstone and Bedford Shale at the surface along the western boundary of the depot with the Mahoning River (OGS 1996). The Berea Sandstone and the Bedford Shale have a total thickness ranging from 85 to 255 ft (26 to 78 m) (Swinford et al. 2000:3). These strata generally thicken to the northwest across Ohio and, together, with the older units beneath them, generally dip downward to the east and southeast into the Appalachian Basin structural feature (Collins 1979:E10, E12; Lloyd and Lyke 1995:K5; OGS 2000a).

Trumbull County's principal nonfuel mineral products include construction sand and gravel and vermiculite (an industrial mineral comprised of magnesium, iron, aluminum, and silicon) that are obtained predominantly from the northwestern portions of the county (USGS 1999c). Glacial till is a potential source of common clay and bedrock potentially suitable for quarrying dimension stone and rock aggregate (e.g., shale, sandstone) occurs across the county (Weisgarber 1997). Productive oil and natural gas fields occur at depth within the sedimentary rocks of the Appalachian Basin across eastern Ohio, including Trumbull County (Larsen 1998; OGS 2001).

A number of geologic faults have been mapped in the basement rocks of Ohio, including several deep, northwest to southeast trending faults, located just to the south and southwest of the depot in parts of Mahoning, Portage, and Summit counties (OSN 2001a). Such deeply buried faults are thought to be responsible for the historical and ongoing seismicity of the Anna seismic zone in west-central Ohio. A similar mechanism is inferred for the Northeast Ohio seismic zone encompassing Cuyahoga, Geauga, Lake, Portage, and Summit counties to the northwest of Trumbull County (Crone and Wheeler 2000:173, 241, 242). About half of the historic earthquakes associated with the Northeast Ohio seismic zone have occurred along the Akron Magnetic Lineament. This is a subsurface structural feature that extends from roughly the northeast tip of Lake County southwest through Summit County and to the west of the Warren Depot (OSN 2001a). However, no surface evidence of fault slip or other surficial evidence of large earthquakes associated with this feature has been identified to date (Crone and Wheeler 2000:241). The Warren Depot lies to the north of two notable active fault zones. These include the Wabash Valley fault system located approximately 400 mi (644 km) southwest of the depot and the central Virginia seismic zone located about 250 mi (402 km) southeast of the depot (Crone and Wheeler 2000:4).

Since 1776, at least 120 felt earthquakes have been centered in Ohio. In addition, the sequence of large earthquakes originating in the New Madrid fault zone in 1811 and 1812 were sufficient to cause chimney damage in Cincinnati, Ohio (i.e., equivalent to MMI VI). Likewise, the Charleston, South Carolina, earthquake of 1886 was strongly felt in Ohio (see Section 3.5.5) (OGS 2000b). Within a radius of 100 mi (161 km) of the Warren Depot, a total of three significant earthquakes (i.e., having a magnitude of at least 4.5 or a MMI of VI or larger) have been documented going back to 1900. All had epicenters in northeastern Ohio. A magnitude 5.0 event occurred on January 31, 1986, located 36 mi (58 km) northwest of the depot near the border of Geauga and counties (USGS 2001i). This earthquake was strongly felt across Ohio and in 10 other states and into Canada. Minor to moderate damage was reported near the epicenter, including broken windows and cracked plaster (equivalent to MMI V to VI) (OGS 2000b). More recently, a light to moderate earthquake with a calculated magnitude ranging from 4.3 to 5.2 occurred on September 25, 1998. It was located about 29 mi (47 km) east of Warren Depot near Jamestown, Pennsylvania (OSN 2001b; USGS 2001j). Although felt from Wisconsin to New Jersey, damage was light near the epicenter and included some broken dishes and chimney damage (equivalent to MMI V to VI).

Earthquake-produced ground motion is expressed in units of percent “g” (force of acceleration relative to that of the earth’s gravity). Two differing measures of this motion are peak (ground) acceleration and response spectral acceleration (see Section E.6.1). New seismic hazard metrics and maps developed by the USGS have been adapted for use in the *International Building Code* and depict maximum considered earthquake ground motion of 0.2- and 1.0-second spectral acceleration, respectively, based on a 2 percent probability of exceedance in 50 years (ICC 2000; USGS 2001c). This corresponds to an annual probability of occurrence of about 1 in 2,500. Section E.6.1 provides a more detailed explanation of these maps. The Warren Depot lies within the 0.17g to 0.18g mapping contours for a 0.2-second spectral response acceleration and the 0.05g to 0.06g contours for a 1.0-second spectral response acceleration. The calculated peak ground acceleration for the given probability of exceedance at the site is approximately 0.08g (USGS 2001d). Based on the maximum considered earthquake ground motions, the Warren Depot is located in a region of negligible seismicity with very low probability of collapse of structures. On a design basis, the probability of life-threatening damage to or collapse of structures in such regions is very low, even for the most vulnerable types of structures. The seismic hazard in these regions is controlled by earthquakes with a body-wave magnitude less than or equal to 5.5 with MMIs of up to V (BSSC 2001:381, 382, 387). For comparison, a peak ground acceleration of about 0.10g roughly marks the approximate threshold of damage to older (pre-1965) structures and roughly corresponds to a MMI of VI (USGS 2002a). Table E–11 in Appendix E shows the approximate correlation between MMI, earthquake magnitude, and peak ground acceleration.

There are no volcanic hazards at the Warren Depot. There has been no volcanism in the Ohio portion of the Appalachian Plateaus Physiographic Province for more than 570 million years (Hansen 1997).

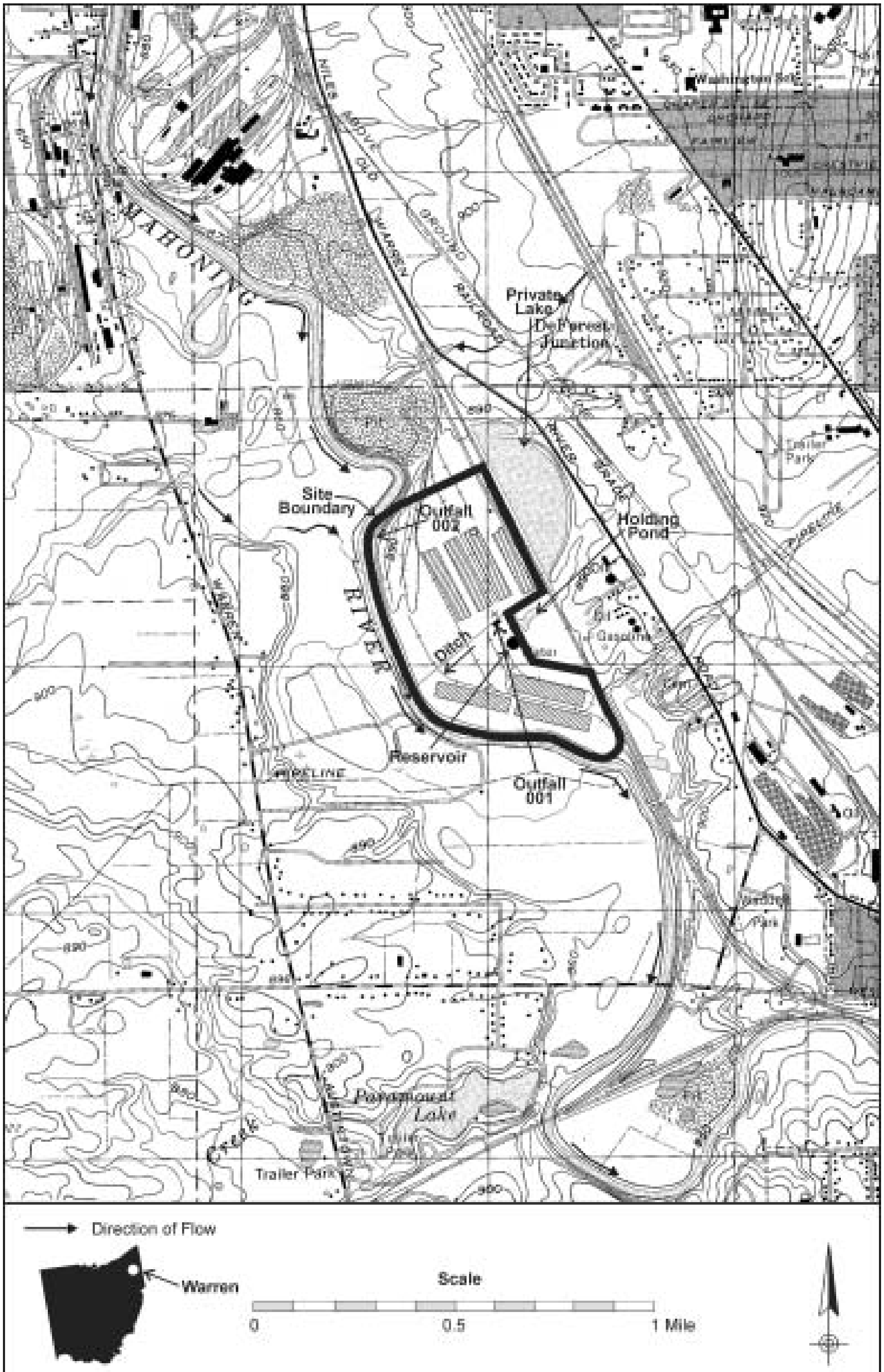
Soils across the Warren Depot are mapped as urban land (USDA 1992b). This mapping unit generally corresponds to nearly level to gently sloping areas of at least 5 acres (2.0 ha) in size where more than 80 percent of the surface has been developed by structures or other impervious surfaces (e.g., asphalt, concrete) (USDA 1992b:76, sheet 59). Areas mapped as urban land cannot be prime farmland (7 CFR 657.5(a)), nor are they subject to the Farmland Protection Policy Act (7 CFR 658). Soil borings logs describe the upper 2 ft (0.6 m) as predominantly consisting of black and gray cinders and slag with minor amounts of clay, gravel, sand, and silt in some borings (USACE 2000d:3-16). The county general soil map depicts any remaining natural soils across most of the depot as part of the Mahoning-Ellsworth association. Soils comprising this association occur in undulating areas on till plains that are dissected by drainage ways and mainly consist of silt loams at the surface. A thin tract of the depot immediately adjacent to the Mahoning River is mapped as part of the Holly-Orrville-Tioga association. This association consists of nearly level, poorly drained to somewhat poorly drained silt loams and loams that formed in alluvium (USDA 1992b:7, 8, 15, 124).

A preliminary assessment was initiated in 1998 to assess the potential for hazardous substance releases to the environment as a result of depot operations (USACE 1999b). As part of a subsequent site investigation, soil samples were collected from 10 locations by hand auger; however, subsurface conditions prevented collection of a subsurface sample at 3 of the 10 locations. Two additional boring locations were located in the southeast corner of the depot to serve as comparative background soil sampling locations. Soil samples were analyzed for 14 metals (USACE 2000d:3-1, 3-2, 3-13, 3-16, 3-17). Significantly elevated parameter concentrations of at least one of all 14 metals analyzed were found in 19 of the 20 surface and subsurface samples obtained. Soil sample concentrations were also compared to the Ohio Environmental Protection Agency direct-contact soil standards for residential and commercial land-use scenarios. Excluding the background samples, residential land-use standards were exceeded in 13 of the 20 samples for arsenic, 5 samples for total chromium, 4 samples for lead, 1 sample for nickel, and 1 sample for zinc. Significantly elevated concentrations of mercury were detected at three separate sample locations, but the samples did not exceed either of the land-use standards. These locations included one in the northwest corner of the depot; the second, just north of Warehouse No. 4, near the former copper stockpile; and the third, along the northwest property boundary, northwest of Warehouse No. 4 (USACE 2000d:3-3, 3-4, 3-23–3-26, 3-28–3-32, 3-34). The final site investigation report completed in February 2001 recommended additional sampling and analysis to determine the lateral and vertical extent of soil sediment and potentially other media contamination, including in offsite areas, as part of a subsequent remedial investigation. Results of the sediment analysis indicate that migration of metals outside the depot perimeter is likely. This work is planned for fiscal year 2003/2004 (Lynch 2002a).

3.4.6 Water Resources

3.4.6.1 Surface Water

The Warren Depot is bordered on the northwest, west, and southwest boundaries by the floodplain of the Mahoning River. The river flows southeast, adjacent to the depot to its eventual confluence with the Ohio River (see Figure 3.4–1). The Mahoning River has an annual average flow of 906 ft^3/s (25.6 m^3/s) as measured downstream at Niles, Ohio, and drains an upstream area of 854 mi^2 (2,212 km^2) (USGS 2001k). The major surface water drainage feature within the depot boundary is a ditch that bisects the property and originates from an interconnected holding pond located just off site to the east (Cash 1998c:7; USACE 2000d:3-13). The only other water body on the depot is a 0.3-acre (0.1-ha) water-storage reservoir.



Source: Cash 1998c:7; USGS 1994b.

Figure 3.4–1. Surface Water Features at the Warren Depot, Ohio

In addition to this onsite water body, a manmade lake is located adjacent to the northeastern boundary of the depot and is used by a private fishing club (USACE 1999b:2-1, 2000d:3-8) (see Figure 3.4–1).

Since 1996, a number of best management practices have been implemented at the depot, in conjunction with the depot's Storm Water Pollution Prevention Plan, to prohibit or greatly reduce the potential for site runoff to leave the property (USACE 2000e:3-8). As a result, storm water runoff is now essentially retained with the property boundary and allowed to percolate into the fill beneath the site. Two existing storm water outfalls (Outfalls 001 and 002) and the aforementioned drainage ditch collect surface drainage that originates as sheetflow across the property and runoff from material storage piles and depot facilities. Outfall 001 is a culvert pipe that discharges runoff from the central portion of the depot, including the area around Warehouses 1 through 4 to the uppermost (eastern) segment of the four channel segments that comprise the depot drainage ditch. A limestone gravel mat is maintained at the mouth of Outfall 001 prior to the uppermost segment of the drainage ditch to filter storm water before it enters the ditch. Nevertheless, this first ditch segment drains east to the holding pond, which is located beyond the depot property line. During heavy rainfall, however, the pond is designed to overflow to the uppermost segment of the ditch with the overflow traveling west-southwest through the ditch toward the Mahoning River. Since the culvert pipe at the western end of the depot drainage ditch was capped by concrete in 1998, this has converted the ditch system into a retention pond; thus, eliminating the main point source of storm water discharge from the depot to the Mahoning River (Cash 1998c:7–10).

Outfall 002 is essentially a low drainage swale along the perimeter fence in the northwest corner of the depot that normally would convey depot runoff about 60 ft (18 m) through woodlands to the Mahoning River (Cash 1998c:7; USACE 2000e:3-9; USACHPPM 1998:10). At Outfall 002, a 2-ft (0.6-m) high, 100-ft (30-m) long limestone gravel berm has been placed inside the northwest perimeter of the depot to retain outflow (Cash 1998c:8, 9). In addition to the two outfalls and the main drainage ditch, storm water runoff exited the depot property at various other points as sheetflow. To address this source, a 12-in (30-cm) high berm composed of granular slag material was placed around the base of the depot's perimeter fence to retain overland flow within the depot boundary (Cash 1998c:10; USACE 2000e:3-9). Although the berm functions to retain sediments and adsorbed contaminants, the material is granular and could allow storm water to pass through (USACE 2000e:3-9). As direct discharges of storm water have been eliminated and storm water is retained with the confines of the depot, DNSC maintains that the depot is exempt from NPDES storm water permitting, although a Storm Water Pollution Prevention Plan has been implemented (USACHPPM 1998:vi, viii).

Surface water is the source of public water supply for the Warren Depot and the surrounding communities of Girard, Lordstown, Niles, and Warren (USACE 1999b:3-1, 2000e:3-5, 3-8). The primary surface water source for these communities is the Meander Creek Reservoir located approximately 3 mi (4.8 km) south of the depot (USACE 2000e:3-8; USGS 1994b). No drinking water intake structures are located within 15 mi (24 km) downstream of the depot (USACE 1999b:4-2). The Warren Depot obtains its water supply from Weathersfield Township, which purchases water from the city of Niles, Ohio (USACE 1999b:2-2). The depot uses water for sanitary uses and fire protection. However, the fire prevention system is a dry system and does not normally use any water except when annual trip testing is preformed (DNSC 2001d). The onsite open reservoir is nonetheless maintained for fire fighting (Cash 1998c:10; USACE 1999b:C-13). Water supply and use are further discussed in Section 3.4.10.

The Warren Depot lies just outside the mapped 100- and 500-year floodplains of the Mahoning River. In particular, the northwest, west, and southwest perimeters of the depot appear to be above the wooded east bank of the river and associated 100-year floodplain (Cash 1998c:11; FEMA 1978; USACE 2000e:3-13) (see Figure 3.4–1). The depot has reportedly never been flooded (USACE 1999b:3-2).

Standards for water bodies in Ohio include designated uses and associated numerical or narrative criteria intended to protect designated uses. The Mahoning River and its tributaries in the vicinity of the depot have been designated for warm-water aquatic life habitat, agricultural and industrial water supply, and for primary contact recreation uses (OEPA 2001a). A segment of the Lower Mahoning River between Meander Creek downstream of the depot through the Warren, Ohio, area is on the state's Clean Water Act, Section 303(d) list as being impaired relative to attaining water quality standards and designated uses (EPA 2001i). Major parameters of concern include metals, nutrients, pesticides, and priority organic compounds. Identified sources of these pollutants include major industrial and municipal point source discharges and combined sewer overflows (EPA 2001i; OEPA 2001b).

Sanitary wastewater is generated and discharged as a result of current depot operations. This wastewater is discharged to an onsite septic system (USACE 2000e:2-6). Wastewater management is further discussed in Section 3.4.2. Outfalls 001 and 002 and the main drainage ditch discharged storm water from the Warren Depot to the Mahoning River prior to 1998. Historical storm water monitoring results indicated that chemical oxygen demand, copper, iron, lead, manganese, total suspended solids, and zinc in the two discharges exceeded EPA benchmark values (Cash 1998c:8; USACE 1999b:3-2, 3-3). As part of the site investigation previously discussed in Section 3.4.5, sediment samples were collected from near the overflow point to the offsite holding pond (just downstream of Outfall 001), from the former drainage swale associated with Outfall 002 in the northwest corner of the property, and from near the end of the main drainage ditch prior to the outflow culvert (see Figure 3.4–1). The results were compared on a relative basis to each other for concentration consistency and against average background surface soil concentrations. Beryllium, cadmium, nickel, and zinc were detected at concentrations significantly above both standards used in the comparison. It was concluded in the site investigation that the potential for metals to have migrated off site in storm water-carried sediment is likely (USACE 2000e:3-8–3-10, 3-13, 3-46, 4-1). As stated in Section 3.4.5, the final site investigation report recommended further site characterization work to determine the extent of offsite sediment contamination (Lynch 2002a).

3.4.6.2 Groundwater

In northeastern Ohio, groundwater generally occurs both in unconsolidated deposits comprising the surficial aquifer system and in aquifers contained in the underlying bedrock (Pennsylvanian and Mississippian Aquifers). Over most of the Appalachia Plateaus of northeastern Ohio, the surficial aquifer system is comprised of thin, discrete sand and gravel aquifers contained within glacial till, having a total thickness of generally less than 100 ft (30 m). The most productive and extensive surficial aquifers are found in the present-day stream valleys and occur at or near the land surface. These aquifers are comprised of glacial outwash and alluvium and range in thickness from 25 ft (7.6 m) to more than 200 ft (61 m) in the larger stream valleys. However, these stream-valley aquifers are mapped as relatively more isolated and discontinuous along the Mahoning River Valley in Trumbull County compared to the larger Ohio River tributaries (Lloyd and Lyke 1995:K3, K22, K23). Deposits of glacial till and outwash along water courses in the county are generally less than 5 ft (1.5 m) thick. Where present, the surficial aquifers are very productive. Well yields from sand and gravel deposits typically range from 100 to 500 gal/min (380 to 1,900 l/min), with finer-grained aquifers typically yielding from 25 to 50 gal/min (95 to 189 l/min) (Lloyd and Lyke 1995:K23).

Aquifers in consolidated rocks are important groundwater sources in the Appalachian Plateaus. The Warren Depot and most of Trumbull County is immediately underlain by the Mississippian Aquifers. Sandstones are the primary water-bearing units in Ohio. Beneath the site and vicinity, the geologic units comprising the Mississippian Aquifers, in descending order, include the Black Hand Sandstone member of the Cuyahoga Formation, the Sunbury Shale consisting of interbedded sandstone and shale, and the Berea Sandstone. These units sit atop the Ohio Shale that serves as a lower confining unit. Groundwater would be expected to occur under water table (unconfined) conditions although shale interbeds of relatively lower permeability could act as confining units, possibly resulting in confined (artesian) conditions on a localized basis. Groundwater within the Mississippian rocks beneath the site resides in and is transmitted through the fractures and bedding planes of the sandstones and shales. However, these fractures decrease in size and number with depth resulting in variable well yields while restricting the regional groundwater flow in the aquifer. Well yields from the Mississippian Aquifers typically range from 5 to 25 gal/min (19 to 95 l/min) but may be higher, especially where Mississippian rocks are in contact with surficial aquifers (Lloyd and Lyke 1995:K22, K23).

The surficial and Mississippian Aquifers are recharged from precipitation, with recharge to the underlying bedrock units primarily occurring where they are exposed at the surface. The general direction of groundwater flow in the upper Mississippian Aquifer across the site would be expected to be west toward the aquifer's discharge point in the Mahoning River Valley. Mississippian Aquifers provide substantial base flow to streams in the region, especially where overlying Pennsylvanian-age strata is thin or absent (Lloyd and Lyke 1995:K23). Shallow groundwater in unconsolidated materials beneath the site is expected to flow westerly toward the Mahoning River and then tangentially in the direction of the river flow (i.e., south to southwest). Depth to shallow groundwater is likely to vary and is largely dictated by the river level (USACE 2000e:3-5).

Groundwater is not used for water supply at the Warren Depot or by any of the surrounding communities of Girard, Lordstown, Niles, or Warren as discussed above. However, there are 3,669 private water wells within a 4-mi (6.4-km) radius of the depot, as determined from U.S. census data (USACE 2000e:3-5). There are no designated Class I sole-source aquifers in the northern half of Ohio (EPA 2001c). All aquifers are considered Class II aquifers (current or potential sources of drinking water or other beneficial use). Groundwater quality in the surficial and Mississippian Aquifers is generally suitable for most purposes with minimal treatment, although concentrations of iron and sulfate may be a problem on a localized basis. Water from the surficial system is harder than groundwater from rock aquifers in the same area. In the Mississippian Aquifers, water obtained from the sandstone units is generally soft with harder groundwater obtained from the shale units (Lloyd and Lyke 1995:K23, K24).

Soil sampling conducted as part of the 1999 site investigation included an evaluation of the potential for migration of contaminants to groundwater at the depot. Essentially, soil parameter concentrations were first evaluated against leach-based soil concentrations, which were established by the Ohio Environmental Protection Agency to be protective of potable groundwater use, and then compared by depth to evaluate the potential for downward migration to groundwater. At one sample location, concentrations of barium, cadmium, total chromium, and zinc were significantly elevated in the subsurface (i.e., a subsurface concentration at least 300 percent higher than in the surface at the same location). Another location had a significantly elevated subsurface concentration of chromium (USACE 2000e:3-7, 3-38–3-41, 3-43, 3-45). As stated in Section 3.4.5, the final site investigation report recommended further site characterization work to determine the lateral and vertical extent of metals contamination, including in groundwater. This work is planned for fiscal year 2003/2004 (Lynch 2002a).

3.4.7 Ecological Resources

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

3.4.7.1 Nonsensitive Habitats and Species

Woodlands border the western perimeter of the Warren Depot. The dominant forest types in this region include white oak-northern red oak-hickory hardwood forests and American beech-sugar maple forests. There are no woodlands within the perimeter of the depot, which consists of mowed lawn, gravel, and pavement (Cash 1998c:11).

The Mahoning River borders the southern and western sides of the depot and extends beyond the western perimeter fence line. The river's eastern bank has woodlands along it. This forested buffer is approximately 60 ft (18 m) wide and provides riverbank stability, which helps protect the water quality (Cash 1998c:11).

The frequent sighting of raccoons, skunks, squirrels, and various birds and waterfowl is attributed to the proximity of the Mahoning River. Most likely, this river serves as a wildlife corridor for many animal species. Canada geese have been observed within and around the onsite, manmade reservoir. However, no known habitat exists to support animal species at the depot, despite incidental use by some wildlife (Cash 1998c:11).

3.4.7.2 Sensitive Habitats and Species

The U.S. Department of Interior, Fish and Wildlife Service has identified wetland areas immediately adjacent to the east-central perimeter of the Warren Depot. The wetland was classified as palustrine (P), open water, intermittently exposed/permanent (Z), and excavated (x), or POWZx (USACE 1999b:3-3). However, there are no known wetland areas present at the Warren Depot (Cash 1998c:11). Furthermore, no endangered, threatened, or rare species have been reported to be located on site or in the vicinity of the depot (Cash 1998c:12; USACE 1999b:3-4).

3.4.8 Cultural Resources

No prehistoric archaeological or historic resources were discovered during a survey of the Warren Depot. If archaeological resources exist within the boundaries, they are deeply buried and most likely are protected from disturbance by the thick layer of slag on which the depot was built (DeLeon and Whetsell 1999b:13-15).

An offsite survey indicated that two prehistoric sites are recorded within a 1-mi (1.6-km) radius of the depot. The Morgan site lies across the Mahoning River from the depot and was at one time an apparently rich site. The second site, a small remnant of an Early Woodland village, is also situated on the other side of the Mahoning River from the depot, approximately 1.5 mi (2.4 km) upstream from the Morgan site (DeLeon and Whetsell 1999b:5).

The architectural survey concluded that of the 15 buildings and 1 reservoir structure identified in preliminary assessments, none are eligible for individual or district nomination to the NRHP. The depot is not eligible as a historic district due to damage inflicted during a 1986 tornado, and no individual structure is eligible because there are no buildings on the depot that represent an exceptional architectural design or construction method (DeLeon and Whetsell 1999b:14-15).

When Ohio became a state in 1803, American Indian tribes claimed parts of northern and northwestern Ohio. Although they fought hard to retain this land, by 1843 the United States had sent away the remaining Indian tribes (OHS 2000). At the time of the 2000 census, there were 16,515 Native Americans residing in Ohio, of which 221 were residing in Trumbull County (DOC 2001e, 2001f).

However, there are no federally recognized tribes or any groups being considered for tribal recognition currently in Ohio (AIHF 2000; DOC 2001e, 2001f).

3.4.9 Land Use and Visual Resources

3.4.9.1 Land Use

Land use at the Warren Depot is considered to be light industrial. The depot contains 14 buildings, 7 of which are warehouses. There are also outdoor stockpile areas located on site (Cash 1998c:2; USACE 2000d:2-1). The depot is bordered on the east by the Conrail Railroad (formerly the Penn Central Railroad), on the northeast by WCI Steel, and on the northwest, west, and south by the Mahoning River floodplain. The river is used for fishing, boating, skiing, and swimming. A manmade lake, used by a private fishing club, is located along the northeast property boundary (USACE 2000d:2-1, 3-8). Land use in the surrounding area is largely industrial, with some open space areas along the Mahoning River corridor (Newbrough 2001).

DNSC currently anticipates turning over the Warren Depot to American Premier Underwriters, Inc. (formerly The Penn Central Corporation) by 2018 (Lynch 2002b; Stacey 2000), although the current lease expires in 2010 (Cangro 2002). However, formal plans for the potential closure, disposal, or reuse of the facility have not been developed (Lohrbach 2001).

3.4.9.2 Visual Resources

The developed areas of the Warren Depot are consistent with BLM's VRM Class III or IV. Class III includes areas in which there have been moderate changes in the landscape that could attract attention, but do not dominate the view of the casual observer. Class IV includes areas in which major modifications to the character of the landscape have occurred. These changes may be dominant features of the view and the major focus of viewer attention (DOI 1986:app. 2). However, no structures located at the depot exceed 25 ft (7.6 m) in height (DNSC 2001d:3). The viewshed around the Warren Depot consists mainly of industrial areas, woodlands, and some private residences, a range that encompasses VRM Class II (where visible changes to the character of the landscape are low and do not attract the attention of the casual observer), Class III, and Class IV (DiMarzio 2000c).

3.4.10 Infrastructure

Site infrastructure includes those utilities and other resources (see Table 3.4–1) required to support operation of mission-related facilities.

3.4.10.1 Transportation

The Warren Depot is located on Niles Warren River Road in Warren, Ohio. The depot is located within 12 mi (19 km) of two major interstates, I–80 and I–76, as well as State Route 11. A series of rail spurs off of the Conrail Railroad line extend east across the depot.

3.4.10.2 Electricity

Electricity is purchased from Ohio Edison Electric and is transported to the site via utility poles. The depot is responsible for repairs to electric lines within its fence line (Pittano 2000).

Table 3.4–1. Warren Depot-wide Infrastructure Characteristics

Resource	Current Usage	Site Capacity
Transportation		
Roads (mi)	1.0	1.0
Railroads (mi)	2.8	2.8
Electricity		
Energy consumption (MWh/yr)	416	(a)
Fuel		
Natural gas (ft^3/yr)	0	0
Oil (gal/yr)	7,500	4,350[b]
Coal (ton/yr)	0	0
Gasoline (gal/yr)	1,500	970[c]
Water (gal/yr)	44,800	262,800,000

[a] Local utility provided; no capacity available.
[b] Includes capacity of five refillable underground storage tanks.
[c] Refillable storage tank.
Source: Lynch 2001a, 2001c; Pittano 2002a, 2002b.

3.4.10.3 Fuel

Fuel oil is provided by North West Fuel and is used for heating and forklifts. It is stored on site in five underground storage tanks (Pittano 2000). Gasoline is also stored on site in one underground storage tank and is used to operate site equipment, such as forklifts, etc. These tanks are refilled throughout the year, depending upon demand. A small number of forklifts also use propane; however, the total amount of propane used is small and there is no bulk storage on site (Pittano 2002a).

3.4.10.4 Water

Through the use of underground water mains, water is supplied to the depot by the town of Niles (Pittano 2000). A 0.3-acre (0.1-ha) water storage reservoir is maintained on site for fire suppression (Cash 1998c:10).

3.4.10.5 Site Safety Services

Security for the facility is provided by a private security firm. Armed security personnel are present at the depot 24 hours a day, and regular patrols are made of the property. Entrance to the depot is controlled by an 8-ft (2.4-m) high barbed-wire fence. Access is only through one gate, which is a controlled-access point. Persons seeking entry to the depot must present valid identification (DLA 2000b).

Mercury is stored in one warehouse building at the depot. Access to the area is under strict control. Entry to the warehouse is through a roll-up door, which is locked when the warehouse is unoccupied. A security tag is also attached to the door to ensure that unauthorized access to the warehouse has not been attempted (DLA 2000b).

Inspections of facilities and materials stored at the depot are performed weekly. Results of the inspections and the resolution of problems are recorded on site inspection reports. The Weatherfield Volunteer Fire Department is located 5 mi (8 km) from the depot and would be the primary responder to any incident (fire, hazardous spill, accident) at the depot (Pittano 2002b). The Trumbull County

Emergency Management Agency located in Warren, Ohio, is the lead agency in the event of an emergency incident at the depot.

3.4.11 Environmental Justice

Under Executive Order 12898 (59 FR 7629), DNSC is responsible for identifying and addressing disproportionately high and adverse impacts on minority or low-income populations. As discussed in Appendix G, minority persons are those who identify themselves as American Indian or Alaska Native, Asian, Black or African American, Hispanic or Latino (of any race), Native Hawaiian or Other Pacific Islander, or multiracial (CEQ 1997). Persons who report that their income is less than the Federal poverty threshold are designated as low-income persons.

Figure 3.4–2 shows populations residing in Trumbull County as reported in the 1990 census and the 2000 census (DOC 1992, 2001g). In this figure, lightly shaded bars show populations in 1990, while the darker bars show those in 2000. In the decade between 1990 and 2000, the total population of Trumbull County decreased by approximately 1 percent, while the minority population increased by nearly 19 percent. The 2000 census found that Black/African American residents of the county comprised approximately 84 percent of the total minority population. Persons who declared that they are multiracial and not Hispanic/Latino are included in the minority population shown in Figure 3.4–2. They comprised approximately 11 percent of Trumbull County's total minority population.

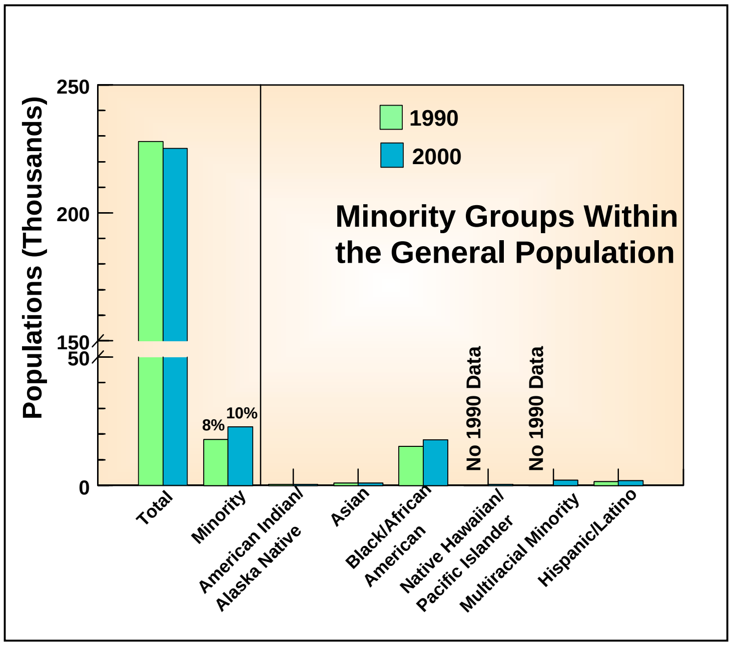


Figure 3.4–2. Populations Residing in Trumbull County, Ohio, in 1990 and 2000

The 2000 census was the first decennial census in which multiracial selections were counted. There is no data for this category available from the 1990 census. Also, during the 1990 census, Asian and Pacific Islander designations were placed together in a single category, whereas during the 2000 census, Native Hawaiians and Other Pacific Islanders were counted separately from Asian respondents. Therefore, as indicated in Figure 3.4–2, direct comparison of 1990 census data and 2000 census data for these two categories is not possible.

Nationwide, approximately 2 percent of the population identified themselves as multiracial (DOC 2001h). Although the CEQ has not yet revised their environmental justice guidance to address multiracial responses, in this MM EIS the total multiracial population was included in the minority population for the year 2000.

The minority population of Trumbull County is not representative of that for the State of Ohio as a whole. Minority residents of the State of Ohio comprised approximately 16 percent of the total resident population. Black residents of Ohio comprised approximately 72 percent of the total minority residents of the state. Ohio residents who declared that they were not Hispanic and of two or more races comprised approximately 9 percent of the total minority population.

Approximately 36,765 minority individuals and 27,618 low-income persons lived within 10 mi (16 km) of the Warren Depot in 2000 (DOC 2001g, 2002a). The majority population residing in the same area in 2000 was approximately 205,449 persons. Figure 3.4–3 shows the cumulative percentage of these populations residing at a given distance from the Warren Depot in 2000. For example, Figure 3.4–3 indicates that 50 percent of all three populations lived within 6 mi (9.6 km) of the Warren Depot.

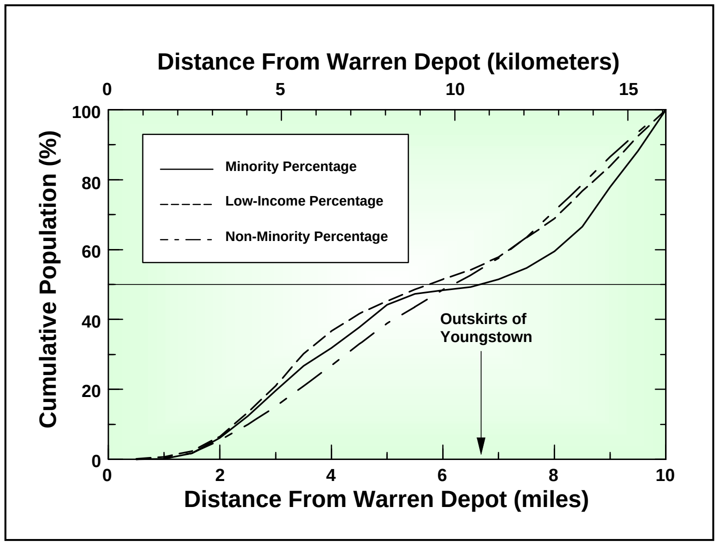


Figure 3.4–3. Percent Resident Populations Within 10 Miles of the Warren Depot

3.5 Y–12

Y–12 is located in Anderson County, Tennessee. Located on DOE's 34,516-acre (13,968-ha) Oak Ridge Reservation (ORR) in eastern Tennessee, it is approximately 18 mi (29 km) west of the city of Knoxville. The main area of Y–12 consists of approximately 811 acres (328 ha) of land owned by the Federal Government (Hamilton et al. 1999:summ. 2). The developed portions of the city of Oak Ridge form much of the northern boundary of ORR. The Tennessee Valley Authority's Melton Hill Reservoir and the Clinch River form the eastern and southern boundaries of ORR.

The storage location for DNSC's mercury is in a building in the southern portion of Y–12. Figure 2–5 shows the layout of Y–12. The nearest site boundary is located approximately 0.6 mi (1 km) south of the mercury storage building (Bosma 2000). The building is 13,500 ft^2 (1,254 m^2), has a concrete floor, solid block wall construction, ceiling air vents, and a dry-pipe (water supply) fire suppression system. Although the building is vented, there are no floor drains through which leaked or spilled materials could escape. The floor is sealed with a leak-proof, seamless coating that will not allow penetration by mercury.

There are approximately 772 tons (700 metric tons) of DNSC mercury stored in 20,276 76-lb (34-kg) seamless low carbon steel flasks.

3.5.1 Meteorology, Air Quality, and Noise

3.5.1.1 Meteorology

The climate at ORR may be classified as humid continental, but is moderated by the influence of the Cumberland and Great Smoky Mountains. Winters are mild and summers are warm, with no noticeable extremes in precipitation, temperature, or winds (DOE 1996:3-192). The average annual precipitation is 54.5 in (138.4 cm), including about 9.3 in (24 cm) of snowfall. Average annual snowfall is 12 in (30 cm); the maximum snow depth, 15 in (38 cm), occurred in 1993 (NCDC 2001e).

Prevailing winds at ORR generally follow the valleys—up the valleys from the southwest daytime winds, or down the valleys from the northeast during the nighttime winds. Wind speed is less than 7.4 mph (11.9 m/s) 75 percent of the time. Tornadoes and winds exceeding 18 mph (3 m/s) are rare, although in February 1993 a tornado struck the east end of Y–12, uprooting trees but causing minimal damage to buildings and equipment (Hamilton et al. 1999:1-2–1-4). Two tornadoes were reported in Anderson County between January 1950 and December 2000. Several occurrences of high winds usually associated with thunderstorm activity typically occur every year (NCDC 2001f). The mean number of days per year with thunderstorm activity is 47.3 (NCDC 2001e). The mean number of days per year with one or more tornadoes within 25 mi (40 km) of Y–12 is 0.6 (NSSL 2002). The average annual wind speed is 4.1 mph (1.8 m/s). The maximum wind speed at Knoxville (based on the minimum for 1 mile of wind to pass) is 64 mph (29 m/s) (NOAA 2000).

The average annual temperature is 57.2 °F (14.0 °C). Average monthly temperatures range from a minimum of 36 °F (2.2 °C) in January to a maximum of 76.8 °F (24.9 °C) in July. Extremes of temperature range from a low of -24 °F (-31 °C) to a high of over 100 °F (38 °C) (Hamilton et al. 1999:1-2–1-4).

3.5.1.2 Air Quality

Y–12 is located in Anderson County in the Eastern Tennessee and Southwestern Air Quality Control Region (#207), which is designated as better than national ambient air quality standards for sulfur dioxide and better than national standards or unclassifiable for nitrogen dioxide. The area is unclassifiable regarding attainment of the standards for carbon monoxide. Under EPA's rule change that reinstated the 1-hr ozone standard, the area is unclassifiable regarding attainment of the standard for ozone (EPA 2000a). EPA has not assigned attainment status designation for lead. The attainment status for total suspended particulates is better than national standards (EPA 2000e).

One PSD Class I area can be found in the vicinity of ORR. A Class I area is one in which very little increase in pollution is allowed due to the pristine nature of the area. This area, the Great Smoky Mountains, is located 30 mi (48 km) southeast of ORR. ORR and its vicinity are classified as a Class II area in which more moderate increases in pollution are allowed. No PSD permits are required for any emission source at ORR (DOE 1996:3-192).

The primary sources of criteria pollutants at ORR are the steam plants at the Oak Ridge National Laboratory, Y–12, and the East Tennessee Technology Park. Other emission sources include the Toxic Substances Control Act incinerator, various process sources, vehicles, temporary emissions from construction activities, and fugitive particulate emissions from coal piles (DOE 1996:3-192; Hamilton et al. 1999). Sources of mercury emissions to the air include the Toxic Substances Control Act incinerator at East Tennessee Technology Park and coal and natural gas burning at the Y–12 steam plant. Y–12 has 36 individual air permits (Hughes et al. 2002:4-3, 6-2, 6-5).

The existing ambient air pollutant concentrations attributable to sources at ORR are presented in Table 3.5–1. These concentrations are based on dispersion modeling, using emissions for the year 1998 (Hamilton et al. 1999).

Table 3.5–1. Modeled Ambient Air Concentrations from Oak Ridge Reservation Sources in 1998 and Regional Ambient Monitored Concentrations in 2000

Pollutant	Averaging Period	Ambient Standard[a] (μg/m^3)	ORR Contribution to Ambient Concentrations (μg/m^3)	Offsite Monitored Concentrations (μg/m^3)
Carbon monoxide	8 hours	10,000[b]	8.05	3,570
	1 hour	40,000[b]	27.1	5,180
Nitrogen dioxide	Annual	100[b]	1.58	24.4
Ozone	1 hour	235[c]	(d)	220
Lead	Maximum quarterly	1.5[b]	(e)	0.06
	Annual	50[b]	1.6	32
PM_{10}	24 hours	150[b]	12.7	84
Sulfur dioxide	Annual	80[b]	4.86	8.
	24 hours	365[b]	35.7	68
	3 hours	1,300[b]	112.	390
Total suspended particulates	24 hours	150[f]	2[g]	(h)

[a] The more stringent of the Federal and state standards is presented if both exist for the averaging period. The National Ambient Air Quality Standards (40 CFR 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 mean particulate matter with an aerodynamic diameter less than or equal to 10 microns standard is attained when the expected annual arithmetic mean concentration is less than or equal to the standard.

[b] Federal and state standard.

[c] Federal 8-hr standard is currently being implemented.

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

[e] No lead concentrations have been modeled.

[f] State standard.

[g] Based on stack emissions of particulate matter only.

[h] Total suspended particulates concentrations are not available.

Note: Emissions of hazardous air pollutants not listed here have been identified at ORR, but are not associated with activities related to mercury management. EPA revised the ambient air quality standards for particulate matter and ozone in 1997 (62 FR 38652, 62 FR 38856). These standards are currently being implemented, but monitoring data is not currently available for comparison for the new standards.

Source: 40 CFR 50; DOE 2000:3-8; EPA 2001j; Hamilton et al. 1999; TDEC 1999a.

The closest offsite monitors are operated by the Tennessee Department of Environment and Conservation in Anderson County and the city of Knoxville. Ambient concentrations for these monitors for 2000 are shown in Table 3.5–1. Monitored concentrations in the area and modeled contributions to concentrations from ORR activities are well below ambient standards.

Mercury vapor concentrations are routinely measured inside the warehouse during periodic inspections (see Section 3.5.4.2).

Two ambient air monitoring stations for mercury were operated during 2001 at Y–12. The monitor at the west end of Y–12, along the boundary, is closest to the mercury storage building. The annual average ambient mercury concentration, 0.0042 μg/m^3, at this monitoring site is comparable to background levels measured on Chestnut Ridge, and is only slightly elevated above continental background concentrations (i.e., about 0.002 μg/m^3). Monitored concentrations are well below the EPA reference concentration (0.3 μg/m^3) for mercury for chronic inhalation exposure and the American Conference of Governmental

Industrial Hygienists workplace threshold limit value of 25 µg/m^3 (time-weighted average for a normal 8-hr workday and 40-hr work week) (Hughes et al. 2002:6-4–6-6).

3.5.1.3 Noise

Major noise emission sources within Y–12 include various industrial facilities, equipment, and machines—boilers, construction and materials-handling equipment, cooling systems, engines, paging systems, alarms, pumps, steam vents, transformers, and vehicles. Most Y–12 industrial facilities are at a sufficient distance from the site boundary so noise levels at the boundary from these sources are not distinguishable from background noise levels (DOE 1996). No noise complaints have been received from the public in the last 5 years (Morris 2002).

EPA guidelines for environmental noise protection recommend a day-night average sound level of 55 dBA as sufficient to protect the public from the effects of broadband environmental noise in typically quiet outdoor and residential areas (EPA 1974). Land-use compatibility guidelines adopted by the Federal Aviation Administration and the Federal Interagency Committee on Urban Noise indicate that yearly day-night average sound levels less than 65 dBA are compatible with residential land use, and levels up to 75 dBA are compatible with residential uses if suitable noise reduction features are incorporated into structures (14 CFR 150).

The State of Tennessee has not established specific community noise standards applicable to Y–12. The city of Oak Ridge has specific acceptable sound levels at property lines. Maximum allowable noise limits for the city of Oak Ridge are presented in Table 3.5–2 (City of Oak Ridge 1999).

Table 3.5–2. City of Oak Ridge Maximum Allowable Noise Levels Applicable to the Oak Ridge Reservation

	Maximum Sound Level (dBA)		
Adjacent Use	**L_{50}**	**L_{10}**	**Maximum Limit**
Residential			
7 a.m.–10 p.m.	65	70	80
10 p.m.–7 a.m.	55	60	75
Business			
7 a.m.–12 midnight	70	75	80
12 midnight–7 a.m.	70	75	80
Industrial			
7 a.m.–12 midnight	75	NA	80
12 midnight–7 a.m.	75	NA	80

Note: L_{10} sound level, expressed in dBA, which is exceeded 10 percent of the time for a 1-hr period. L_{50} sound level, expressed in dBA, which is exceeded 50 percent of the time for a 1-hr period.

Key: NA, not applicable.

Source: City of Oak Ridge 1999.

Sound-level measurements have been recorded at various locations within and near ORR in the process of testing sirens and preparing support documentation for the Atomic Vapor Laser Isotope Separation site. The acoustic environment along the Y–12 site boundary in rural and residential areas away from traffic noise is typical of a rural location, with the day-night average sound level in the range 35 to 50 dBA. Areas near the site within Oak Ridge are typical of a suburban area, with average day-night sound levels in the range of 53 to 62 dBA. Traffic is the primary source of noise at the site boundary and at residences located near roads. During peak hours, the Y–12 worker traffic is a major contributor to traffic noise levels in the area (DOE 1996). It is expected that for most residences near ORR, the day-night average sound level is less than 65 dBA, and is compatible with the residential land use, although for some residences along major roadways noise levels may be higher (DOE 2000). Roads that provide access to Y–12 from I–40 include TSR 58, TSR 95, and Pellissippi Parkway for which average daily traffic flows (vehicles per day) are 11,600, 8,058, and 33,180, respectively (DOE 2001:4-18; TDOT 2000). Rail transport is available at Y–12, but is not currently being used, and therefore does not contribute to sound levels.

3.5.2 Waste Management

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

Hazardous, low-level radioactive, mixed (both low-level radioactive and hazardous), and nonhazardous wastes are the major waste types generated by routine operations at Y–12. Only hazardous and nonhazardous wastes are discussed in this MM EIS because neither routine nor non-routine activities involving the mercury stockpile at Y–12 would be expected to generate waste containing radioactive materials. Y–12 is a RCRA large quantity generator.

RCRA-regulated waste is generated through a variety of production and maintenance operations. The major sources of hazardous wastes are plating rinse waters, waste oil, and solvents from machining and cleaning operations; contaminated soil, soil solutions, and soil materials from RCRA closure activities; and waste contaminated with hazardous constituents from construction and demolition activities (DOE 2001:A-32). The majority of RCRA-regulated waste is in solid form. Some hazardous waste may be treated on site, then disposed of as nonhazardous. The remaining hazardous waste is shipped off site for treatment and disposal at either DOE or commercial facilities (DOE 2001:4-84). Approximately 16.5 tons (15.0 metric tons) of hazardous waste (including waste regulated under the Toxic Substances Control Act, i.e., polychlorinated biphenyl wastes) were generated in fiscal year 2000, 14.3 tons (13.0 metric tons) from routine operations and 2.2 tons (2.0 metric tons) from cleanup and stabilization activities (DOE 2001).

Major activities that generate nonhazardous waste include construction and demolition activities that produce large volumes of non-contaminated wastes, including lumber, concrete, metal objects, soil and roofing materials. Industrial trash is generated by daily operations throughout the plant, including janitorial services, floor sweepings in production areas, and production activities (DOE 2001:A-34). Of the 8,545 tons (7,752 metric tons) of solid nonhazardous waste generated at Y–12 in fiscal year 2000, 2,688 tons (2,438 metric tons) were from routine operations and 5,858 tons (5,314 metric tons) were from cleanup and stabilization activities (DOE 2001). Assuming a density of 20 lbs/ft^3, 2,688 tons (2,438 metric tons) of solid nonhazardous waste equals 9,956 yd^3 (7,612 m^3). The *Final Y–12 Site-wide EIS* states that by 2006, more than 95 percent of the current remediation activities will be completed (DOE 2001:4-87).

Industrial wastewater is discharged from several locations through NPDES-permitted outfalls. Sanitary wastewater is discharged to the city of Oak Ridge publicly owned treatment works. The wastewater is monitored for a number of organic and inorganic constituents prior to discharge to the publicly owned treatment works in accordance with its Industrial and Commercial Users Wastewater Permit (White et al. 2000:6-11). Approximately 40 million gal (150 million l) of sanitary wastewater are estimated to be discharged annually.

Excess treatment and disposal capacity exists both on site and off site for hazardous waste, and there are a number of onsite areas for storage of hazardous wastes. Although exceedances of the 1-yr storage limit for hazardous waste are possible, routine shipments of hazardous waste for disposal should be adequate to prevent such an occurrence (DOE 2001:4-84, 4-85).

3.5.3 Socioeconomics

Y–12 is located in the Anderson County, Tennessee, portion of ORR. Therefore, all statistics for the local economy, population, housing, and community services as defined in Appendix E, will be presented for Anderson County only. In 2000, Y–12 employed approximately 8,900 workers, including DOE employees and contractors (about 25.1 percent of the county's 2000 civilian labor force) (DOE 2001:4-21; DOL 2001).

3.5.3.1 Regional Economic Characteristics

From 1990 to 2000, the civilian labor force in Anderson County increased by 8.3 percent to 35,461 persons. In 2000, the unemployment rate for the county was 3.6 percent, which was less than the 2000 unemployment rate for Tennessee (3.9 percent) (DOL 2001).

3.5.3.2 Population and Housing

In 2000, the population of Anderson County totaled 71,330. From 1990 to 2000, the county's population grew by 4.5 percent, compared with the 16.7 percent growth in Tennessee (DOC 2001a, 2001b, 2001c). The percentage of the county's population under the age of 5 is 5.6 percent with women age 18 to 40 comprising 17.8 percent (DOC 2001d). In 2000, the total number of owner and renter housing units in the county was 32,451, of which 66.5 percent were owner occupied; 25.2 percent, renter occupied; and 8.2 percent, vacant (DOC 2001a).

3.5.3.3 Community Services

3.5.3.3.1 Education

In 2000, student enrollment in Anderson County was 6,849, and there were 518 teachers, for a student-to-teacher ratio of 13.2:1 (DOE 2000:L-2).

3.5.3.3.2 Public Safety

In 2000, 158 sworn police officers served Anderson County, with a ratio of 2.23 officers per 1,000 persons. In 2000, 285 paid and volunteer firefighters provided fire protection services in the county. The average ratio was 4.01 firefighters per 1,000 persons (DOE 2000:L-3).

3.5.3.3.3 Health Care

In 2000, 185 physicians served Anderson County (DOE 2000). The average ratio was 2.6 physicians per 1,000 persons. In 1995, there were two hospitals in the county, with a total of 313 hospital beds (AHA 1995).

3.5.4 Human Health Risk

3.5.4.1 Health Effects Studies

Health effects studies involving mercury exposure have been conducted in the vicinity of Y–12. Studies were conducted that evaluated exposure to workers and the public. Mercury was used at Y–12 in the 1950s and 1960s in a process that separated isotopes of lithium. As a result of facility operations, mercury was released into the atmosphere and into East Fork Poplar Creek. Releases to the creek resulted in contamination of some floodplain soil, vegetation, and aquatic biota, including edible fish. The releases originated from chemical engineering processes in the 1950s and 1960s and have continued as a result of migration of mercury spilled during those processes. None of the releases have been attributed to the storage of DNSC mercury.

A health effect study conducted by Cragle et al. (1984) of the Oak Ridge Associated Universities evaluated workers involved with mercury-related processes. This study evaluated the rate of mortality and cancer for workers who had mercury detected in urine samples between 1953 and 1972. The overall death rate and the rate of all cancers were not significantly different between the workers and an unexposed group. The study concluded that industrial mercury use at Y–12 did not result in elevated rates of mortality and cancer. However, another study concluded that there were adverse health effects in mercury workers who had been exposed in the 1950s and early to mid 1960s (Albers et al. 1988). This study also was conducted on workers who had mercury detected in urine samples, but was conducted between 20 to 35 years after the workplace exposures. Documented symptoms include decreased strength, coordination, and sensation and tremor. These symptoms were attributed to direct exposure to mercury in the workplace or secondary exposure to mercury adhering to clothing.

A study evaluating resident exposure to mercury was performed by the Centers for Disease Control and Tennessee Department of Health and Environment (Rowley et al. 1985). In this study, hair and urine samples were analyzed for mercury content. Samples were collected from residents of the East Fork Poplar Creek floodplain and Scarboro and workers who had been exposed to contaminated soil during construction of a sewer line. Hair samples of persons who ate a large amount of locally caught fish were analyzed. These sample results were compared with those from groups with no known exposure to environmental mercury. No significant differences in mercury levels among the three groups were observed.

The Oak Ridge Health Agreement Steering Panel was formed in the early 1990s to provide oversight of remediation activities and to collect and organize input from the public about the remediation. One of its tasks was to estimate doses to the public from past releases of contaminants from Y–12 and estimate the potential for harm to the public. They concluded that harm to the surrounding population may have resulted from release of mercury (ORHASP 1999). The highest mercury exposures were to farm families along East Fork Poplar Creek and to children in the Scarboro community near Y–12. Exposure occurred through inhalation of mercury vapors, contact with contaminated water and sediment, ingestion of produce grown in contaminated floodplain soil, and ingestion of contaminated fish. Fetuses of women who regularly consumed fish from Watts Bar Lake, the Clinch River, and the Tennessee River are likely to have received doses of methyl mercury above the RfD of 0.0001 mg methyl mercury per kilogram of body weight per day (a limit established by EPA to protect the population from toxic effects of chemicals) (TDH 2000).

In 1997, the Agency for Toxic Substances and Disease Registry reported a study of people who regularly ate fish and/or turtles caught in Watts Bar Lake (DOE 2001). The study evaluated levels of mercury in the blood of 116 people. Only one individual had an elevated mercury concentration (i.e., above 10 µg/l). Mercury levels in the rest of the study group were similar to those in the general population.

The health of the DNSC workers who inspect mercury stored at Y–12 has been monitored since 1990 through a medical surveillance program conducted by the U.S. Public Health Service. The surveillance program includes periodic physical examinations and an occupational exposure history. For a period of one year, biological monitoring was conducted for mercury levels in all stockpile employees; no elevations of mercury were detected. Currently, biological monitoring is only performed in cases of reported exposure. As of 2001, no adverse health effects from mercury exposure to any DNSC Y–12 worker have been documented by the U.S. Public Health Service (Holland 2001).

3.5.4.2 Accident History

All mercury stored at Y–12 was transferred into new seamless flasks in 1975 and is not expected to leak. The interior of the storage building is monitored periodically for mercury vapors. Review of the mercury inspection reports since December 1999 showed that all mercury vapor readings have been below the instrument's limit of detection (approximately 0.005 mg/m^3). Mercury concentrations in the vicinity of the mercury storage building were reported in the *Upper East Fork Poplar Creek Catchment Area Remedial Investigation Report*. Concentrations in surface soil near the building ranged from less than 1 mg/kg to 10 mg/kg, whereas mercury concentrations in soil farther east ranged as high as 1,000 mg/kg (DOE 1998). Two surface water outfalls reported mercury concentrations less than 0.5 µg/l, and mercury was not detectable above 0.2 µg/l in groundwater immediately downgradient from the building.

The potential for accidents from human error, equipment failure, or natural phenomena can result in releases of stored mercury. There have been no accidents during storage and handling of DNSC mercury at Y–12 that have resulted in exposures to facility workers or releases outside the building.

3.5.4.3 Emergency Preparedness

Y–12 is operated by DOE and follows DOE-required protocols for emergency response. The Plant Shift Superintendent is notified of any release or potential release of mercury. The initial actions taken by trained Y–12 workers involve locating any leaks and minimizing any offsite movement of mercury or its vapors. Y–12 has a 24-hr hazardous materials response team to respond to leaks that threaten to escape the storage building. Y–12 also has emergency medical technicians to provide emergency medical care and transportation to the onsite medical facilities. Y–12 has an ongoing relationship with the Methodist Medical Center in Oak Ridge where severely injured individuals would be transported. All of the Oak Ridge-based DOE-operated plants have mutual aid agreements with the Oak Ridge Fire Department to provide supplemental support for fire fighting or medical assistance. The Oak Ridge Fire Department, upon notification, could reach the ORR within 3 minutes (Nemeth 2002f). Any release to the environment would also be reported to the Tennessee Emergency Management Agency who would oversee the response, notify appropriate regulatory agencies, and coordinate the remediation response. If needed, Tennessee Emergency Management Agency could reach Y–12 within 1 hour or less (Nemeth 2002g). Also, DNSC would be notified of any mercury release or mercury-related injury that occurs at the Y–12 mercury facility.

3.5.5 Geology and Soils

Y–12, within ORR, lies in the southwestern portion of the Valley and Ridge Physiographic Province of east-central Tennessee. Y–12 is specifically located in Bear Creek Valley between Pine and Chestnut Ridges (DOE 2000:3-18). The topography within ORR ranges from a low of 750 ft (229 m) above mean sea level along the Clinch River to a high of about 1,260 ft (384 m) above mean sea level along Pine Ridge, north of Y–12. Within ORR, the topographic relief between the valley floors and ridge crests is generally about 300 to 350 ft (91 to 107 m) (DOE 2001:4-23). Most of Y–12 lies at an elevation of approximately 1,000 ft (305 m) above mean sea level (USGS 1989).

Y–12 is located in Bear Creek Valley, which is underlain by the Conasauga Group, consisting of fractured and jointed shales, calcareous siltstones, and silty-to-clean limestones (DOE 2000:3-18; 2001a:4-26). The Rome Formation which is present north of Y–12 and Bear Creek Valley and forms Pine Ridge, consists of massive to thinly bedded sandstones interbedded with minor amounts of thinly bedded, silty mudstones, shales, and dolomites. The Knox Group forms Chestnut Ridge immediately to the south of Y–12. This group is divided into five formations of dolomite and limestone. The Knox Group weathers to a thick, orange-red, clay residuum that consists of abundant chert and contains karst features such as sinkholes, large solution cavities, sinking streams, and caves. Karst features, including large fractures, cavities, and conduits, are most widespread in the Knox Group and in the Maynardville Limestone member of the Conasauga Group, a formation that underlies the southern strip of Y–12 abutting Chestnut Ridge. These cavities and conduits are often connected and are typically found at depths greater than approximately 100 ft (30 m) (DOE 2001:4-23–4-26).

With the exception of strata suited to hard-rock quarrying for stone and aggregate (e.g., limestone, shale), no unique or economically viable geologic resources have been identified within ORR (DOE 2000:3-18). Several quarries are mapped within the confines of ORR in addition to a number of caves and numerous sinkholes as mentioned above (DOE 2001:4-23, 4-27).

There is no evidence of active faults in the Valley and Ridge Physiographic Province or within the sedimentary rocks comprising the Appalachian Basin structural feature, where ORR is located (DOE 2000:3-18). The nearest active faults are approximately 298 mi (480 km) northwest of ORR in the New Madrid (Reelfoot rift) fault zone (DOE 2000:3-18; 2001a:4-26). The most notable surface expression of this active faulting is the Reelfoot scarp that is a topographic escarpment or long ridge that extends from the town of New Madrid, Missouri, southeast into extreme northwestern Tennessee (Crone and Wheeler 2000:13, 37, 38). Historical earthquakes occurring in the Valley and Ridge of Tennessee are not attributable to fault structures in underlying sedimentary rocks, but rather occur at depth in basement rock (DOE 2000:3-18).

ORR lies between two regions that have produced major earthquakes in the past. A series of earthquakes occurred during the winter of 1811 and 1812 in northeastern Arkansas and neighboring Missouri (known as the Mississippi Valley or New Madrid earthquakes) located some 370 mi (595 km) west of ORR. The maximum estimated magnitude of these events was 7.9 with a MMI of XI at the epicenter, and they were felt over large areas of the south, southeast, and northeast United States. Observed intensities across eastern Tennessee were in the MMI VI range. Second to the New Madrid earthquakes in intensity, the Charleston, South Carolina, earthquake of 1886 was located about 310 mi (499 km) southeast of ORR and had an estimated magnitude of 7.0 and produced a MMI of up to X (USGS 2001l). This earthquake is estimated to have produced effects at ORR also in the range of MMI VI. Within a radius of 100 mi (161 km) of ORR and Y–12, a total of 15 significant earthquakes (i.e., having a magnitude of at least 4.5 or a MMI of VI or larger) have been documented going back to 1779 (USGS 2001m). The closest and most recent of these significant earthquakes in eastern Tennessee occurred on November 30, 1973, in Maryville, Tennessee. It had a body-wave magnitude of 4.7 with an epicenter located about 19 mi (30 km) southeast of Y–12. This earthquake produced a MMI of V to VI at ORR (DOE 2000:3-18; USGS 2001n).

Earthquake-produced ground motion is expressed in units of percent "g" (force of acceleration relative to that of the earth's gravity). Two differing measures of this motion are peak (ground) acceleration and response spectral acceleration (see Appendix E, Section E.6.1). New seismic hazard metrics and maps developed by the USGS have been adapted for use in the *International Building Code* and depict a maximum considered earthquake ground motion of 0.2- and 1.0-second spectral acceleration, respectively, based on a 2 percent probability of exceedance in 50 years (ICC 2000; USGS 2001c). This corresponds to an annual probability of occurrence of about 1 in 2,500. This corresponds to an annual recurrence interval of about 1 in 2,500. Appendix E, Section E.6.1 provides a more detailed explanation of these maps. Y–12 lies within the 0.50g to 0.51g mapping contours for a 0.2-second spectral response acceleration and the 0.14g to 0.15g contours for a 1.0-second spectral response acceleration. For comparison, the calculated peak ground acceleration for the given probability of exceedance is approximately 0.27g (USGS 2001d). Based on the maximum considered earthquake ground motions, Y–12 is located in the broadly defined region of low and moderate to high seismicity. Ground motions in these regions are controlled by earthquake sources that are not well defined with estimated maximum earthquake magnitudes having relatively long return periods. Maximum considered earthquake ground motions encompass those that may cause significant structural damage to buildings and thus present safety concerns for occupants (equivalent to MMI VII and up). Specifically, maximum considered earthquake ground motions of about 0.50g at 0.2 seconds and 0.20 g at 1.0 second are representative of MMI VII earthquake damage (BSSC 2001:381, 383, 387). Table E–11 in Appendix E shows the approximate correlation between MMI, earthquake magnitude, and peak ground acceleration.

There are no volcanic hazards at ORR. The area has not experienced volcanism within the last 230 million years. No present or future volcanic activity is expected (DOE 2001:4-26).

Developed portions of Bear Creek Valley are designated as urban land in the county soil survey (DOE 2001:4-29). Soils typically range from clayey silts to silty clays. Alluvium, colluvium, manmade fill, fine-grained residuum from the weathering of the underling bedrock, saprolite, and weathered bedrock are also present. The overall thickness of these materials in the Y–12 area is typically less than 40 ft (12 m). Soil characteristics across Y–12 range from shallow to deep, steep to nearly level to rolling, well-drained and moderately well-drained soils underlain by shale, dolomite, and multicolored shale, siltstone, and sandstone (DOE 2000:3-20). Finer textured soils of the Armuchee-Montevallo-Hamblen association have been designated as prime farmland when drained (DOE 2001:4-29). However, prime farmland designation is waived within the limits of the city of Oak Ridge and across ORR with activities exempt from the Farmland Protection Policy Act (7 CFR 658) (DOE 2000:3-20).

3.5.6 Water Resources

3.5.6.1 Surface Water

The major surface water feature in the immediate vicinity of ORR is the Clinch River, which borders the site to the south and west. The Clinch River has an average flow of 4,647 ft^3/s (132 m^3/s) as measured at the downstream side of Melton Hill Dam. Drainage from Y–12 enters both Bear Creek and East Fork Poplar Creek (see Figure 3.5–1). These streams, ultimately converge and enter Poplar Creek approximately 8 mi (13 km) east of Y–12. Poplar Creek then flows into the Clinch River about 12 mi (19 km) southeast of Y–12. The average flow of Bear Creek near Y–12 is 3.9 ft^3/s (0.1 m^3/s). As further described below, the average flow in East Fork Poplar Creek has increased as flow augmentation raised the minimum flow rate to 11 ft^3/s (0.3 m^3/s) in the headwaters of Upper East Fork Poplar Creek (DOE 2000:3-10 – 3-12; 2001a:4-29, 4-30).

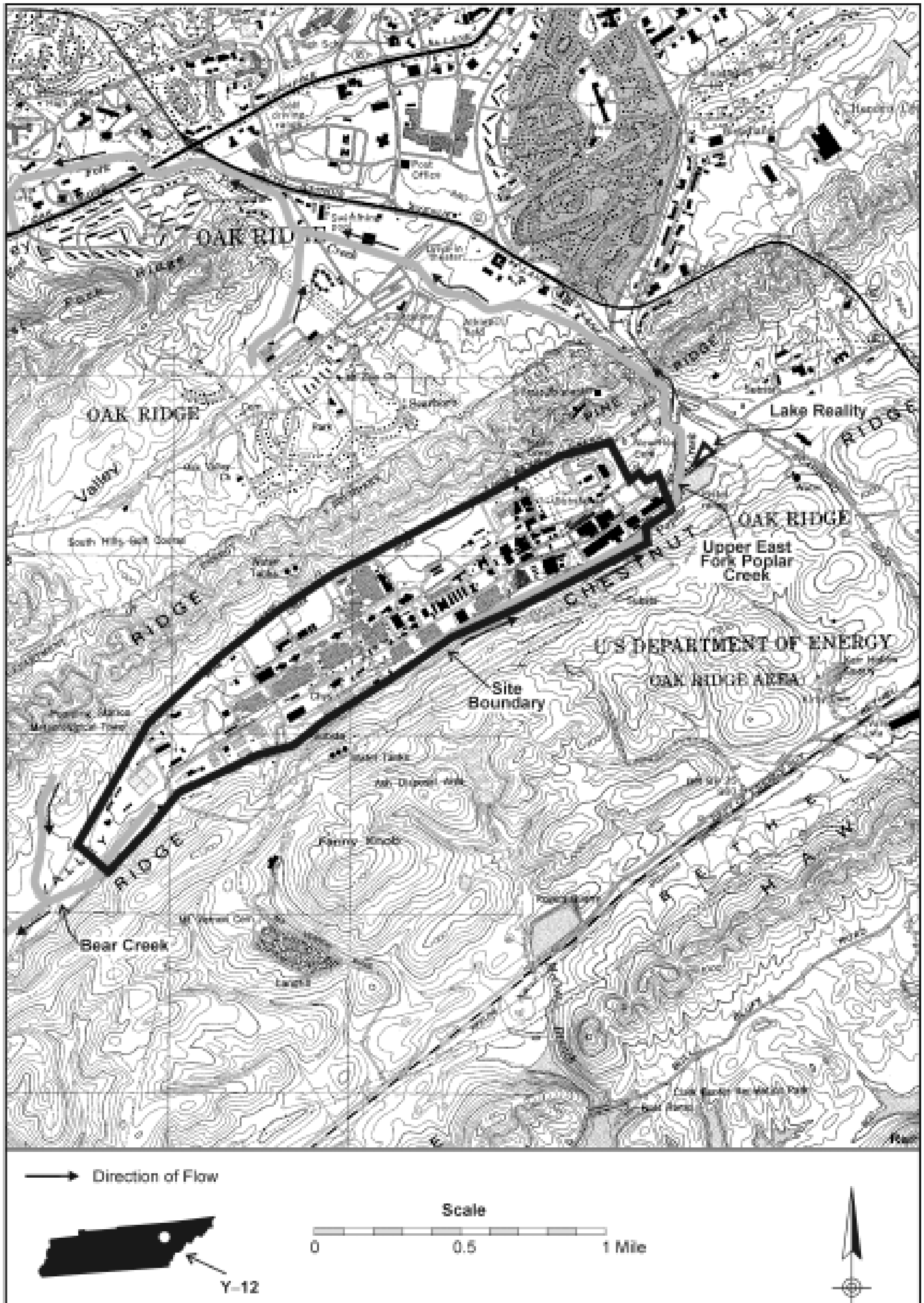
Upper East Fork Poplar Creek drains the majority of the industrial facilities within Y–12 and has been radically altered from its natural state by the construction of Y–12. The western portion of the creek flows underground through pipes, and the remaining portion flows in a modified and straightened channel lined with riprap and concrete. Flow in Upper East Fork Poplar Creek is derived partially from groundwater captured by the buried channels and funneled to the creek and from wastewater outfalls that add a combination of groundwater, storm water, and water generated by plant operations (e.g., basement sumps, treatment plant discharges). Due to reduced operations and the elimination of inadvertent and direct discharges to Upper East Fork Poplar Creek, flow in the creek has decreased from as much as 15 million gal/day (57 million l/day) in the mid-1980s to about 2.5 million gal/day (9 million l/day) in the mid-1990s (DOE 2001:4-29, 4-30). Since mid-1996, to maintain a minimum flow of 7 million gal/day (26 million l/day) and to improve downstream water quality, raw water from the Clinch River has been added to the western portion of the open channel. This flow augmentation was stipulated under Y–12's 1995 NPDES permit (DOE 2001:4-29; White et al. 2000:6-12). In contrast, Bear Creek drains the portion of Bear Creek Valley west of Y–12, but has been much less altered or affected by site activities than Upper East Fork Popular Creek (DOE 2001:4-30) (see Figure 3.5–1).

The Clinch River and connected waterways supply all raw water for ORR and provide potable water for Y–12, Oak Ridge National Laboratory, and the city of Oak Ridge. Y–12 uses approximately 1,989 million gal/yr (7,529 million l/yr) of water. The ORR water supply system, which includes the city of Oak Ridge treatment facility and the East Tennessee Technology Park treatment facility, has a capacity of 11,716 million gal/yr (44,350 million l/yr) (DOE 2001:4-30).

TVA has conducted floodplain studies along Bear Creek, Clinch River, and East Fork Poplar Creek. Small portions of Y–12 lie within the 100- and 500-year floodplains of East Fork Poplar Creek (DOE 2001:4-30, 4-32). However, the current mercury storage location is located outside of the 500-year floodplain.

The surface streams of Tennessee are classified by the Tennessee Department of Environmental Conservation according to the *Use Classifications for Surface Waters* (TDEC 1999b). Classifications are based on water quality, beneficial uses, and resident aquatic biota. The Clinch River is the only surface water body on or near ORR classified for domestic water supply use. Unless otherwise specified in these rules, classifications for all streams in Tennessee are for fish and aquatic life, recreation, irrigation, and livestock watering, and wildlife. In addition, the Clinch River and a short segment of Poplar Creek from its confluence with the Clinch River are classified for industrial water supply use. East Fork Poplar Creek, from its mouth to mile 15, is posted by the State of Tennessee with public health warnings against fish consumption and water contact due to bacteria, mercury, and polychlorinated biphenyl contamination (TDEC 2001).

In 1999, approximately 95 outfalls from Y–12 were subject to compliance monitoring under its NPDES permit (TN0002968). The permit regulates the discharge of storm water, storm drainage, cooling water, cooling tower blowdown, steam condensate, and treated process wastewaters (including effluents from six wastewater treatment facilities), as well as discharges from building sumps encompassing Bear Creek, East Fork Poplar Creek, and several unnamed tributaries on the south side of Chestnut Ridge (White et al. 2000:6-8, 6-9). Under the permit, DOE must also maintain a Storm Water Pollution Plan to minimize the discharge of pollutants in storm water runoff. At least 25 representative storm water outfalls must be sampled and characterized annually. Biological toxicity testing of outfalls is also required quarterly (White et al. 2000:6-11, 6-12). Monitoring for radionuclides is required under the NPDES permit at selected locations and is conducted in accordance with a separate Radiological Monitoring Plan, although no effluent limits are imposed (White et al. 2000:6-6, 6-7). Sanitary wastewater from Y–12 is discharged to the city of Oak Ridge publicly owned treatment works under Industrial and Commercial Users Wastewater Permit Number 1-91 (White et al. 2000:6-11). Wastewater management is discussed in Section 3.5.2.



Source: USGS 1975, 1989, 1990a, 1990b.

Figure 3.5–1. Surface Water Features at the U.S. Department of Energy's Y–12 National Security Complex Area, Tennessee

Ambient surface water quality in Upper East Fork Poplar Creek has been affected primarily by Y–12 legacy operations from the late 1940s to the early 1980s. Contaminants include mercury, polychlorinated biphenyl, and uranium isotopes that have also been found at detectable concentrations in stream sediments. Bear Creek is mostly affected by storm water runoff, groundwater infiltration, and tributaries that drain former waste disposal sites in the Bear Creek Valley Burial Groundwater Waste Management Area (White et al. 2000:1-5, 6-22). Surface water surveillance monitoring is conducted as a best management practice. Of all the parameters measured, mercury was found to be the only contaminant of concern and exceeded the Tennessee water quality criterion of 0.00015 mg/l in 398 of the 400 samples collected at the Upper East Fork Poplar Creek monitoring station on the east end of the Y–12 complex (White et al. 2000:6-20, 6-21, 6-24). A Consent Order, dated September 27, 1999, deleted mercury monitoring requirements and instream limits from the NPDES permit, deferring them to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) program. The CERCLA Record of Decision will define any future requirements for the Upper East Fork Poplar Creek mercury contamination (White et al. 2000:6-11).

3.5.6.2 Groundwater

Two broad hydrologic regimes have been characterized at ORR. The Knox Group and the Maynardville Limestone of the Conasauga Group constitute the Knox Aquifer, in which flow is dominated by solution conduits formed along fractures and bedding planes. The less permeable ORR aquitard units constitute the second regime, in which flow is dominated by fractures. The Knox Aquifer is the primary source of groundwater to many streams (base-flow), and most large springs on ORR receive discharge from the Knox Aquifer. Yields of some wells penetrating larger solution conduits are reported to exceed 1,000 gal/min (3,785 l/min). Units at ORR constituting the ORR aquitards include the Rome Formation, the Conasauga Group below the Maynardville Limestone, and the Chickamauga Group and mainly consist of siltstone, shale, sandstone, and thinly bedded limestone of low to very low permeability. The typical yield of a well in the aquitards is less than 1 gal/min (3.8 l/min), and the base flows of streams draining areas underlain by the aquitards are poorly sustained because of such low flow rates (White et al. 2000:1-5).

Groundwater in both the Knox Aquifer and in the aquitards is recharged mainly on the ridges via precipitation and is discharged into lakes, streams, springs, and seeps. Within ORR, the Knox Aquifer underlies some of the major ridges (e.g., Chestnut and Copper Ridge) and aquitard units predominate under the valleys (e.g., Bear Creek, Bethel, and Melton Valley) (DOE 2000:3-15; White et al. 2000:1-6, 1-7). Aquitards underlie Pine Ridge and Bear Creek Valley, which contain the majority of the main plant area of Y–12 and the disposal facilities of western Bear Creek Valley. The Knox Aquifer underlies Chestnut Ridge, most of the westerly flowing portion of Bear Creek, and all of Upper East Fork Poplar Creek adjacent to Y–12 (DOE 2001:4-34; White et al. 2000:1-7).

Topographic areas, the unsaturated zone is thicker and the water table is often deep (15 to 175 ft [4.6 to 53 m]). In general, topographic relief across the ORR is such that most active subsurface groundwater flow occurs at shallow depths. Modeling by the USGS suggests that 95 percent of all groundwater flow occurs in the upper 50 to 100 ft (15 to 30 m) of the saturated zone in the aquitards. As a result, flow paths in the active-flow zones (particularly in the aquitards) are relatively short, and nearly all groundwater discharges to local surface water drainages on the ORR. Conversely, in the Knox Aquifer, it is believed that solution conduit flow paths may be considerably longer, perhaps as much as 2 mi (1.6 km) long. Available data indicates that groundwater flow and contaminant transport occurs off ORR in the intermediate interval of the Knox Aquifer, near the east end of Y–12 (White et al. 2000:1-9). The influence of manmade fill on groundwater flow within the shallow unit is an important consideration at Y–12 where pre-existing Upper East Fork Poplar Creek stream channels have been filled and act as preferential groundwater flow paths (DOE 2001:4-34).

In Bear Creek Valley, depth to groundwater is generally 20 to 30 ft (6.1 to 9.1 m) but is as little as 7 ft (2.1 m) in the area of Bear Creek near Highway 95. On Chestnut Ridge, the depth to the water table is greatest (less than 100 ft [30 m] below ground surface) along the crest of the ridge, which is a groundwater flow divide and recharge area. Groundwater in the Chestnut Ridge hydrogeologic regime tends to flow from west to east with elements of radial flow from the ridge crest north into Bear Creek Valley and south toward the headwaters of tributaries draining into Bethel Valley (DOE 2001:4-34).

Very little groundwater is used at ORR. Only one water supply well exists on ORR; it provides a supplemental water supply to an aquatics laboratory during extended droughts (DOE 2001:4-35). There are no Class I sole-source aquifers that lie beneath ORR (EPA 2001k). All aquifers are considered Class II (current or potential sources of drinking water or other beneficial use). Background groundwater quality at ORR is generally good in the near surface aquifer zones and poor in the bedrock aquifer at depths greater than about 980 ft (299 m) due to high total dissolved solids (DOE 2001:4-35). Water supply and use are further discussed in Section 3.5.10.

Historical groundwater monitoring at Y–12 has shown that the groundwater quality has been affected by nitrate, volatile organic compounds, metals, and radionuclides, with nitrate and volatile organic compounds being the most widespread contaminants. Some radionuclides, particularly technetium 99, are also present, particularly in the Bear Creek regime and the western portion of the Upper East Fork Poplar Creek regime. Groundwater monitoring conducted in 1999 revealed that nitrate concentrations exceeded the Federal drinking water maximum contaminant level of 10 mg/l in a large part of the western portion of the Upper East Fork Poplar Creek regime and in the Bear Creek regime. Concentrations of 11 different metals (e.g., chromium, copper, lead, mercury) exceeded maximum contaminant levels in samples from throughout Y–12. A continuous dissolved volatile organic compound plume extends eastward from the S-3 site near the west end of Y–12 across the entire southern portion of the Upper East Fork Poplar Creek regime and Y–12. Individual parameters exceed applicable maximum contaminant levels in many wells. Groundwater with gross alpha activity greater than the drinking water maximum contaminant level of 15 pCi/l occurs in scattered areas throughout the Upper East Fork Poplar Creek drainage basin (White et al. 2000:6-29, 6-31–6-36). Groundwater contamination at Y–12 is associated with past activities at the site and is not associated with the storage of DNSC mercury.

3.5.7 Ecological Resources

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

3.5.7.1 Nonsensitive Habitats and Species

ORR consists of diverse habitats and supports a rich variety of flora and fauna. Vegetation is characteristic of that found in the intermountain regions of central and southern Appalachia. The Y–12 site is covered in mowed grass, concrete, gravel, asphalt, and industrial structures. Thus, the site lacks unique habitats and a wide diversity of flora and fauna (DOE 1999a:3-10).

3.5.7.2 Sensitive Habitats and Species

There is an emergent wetland (0.45 acre [0.18 ha]) at the eastern end of Y–12 at a seep by a small tributary of the East Fork Poplar Creek, a wooded area between New Hope Cemetery and Bear Creek Road. The wetland receives effluent from an NPDES outfall (DOE 1999a:3-10; 2001:4-49).

There are two federally listed animal species that have been recently observed at ORR; the gray bat and bald eagle. The federally listed endangered gray bat is represented by one to several migratory or transient individuals rather than permanent residents, although this situation may change as this species continues to recover. The federally listed threatened bald eagle is increasingly seen in winter and may well begin nesting on the site within a few years (Hughes et al. 2002:2-14, 2-15). On July 6, 1999, the U.S. Fish and Wildlife Service requested public comments concerning a proposal to remove the bald eagle from the agency's list of endangered wildlife. However, delisting the bald eagle as a threatened species under the act will not affect the protection provided under the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, and Tennessee State laws (DOI 1999a:36454). While the proposal to delist the bald eagle is moving forward, it was put on hold in order to develop new management guidelines (e.g., nesting considerations) and to review the regulations of the Bald and Golden Eagle Protection Act (Ragan 2001). Similarly, several state-listed bird species, such as the anhinga, olive-sided flycatcher, double-crested cormorant, and little blue heron are currently uncommon migrants or visitors; however, the double-crested cormorant and little blue heron are probably increasing in numbers. Others, such as the cerulean warbler, northern harrier, great egret, and yellow-bellied sapsucker, are common migrants or winter residents that do not nest on ORR (Hughes et al. 2002:2-14, 2-15). While there are no federally listed plant species known to occur at ORR, 21 plant species have been observed that are listed by the State of Tennessee, including the Canada lily and pink lady's-slipper (Hughes et al. 2002:2-15; TDEC 2002a). Three species, the Appalachian bugbane, butternut, and tall larkspur, are under review for federal listing and are informally referred to as "special concern" species by the U.S. Fish and Wildlife Service and do not have any federal regulatory status under the Endangered Species Act (Andrews 2002). The state listed Michigan lily and hairy sharp-scaled sedge were identified in the past on ORR but have not been found in recent years (Hughes et al. 2002:2-16). Table 3.5–3presents the special-status animal and plant species known to occur at ORR.

Table 3.5–3. Threatened and Endangered Species, Species of Concern, and Sensitive Species Occurring in the Vicinity of the Oak Ridge Reservation (not including the Clinch River)

Common Name	Scientific Name	Federal Status	State Status
Amphibians			
Four-toed salamander	*Hemidactylium scutatum*		D
Birds			
Anhinga	*Anhinga anhinga*		D
Bald eagle	*Haliaeetus leucocephalus*	T (AD)	D
Cerulean warbler	*Dendroica cerulea*	C	D
Great egret	*Casmerodius albus*		D
Little blue heron	*Egretta caerulea*		D
Loggerhead shrike	*Lanius ludovicianus*		D
Northern harrier	*Circus cyaneus*		D
Olive-sided flycatcher	*Contopus cooperi (borealis)*		D
Peregrine falcon[a]	*Falco peregrinus*		E
Sharp-shinned hawk	*Accipiter striatus*		D
Snowy egret	*Egretta thula*		D
Yellow-bellied sapsucker	*Sphyrapicus varius*		D
Fish			
Tennessee dace	*Phoxinus tennesseensis*		D

Common Name	Scientific Name	Federal Status	State Status
Mammals			
Gray bat	*Myotis grisescens*	E	E
Southeastern shrew	*Sorex longirostris*		D
Vascular Plants			
American ginseng	*Panax quinquifolius*		S-CE
Appalachian bugbane	*Cimicifuga rubifolia*	C	T
Branching whitlow-grass	*Draba ramosissima*		S
Butternut	*Juglans cinerea*	C	T
Canada lily	*Lilium canadense*		T
Fen orchid	*Liparis loeselii*		E
Goldenseal	*Hydrastis canadensis*		S-CE
Heavy sedge	*Carex gravida*		S
Mountain witch-alder	*Fothergilla major*		T
Northern bush-honeysuckle	*Diervilla lonicera*		T
Northern white cedar	*Thuja occidentalis*		S
Nuttall’s waterweed	*Elodea nuttallii*		S
Pink lady’s-slipper	*Cypripedium acaule*		E-CE
Pursh’s wild-petunia	*Ruellia purshiana*		S
River bulrush	*Scirpus fluviatilis*		S
Shining ladies’-tresses	*Spiranthes lucida*		T
Small-headed rush	*Juncus brachycephalus*		S
Spreading false-foxglove	*Aureolaria patula*		T
Tall larkspur	*Delphinium exaltatum*	C	E
Three-parted violet	*Viola tripartita var. tripartita*		S
Tuberculed rein-orchid	*Platanthera flava var. herbiola*		T

[a] The peregrine falcon was federally delisted on August 25, 1999 (DOI 1999b:46542).

Key: AD, proposed delisting; C, species of concern; D, deemed in need of management; E, endangered; E-CE, endangered, commercially exploited; S, special concern species; S-CE, special concern species, commercially exploited; T, threatened.

Source: Hughes et al 2002; TDEC 2002a, 2002b; USFWS 2001.

There are no federally protected, threatened, or endangered species known on the Y–12 site. Although surveys for protected species are not comprehensive enough to rule out all possible Federal- or state-listed vertebrates, the likelihood of finding such species appears unlikely (DOE 1999a:3-10).

3.5.8 Cultural Resources

About 90 percent of ORR, in which Y–12 is located, has been surveyed on a reconnaissance level for prehistoric and historic archaeological resources, but less than 5 percent has been intensely surveyed. There have been several archaeological surveys conducted at Y–12 in the past (DOE 2001:4-83, 4-84).

For this study, additional surveys are not currently required for activities that do not exceed the depth and extent of previous ground-disturbing activities. One prehistoric archaeological site, a light scatter of artifacts, has been recorded in the Y–12 area and the remains of 16 pre-World War II structures have been identified. A field review indicated that the potential for discovery of NRHP-eligible archaeological resources was considered low due to past disturbances. Remaining undisturbed areas are also not considered likely locations for significant archaeological resources. However, archaeological resources could exist in areas that have not yet been inventoried and subsurface archaeological deposits may occur below shallow disturbances (DOE 2001:4-84).

After an extensive survey of all buildings and structures at Y–12, designation of a historic district has been proposed to encompass the original Y–12 Plant and 92 contributing buildings and structures associated with the Manhattan Project, post-World War II nuclear weapons production, and early nuclear research.

It appears that the buildings in the proposed district meet the NRHP criteria of "exceptional importance" required for listing properties less than 50 years old. Two buildings, 9731 and 9204-3, located in the Y–12 area have been proposed for National Historic Landmark status. Building 9731 is the oldest facility constructed at Y–12 and housed Manhattan Project activities. Building 9204-3 was a uranium enrichment facility during World War II and is significant for its role in nuclear research of enriched uranium and the separation of stabilized isotopes (DOE 2001:4-84).

At least 32 cemeteries have been recorded within the boundaries of ORR that are associated with Euro-American use prior to World War II. Within the Y–12 area, seven historic period cemeteries have been identified. These cemeteries may have religious or cultural importance to descendants and the local community. To date, there have been no other traditional, ethnic, or religious resources identified in the ORR or in particular in the Y–12 area (DOE 2001:4-84, 4-85).

At the time of the first Euro-American contact with the region surrounding ORR, the inhabitants of the area were known as Overhill Cherokee. Prior to the late 17th century, archaeological evidence of these inhabitants reflects an increasingly complex and specialized society with a high degree of organization, including the development of elite classes. Most of the Cherokee were forcibly relocated to the Oklahoma Territory in 1838, after a series of conflicts with the Euro-American settlers to the region. The ancestors of these people may be culturally affiliated to the Eastern Band of the Cherokee Indians and the Cherokee Nation of Oklahoma. There appear to be no Native American traditional use areas or religious sites located at ORR or in the Y–12 area, and no known artifacts of Native American religious significance appear to exist or have been removed from the ORR or Y–12 area (DOE 2001:4-83, 4-85). At the time of the 2000 census, there were 10,911 Native Americans residing in Tennessee, of which 162 were residing in Anderson County (DOC 2001e, 2001f).

3.5.9 Land Use and Visual Resources

3.5.9.1 Land Use

Y–12 is an industrial site that has been in operation since World War II. It is composed of numerous support, manufacturing, and storage facilities. Although the main area of Y–12 is primarily industrial, there are also limited forested areas present (DOE 2001:4-12). Except for the cities of Knoxville and Oak Ridge, land use surrounding Y–12 is primarily agricultural. Recreational uses of the surrounding area include fishing, boating, hunting, and camping (Hamilton et al. 1999:3-11).

Unlike the DNSC mercury storage locations where the General Services Administration serves as landlord (the New Haven, Somerville, and Warren depots), DOE functions as the landlord and operator of Y–12. DNSC currently anticipates that it would end its use of the mercury storage building should a decision be made to remove surplus mercury from Y–12 in association with MM EIS consolidated storage or sales alternatives (Lynch 2002b). DOE has identified that planned modernization of Y–12 over the next decade is expected to increase development pressure in and around the currently developed area. It is expected that as facility space at Y–12 is rendered surplus, the use of this space will be evaluated for various end-use scenarios, including demolition (DOE 1999b:32).

3.5.9.2 Visual Resources

The developed areas of ORR are consistent with BLM's VRM Class IV. Class IV includes areas in which major modifications to the character of the landscape have occurred. These changes may be dominant features of the view and the major focus of viewer attention (DOI 1986:app. 2). At Y–12, most structures are of a low profile and reach heights of three stories or less. However, two meteorological towers are located on the east and west ends of the complex and reach heights of 328 ft (100 m) and 197 ft (60 m), respectively (DOE 2001:4-80). The undeveloped areas of ORR range from VRM Class II to Class III. Class II includes areas where visible changes to the character of the landscape are low and do not attract the attention of the casual observer. Class III includes areas in which there have been moderate changes in the landscape that could attract attention, but do not dominate the view of the casual observer (DOI 1986:app. 2). While there are no prime farmlands on ORR, the viewshed consists mainly of rural land that is used primarily for residences, small farms, forest land, and pasture land and is generally consistent with VRM Class II and Class III (DOE 1996:3-186).

3.5.10 Infrastructure

Site infrastructure includes those utilities and other resources (see Table 3.5–4) required to support modification and continued operation of mission-related facilities.

Table 3.5–4. Y–12 National Security Complex Infrastructure Characteristics

Resource	Current Usage	Site Capacity
Transportation		
Roads (mi)	65	65
Railroads (mi)	3.0	3.0
Electricity		
Energy consumption (MWh/yr)	357,900	1,752,000
Fuel		
Natural gas (ft^3/yr)	97,000,000	as needed
Oil (gal/yr)	0	as needed
Coal (ton/yr)	71,000	as needed
Water (gal/yr)	1,563,000,000[a]	2,555,000,000

[a] Treated water for fire protection, sanitary sewage, process operations, and boiler feed at the steam plant.
Source: DOE 2001.

3.5.10.1 Transportation

Y–12 contains 65 mi (105 km) of roads ranging from well-maintained, paved roads to remote, seldom-used roads that provide occasional access. Primary roads serving Y–12 include Tennessee State Routes 58, 62, 95, and 170 and Bear Creek Road. Except for Bear Creek Road, all are public roads. In addition, Y–12 is located within 50 mi (80 km) of three interstate highways: I–40, I–75, and I–81. Rail transport to Y–12 is from a 4-mi (6.4-km) rail spur from the CSX main line, east of Oak Ridge. DOE maintains an additional three miles of rail at Y–12 (DOE 2001:4-76).

3.5.10.2 Electricity

Electric power is supplied by the Tennessee Valley Authority and is distributed to Y–12 via three 161 kV overhead radial feeders. Eleven 13.8 kV distribution systems further distribute the power to approximately 400 transformers located throughout Y–12 (DOE 2001:4-76).

3.5.10.3 Fuel

Both natural gas and coal are used as fuels for heating and operations on the Y–12. Natural gas is used as fuel in the furnaces, Y–12 steam plant, and laboratories and is supplied via pipeline from the East Tennessee Natural Gas Company. The steam plant has four boilers capable of firing either pulverized coal or natural gas. Coal is purchased regionally, delivered by truck, and stored in a bermed area near the plant (DOE 2001:4-77).

3.5.10.4 Water

Y–12 uses both raw and treated water. Raw water is drawn from the Melton Hill Reservoir, pumped through a filtration plant, and used to maintain a minimum flow of 7.0 million gal/day (26 million l/day) in the East Fork Poplar Creek. Treated water is routed from the City of Oak Ridge Filtration Plant to Y–12 through three main pipelines. The treated water system supplies water for fire protection, process operations, sanitary requirements, and boiler feed at the steam plant. Ownership and operation of the treated water system was transferred from DOE to the city of Oak Ridge in May 2000 (DOE 2001:4-77).

3.5.10.5 Site Safety Services

Local security for Y–12 is provided by a private contractor. It is a secure facility with 24-hr guards at each gate entrance. Because of DOE's work with nuclear weapons and materials, the entrance to Y–12 is restricted. Security measures include a highly trained security force, personnel and vehicle searches, metal detectors, explosive sniffing dogs, and a perimeter intrusion detection and alarm system. Additionally, all personnel entering the site are required to be properly badged.

Y–12 has its own continuously staffed fire department on site and would be the primary responder to any incident (i.e., fire, hazardous spill, accident) at the site. The department maintains a full complement of fire trucks and equipment, emergency medical services, and hazardous spill response equipment. The site has Mutual Aid Agreements with other DOE sites at Oak Ridge National Laboratory and the East Tennessee Technology Park (both Federal installations) and the city of Oak Ridge Fire Department. In addition, Y–12 has a close working relationship with the Tennessee Emergency Management Agency.

3.5.11 Environmental Justice

Under Executive Order 12898 (59 FR 7629), DNSC is responsible for identifying and addressing disproportionately high and adverse impacts on minority or low-income populations. As discussed in Appendix G, minority persons are those who identify themselves as American Indian or Alaska Native, Asian, Black or African American, Hispanic or Latino (of any race), Native Hawaiian or Other Pacific Islander, or multiracial (CEQ 1997). Persons who report that their income is less than the Federal poverty threshold are designated as low-income.

Figure 3.5–2 shows populations residing in Anderson County as reported in the 1990 census and the 2000 census. In this figure, lightly shaded bars show populations in 1990, while the darker bars show those in 2000 (DOC 1992, 2001g). In the decade between 1990 and 2000, the total population of Anderson

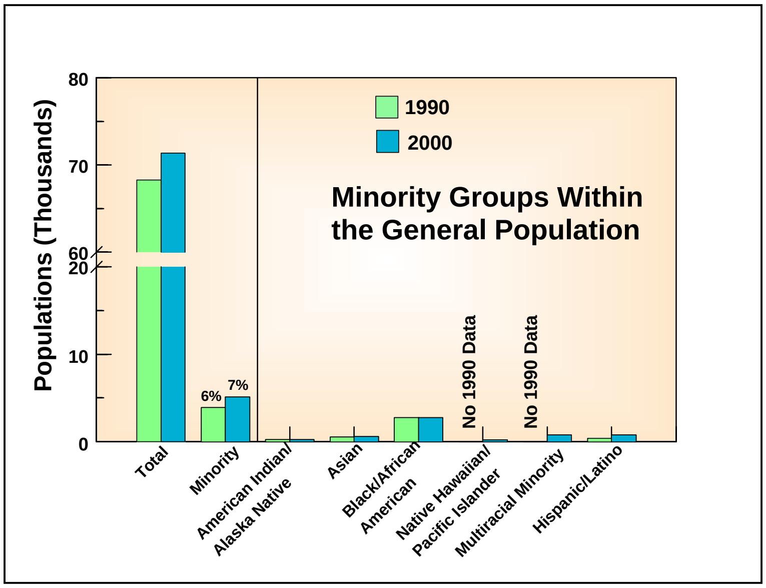


Figure 3.5–2. Populations Residing in Anderson County, Tennessee, in 1990 and 2000

County increased by approximately 4.5 percent, while the minority population increased by nearly 32 percent. The 2000 census found that Black/African American residents of the county comprised approximately one-half of the total minority population. Persons who declared that they are multiracial and not Hispanic/Latino were included in the minority population shown in Figure 3.5–2. They comprised approximately 21 percent of the total minority population residing in Anderson County in 2000.

The 2000 census was the first decennial census in which multiracial selections were counted. There is no data for this category available from the 1990 census. Also, during the 1990 census, Asian and Pacific Islander designations were placed together in a single category, whereas during the 2000 census, Native Hawaiians and Other Pacific Islanders were counted separately from Asian respondents. Therefore, direct comparison of 1990 census data and 2000 census data for these two categories is not possible.

Nationwide, approximately 2 percent of the population identified themselves as multiracial (DOC 2001h). Although the CEQ has not yet revised their guidance on environmental justice to address multiracial responses, in this MM EIS the total multiracial population was included in the minority population for the year 2000.

The minority population of Anderson County is not representative of that for the State of Tennessee as a whole. Minority residents of the State of Tennessee comprised approximately 21 percent of the total resident population. Black or African American residents of Tennessee comprised nearly 80 percent of the total minority residents of the state. Approximately 5 percent of the total minority population was composed of multiracial persons.

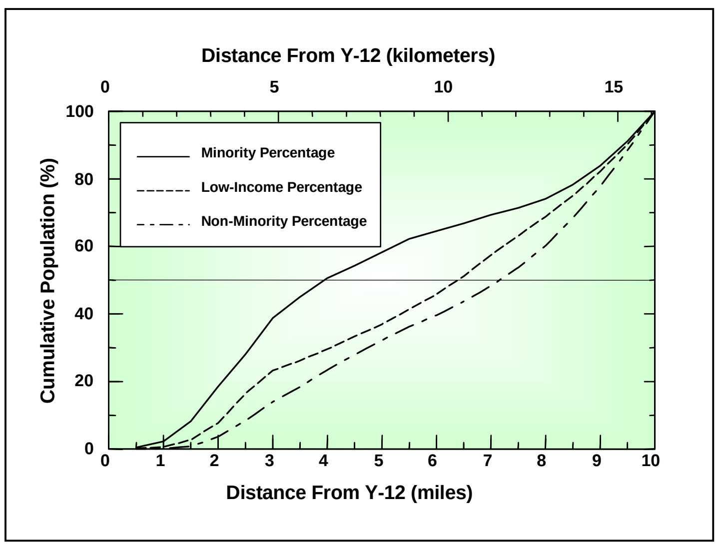


Figure 3.5–3. Percent Resident Populations Within 10 Miles of Y–12

Approximately 7,663 minority individuals and 7,314 low-income persons lived within 10 mi (16 km) of Y–12 in 1990 (DOC 2001g, 2002a). The non-minority population living in the same area in 1990 was approximately 95,553 persons. Figure 3.5–3 shows the cumulative percentage of these populations residing at a given distance from Y–12. For example, 50 percent of the total minority population lived within approximately 4 mi (6.4 km) of Y–12, and 50 percent of the majority population lived within approximately 7 mi (11 km). The minority community of Scarboro, Tennessee, is approximately 2 mi (3.2 km) from Y–12.

3.6 HAWTHORNE ARMY DEPOT

The Hawthorne Army Depot is located in Mineral County, Nevada. It consists of 147,236 acres (59,585 ha) of land owned by the Federal Government (Army 2001a). The western half of the depot is undeveloped mountainous land containing Mt. Grant (elevation 11,245 ft [3,427 m]). In addition, the depot is bounded by Walker Lake to the north, the Gillis Range to the east, and the Excelsior Mountains to the south (Army 2000:4). Access to the depot is via U.S. Highway 95 (Nevada DOT 2002).

Figure 2–6 shows the layout of storage igloos and warehouses at the depot. The depot contains 2,427 igloos and 488 buildings and has a storage capacity of 7,685,000 ft^2 (713,960 m^2) (Army 2001a). The warehouses that could be used to store mercury at Hawthorne are 200 ft (61 m) long by 50 ft (15 m) wide. The warehouses have concrete floors, walls and columns, steel roof trusses, and ceiling air vents (Downs 2002a). The dimensions of the igloos vary with a width of 25 ft (7.6 m) and lengths of 20, 60, and 80 ft (6.1, 18, and 24 m) (Ensminger and Storch 2002). The igloos are constructed of 8-in (20-cm) reinforced concrete walls and ceiling with 2 ft (0.6 m) of earthen cover (Theisen 2002:3). Although the buildings are vented, all igloos at the Hawthorne Army Depot have two floor launders (condensate collection troughs) that discharge to the ground near the doors of the igloos. Should igloos be used for storage of mercury, these launders would require sealing.

3.6.1 Meteorology, Air Quality, and Noise

3.6.1.1 Meteorology

The climate of the Hawthorne Army Depot area is semi-arid. The average annual rainfall is 6.4 in (16.2 cm). Maximum rainfall occurs in late spring and during the fall. Minimum rainfall months are July and August (Army 2000:8). Damaging hailstorms rarely occur (NCDC 2002a). The average annual snowfall at Reno is 25.3 in (64.3 cm); however, the maximum snow depth, 13 in (33 cm), occurred in 1990 (NCDC 2001g).

No tornadoes were reported in Mineral County between January 1950 and April 2002. Several occurrences of high winds typically occur every year (NCDC 2002a). The average annual wind speed is 6 mph (2.7 m/s) (Army 2000:8). The maximum wind speed, based on the minimum for 1 mile of wind to pass at Reno, is 52 mph (23 m/s) (NOAA 2000). The mean number of days per year with thunderstorm activity at Reno is 13.5 (NCDC 2001g).

The average annual temperature is 54.1 °F (12.3 °C) (Army 2000:8). At Reno, the average annual temperature is 50.3 °F (10.2 °C); temperatures range from a monthly average minimum temperature of 20.1 °F (-6.6 °C) in January to a monthly average maximum of 90.9 °F (32.7 °C) in July. The maximum recorded temperature at Reno is 105 °F (41 °C) (NCDC 2001g).

3.6.1.2 Air Quality

The Hawthorne Army Depot is in an area of Mineral County that is designated better than national standards for sulfur dioxide and better than national standards or unclassifiable for nitrogen dioxide. The area is unclassifiable/attainment regarding attainment of the standard for carbon monoxide. Under the EPA's rule change, which reinstated the 1-hr ozone standard, the area is unclassifiable regarding attainment of the standard for ozone. EPA has not assigned an attainment status designation for lead and PM_{10} is unclassifiable (EPA 2000f).

The nearest PSD Class I area is Yosemite National Park, about 50 mi (80 km) to the southwest. A Class I area is one in which very little increase in pollution is allowed due to the pristine nature of the area. Hawthorne and its vicinity are classified as a Class II area in which more moderate increases in pollution are allowed. No PSD permits are required for any emission source at the Hawthorne Depot.

The primary sources of criteria pollutants at the Hawthorne Army Depot are fuel oil-fired boilers; material recovery processes; propane furnaces; rock crushing, screening, and stacking operations; portable generators; surface coating operations; and ordnance disposal operations. The Hawthorne Army Depot has an operating permit that covers these sources as required under the Federal Clean Air Act and companion State of Nevada regulations (NVDEP 2000) and a permit for the Plasma Ordnance Demilitarization System (which may emit mercury) (NVDEP 2002a). The storage buildings and the igloos are not heated and there are no emission sources associated with them that are required to be permitted.

There are no nearby monitors for criteria air pollutants. The closest offsite monitors are operated by the State of Nevada in Carson County and Douglas County for PM_{10}. In 2001, these monitors reported a maximum 8-hr average carbon monoxide concentration of 4,490 $\mu g/m^3$ and a maximum 1-hr average concentration of 7,940 $\mu g/m^3$. For PM_{10}, an annual average concentration of 10.7 $\mu g/m^3$ and a maximum 24-hr average concentration of 49 $\mu g/m^3$ were reported. For nitrogen dioxide an annual concentration of 13 $\mu g/m^3$ was reported. A 1-hr average ozone concentration of 178 $\mu g/m^3$ was reported (EPA 2002a). Monitored concentrations in the region are well below ambient standards. There are no nearby monitors for lead, mercury, and sulfur dioxide.

3.6.1.3 Noise

Major noise emission sources within the Hawthorne Army Depot include various equipment and machines—heating, ventilation, and air conditioning equipment, material-handling equipment (i.e., forklifts and loaders), and vehicles. Some implosive noise is generated from test firing and demolition of military munitions, weapons, and small arms. An environmental noise study for the plant concluded that incompatible and normally incompatible noise zones from activities on the plant do not extend beyond the installation boundary. Noise levels from the plant are expected to be compatible with nearby residential areas and other noise-sensitive land use (USAEHA 1991). The nearest noise-sensitive receptors are in Hawthorne. The closest residence is approximately 10,000 ft (3,000 m) distant from the proposed mercury storage location.

The State of Nevada and Mineral County have not established community noise standards, which specify acceptable noise levels applicable to the depot. Sound-level measurements have not been recorded near the depot; however, it is expected that the acoustic environment near the site boundary ranges from that typical of rural to industrial locations. Traffic is the primary source of noise at the site boundary. There is occasional noise from aircraft operations at Hawthorne Municipal Airport. Traffic is the primary source of noise at residences located near roads. The traffic generated by the depot (typically 180 trips per day), including employee vehicles (480 employees in 2002) and trucks used for shipping, has little effect on traffic on nearby roads and the associated traffic noise. Roads that provide access to the Hawthorne Army Depot include U.S. Highway 95 and State Route 362 for which average daily traffic flows (vehicles per day) are 2,700 and 1,050, respectively (NV DOT 2002). Railroad activity related to the depot (i.e., delivery or removal of railcars) is occasional, with 474 incoming or outgoing railcars per year, and would result in short-term increases in sound levels near the depot (Hawthorne Army Depot 2001).

3.6.2 Waste Management

Waste management includes minimization, characterization, treatment storage, transportation, and disposal of waste generated from ongoing depot activities. Waste is managed using appropriate treatment, storage, and disposal technologies in compliance with applicable Federal and state statutes and Department of Defense requirements. Hazardous and nonhazardous wastes are the waste types generated by routine operations at the Hawthorne Army Depot.

The Hawthorne Army Depot uses large quantities of petroleum, oil, and lubricants in addition to other hazardous materials such as solvents, pesticides, and compressed gases to support its mission. The depot generates hazardous waste during renovation, recovery and disposal of unserviceable ammunition and explosives, and during general depot support activities (Army 2000:33).

The Hawthorne Army Depot has five primary locations for the storage of hazardous waste in the North Magazine Area (Army 2000:34). These areas have a total hazardous waste storage capacity of 3,972 55-gal (208-l) drums, 125,000 lbs (56,700 kg) of explosives, and 384,000 lbs (174,182 kg) on 96 pallets (Nevada 1999:IV-9). Explosive hazardous waste is treated at the New Bomb Disposal Facility located on 3,200 acres (1,295 ha) of land 22 mi (35 km) south of the main depot. The remaining hazardous waste is shipped off site for treatment and disposal at commercial facilities (Army 2000:34). Approximately 104,590 lbs (47,442 kg) of hazardous waste are generated each year (Downs 2002a).

The Hawthorne Army Depot holds two hazardous waste Part B permits. One permit is for the treatment and storage of hazardous wastes at the main Hawthorne Army Depot. The second permit is for the New Bomb Disposal Facility (Army 2000:17, 34). The Hawthorne Army Depot is classified as a RCRA large quantity generator (EPA 2002b).

The Hawthorne Army Depot is not on the Superfund National Priority List. The regulatory process for the Installation Restoration Program is governed under RCRA, and has been conducted under the guidance of the State of Nevada. Remedial investigations have been conducted at 128 solid waste management units (Army 2000:16, 25).

Nonhazardous wastes generated at the Hawthorne Army Depot include construction and demolition waste, (e.g., wood, concrete, metal objects, soil, and roofing materials) office wastes, lunchroom wastes, and janitorial wastes (Theisen 2002). Nonhazardous waste generated in the housing area is collected by a commercial waste hauling contractor and disposed of at the Hawthorne Landfill west of Hawthorne. Construction debris, inert mock-munition items, office waste, lunchroom waste, and horticultural wastes generated on the remainder of the depot are disposed of in the state-permitted, onsite construction and debris landfill. Treated wood and asbestos are disposed of in the state-permitted Asbestos and Treated Wood Landfill. This landfill has a permitted disposal capacity of 612,000 yd^3 (467,905 m^3) and consists of six unlined cells; one cell is designated for asbestos-containing material. The depot also collects scrap metal and wood for recycling (Army 2000:16, 17, 38). In 2001, 1,509 tons (1,369 metric tons) of waste were disposed of in the Construction and Debris Landfill, with 887 tons (805 metric tons) disposed of in the Asbestos and Treated Wood Landfill (Theisen 2002). Assuming a density of 20 lbs/ft^3, 2,396 tons (2,174 metric tons) of solid nonhazardous waste equals 8,874 yd^3 (6,785 m^3).

Sanitary wastewater generated in the industrial and housing areas of the Hawthorne Army Depot is discharged to a sewage treatment facility. Approximately 25,000 gal (94,635 l) per day of sanitary wastewater are discharged to the treatment facility (Downs 2002a). Effluent from the sewage treatment facility is discharged to any one of 20 evaporation/percolation ponds. The sewage treatment facility has a design capacity of 0.4 million gal (1.5 million l) per day (Army 2000:38). The Hawthorne Army Depot is in the process of connecting its sanitary sewer system to the Town of Hawthorne sewage treatment facility. Locations other than the Western Area Demilitarization Facility Area and the Industrial Area are serviced by septic systems (settling tanks that drain to buried drain fields) (Army 2000:39).

3.6.3 Socioeconomics

The Hawthorne Army Depot is located in Mineral County, Nevada. Therefore, all statistics for the local economy, population, housing, and community services as defined in Appendix E, are presented for Mineral County. In 2002, the Hawthorne Army Depot employed 480 persons (about 23.6 percent of the county's 2000 civilian labor force) (DOL 2002; Downs 2002a).

3.6.3.1 Regional Economic Characteristics

From 1990 to 2000, the estimated civilian labor force in Mineral County decreased by 30.3 percent to 2,038 persons. In 2000, the estimated unemployment rate for the county was 10.2 percent, which was greater than the 2000 unemployment rate for Nevada (4.1 percent) (DOL 2002).

3.6.3.2 Population and Housing

In 2000, the estimated population of Mineral County totaled 5,071. From 1990 to 2000, the county's population decreased by 21.7 percent, compared with the 66.3 percent growth in Nevada (DOC 2001i:3, 44). The percentage of the county's population under the age of 5 is 5.3 percent, with women age 18 to 39 comprising 10.8 percent (DOC 2002a, 2002b). There were 2,866 housing units in the county in 2000, of which 55.6 percent were owner occupied; 21.1 percent, renter occupied; and 23.3 percent, vacant (DOC 2002a).

3.6.3.3 Community Services

3.6.3.3.1 Education

In 2001–2002, student enrollment in Mineral County was 774, and there were 70 teachers for an average student-to-teacher ratio of 11.1:1 (Nemeth 2002h).

3.6.3.3.2 Public Safety

In 2002, 16 sworn police officers served Mineral County, with a ratio of 3.1 officers per 1,000 persons (Nemeth 2002i). If a mercury incident should occur at the Hawthorne Army Depot, the Day and Zimmermann Hawthorne Corporation Fire and Emergency Services would respond (Downs 2002a). In 2002, about 29 firefighters provided fire protection services in the county (Nemeth 2002j). The average ratio was 5.7 firefighters per 1,000 persons.

3.6.3.3.3 Health Care

In 1999, six physicians served Mineral County (DOC 2001i:188). The average ratio was 1.2 physicians per 1,000 persons. In 2002, there was one hospital in Mineral County with 35 beds (Nemeth 2002k; SuperPages.com 2002).

3.6.4 Human Health Risk

3.6.4.1 Health Effects Studies

Environmental studies at the Hawthorne Army Depot have not specifically focused on mercury exposure health effects; however, investigations are ongoing to delineate areas of environmental concern. Depot-wide monitoring has consistently detected the presence of volatile organic compounds (PCE, TCE, 1,2-DCA, and 1,4-DCB) and explosives (RDX, TNT, 2,4-DNT, tetryl, HMX) in groundwater. Benzene, ethylbenzene, toluene, and xylenes and methyl tertiary-butyl ether have been detected in the subsurface soil as a result of diesel fuel and gasoline releases (Army 2000).

Nevada State Health Division, Bureau of Health Protection Services indicate that human health studies have not been conducted in the vicinity of Hawthorne Army Depot outside of the ongoing IRP studies (Goodman 2002). Historically mercury mining has been conducted in the area, thus, mercury occurs naturally and the mercury detected in Walker Lake in not thought to be related to Hawthorne Army Depot activities. Mercury detections in Walker Lake are currently being studied by the U.S. Fish and Wildlife Service (Gravenstein 2002). Mercury has not been detected in the drinking water supply; however, occasionally elevated concentrations of antimony, arsenic, and fluoride are detected (Pennington 2002). The Nevada Division of Environmental Protection indicates that no evidence of elevated mercury concentrations has been found in the soil at the Hawthorne Army Depot. Extensive explosives contamination (TNT and RDX) in the soil is currently under remediation.

3.6.4.2 Accident History

According to information provided by facility personnel for this report, the proposed warehouse structures at Hawthorne Army Depot have been previously used as open storage warehousing, but there is no history of prior storage of mercury. A fire in a storage magazine containing mercury batteries did not release a reportable quantity of hazardous constituents. Remediation of the site was completed and the fire-damaged building was removed.

3.6.4.3 Emergency Preparedness

The Hawthorne Army Depot has an established Spill Prevention Control and Countermeasure Plan and Installation Contingency Plan to maintain adequate response preparedness for fire and hazardous materials releases (Day and Zimmermann 2001). The Hawthorne Army Depot operates and maintains onsite fire and emergency services and emergency response teams. The Day and Zimmermann Hawthorne Corporation Fire and Emergency Services responds to all fires, explosions, and spills where the real or potential threat of fire and explosion exists (Downs 2002a). Emergency services are initiated through 911 reporting.

The infrastructure currently available in the proposed mercury storage warehouses consists of concrete floor and walls with fire-resistant transite roofing. The buildings are vented; however, there is currently no provision for real-time fire suppression in the warehouses. The buildings are within a fenced enclosure with 24-hour security patrol. The Hawthorne warehouse facilities have not been used for bulk mercury storage.

3.6.5 Geology and Soils

Hawthorne Army Depot in southwest Nevada lies within the Great Basin section of the Basin and Range Physiographic Province. The majority of the Hawthorne Army Depot facilities are specifically located in the eastern half of the depot property within the Whiskey-Flat-Hawthorne subarea of Walker Lake Valley. Walker Lake Valley is a high-desert plateau that trends north-northwesterly and is bordered by the Wassuk Range to the west and southwest and by the Gillis Range and Garfield Hills to the east and southeast (Army 2000:8; USGS 1985, 1987a, 1987b, 1987c). Just to the northwest of the main depot complex, Walker Lake occupies the topographic low point in the Walker Lake Valley. Walker Lake is a remnant of a glacial lake that once covered much of the northwestern Great Basin (Army 2000:12). Relief and topography across the 226 mi^2 (585 km^2) depot property differ greatly. Elevations range from 11,240 ft (3,426 m) above mean seal level at Mount Grant in the Wassuk Range in the far western portion of the depot property to about 3,960 ft (1,207 m) above mean sea-level just to the northwest of the depot facility complex along the shoreline of Walker Lake (USGS 1985, 1987c). Along the valley floor where the main depot complex is located, the topography is gently sloping (USGS 1985, 1987a, 1987c).

Geologic strata comprising the Walker Lake basin and the Walker Lake Valley as a whole consists of unconsolidated alluvium (basin fill) that includes alluvial fan, floodplain, windblown channel and lake deposits, as well as terrace gravels and evaporites. While the maximum depth of the basin fill to bedrock is unknown, it is at least 1,008 ft (307 m) based on well completion records for Hawthorne Utilities Well No. 5 (Army 2000:12). On the western edge of the Walker Lake Valley, the Wassuk Range is a mountain range formed by fault-block uplift over the last 3 to 4 million years. The east face of the Wassuk Range is an active fault scarp that has down-dropped the west side of the Walker Lake Valley relative to the east side. Rocks of the Wassuk Range are principally granitic rocks dominated by quartz monzonite. Rocks of the Excelsior Formation unconformably overlie the rocks of the Wassuk Range, which are comprised of metamorphosed volcanic rocks (e.g., flows, tuffs, breccias, basalt, and rhyolite) as well as sedimentary interbeds (Army 2000:11, 12; Geo-Marine 1996:E-3). The Excelsior Formation is also exposed in the Garfield Hills to the southeast of the depot facility complex. Limestones of the Luning Formation also occur southeast of the depot. Unaltered volcanic rocks are also exposed in the vicinity of the depot (e.g., in the Garfield Hills) (Geo-Marine 1996:E-3).

Mineral County's principal mineral products include gold and silver (USGS 2000a). The Lucky Boy Mining District extends into the far southern portion of the depot, along State Route 359. The district is a source for silver and lead. A portion of the Pamlico Mining District encroaches into the South Magazine Area of the depot. Ore in the district contains gold, copper, silver, iron, and uranium. Pamlico Wash drains a portion of the district in the Garfield range (Garfield Hills) and flows onto the depot in the South Magazine Area (Army 2000:80, 81). In general, some small mineral deposits may occur within the depot property, but the metallic mineral development potential of the depot is considered low. A minor geothermal resource has also been identified in the region (Army 2000:11). Several hot wells (i.e., with water temperatures exceeding 98 ºF [37 ºC]) are reported from several locations in and around the town of Hawthorne (Shevenell et al. 2000). In fact, groundwater from the depot's main supply well has a temperature of about 120 ºF (49 ºC) (Army 2000:40).

An active fault marked by the eastern margin of the Wassuk Range roughly bisects the Hawthorne Army Depot. The fault is part of the regional Walker Lake fault zone. Faulting has occurred in the foothills bordering the depot, although no depot facilities have suffered structural damage to date (Army 2000:11, 12).

Nevada is one of the most seismically active states and has experienced the effects of a number of major earthquakes within the past 100 years. Among these, the October 15, 1915 Pleasant Valley earthquake, occurred in a relatively uninhabited area of the state 150 mi (241 km) northeast of Hawthorne. Attributed to a fault on the east side of the Pleasant Valley, it had an estimated magnitude of 7.75 and produced a MMI of X. The earthquake destroyed many adobe homes in Pleasant Valley and was felt from beyond Salt Lake City, Utah, to western Oregon and south to San Diego, California. A magnitude 7.3 earthquake occurred on December 20, 1932, and also produced a MMI of X. This earthquake was located about 34 mi (55 km) northeast of Hawthorne near the Mineral/Nye County line. This earthquake destroyed two cabins near the epicenter and threw down chimneys in Hawthorne. Within a radius of 100 mi (161 km) of the southeastern portion of the Hawthorne Army Depot, a total of at least 383 significant earthquakes (i.e., having a magnitude of at least 4.5 or a MMI of VI or larger) have been documented since 1790. The closest of these was a magnitude 5.4 earthquake on September 18, 1988, that was located about 13 mi (21 km) southeast of the depot. It had a MMI of V (USGS 2002b, 2002c).

Earthquake-produced ground motion is expressed in units of percent “g” (force of acceleration relative to that of the earth’s gravity). Two differing measures of this motion are peak (ground) acceleration and response spectral acceleration (see Section E.6.1). New seismic hazard metrics and maps developed by the USGS have been adapted for use in the *International Building Code* and depict maximum considered earthquake ground motion of 0.2- and 1.0-second spectral acceleration, respectively, based on a 2 percent probability of exceedance in 50 years (ICC 2000; USGS 2001c). This corresponds to an annual probability of occurrence of about 1 in 2,500. Section E.6.1 provides a more detailed description of these maps. The southeastern portion of the Hawthorne Army Depot lies within the 1.55g to 1.56g mapping contours for a 0.2-second spectral response acceleration and the 0.61g to 0.62g contours for a 1.0-second spectral response acceleration. The calculated peak ground acceleration for the given probability of exceedance is approximately 0.67g (USGS 2002d). The Hawthorne Army Depot is located in a region of high seismicity near known faults. Generally, such regions are those in which the design-basis maximum considered earthquake ground motions (spectral response acceleration) with a 2 percent probability of exceedance in 50 years exceed 1.5g at 0.2 seconds and 0.60g at 1.0 seconds (BSSC 2001:385, 387). Table E–11 in Appendix E shows the approximate correlation between MMI, earthquake magnitude, and peak ground acceleration.

Hawthorne Army Depot lies approximately 60 mi (96 km) north of the Mono-Inyo Craters volcanic chain. This active volcanic complex extends southward for some 30 mi (48 km) from Mono Lake in east-central California. Over the past 5,000 years, an eruption has occurred somewhere along the chain every 250 to 750 years, with the last eruption on its northern end at Paoha Island in Mono Lake about 250 years ago (Hill et al. 1998). Southwestern Nevada and Mineral County in particular could experience ash falls from future eruptions in excess of 2 in (5 cm) in thickness (Miller and Johnson 1999).

A soil survey of the Hawthorne Army Depot was conducted by the Soil Conservation Service (now the Natural Resources Conservation Service) in 1991. Soils on the valley floor and encompassing the main portion of the depot operational areas were delineated as belonging to the Mazuma-Patina-Soda Lake group. These soils consists of deep, nearly level, well drained to excessively drained soils on beach or lake plains. Soil textures covering the majority of the depot complex include silty sands, gravelly silt-sand mixtures, inorganic clay, and silt intermixed with sand and gravel (Army 2000:9).

An Environmental Baseline Survey was conducted in 1999 at the Hawthorne Army Depot to review and evaluate the depot for existing or potential environmental contamination that may be a threat to human health or the environment. Hawthorne Army Depot has had an active Installation Restoration Program to address actual or suspected sources of soil and/or groundwater contamination associated with legacy operations. A Remedial Investigation Report, completed in 1999, evaluated 90 sites (i.e., solid waste management units) across the depot with 41 determined to require corrective action before final closure. Of the 41 sites, removal was the recommended action at 29 sites where high concentrations of explosive compounds exist in site soils. Groundwater monitoring was the recommended corrective action at seven landfill sites (Army 2000:1, 25-28 30, 31, E-8).

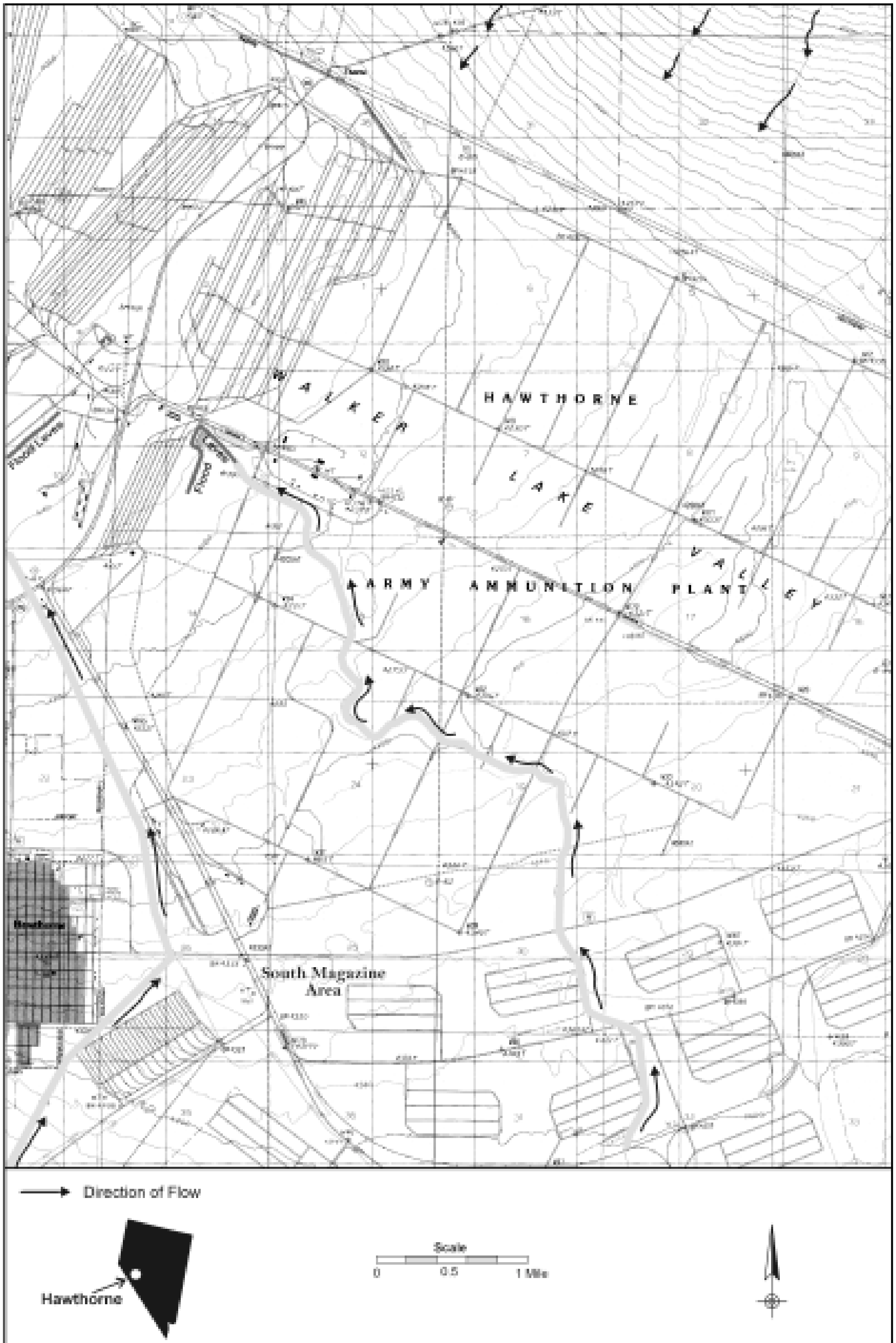
3.6.6 Water Resources

3.6.6.1 Surface Water

Walker Lake is a closed, fresh water lake covering approximately 37,000 acres (14,974 ha) with a maximum depth of some 115 ft (35 m) (Geo-Marine 1996:E-4). The lake is the terminal point for surface drainage entering the Walker Lake Valley. The Walker Lake Valley floor adjacent to the lake basin consists of a broad alluvial apron drained by ephemeral streams (see Figure 3.6–1). No perennial streams cross the valley floor. The alluvial apron is flanked by alluvial fans that originate from sheet and channel erosion in the mountains caused by intense thunderstorms. Runoff and associated flash floods through ephemeral streams carry sediment that is deposited as alluvial fans on the desert floor. Relative to Walker Lake, the closest depot facilities (i.e., the Western Area Demilitarization Facility) are currently located about 5 mi (8 km) southeast of the lakeshore. Little surface water normally reaches Walker Lake directly. Water levels and the surface extent of the lake have generally been declining due to upstream diversion. Between 1950 and 1979, the lake level declined by 44 ft (13 m) and the south shoreline adjacent to the depot facility complex receded at a rate of about 230 ft (70 m) per year. However, increased snowfall and runoff in the late 1990’s have raised lake levels slightly (Army 2000:10).

A combination of surface and groundwater sources is used to provide potable water for the Hawthorne Army Depot. From November to May, water is predominantly derived via a catchment and reservoir system in the Wassuk Range. Water is collected and conveyed from Cottonwood, Squaw, Rose, and House Creeks to Black Beauty Reservoir. There it is chlorinated and distributed via the depot water distribution system. During the remainder of the year, this surface water source is supplemented by groundwater (via Well Number 1), although groundwater has never provided more than 40 percent of the depot’s total use (Army 2000:11, 13, 40). The Black Beauty Reservoir is located about 3.8 mi (6.1 km) west of the town of Hawthorne (USGS 1987c). Water supply and use are further discussed in Section 3.6.10.

The depot is above the 100- and 500-year floodplains. However, some portions of the depot facility complex are subject to periodic flash flooding. Therefore, dikes (levees) have been constructed along principal drainages through the depot to protect facilities from flash flooding (Army 2000:10).



Source: USGS 1987a.

Figure 3.6–1. Surface Water Features at the Hawthorne Army Depot, Nevada

The State of Nevada has assigned beneficial uses and applicable water quality standards and criteria to all natural streams and lakes, reservoirs or impoundments on natural streams and other specified waterways (unless excepted on the basis of existing irreparable conditions which preclude such use) (NVDEP 2002b:445A-5). New water quality standards were adopted for Walker Lake in 2001. Designated uses include contact and noncontact recreation; propagation of wildlife; and propagation of aquatic life, including for species of major concern (i.e., the Tui Chub, the Tahoe Sucker and juvenile and adult Lahontan cutthroat trout) (NVDEP 2002c). Otherwise, the only streams classified as to beneficial use near the depot are Cottonwood, Rose, and Squaw creeks in the Wassuk Range, which are designated "Class A" waters. These are waters or portions of waters located in areas of little human habitation, no industrial development or intensive agriculture and where the watershed is relatively undisturbed by man's activity. The beneficial uses of Class A waters are municipal or domestic supply, or both, with treatment by disinfection only; aquatic life; propagation of wildlife; irrigation; watering of livestock; and contact and noncontact recreation (NVDEP 2002b:445A-8, 445A-12). Walker Lake is listed on Nevada's draft Clean Water Act Section 303(d) list for 2002 as being impaired relative to attaining water quality standards and designated uses. The primary parameter or stressor of concern is total dissolved solids. The Nevada Division of Wildlife has found that hatchery Lahontan cutthroat trout experienced high death rates upon release into the waters of Walker Lake. Increasing solids concentrations have caused significant biological changes in Walker Lake, including a reduction in biological diversity and the extinction of at least one zooplankton species (NVDEP 2002d:A-9, A-10).

Sanitary and industrial wastewater is generated at the depot. A sewage treatment facility serves the industrial and the housing areas of the depot facility complex (i.e., located northwest of the town of Hawthorne and just west of U.S. Highway 95). Treated effluent is discharged to a bank of 20 evaporation/percolation ponds in accordance with a current NPDES permit (Number NEV50029, issued July 28, 1998). A second NPDES permit (Number NV0021946, renewed July 1999) covers the discharge of treated wastewater, boiler blowdown, and sanitary wastewater to the evaporation basins as well as storm water and treated water used for dust suppression (Army 2000:16, 38, 39). The depot also has a third NPDES for general storm water discharges (Number GNV0022233), which was reissued in 1998 (Army 2000:16). Wastewater management is further discussed in Section 3.6.2.

As previously discussed under Section 3.6.5, a remedial investigation report completed in 1999 recommended action at 29 sites where high concentrations of explosive compounds exist in site soils. Completion of corrective action at identified sites of concern will help to ensure that existing site contamination does not migrate via the surface water pathway.

3.6.6.2 Groundwater

The principal source of groundwater in the area of Hawthorne Army Depot is the basin-fill aquifer system beneath the Walker Lake Valley. Rocks comprising the Wassuk Range to the west and the Gillis Range and the Garfield Hills to the east and southeast of the depot, respectively, are not principal sources of groundwater (Planert and Williams 1995:B3).

Groundwater occurs under both confined and unconfined conditions. As previously discussed, the basin fill is comprised of alluvial fan, floodplain, windblown channel and lake deposits, as well as terrace gravels and evaporites. Gravel, sand, and silt are the predominant sediments to a depth of about 500 ft (152 m). Fine-grained silt is interbedded with the sand and gravel, which accounts for the confined and probable semi-confining conditions reported for water-bearing horizons beneath the valley. The coarser-grained materials (e.g., sand and gravel) yield large amounts of water. Several wells near the town of Hawthorne have a saturated thickness (i.e., the vertical thickness of aquifer material that is saturated with water) exceeding 300 ft (90 m) (Army 2000:12). However, no specific well yield data are available for Walker Lake Valley wells completed in the basin-fill aquifer system.

Because the Walker Valley is a closed hydrogeologic basin with no flow between adjacent basins, groundwater losses are mainly due to evapotranspiration and groundwater pumping. Small amounts of groundwater are reportedly discharged to springs and some may be lost through flow into the older, consolidated rocks. Precipitation and runoff, including snowmelt from the Wassuk Range, are the primary source of recharge to the basin-fill aquifer system. The safe yield of the basin-fill aquifer system has been estimated at 4,600 acre-ft/yr (Army 2000:10, 12, 13). Walker Lake is the terminal point for all groundwater flow within the Walker Lake Valley, and the basin-fill aquifer system contributes an average of 11,000 acre-ft of groundwater inflow to Walker Lake annually (Thomas 1995). The direction of groundwater flow across the valley, and beneath the depot in particular, averages west-northwest toward Walker Lake and the axis of the valley, but is locally variable based on topographic changes and well pumping influence. Depth to groundwater beneath the depot ranges from about 5 ft (1.5 m) below land surface on the north side of the depot to about 200 ft (61 m) in the southern portion of the depot (Army 2000:12–14).

As previously discussed, surface water is the primary potable water source for Hawthorne Depot. However, groundwater is used to supplement surface water on a seasonal basis. Supplemental groundwater for the main depot area has historically been supplied via a single supply well (Well Number 1) located northwest of the town of Hawthorne and just north of the depot's industrial area. The well is tied into the Black Beauty Reservoir. A low-flow float in the reservoir turns on the well, with the water then passed through a cooling tower before being pumped to the reservoir for distribution. Cooling is necessary as the temperature of the groundwater is approximately 120 ºF (49 ºC). Other depot wells include Well Number 4, located near Magazine Group 27, that previously supplied potable water to the Central and South Magazine Areas of the depot before becoming inoperable. Water from the town of Hawthorne was being supplied to these areas while the depot considered redrilling the well. Well Number 3 located near Magazine Group 6 in the South Magazine Area is used to supply water for dust control equipment. Several other wells (number 5, 7, and 8) located within the main depot area are not used for potable supply due to high levels of several chemical constituents, including arsenic, fluoride, and nitrate (Army 2000:40–42). Groundwater quality data for the basin indicates relatively high sulfate and total dissolved solids concentrations. Total dissolved solid concentrations in old supply Well Number 5 located just west of the depot Industrial Area approach EPA's secondary drinking water standard of 500 mg/l. Solids concentrations increase downgradient toward Walker Lake (Army 2000:13). Nevertheless, all basin-fill aquifers would be considered Class II aquifers (current or potential sources of drinking water or other beneficial use). There are no designated Class I sole-source aquifers in Nevada (EPA 2002c). Water supply and use are further discussed in Section 3.6.10.4.

A depot-wide groundwater monitoring program was first instituted in 1997 with the installation of 55 monitoring wells. These monitoring wells as well as other existing wells have been monitored quarterly since 1997 for the purposes of investigation and monitoring groundwater quality and hydrogeologic conditions beneath the depot. The depot's 1999 Remedial Investigation Report identified seven landfill sites on the depot for which groundwater monitoring data have indicated that either explosives or volatile organic compounds have impacted groundwater in these areas. Groundwater monitoring has confirmed groundwater contamination beneath two areas in the North Magazine Area (Group 103-34/41 Complex Area and north of the former Navy Area) and two areas in the Central Magazine Area of the depot (Group 49 Area and Group 101 Areas). Explosive compound and petroleum product contamination has also been detected in groundwater at several other locations scattered within the depot, including the Group 102 and 108 Areas, and in the Western Area Demilitarization Facility Complex (Army 2000:26, 30–32).

3.6.7 Ecological Resources

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

3.6.7.1 Nonsensitive Habitats and Species

The Hawthorne Army Depot encompasses representative basin and range ecosystems of the Great Basin, which provide habitat for a diversity of native plants and animals (Nachlinger 2001:1). The depot area includes Walker Lake and the approximately 45,000-acre (18,211-ha) watershed area on Mount Grant in the Wassuk Range.

The Hawthorne Army Depot is within the Lahontan Basin and Reno sections of the Great Basin province. The boundary between these two sections occurs roughly at the base of the eastern flank of the Wassuk Range, but it varies from about 4,400 ft (1,341 m) in elevation in the northern portion to about 6,800 ft (2,073 m) in elevation further south (Nachlinger 2001:3). The lower elevations at Hawthorne include the south end of Walker Lake and the areas of active military operations. These areas lie within the Lahontan Basin Section, which is characterized by basin and desert scrub vegetation. The Reno Section is comprised of sagebrush semidesert valleys and montane woodlands; 13 general plant communities have been described for this portion of the depot (Nachlinger 2001:7).

The major phytogeographic regions (expressed as the dominant vegetation of each locality) include the South Magazine Area, North Magazine Area, Southwestern Shore of Walker Lake, and Slopes of Mt. Grant (Espinoza and Tracy 1999). Mercury would be stored in the Central Magazine Area, which is predominantly composed of four shrubs: blackbrush, four-wing saltbush, shadscale, and hopsage. The Indian ricegrass is the most abundant perennial grass. This area has many roads transecting the region.

In addition to the major phytogeographic regions, various human-made structures provided habitat for the local fauna. However, little natural habitat remains in administrative, industrial, and housing areas of the depot (Nachlinger 2001:3). Surrounding land that is not paved or occupied by a building or structure has been converted to lawns, parade grounds, drill fields, windbreaks, and other forms of landscaped areas or left in its natural desert habitat. General maintenance requires some control of noxious and weedy species from encroaching and deteriorating various facilities and habitats in improved areas. The integrated pest management program includes using disease-resistant flora, natural deterrents, and preventive maintenance practices to achieve a healthy and aesthetically pleasing landscape. Nuisance animals include feral cats and dogs, lizards, scorpions, snakes, and insects (I&AS 1998:ES-3, ES-4).

The only non-manmade water body on the Hawthorne Army Depot is Walker Lake, located at the northern boundary of the site (Nachlinger 2001:6). The lake provides habitat for the Lahontan cutthroat trout, Lahontan tui chub, Tahoe sucker, and other native fish (Army 2000; Walker Lake Working Group 1997). It is also used by thousands of birds, including loons, grebes, pelicans, waterfowl, sea gulls, terns, and ducks (Walker Lake Working Group 2002).

The biodiversity of the region is extensive due to the variety of plant communities and terrain. A comprehensive survey of fauna recorded 10 amphibians, 185 birds, 27 invertebrates, 70 mammals, and 45 reptiles (I&AS 1998). Another survey for flora produced a preliminary checklist of 476 species of vascular plants, including 21 trees, 96 shrubs, 95 grasses and grass-like plants, and 264 other herbaceous perennial and annual plants (Nachlinger 2001:25).

3.6.7.2 Sensitive Habitats and Species

A number of wetlands occur on the Hawthorne Army Depot, the largest of which is located at the southern end of Walker Lake. This area is classified as palustrine emergent by the U.S. Fish and Wildlife Service (USFWS 2002a). Palustrine wetlands generally include nontidal wetlands dominated by persistent emergent vegetation, shrubs, and/or trees. A number of additional small palustrine areas (primarily consisting of scrub-shrub and emergent vegetation) occur along streams draining the Wassuk Range. Only one small wetland area is located near the proposed storage site. This wetland, which is classified as palustrine, unconsolidated shore, is associated with a dike and intermittent stream located just to the northeast of the storage site.

Twenty-eight animal species, including two federally listed threatened species, having special status have been observed at the Hawthorne Army Depot as shown in Table 3.6–1. The U.S. Fish and Wildlife Service manages a regional bald eagle recovery plan that includes monitoring the nesting habits and a regional Lahontan cutthroat trout recovery plan that includes artificially stocking lakes and rivers and protecting critical habitat from degradation. Although no known nests for bald eagles were observed on the depot, bald eagles winter at Walker Lake (I&AS 1998:12). The State of Nevada classifies their rare species as sensitive or watch-list and may be protected under Nevada Revised Statutes Chapter 501 (NNHP 2002a).

A rare plant survey of the Hawthorne Army Depot was conducted in 2000 (Nachlinger 2001). Five known rare plants were identified during the survey as shown in Table 3.6–1. None of these rare plants are federally listed. The sand cholla is protected by the State of Nevada as a cactus under the state’s cactus, yucca, or Christmas tree list (Nachlinger 2001:12; NNHP 2002b).

3.6.8 Cultural Resources

An NRHP nomination for architectural resources was drafted for the Hawthorne Army Depot in 1989. Factors for nomination included its significance as the largest depot in the world; its importance during World War II and to Nevada history; and its integrity of landscape, infrastructure, and architecture. By 1994, 73 percent of all architectural resources were inventoried, including almost all pre-1946 buildings and structures and less than half of the Cold War resources. This survey concluded that 1,790 of the inventoried architectural resources were eligible for listing on the NRHP, including the 1942-era general-purpose warehouses (Waite1996:1-15). Mercury management storage is being considered for 20 of the general-purpose warehouses.

In 1976, an archeological inventory of the 147,001-acre (59,491-ha) site was initiated. By 1996 22 surveys were conducted over 10,360 acres (4,193 ha) by the Bureau of Land Management and the Nevada Department of Transportation and other organizations, mostly involving road construction projects. The discovery of campsites, gathering areas, hunting blinds, and hot springs suggest prehistoric habitation of the Hawthorne Army Depot area from the Paleo-Indian through the Protohistoric eras. Homesteads, cabins, railroad beds, and the identification of the former Oro City community provided evidence of the historic period. Eighteen eligible archaeological sites, 15 prehistoric and 3 historic, were designated as eligible for listing on the NRHP (Waite 1996:v–viii). Many of the archeological sites are located on property adjacent to and managed by the depot for water conservation and ordnance protection purposes (Nemeth 2002l). Since the warehouses that may be used for mercury storage are located on property that has already been disturbed by construction, it is unlikely that any of the identified archeological NRHP-eligible sites at Hawthorne Army Depot will be impacted.

Table 3.6–1. Threatened and Endangered Species, Species of Concern, and Sensitive Species Occurring in the Vicinity of the Hawthorne Army Depot

Common Name	Scientific Name	Federal Status	State Status
Birds			
American White Pelican	*Pelecanus erythrorhynchos*		W
Bald eagle	*Haliaeetus leucocephalus*	T (AD)	S
Black tern	*Chlidonias niger*	C	S
Common loon	*Gavia immer*		S
Ferruginous hawk	*Buteo regalis*	C	S
Golden eagle	*Aquila chrysaetos*		W
Harlequin duck	*Histrionicus histrionicus*		W
Lewis' woodpecker	*Melanerpes lewis*		W
Long-billed curlew	*Numenius americanus*		W
Macgillivray's warbler	*Oporornis tolmiei*		W
Orange-crowned warbler	*Vermivora celeta*		W
Sage grouse	*Centrocercus urophasianus*		S
Swainson's hawk	*Buteo swainsoni*		S
Western snowy plover[a]	*Charadrius alexandrinus nivosus*		S
White-faced ibis	*Plegadis chihi*		S
Wilson's warbler	*Wilsonia pusilla*		W
Yellow warbler	*Dendroica petechia*		W
Fish			
Lahontan cutthroat trout	*Oncorhychus clarki henshawi*	T	S
Mammals			
California myotis	*California myotis*		S
Fletcher dark kangaroo mouse	*Microdipodops megacephalus nasutus*	C	S
Fringed myotis	*Myotis thysanodes*		S
Hoary bat	*Lasiurus cinereus*		W
Long-legged myotis	*Myotis volcans*	C	W
Pale kangaroo mouse	*Microdipodops pallidus*		W
Pallid bat	*Antrozous pallidus*		W
Silver-haired bat	*Lasionycteris noctivagans*		W
Spotted bat	*Euderma maculatum*	C	S
Yuma myotis	*Myotis yumanensis*	C	W
Vascular Plants			
Eatley buckwheat	*Eriogonum beateyae*		S
Bodie Hills rockcress	*Arabis bodiensis*		S
Oryctes	*Oryctes nevadensis*		S
Sand cholla	*Opuntia pulchella*		S
Wassuk beardtongue	*Penstemon rubicundus*		S

[a] The pacific coast population of the western snowy plover is federally listed as threatened (USFWS 2002b).

Key: AD, proposed delisting; C, species of concern; S, sensitive; T, threatened; W, watch-listed.

Source: I&SA 1998; Morefield 2001; Nachlinger 2001; NNHP 2002a; USFWS 2002c.

The State of Nevada has 25 federally recognized Indian tribes and colonies, including the Walker River Reservation, which is located in Mineral County near the Hawthorne Army Depot (AIHF 2002). The Walker Lake Basin area has been home to Native Americans for nearly 11, 000 years (Mineral County Chamber 2002). Members of the Paiute tribe, the "Agai Ducutta Numa" (Trout Eater People), lived in this area and were a hunter-gatherer society who hunted and fished at what is now called Walker Lake (Mineral County Chamber 2002). The Walker River Indian Reservation currently occupies this area and is home to the Schurz community (Nevada 2002). Based on data from the 2000 census, the Walker River Reservation population was 853; 779 people living in Mineral County identified themselves as Native American or Alaskan Native (DOC 2002c).

3.6.9 Land Use and Visual Resources

3.6.9.1 Land Use

Land use at the Hawthorne Army Depot is consistent with that of light to general industry. The vast depot complex encompasses approximately 226 mi^2 (585 km^2) within Mineral County, Nevada. More than 3,000 structures are present on the installation, including approximately 1,800 explosive storage buildings distributed throughout three large areas (the North, Central, and South Magazine Areas). The remaining portions of the depot are divided into the Industrial Area, which is located along U.S. Highway 95 in the west-central portion of the depot and includes headquarters and office buildings, housing areas, a golf course, and maintenance shops; the Western Area Demilitarization Facility located on the northwestern-most portion of the depot; and several production areas located west and southwest of the Central Magazine Area. The depot is bounded by the Wassuk Range to the west, the Gillis Range to the east, the Excelsior Mountains to the south, and Walker Lake to the north (Army 2000:4, 55).

Land use surrounding the Hawthorne Army Depot is predominantly vacant, open space containing a small number of active mining operations (Hirrlinger 2002a). The Town of Hawthorne is bordered to the north, east and south by the Depot, with the Hawthorne Municipal Airport extending northwest toward the North Magazine Area of the Depot (USGS 1985).

3.6.9.2 Visual Resources

The developed areas of the Hawthorne Army Depot are consistent with BLM's VRM Class III or IV. Class III includes areas in which there have been moderate changes in the landscape that could attract attention, but do not dominate the view of the casual observer. Class IV includes areas in which major modifications to the character of the landscape have occurred. These changes may be dominant features of the view and the major focus of viewer attention (DOI 1986:app. 2). The tallest structures located at the depot are two 280-ft (85-m) water storage tanks located in the Central Magazine Area (Downs 2002a). The viewshed around the Hawthorne Army Depot consists mainly of open range within the Walker Lake Valley containing low-profile military storage, residential, and light industrial areas dominated by views of the Wassuk Range to the west and the Gillis Range to the east. This viewshed is generally consistent with VRM Class II (where visible changes to the character of the landscape are low and do not attract the attention of the casual observer) and Class III.

3.6.10 Infrastructure

Site infrastructure includes those utilities and other resources (see Table 3.6–2) required to support modification and continued operation of mission-related facilities identified under the various proposed alternatives.

Table 3.6–2. Hawthorne Army Depot-wide Infrastructure Characteristics

Resource	Current Usage	Site Capacity
Transportation		
Roads (mi)	244	244
Railroads (mi)	211	211
Electricity		
Energy consumption (MWh/yr)	7,386	109,500[a]
Fuel		
Natural gas (ft^3/yr)	0	0
Propane (gal/yr)	62,000	150,000
Oil (gal/yr)	1,000,000	264,200[b]
Coal (ton/yr)	0	0
Gasoline (gal/yr)	170,000	1,000[c]
Water (gal/yr)	82,125,000	567,648,000

[a] Assumes 1 kVA equals 1 kW (power factor of 1).
[b] Capacity of 24 refillable storage tanks.
[c] Capacity of one refillable aboveground storage tank.
Source: Downs 2002a, 2002b, 2002c; Day and Zimmermann 2002.

3.6.10.1 Transportation

The Hawthorne Army Depot is located in Mineral County, approximately 130 mi (209 km) southeast of Reno. U.S. Route 95 crosses the center of the depot property and is the main Federal highway going north/south in the region. The depot can also be accessed from the south by State Route 359 and from the north by State Route 839. The area is also served by an Army-owned railroad.

3.6.10.2 Electricity

Electricity is purchased from the Sierra Pacific Power Company, although the infrastructure is owned by the Army. The depot is served by three 2,500 kVa substations and one 5,000 kVa substation.

3.6.10.3 Fuel

Currently, No. 2 fuel oil (diesel) is the main source of fuel used on the Hawthorne Army Depot to fire boilers used for heating. Additionally, propane is used in some buildings for heat, hot water, and miscellaneous uses. Fuel oil and propane are both stored at the depot in above- and underground storage tanks. Gasoline is used at the depot for small equipment such as mowers and is stored in one aboveground storage tank. Currently, neither natural gas nor coal is used (Army 2000).

3.6.10.4 Water

The primary source of water for the Hawthorne Army Depot comes from the watershed of the Wassuk Mountains on the western boundary. Surface water runoff is diverted into three holding reservoirs (Rose Creek, Cat Creek, and Black Beauty). All of the surface water flows through Black Beauty Reservoir and is treated with chlorine before being sent to the depot distribution system. Water in Black Beauty Reservoir is supplemented by a well when surface flow reaches a predetermined minimum level. Water from this distribution system is transported throughout the depot in over 250 mi (402 km) of pipe (Army 2000).

3.6.10.5 Site Safety Services

Security for the Hawthorne Army Depot is provided by fencing and 24-hour armed guards.

The Hawthorne Army Depot maintains 24-hour fire and emergency services, including a fire station. Full-time, paid firemen are assigned to the station. The depot firemen are trained in hazardous materials response and mitigation, first responder emergency medical services, life safety, and fire prevention inspections. In addition, the depot has mutual aid agreements with the Hawthorne City Fire Department, Schurz Indian Reservation, and Mineral County Sheriff's Department. In the event of an emergency, the Mineral County Office of Emergency Management will be contacted by the Guard Operations Center on the depot (Day and Zimmermann 2001).

3.6.11 Environmental Justice

Under Executive Order 12898 (59 FR 7629), DNSC is responsible for identifying and addressing any disproportionately high and adverse impacts on minority or low-income populations. As discussed in Appendix G, minority persons are those who identify themselves as American Indian or Alaska Native, Asian, Black or African American, Hispanic or Latino (of any race), Native Hawaiian or Other Pacific Islander, or multiracial (CEQ 1997). Persons who report that their income is less than the Federal poverty threshold are designated as low-income.

Figure 3.6–2 shows populations residing in Mineral County as reported in the 1990 census and the 2000 census (DOC 1992, 2001g). In this figure, lightly shaded bars show populations in 1990, while the darker bars show those in 2000. In the decade between 1990 and 2000, the total population of Mineral County declined by approximately 22 percent; the minority population decreased by approximately 4 percent. The 2000 census found that American Indian, Black/African American, and Hispanic/Latino populations comprised nearly 96 percent of the total minority population resident in Mineral County. Among the minority populations, only the American Indian population increased during the last decade; all other minority populations declined. Persons who declared that they are multiracial and not Hispanic are included in the minority population shown in Figure 3.6–2, provided that they designated themselves as members of at least one minority race. They comprised approximately 7 percent of the total minority population residing in Mineral County in 2000.

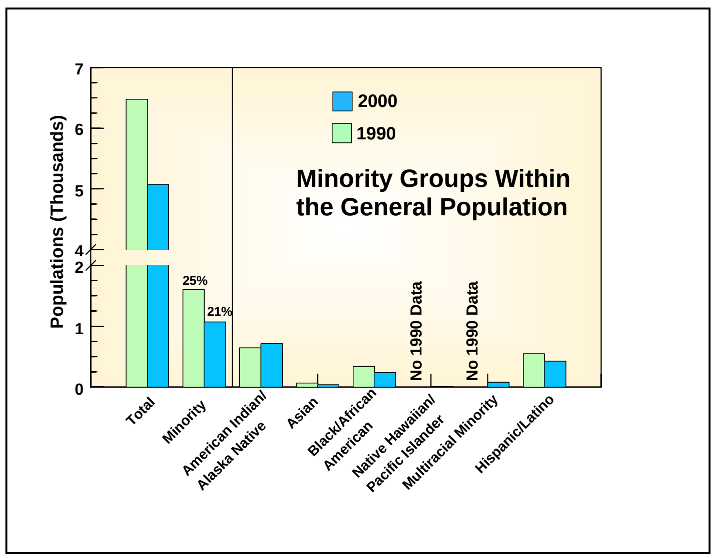


Figure 3.6–2. Populations Residing in Mineral County, Nevada, in 1990 and 2000

The 2000 census was the first decennial census in which multiracial selections were counted. There is no data for this category available from the 1990 census. Also, during the 1990 census, Asian and Pacific Islander designations were placed together in a single category, whereas during the 2000 census, Native Hawaiians and Other Pacific Islanders were counted separately from Asian respondents. Therefore, direct comparison of 1990 census data and 2000 census data for these two categories is not possible.

Approximately 726 minority individuals and 360 low-income persons lived within 10 mi (16 km) of the Hawthorne Army Depot in 2000 (DOC 2001g, 2002a). The majority population residing in the same area in 1990 was approximately 3,177 persons. Figure 3.6–3 shows the cumulative percentage of these populations living at a given distance from the Hawthorne Army Depot. The population living within 10 mi (16 km) of the Hawthorne Army Depot is concentrated in the town of Hawthorne. It would appear from the figure that the low-income population is more dispersed than the minority and non-minority populations. However, this apparent dispersion is an artifact that is due to the fact that the available spatial resolution for minority data is better than the available spatial resolution for low-income data (Appendix G, Section G.3 discusses spatial resolution and the aggregation of census data). Low-income data is aggregated at the block group level (there are six block groups in Mineral County), while racial and ethnic data is available at the block level of spatial resolution (there are 1,403 blocks in Mineral County) (DOC 2001g, 2002a). The entire population, both low-income and non-low-income, is concentrated in the town of Hawthorne.

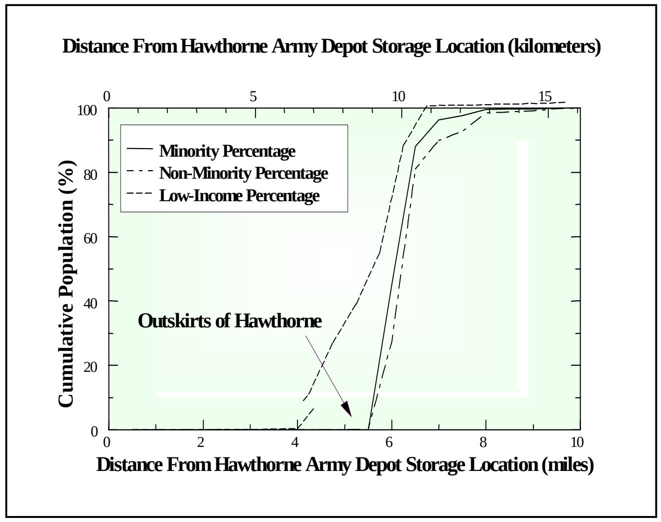


Figure 3.6.–3. Percent Resident Populations Within 10 Miles of the Hawthorne Army Depot

3.7 PEZ LAKE DEVELOPMENT

The PEZ Lake Development is located in Seneca County, New York. It consists of 850 acres (344 ha) of land leased from the Seneca County Industrial Development Agency after the closure of the former 10,594-acre (4,287-ha) Seneca Army Depot (TAG 2002). The entrance to the PEZ Lake Development is via State Highway 96. Former Seneca Army Depot property lies to the west with private property bordering the property to the east. Seneca Lake lies approximately 3.5 mi (5.6 km) to the west, with Cayuga Lake 4 mi (6.4 km) to the east (Army 1998:1-1, 2-2, 2-3).

Figure 2–7 shows the layout of the warehouses on the property. The property contains numerous buildings, including 21 large storage buildings, and has a storage capacity of approximately 2.5 million ft^2 (232,258 m^2) (TAG 2002). The warehouses that would be used to store mercury at the PEZ Lake Development are 500 ft (152 m) long by 180 ft (55 m) wide. The warehouses have concrete floors, solid block wall construction, wood beams and roof trusses, and dry-pipe (water supply) fire suppression systems. There are no floor drains through which leaked or spilled materials could escape to the environment (Palumbo 2002).

3.7.1 Meteorology, Air Quality, and Noise

3.7.1.1 Meteorology

The climate of the Seneca County area is a humid continental climate with warm summers and long cold winters. Weather is influenced by continental air mass movements from Canada, modified by the effects of Lake Ontario. The average annual rainfall, 31 in (79 cm), is fairly well distributed over the year (Army 1998:4-5). Damaging hailstorms occur infrequently (NCDC 2002b). Snow covers the ground for much of the winter months and snowfall is heavy (Army 1998:4-5; NCDC 2001h, 2001i). The average annual snowfall is 53 in (135 cm) (Army 1998:4-5). The maximum snow depth in Syracuse of 48 in (122 cm) occurred in 1966 (NCDC 2001i).

No tornadoes were reported in Seneca County between January 1950 and April 2002. Several occurrences of high winds, usually associated with thunderstorm activity typically occur every year (NCDC 2002b). The mean number of days per year with thunderstorm activity in Syracuse is 26.9 (NCDC 2001i). The average annual wind speed is 10 mph (4.5 m/s) (Army 1998:4-5). The maximum wind speed, based on the minimum for 1 mi of wind to pass, is 68 mph (30 m/s) (NOAA 2000).

The average annual temperature is 48 °F (8.9 °C); temperatures at Rochester range from a monthly average minimum temperature of 17.1 °F (-8.3 °C) in January to a monthly average maximum of 81.9 °F (27.7 °C) in July. The maximum recorded temperature in Rochester and Syracuse is 100 °F (38 °C) (NCDC 2001h, 2001i).

3.7.1.2 Air Quality

The PEZ Lake Development is in an area of Seneca County that is designated better than national standards for sulfur dioxide and better than national standards or cannot be classified for nitrogen dioxide. The area is unclassifiable/attainment regarding attainment of the standard for carbon monoxide. Under the EPA's rule change, which reinstated the 1-hr ozone standard, the area is unclassifiable regarding attainment of the standard for ozone. EPA has not assigned an attainment status designation for lead, and the attainment status for PM_{10} is unclassifiable (EPA 2000g). The State of New York is categorized as an ozone transport region, which means that new sources of volatile organic compounds are required to implement stringent air pollution controls (Army 1998:4-6).

There are no PSD Class I areas within 100 mi (161 km) of the PEZ Lake Development. A Class I area is one in which very little increase in pollution is allowed due to the pristine nature of the area. Seneca County and its vicinity are classified as a Class II area in which more moderate increases in pollution are allowed. No PSD permits are required for any emission source at the PEZ Lake Development.

The primary sources of criteria pollutants at the PEZ Lake Development and nearby facilities are boilers, water heaters, and generators. There are no active air emission sources at the warehouses that would be used for mercury storage that are required to be permitted under the Clean Air Act or state regulations.

The closest offsite air monitors are operated by the State of New York in Rochester, Syracuse, and Wayne County. In 2001, these monitors reported a maximum 8-hr average carbon monoxide concentration of 2,875 $\mu g/m^3$ and a maximum 1-hr average concentration of 5,060 $\mu g/m^3$. A 1-hr average ozone concentration of 214 $\mu g/m^3$ was reported. For sulfur dioxide, an annual concentration of 18.3 $\mu g/m^3$, 24-hr concentration of 81.2 $\mu g/m^3$, and 3-hr concentration of 196.5 $\mu g/m^3$ were reported (EPA 2002d). Monitored concentrations in the region are well below ambient standards. There are no nearby monitors for lead, mercury, or nitrogen dioxide.

3.7.1.3 Noise

Major noise emission sources within the PEZ Lake Development include various equipment and machines—heating, ventilation, and air conditioning equipment, material-handling equipment (i.e., forklifts and loaders), and vehicles. Levels of activity at the site are low, and noise levels produced are expected to be compatible with the adjoining industrial, commercial, agricultural, and recreational uses. The nearest noise sensitive receptors are residences at Elliott Acres (Army 1998:5-23). The closest residence is approximately 550 ft (168 m) north of gate 14 at State Highway 96 and approximately 2,500 ft (762 m) from the warehouses that would be used to store mercury.

The State of New York and Seneca County have not established community noise standards, which specify acceptable noise levels applicable to the PEZ Lake Development. The Township of Romulus noise ordinance prohibits certain types of noise, but does not specify limits on noise levels (Township of Romulus 2001).

Sound-level measurements have not been recorded near the depot except for measurements in the immediate vicinity of the proposed Seneca County Public Safety Building and Jail (Chazen 2002). This study found that daytime average sound levels (L_{eq} [15 minute]) were in the range of 40 to 60 dBA, and the predominant noise sources were traffic and birds. Most of the measurement locations were along State Highway 96 or other roads. It is expected that the acoustic environment near the warehouse area ranges from that typical of rural to industrial locations. Traffic is the primary sources of noise at the site boundary. The Seneca County Public Safety Building and Jail will also result in some noise in the immediate area. Traffic is the primary source of noise at residences located near State Highway 96. The traffic generated by the site (typically 450 trips per day) includes employee vehicles (120 employees in 2002) and trucks used for shipping (Palumbo 2002). Roads that provide access to the PEZ Lake Development include the main entry road and State Highway 96 (Army 1998:5-24). Average daily traffic flow (vehicles per day) on State Highway 96 is 3,095 (NYDOT 2002). Railroad activity related to the site (i.e., delivery or removal of railcars) is currently embargoed (Palumbo 2002).

3.7.2 Waste Management

Waste management includes minimization, characterization, treatment storage, transportation, and disposal of waste generated from ongoing depot activities. Waste is managed using appropriate treatment, storage, and disposal technologies in compliance with applicable Federal and state statutes. Hazardous and nonhazardous wastes are the waste types generated by routine operations at the PEZ Lake Development.

Tenants at the PEZ Lake Development may generate hazardous waste. This may include rags and wipes contaminated with lubricants, paints and solvents, spent solvents, and acidic or caustic solutions. The Kids Peace Seneca Woods Campus located in the northern portion of the former Seneca Army Depot is classified as a RCRA small quantity generator. Because of cleanup and remediation activities, the Seneca Army Depot is still considered a large quantity generator (EPA 2002b). Approximately 1,500 lbs (680 kg) of hazardous waste are generated annually by Seneca Army Depot activities at the PEZ Lake Development. The cleaning solvent is recycled, while Decontamination Solution #2 is treated off site (Palumbo 2002). It is expected that this waste will be generated for the next 3 to 5 years (Absolom 2002a).

Potentially contaminated areas of the former Seneca Army Depot were investigated under the Base Realignment and Closure (BRAC) Installation Restoration Program, RCRA, CERCLA, and non-CERCLA programs (Army 1998:4-30). The Seneca Army Depot was listed on the Superfund National Priority List on August 30, 1990. The Army entered into a Federal facility agreement with EPA and the State of New York on January 21, 1993, to investigate and cleanup the site under CERCLA (EPA 2002e). The Army investigated 72 solid waste management units for release of hazardous materials to the environment on the former Seneca Army Depot property (Army 1998:4-31). Most of these areas were found to be clean, or were cleaned before the property was leased.

Nonhazardous wastes generated by tenants at the PEZ Lake Development include industrial scrap and waste, office wastes, lunchroom wastes, and janitorial wastes. Waste plastic, glass, paper, and cardboard are recycled (Palumbo 2002). Nonhazardous wastes are collected by a commercial waste hauling contractor and disposed of at the Seneca Meadows Landfill, approximately 15 mi (24 km) from the site in Waterloo, New York (Army 1998:4-22). Currently, 240 yd^3 (183 m^3) of waste are disposed of each month in the Seneca Meadows Landfill (Palumbo 2002). The Seneca Meadows Landfill is estimated to have over 40 years of remaining capacity (Army 1998:4-22).

Sanitary wastewater from the PEZ Lake Development is discharged to new sewage treatment plant that serves Seneca County Sewer District #2. The new sewage treatment plant processes an average of 240,000 gal/day of wastewater and has a capacity of 550,000 gal/day (Duddleston 2002).

3.7.3 Socioeconomics

The PEZ Lake Development is located in Seneca County, New York. Therefore, all statistics for the local economy, population, housing, and community services as defined in Appendix E, Impact Assessment Methods, will be presented for Seneca County. In 2001, the PEZ Lake Development employed 120 persons (about 0.8 percent of the county's civilian labor force for the year 2000) (DOL 2002; Palumbo 2002).

3.7.3.1 Regional Economic Characteristics

From 1990 to 2000, the estimated civilian labor force in Seneca County decreased by 7.0 percent to 15,319 persons. In 2000, the estimated unemployment rate for the county was 4.9 percent, which was slightly greater than the unemployment rate for New York (4.6 percent) (DOL 2002).

3.7.3.2 Population and Housing

In 2000, the estimated population of Seneca County totaled 33,342. From 1990 to 2000, the county's population decreased by 1.0 percent, compared with the 5.5 percent growth in New York (DOC 2001i). The percentage of the county's population under the age of 5 is 5.6 percent, with women age 18 to 39 comprising 13.2 percent (DOC 2002a, 2002b). There were 14,794 housing units in the county in 2000, of which 63.0 percent were owner occupied; 22.4 percent, renter occupied; and 14.6 percent, vacant (DOC 2002a).

3.7.3.3 Community Services

3.7.3.3.1 Education

In the 2000–2001 school year, student enrollment in Seneca County was 5,194, and there were 450 teachers for an average student-to-teacher ratio of 11.5:1 (NYSED 2002).

3.7.3.3.2 Public Safety

In 2002, about 82 sworn police officers served Seneca County, with a ratio of 2.5 officers per 1,000 persons (Nemeth 2002m). If a mercury incident were to occur at the PEZ Lake Development, the New York State Department of Environmental Conservation would be notified, and the Romulus Fire Department would respond as well as the Seneca County Health and Emergency Services Agency (Palumbo 2002). In 2002, about 550 firefighters provided fire protection services in the county (Nemeth 2002m). The average ratio was 16 firefighters per 1,000 persons.

3.7.3.3.3 Health Care

In 2002, 40 physicians served Seneca County (NYSDOH 2002a). The average ratio was 1 physician per 1,000 persons. In 2002, there were no hospitals listed in the county (NYSDOH 2002b).

3.7.4 Human Health Risk

3.7.4.1 Health Effects Studies

Environmental studies on the Seneca Army Depot were initiated in 1978 and have identified 72 solid waste management units, including landfills, open burning ground, radioactive waste burial grounds, spill areas, fire training areas, and munitions disposal areas. Environmental investigations at the Seneca Army Depot have detected volatile organic compounds, explosives compounds, fuels, and metals in soil and groundwater and, to a lesser extent, in onsite surface water and sediment. Several solid waste management units are under investigation and groundwater and soil sample results from the site located near the proposed mercury storage buildings had some polycyclic aromatic hydrocarbons and asbestos detections but no mercury (Absolom 2002b). The Agency for Toxic Substances and Disease Registry (ATSDR) evaluated available environmental data and exposure information associated with the Seneca Army Depot and determined that the site poses no apparent public health hazard (ATSDR 2000). ATSDR identified volatile organic compounds in groundwater at levels above human health guidelines. The volatile organic compound plume extends from the landfill to approximately 250 ft (76 m) beyond the depot's western boundary. Volatile organic compounds and explosive compounds, fuels, and metals were detected in soil and groundwater and, to a lesser extent, in onsite surface water and sediment. The contamination has not migrated to downgradient private wells or other drinking water sources and it is unlikely that volatile organic compound contamination will pose future public health concerns because the Seneca Army Depot has implemented remedial measures to control the suspected source and limit the migration of contaminated groundwater.

ATSDR also evaluated potential exposures that might occur through contact with surface soil, surface water, or sediment, and ingestion of local game (e.g., deer and fish) (ATSDR 2000). ATSDR concluded that any low-level chemical contamination present in soil, sediment, or surface water is unlikely to pose a public health hazard. Because of limited available radiologic data, ATSDR was unable to fully assess potential public health hazards associated with radiologic constituents at the depot. Additional chemical hazards identified on the Seneca Army Depot include radon, lead-based paint, pesticides and herbicides, polychlorinated biphenyls, explosives, and unexploded ordnance (Army 1998).

According to the Seneca Army Depot Base Manager, no human health studies of workers are being conducted. The Seneca County Health Department, Environmental Health Division Director was not aware of any human health studies conducted near the Seneca Army Depot (Carroll 2002).

Cancer statistics for the Town of Romulus, east of the Seneca Army Depot, indicate statistically less than expected incidences of breast cancer, lung cancer (males), and colorectal cancer (males) and statistically greater incidences of prostate cancer, lung cancer (females), and colorectal cancer (females) between 1993 and 1997 (NYSDOH 2002c). The cancer incidents for the Town of Romulus do not, however, show a statistically significant difference when compared to statewide cancer incidents and any observed increases in cancer incidence can be attributed to chance. According to the State of New York statistics, there are no areas of statistically elevated incidence of cancer in Seneca County between 1993 and 1997.

3.7.4.2 Accident History

The buildings that would be used for mercury storage have no history of mercury storage or use. Facilities located in the immediate vicinity of the proposed mercury storage buildings include additional warehouse storage. The U.S. Army stores approximately 2 million gal (7.6 million l) of Decontamination Solution #2, a hazardous (corrosive) material, in two nearby warehouses (Palumbo 2002). Small-scale spills of fuel oil and other hazardous liquids and leaking underground storage tanks have been reported within the warehouse complex (Woodward-Clyde 1997). All spills and leaking tank incidents were cleaned up and resolved to closure. There have been no reported accidents or incidents associated with the proposed mercury storage buildings.

3.7.4.3 Emergency Preparedness

The PEZ Lake Development is within the fire and emergency response service area boundaries of the Town of Romulus Fire Department, Town of Ovid Fire, and Varick Fire Department all located within 5 mi (8 km) of the installation. Reservoir 352 is an emergency fire protection reservoir located in the northwest corner of the warehouse complex. The reservoir has a capacity of 1-million gal (3.8-million l) of non-potable water for use as an emergency supply supplement for the warehouse fire protection system (Army 1998). Medical services outside of the Seneca Army Depot are provided by Geneva General Hospital, Schuyler Hospital, and Cayuga Medical Center.

3.7.5 Geology and Soils

The PEZ Lake Development is located on a glacial till plain in the eastern lake section of the Central Lowland Physiographic Province. The site is bordered just to the south by the Appalachian Plateau Physiographic Province that abuts the Central Lowland Physiographic Province along the southern border of Seneca County (Army 1998:4-8; Olcott 1995:M2). The site lies on the eastern edge of a topographic and hydrographic divide that is formed by a series of rock terraces that separate Cayuga Lake to the east and Seneca Lake to the west (Army 1998:4-8; USGS 1970). Topography across the site and vicinity ranges from nearly level to gently sloping with elevations ranging from approximately 760 ft (232 m) above mean sea level near the southeastern corner of the site to about 740 ft (226 m) along the western boundary of the PEZ Lake Development (USGS 1970).

Glacial till comprises the surficial strata which underlies the site. These deposits consist of unsorted silt, clay, sand, and minor gravel (Army 1998:4-9). Although the till can be more than 30-ft (9.1-m) thick in some locations, the till is thin in some portions of the area, including the eastern portion encompassing the PEZ Lake Development where bedrock may be less than 3 ft (0.9 m) from the surface or exposed (Woodward-Clyde 1997:1-8). Rocks of the Hamilton Group underlie the glacial sediments of the former depot. The Hamilton Group consists of a 600- to 1,500-ft (183- to 457-m) sequence of limestones, calcareous shales, siltstones, and sandstones that dip gently to the south. Four formations comprise this group, including, in descending order, the Moscow Shale, Ludlowville Shale, Skaneateles Shale, and the Marcellus Shale. The Moscow Shale dominates the eastern portion encompassing the site (Army 1998:4-8, 4-9; Woodward-Clyde 1997:1-8). The Moscow Shale generally consists of gray, calcareous shale. This formation is about 140 ft (43 m) thick and has many joint openings. The Hamilton Group, in turn, is underlain by the Onondaga Limestone (Army 1998:4-9).

In 2000, Seneca County's principal mineral products consisted of crushed stone and construction sand and gravel (USGS 2000b). Several gravel pits are mapped within about 6 mi (9.6 km) of the site to the south (USGS 1970). Also, the near-surface shales may be locally suitable for crushed stone production. State regulated, commercial mines operating in Seneca County include three sand and gravel mines, one limestone mine, two clay mines, and one peat mine (NYSDEC 2000). Most of the former Seneca Army

Depot lies on the southern boundary of the Fayette-Waterloo natural gas field. The northern two-fifths of the former depot is surrounded by producing gas wells that have been drilled since 1984. The southern portion of the former depot is considered to have a moderate potential for economic gas reserves. To the north of the depot, wells typically test 1 to 2 million ft^3 (0.03 to 0.06 million m^3) of gas per day (Army 1998:4-9). In 1999, a total of 136 wells in Seneca County produced 569,631 million ft^3 (16,130 million m^3) of natural gas (NYSDEC 1999:2).

A number of known or suspected fault systems occur in New York State. Of particular relevance to western New York from a seismic risk perspective is the Clarendon-Linden fault zone located approximately 75 mi (121 km) west of the PEZ Lake Development area. This fault zone extends some 62 mi (100 km) from near the shoreline of Lake Ontario in Orleans County south-southwestward into Allegany County, where the zone contains as many as 17 faults. Review by the USGS has found no surface expression of fault slippage, possibly indicating that earthquakes larger than about magnitude 6.0 have not occurred during the last 10,000 years. Regardless, moderate earthquakes have been associated with the fault zone (i.e., earthquakes in 1929, 1966, and 1967 as discussed below) indicating that the fault has likely been active within the past century (Crone and Wheeler 2000:190–192).

A number of moderate to strong earthquakes centered along the St. Lawrence Valley have affected many parts of New York as well as many parts of the Northeast as recorded from the 1600s to the present. For example, a large portion of the Northeast and eastern Canada experienced the effects of a magnitude 7.0 earthquake located near Quebec, Canada, on February 28, 1925. It produced MMI IV effects across much of New York. The largest earthquake within New York occurred on September 4, 1944, and was located in the northwest corner of the state near Massena. A local magnitude 5.8 earthquake, it produced MMI VIII shaking and caused extensive property damage at Massena, St. Lawrence County and was felt from Canada and Maine and south to Maryland (USGS 2002e).

Within a radius of 100 mi (161 km) of the PEZ Lake Development area, only five significant earthquakes (i.e., having a magnitude of at least 4.5 or a MMI of VI or larger) have been documented going back to 1853. Three of these were located around the Attica, New York, area, north-northwest of the site. The closest and most recent of these was the June 13, 1967, earthquake that was located about 71 mi (114 km) north-northwest of the site just southeast of Attica, New York. This earthquake produced a MMI of VI at its epicenter. A year earlier on January 1, 1966, a magnitude 4.7 earthquake occurred in the same area. This earthquake had a MMI of VI and caused damage to chimneys and walls in Attica and damaged the main smokestack at Attica State Prison. On August 12, 1929, a magnitude 5.2 earthquake occurred to the northwest of Attica, New York. It threw down 250 chimneys in the town, damaged building walls, threw dishes from shelves, and knocked pictures from walls (equivalent to MMI VIII). It also produced flow changes in the Attica reservoir and nearby wells. The event was felt throughout New York and New England, in southern Ontario, northeastern Ohio, and in northern Pennsylvania (USGS 2002e, 2002f).

Earthquake-produced ground motion is expressed in units of percent “g” (force of acceleration relative to that of the earth’s gravity). Two differing measures of this motion are peak (ground) acceleration and response spectral acceleration (see Appendix E, Section E.6.1). New seismic hazard metrics and maps developed by the USGS have been adapted for use in the *International Building Code* and depict maximum considered earthquake ground motion of 0.2- and 1.0-second spectral acceleration, respectively, based on a 2 percent probability of exceedance in 50 years (USGS 2001c; ICC 2000). This corresponds to an annual probability of occurrence of about 1 in 2,500. The PEZ Lake Development area lies within the 0.18g to 0.19g mapping contours for a 0.2-second spectral response acceleration and along the 0.07g contour for a 1.0-second spectral response acceleration. The calculated peak ground acceleration for the given probability of exceedance is approximately 0.09g (USGS 2002d). Based on the maximum considered earthquake ground motions discussed above, the PEZ Lake Development area is located in a region of negligible seismicity with very low probability of collapse of structures. On a design basis, the probability of life-threatening damage to or collapse of structures in such regions is very low even for the most vulnerable types of structures. The seismic hazard in these regions is controlled by earthquakes with a body-wave magnitude less than or equal to 5.5 with MMIs of up to V. Life-threatening structural damage or collapse would not be expected from earthquake shaking of either MMI V or VI (BSSC 2001:381, 382, 387). For comparison, a peak ground acceleration of about 0.10g roughly marks the approximate threshold of damage to older (pre-1965) structures and roughly corresponds to a MMI of VI (USGS 2002a). Appendix E Table E–11 shows the approximate correlation between MMI, earthquake magnitude, and peak ground acceleration.

There is no volcanic hazard in the vicinity of the former Seneca Army Depot. Western New York has not experienced volcanism for more than 360 million years (Olcott 1995:M3).

Across the PEZ Lake Development area, the natural soils have likely been disturbed by site development to include the placement of fill material such that their actual characteristics are likely to be variable. Nevertheless, the Darien silt loam, 0 to 3 percent slopes is the specific soil unit that occurs across the warehouse site (Army 1998:4-10; USDA 1972:sheets 26 and 28). This soil is a grayish-brown to brown heavy silt loam in the upper part with a silty clay loam subsoil above a gravelly silty clay loam at a depth of 24 in (61 cm). Seasonal wetness and slow permeability present severe limitations for some developed uses of these soils (e.g., for septic tank absorption fields) (USDA 1972:68, 95). The Darien silt loam was previously identified as a prime farmland soil mapping unit, an important farmland soil unit. “Urban built-up land” is excluded from the definition of prime farmland contained in 7 CFR 657.5, as is otherwise qualifying farmland in or already committed to urban development among other exemptions, as stipulated in the Farmland Protection Policy Act’s implementing regulations (7 CFR 658.2 through 658.4). As part of the disposal process for Seneca Army Depot, the Army evaluated the impact on farmland soils under the FPPA and determined that no further action was required to preserve prime farmlands (Army 1998:4-11, 4-12, 4-14).

A depot-wide Environmental Baseline Survey was completed by the Army in 1997 to determine the environmental condition of each parcel of installation property relative to one of seven categories. As documented in the survey, the former warehouse area of the main depot, which constitutes the PEZ Lake Development, provided general purpose storage for materials and equipment, including both hazardous and nonhazardous materials. It comprises more than 30 buildings and a dry Tank Farm facility, which is located south of the warehouse portion of the site (Woodward-Clyde 1997:1-2, 1-4, 2-12, 3-5, 3-8, 3-9). Stored materials included pesticides, antifreeze, and other materials in several warehouses. Also, open stockpiles of metallic ores have been stored in the warehouse area. These have included stockpiles of aluminum, antimony, chromite, ferrochrome, and zinc ores. Columbite ore (a mixture of iron, manganese, niobium, and tantalum oxides) was stored in three buildings. However, no corrective action was determined to be required for these buildings. The Environmental Baseline Study identified a total of 13 parcels as requiring removal or remedial action to address hazardous substances/materials. This number includes 10 parcels where contaminants from ore storage pile sites pose a threat to the environment. The other sites include a fire training pit where semi-volatile compounds have contaminated soils; one parcel where a spill of polychlorinated biphenyl oil reportedly occurred (Woodward-Clyde 1997:3-29, 3-30, Table 5-1a, 5-28–5-32). A removal action to address soil contamination at the fire training pit is pending. Investigation of a rumored polychlorinated biphenyl spill found only semi-volatile compound contamination in site soils, and followup sampling was recommended to further determine impacts (Young 2001:20, 21).

3.7.6 Water Resources

3.7.6.1 Surface Water

Seneca Lake and Cayuga Lake, 2 of the 11 freshwater Finger Lakes in western New York, are the dominant surface water features in the vicinity of the PEZ Lake Development and former Seneca Army Depot. They are the two largest of the Finger Lakes in volume, length, and surface area with surface areas of 67.7 mi^2 (175.3 km^2) and 66.4 mi^2 (172.0 km^2), respectively. They are also the deepest with Seneca Lake attaining a maximum depth of 651 ft (198 m) and Cayuaga Lake a maximum depth of 435 ft (132 m). Likewise, Seneca and Cayuga Lakes have extensive watersheds with drainage areas of 456 mi^2 (1,181 km^2) and 442 mi^2 (1,145 km^2), respectively (Callinan 2001:17, 19, 20). PEZ Lake Development is located approximately 3.4 mi (5.5 km) east of Seneca Lake and about 3.6 mi (5.8 km) west of Cayuga Lake (USGS 1970, 1978) (see Figure 3.7–1). The PEZ Lake Development lies on the eastern edge of the Seneca Lake watershed along its boundary with that of Cayuga Lake to the east. As previously mentioned, the drainage basin divide between the lakes is formed by a rock terrace that splits the watershed boundaries roughly along a south to north line on the eastern boundary of the former Seneca Army Depot (Army 1998:4-14, 4-15).

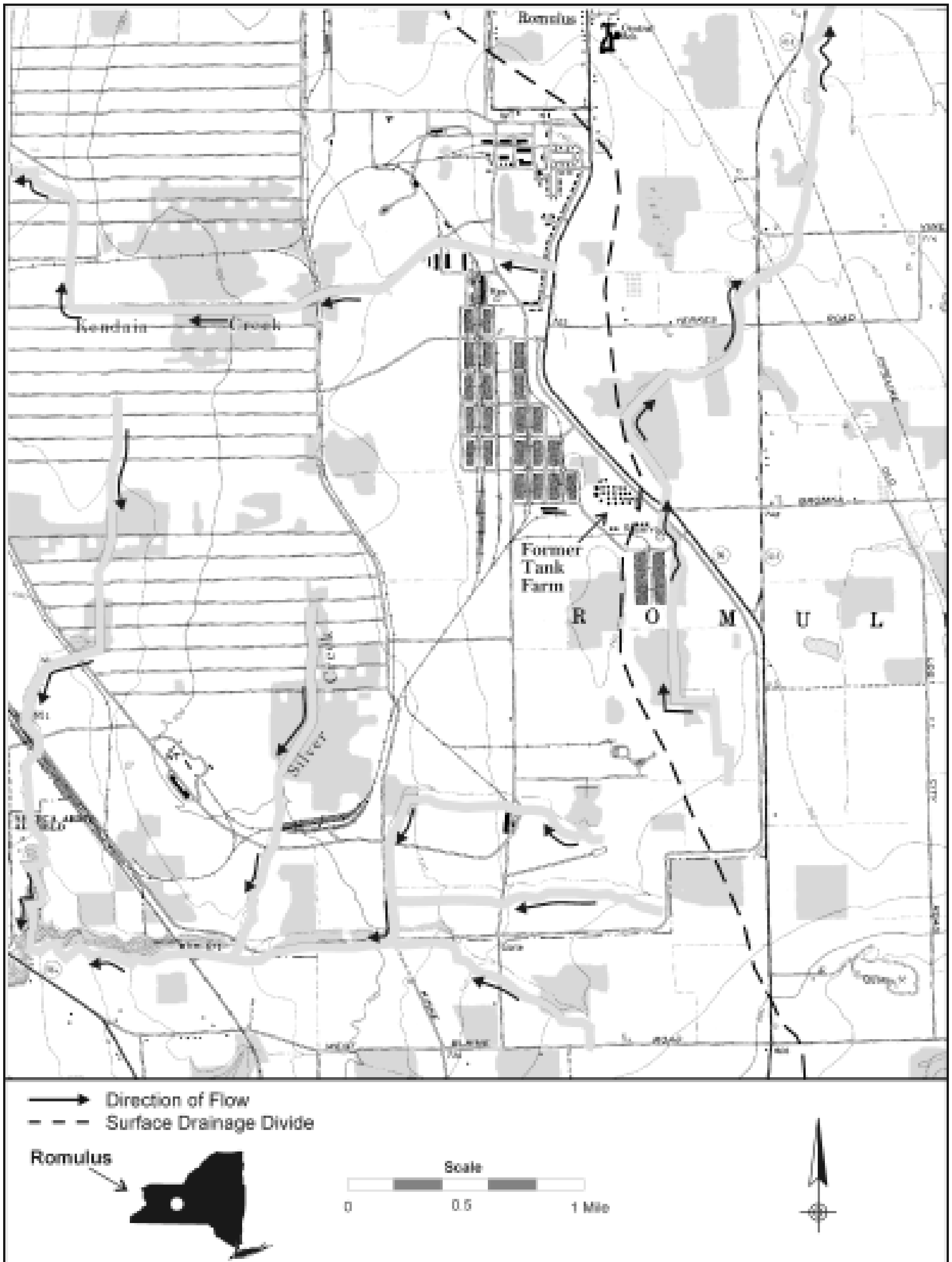
Two streams, Indian Creek and Silver Creek (an intermittent tributary to Indian Creek), drain the southern part of the former Seneca Army Depot. These streams collect surface water runoff through a series of ditches and smaller streams and convey it south and southwest to Seneca Lake. Surface runoff, especially from the southern portions of the PEZ Lake Development not collected and channeled by storm sewers, would be expected to flow south and southwest toward Indian and Silver Creeks. Indian Creek ultimately discharges into Seneca Lake approximately 3.6 mi (5.8 km) southwest of the PEZ Lake Development.

However, surface drainage and runoff from the developed areas of the main depot area and encompassing the PEZ Lake Development and former Tank Farm drain to an intermittent, channeled portion of the east-west running Kendaia Creek. Kendaia Creek ultimately discharges into Seneca Lake some 4 mi (6.4 km) northwest of the PEZ Lake Development. A storm sewer system exists to enhance drainage and specifically to reduce the potential for street flooding in the PEZ Lake Development (Army 1998:4-14–4-16; USGS 1970, 1978). The average flow and drainage area of the streams, which drain the PEZ Lake Development and vicinity are not known.

The PEZ Lake Development obtains potable water from the Seneca County Water District # 1. The district obtains its water from Seneca Lake (Palumbo 2002). Water supply and use are further discussed in Section 3.7.10.

The PEZ Lake Development lies outside the 100- and 500-year floodplains based on published Federal Emergency Management Agency maps (Army 1998:4-16).

New York assigns water classifications to all waters in the state, defining the best way each body of water can be used. The classification is the legal basis for water quality protection programs (NYSDEC 1998). The stretch of Seneca Lake in the vicinity of the PEZ Lake Development is classified as "Class B" fresh surface waters whose best usages are primary and secondary contact recreation and fishing. These waters shall also be suitable for fish propagation and survival (Callinan 2001:22). In general, tributaries to surface water bodies are afforded the highest use classification of the surface water into which it flows. No region of Seneca Lake is on the State's Clean Water Act Section 303(d) list as being impaired relative to attaining water quality standards and designated uses (NYSDEC 2002).



Source: Army 1998:4-15; USGS 1970.

Figure 3.7–1. Surface Water Features at the PEZ Lake Development, New York

Sanitary wastewater from the PEZ Lake Development is collected and conveyed by a sanitary sewer to the new sewage treatment plant that serves Seneca County Sewer District #2 (Jones 2002a). This plant is permitted under a New York State Pollutant Discharge Elimination System. Storm water runoff from the PEZ Lake Development is collected and conveyed by a storm sewer system to Kendaia Creek and ultimately into Seneca Lake, as discussed above. Wastewater management is further discussed in Section 3.7.2.

As previously stated under Section 3.7.5, 10 parcels within the PEZ Lake Development where ore storage piles were located (e.g., BRAC parcel sites 65 through 71, 73, and 74) had been identified as requiring remediation/mitigation due to the potential for contaminant migration in surface water runoff (Woodward-Clyde 1997:table 5-1a, 5-28–5-31).

3.7.6.2 Groundwater

Groundwater occurs in three primary aquifer systems beneath the former Seneca Army Depot and vicinity. These water-bearing strata include the unconsolidated glacial till beneath the site (known as the Glacial Till Aquifer); the upper portions of the Hamilton Group (known as the Shale Aquifer); and the deeper carbonate rocks, including the Onondaga Limestone (known as the Limestone Aquifer) (Army 1998:4-16, 4-17).

The Glacial Till Aquifer yields very small quantities of water (i.e., generally less than 1 gal/min (3.8 l/min) from shallow wells (Army 1998:4-16, 4-17). This is principally because the till is generally unsorted, unstratified, and contains an abundance of fine-grained materials that further lowers its permeability and water-bearing potential (Olcott 1995:M6). Small quantities of groundwater are available from the Shale Aquifer, principally from the Moscow Shale, as this unit is relatively more friable and jointed in the upper part than the underlying units. Typical well yields range from 1 to 10 gal/min (3.8 to 38 l/min) from wells about 100 ft (30 m) deep. The deeper shale units, particularly the Skaneateles Shale and the Marcellus Shale, serve as regional confining units and yield negligible quantities of water (Olcott 1995:M22). Beneath the confining units, the Onondaga Limestone represents the uppermost and thickest hydrogeologic unit comprising the Limestone Aquifer (Army 1998:4-17). This aquifer yields larger quantities of water (commonly 30 gal/min [113 l/min]) from enlarged solution cavities, bedding planes, and other openings in the rock (Olcott 1995:M22). Nevertheless, because this aquifer ranges between 100 and 700 ft (30 to 213 m) deep across the depot, it is the least commonly used groundwater source in the area (Army 1998:4-17).

Groundwater beneath the PEZ Lake Development and the former depot as a whole is recharged by infiltration of precipitation and surface water flow. The depth to groundwater within the upper glacial till ranges from less than 1 to 23 ft (0.3 to 7.0 m). The direction of groundwater flow within the Glacial Till Aquifer has been inferred to be generally to the west as influenced by the topographic and hydrographic divide discussed earlier (Army 1998:4-16; Woodward-Clyde 1997:1-10). Localized variations in groundwater flow are also likely across the former depot. In the immediate vicinity of the PEZ Lake Development, shallow groundwater may have a more south to southwest component toward the headwaters of Indian Creek and Silver Creek. Within the uppermost Shale Aquifer, lateral flow along bedding planes produces seeps and springs to the north and west of the former depot. This is also evident immediately to the south and southwest of the PEZ Lake Development based on review of the topographic map coverage for the area (USGS 1970). Within the deeper strata and on a more regional basis, groundwater flow is more to the south and southeast following the dip of the bedding planes (Army 1998:4-16).

Groundwater is not used on the PEZ Lake Development. Potable water is supplied by Seneca County Water District Number 1. However, the village of Ovid, located about 5 mi (8 km) south of the PEZ Lake

Development, has historically relied upon two, shallow gravel-packed wells as a water source. All aquifers in the Finger Lakes region would be considered Class II aquifers (current or potential sources of drinking water or other beneficial use). There are no designated Class I sole-source aquifers in the area (EPA 2001g). About 95 percent of the groundwater that is used in Seneca County is for domestic and agricultural purposes (Army 1998:4-16, 4-17).

Groundwater from the Limestone Aquifer is generally very hard and slightly alkaline with quality decreasing with depth. Groundwater at depths of 1,000 ft (305 m) in the southern half of Seneca County is inferred to be saltwater due to the presence of evaporite deposits and slow circulation (Olcott 1995:M7). Water supply and use are further discussed in Section 3.7.10.

The sitewide environmental baseline study for the former Seneca Army Depot identified 10 parcels within the PEZ Lake Development where ore storage piles were located as requiring further investigation as to the potential for contaminant migration in surface water runoff, as discussed earlier in this section. Any contaminant migration in surface water runoff could also potentially impact the shallow groundwater at the site. The only confirmed source of widespread groundwater contamination from former depot activities is associated with a former ash landfill located in the southwest portion of the former depot. Contaminants of concern include trichloroethylene and its decay products (Army 1998:4-17).

3.7.7 Ecological Resources

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

3.7.7.1 Nonsensitive Habitats and Species

The former Seneca Army Depot contains wooded areas covering approximately 3,600 acres (1,457 ha). Ninety-five percent of the total woodland area is composed of hardwood species that include red maple, silver maple, shagbark hickory, bitternut hickory, pignut hickory, and various oaks. The remaining 5 percent is composed of softwoods such as white pine and eastern hemlock that are planted mainly in plantation form.

Abandoned agricultural fields undergoing secondary successional changes are characterized as a sapling shrub community, contains maple, white ash, hawthorn, grape, raspberry, blackberry, poison ivy, and various grasses. The remaining upland portions of the depot are in the initial stages of old field succession. Clear zones are maintained by mowing along roads and within the igloo area.

Although a formal vegetation inventory has not been conducted, typical scrub-shrub wetlands plants found in the Finger Lakes region of New York include black willow, buttonbush, sweet pepperbush, and silky dogwood. Typical emergent vegetation in this region includes wool rush, soft rush, bur reed, smartweed, purple loosestrife, cattail, sensitive fern, and northern arrow wood.

A diverse assemblage of mammals, reptiles, amphibians, fish, and bird species have been observed on site. Large mammals known to inhabit the site include coyote, red fox, and white-tailed deer. Other mammals on site include the gray squirrel, meadow vole, groundhog, beaver, raccoon, and muskrat. Reptiles and amphibians common to the site include the black rat snake, brown snake, common snapping turtle, dusky salamander, eastern milk snake, four-toed salamander, gray tree frog, northern black snake, northern water snake, northern ringneck snake, pickerel frog, slimy salamander, and smooth green snake.

Fish species identified include the banded killifish, bluegill, common carp, creek chub, long nose dace, channel catfish, common shiner, largemouth ass, bullhead, and spotfin shiner.

Past wildlife surveys have identified nearly 100 bird species using the grasslands, shrublands, wetlands, and woodlands. In addition to the abundant and diverse habitat available, another reason for the large number of species is the facility's proximity to the Eastern Flyway. While many of the species are short-term migrants, numerous others have been observed breeding on an annual basis. Some of the common breeders include the American kestrel, blue-winged teal, eastern bluebird, eastern meadowlark, great horned owl, green heron, mallard, osprey, ring-necked pheasant, tree swallow, and wood duck. All of the birds that have been observed to breed or believed to breed on the site on an annual basis are protected under the Migratory Bird Treaty Act, except for the ring-necked pheasant (Army 1998:4-37, 4-38).

3.7.7.2 Sensitive Habitats and Species

A total of 87 wetland parcels have been identified on the Seneca Army Depot with a total area estimated at approximately 496 acres (201 ha). The dominant wetland systems on the site are palustrine and lacustrine (Army 1998:4-41). Palustrine wetlands generally include nontidal wetlands dominated by persistent emergent vegetation, shrubs, and/or trees. Lacustrine wetlands are lakes, ponds, and other enclosed open water at least 20 acres (8 ha) in extent and not dominated by emergent vegetation, shrubs, and/or trees. Wetlands within the general area of the PEZ Lake Development property include palustrine emergent, palustrine scrub-shrub, and palustrine forested. The closest wetland to the PEZ Lake Development property on the Seneca Army Depot is a small palustrine emergent wetland located about 0.3 mi (0.5 km) to the south. Two larger wetlands, one classified as palustrine scrub-shrub and the other as palustrine, are located about another 0.1 mi (0.2 km) to the south of the first wetland. These two areas would be expected to be of greater value to wildlife than the small emergent wetland.

Except for the occasional transient individual, there are no known federally listed endangered, threatened, or candidate species on the site (Army 1998:4-38).

A limited rare species survey concluding in 1996 identified four state-listed species, including the northern harrier (threatened) and osprey (special concern), both of which nest on site, and the northern reedgrass (threatened) and rough avans (endangered). It was noted that nine other wildlife species may occur on site and that suitable habitat was available for up to 10 other rare plant species, although their presence could not be confirmed (Army 1998:4-39; NYSDEC 2001; Young 2002).

The population of white-tailed deer include individuals that possess a rare genetic anomaly, expressed as an all-white coat. This condition differs from albinism in that the white deer are not lacking pigmentation, as evidenced by their brown eyes and noses. While it is fairly common for the occasional white deer to appear in a large population of normal, white-tailed deer, it is uncommon for an entire herd to develop. From the time of their first appearance, this deer population has been intensely managed and subjected to only limited hunting, which allowed it to thrive. In 1996, the population of this rare deer numbered 175 (Army 1998:4-39).

3.7.8 Cultural Resources

A main core of the Seneca Army Depot is eligible for historic listing on State and National Register of Historic Places (Chazen 2002). Construction of the Seneca Army Depot was initiated in 1941 by the U.S. Army Ordnance Department as one of 54 depots built across the country in response to America's involvement in World War II. The depot provided loading, storage, and shipping services for army troops stationed in New England and the Middle Atlantic states. The historic district comprises approximately

7,500 acres (3,035 ha) of the depot's total 10,594 acres (4,287 ha) and includes approximately 450 barrel-vaulted, reinforced concrete, earth-covered munitions igloos/bunkers; roads; rail lines; dozens of warehouses; loading docks; and support structures. Seneca Army Depot's Q area is also considered part of the historic district with approximately one dozen mission-related military buildings and about 50 enhanced storage igloos/bunkers built in the mid- to late 1950s during the Cold War (New York 1998). Several groups of buildings are excluded from the historic district, including the track-sided warehouses and support buildings built in the 1940s and 1950s located south of the administration complex. The majority of these buildings are not eligible for listing on the NRHP (Nemeth 2002n).

Archeological investigations have provided evidence of human occupation in this area of New York State during the Paleo-Indian, Archaic, and Woodland periods (Army 1998:4-45, 4-46). However, it is unknown if there was human occupation on the Seneca Army Depot and PEZ Lake Development during these periods due to irregularities in survey methods for archeological studies conducted on the depot prior to 1998 (New York 1998). In 1999, the New York State Historic Preservation Office requested additional Phase II investigations on the depot to determine whether there is archeological evidence of human occupation during these periods (New York 1999). The entire Seneca Army Depot has now been surveyed and two prehistoric and many historic sites were found within its boundaries (Nemeth 2002o). However, since the proposed mercury storage buildings are located on property that has already been disturbed, it is unlikely that any of these sites will be impacted.

Two tribes of the Iroquois Nation, the Cayuga and Seneca, lived in the vicinity of Seneca Army Depot and PEZ Lake Development. Both tribes were members of the Six Nations of the Iroquois Nation Confederacy until its demise in 1777 after the Revolutionary War. The Seneca Army Depot and PEZ Lake Development are within the eastern boundary of lands occupied by the Seneca Indian Tribe. The Cayuga Tribe occupied property east of the depot's boundaries. In 1789, members of the Seneca Tribe living in this area were forced to move to reservations further west in New York State and Canada (Army 1998:4-49). There are seven federally recognized Native American reservations in New York State in addition to offices of three other federally recognized tribes; however, none are located in Seneca County (American Indian 2002). A total of 83 people living in Seneca County identified themselves as Native American or Alaskan Native during the 2000 census (DOC 2002d).

3.7.9 Land Use and Visual Resources

3.7.9.1 Land Use

Land use at the PEZ Lake Development is predominantly light industrial. The facility consists of approximately 850 acres (344 ha) of the former 10,594-acre (4,287-ha) Seneca Army Depot that are currently being leased to the Seneca County Industrial Development Agency and sub-leased to The Advantage Group (Army 1998:2-1; Jones 2002a; TAG 2002:Summary, 2). Located within the "Industrial/Warehousing" zoned district of the Town of Romulus, PEZ Lake Development contains approximately 40 warehouse and administrative buildings. Most of these structures occur along the eastern and southern portions of the facility, with the northern and western portions largely consisting of open space. Much of the eastern perimeter of the property follows New York State Highway 96. State and federally owned lands are adjacent to the south. The western and northern perimeter of the PEZ Lake Development is bordered by vegetated open space associated with the former Seneca Army Depot (Chazen 2002:xi,xiv; Hirrlinger 2002b; Jones 2002b).

Tenants on the PEZ Lake Development include U.S. Freightways, RTG, Finger Lakes Rail, TAG EX (a division of The Advantage Group), and the Highway Department. U.S. Freightways is involved in the distribution of dry goods, health and beauty aids, and nonperishable foods. RTG stores chipped tires. Finger Lakes Rail stores 300 boxcars and coal cars on the tracks within the PEZ Lake Development.

TAG EX uses buildings for storage and distribution of restaurant equipment and furniture. The Highway Department Emergency Services occupies a number of smaller buildings at the PEZ Lake Development (Palumbo 2002).

Current land use surrounding PEZ Lake Development are largely associated with the redevelopment of the former Seneca Army Depot. Housing is proposed for a small area located between the existing warehouse area and the main entrance to PEZ Lake Development along State Highway 96. The Five Points State Correctional Facility and an antennae facility operated by the U.S. Coast Guard are present to the south. A county jail is proposed for an adjacent area to the east. Open areas extending to the north and west are planned to be maintained for conservation and recreational purposes, and the former Army airfield area to the southwest is planned to be sub-leased for use by the New York State Police (Chazen 2002:2,57; Jones 2002b). Beyond the perimeter of the former Seneca Army Depot, land use in the region is predominantly agricultural, with principal crops, including silage, soybeans, wheat, and grapes (Army 1998:4-3).

3.7.9.2 Visual Resources

The developed areas of the PEZ Lake Development are consistent with the Bureau of Land Management's Visual Resource Management Class III or IV. Class III includes areas in which there have been moderate changes in the landscape that could attract attention, but do not dominate the view of the casual observer. Class IV includes areas in which major modifications to the character of the landscape have occurred. These changes may be dominant features of the view and the major focus of viewer attention (DOI 1986:app. 2). At the PEZ Lake Development complex, most structures are of a low profile and reach heights of three stories or less. The tallest onsite structure is a 140 ft (43 m) derelict water tower near the entrance of the facility that formerly served the Seneca Army Depot (Palumbo 2002).

Although a 695 ft (212 m) antennae complex operated by the Coast Guard (Palumbo 2002) tends to dominate the viewshed to the southeast of the property, viewsheds in the vicinity of the PEZ Lake Development consist mainly of rural land used for residences, small farms, forest land, and pasture land, and are generally consistent with Visual Resource Management Class II and Class III. Class II includes areas where visible changes to the character of the landscape are low and do not attract the attention of the casual observer. Class III includes areas in which there have been moderate changes in the landscape that could attract attention, but do not dominate the view of the casual observer (DOI 1986:app. 2).

3.7.10 Infrastructure

Site infrastructure includes those utilities and other resources (see Table 3.7–1) required to support modification and continued operation of mission-related facilities identified under the various proposed alternatives.

Table 3.7–1. PEZ Lake Development-wide Infrastructure Characteristics

Resource	Current Usage	Site Capacity
Transportation		
Roads (mi)[a]	139.0	139.0
Railroads (mi)[a]	42.0	42.0
Electricity		
Energy consumption (MWh/yr)	450	30,225[b]
Fuel		
Natural gas (ft^3/yr)	0	0
Propane (gal/yr)	30,000	3,250
Fuel Oil (gal/yr)	9,000	6,285[b]
Coal (ton/yr)	0	0
Gasoline (gal/yr)	0	0
Water (gal/yr)	91,250,000	328,500,000

[a] Total for the Seneca Army Depot.
[b] Capacity of seven refillable storage tanks.
Source: Army 1998; Chazen 2002; Cleary 2003; Palumbo 2002.

3.7.10.1 Transportation

The PEZ Lake Development site is located in a rural area of Seneca County, New York, just west of the Town of Romulus. The site is bordered by State Highway 96 on the east. The main entrance is on the east side of the site with direct access to State Highway 96. State Highway 96 joins U.S. Highway 20 approximately 8 mi (13 km) north of the site. State Route 414 off of U.S. Highway 20 intersects the New York State Thruway (I–90) approximately 15 mi (24 km) north of the site. Most of the 139 mi (224 km) of roadway on the site are paved and in fair-to-good condition (Army 1998).

The 42 mi (68 km) of railroad on the former Seneca Army Depot serve as a spur to the Main Finger Lakes Short Line System. The railways serving the site are used for freight transfer. However, speeds are restricted to 10 mph (16 km/hr) because the site rail system does not meet the current load rating standards recommended by the American Railway Engineering Association for industrial/commercial use and current Federal Railway Association Class I safety standards (Army 1998). Currently, there is an embargo on the rail lines at the PEZ Lake Development because the rail line operator is storing railcars outside the entry to the former Seneca Army Depot (Palumbo 2002).

3.7.10.2 Electricity

Electricity is transmitted to the site by New York State Electric and Gas through a 34.5 kV, overhead transmission line to two substations. Power is distributed around the site by 4.8 kV, overhead and underground lines (Army 1998).

3.7.10.3 Fuel

There is no natural gas used at the site. New York State Electric and Gas is currently extending natural gas pipelines to the PEZ Lake Development site. Natural gas should be available on site in 2003 via underground pipe (Chazen 2002).

Seven storage tanks containing fuel oil with a total capacity of 6,285 gal (23,791 l) are currently used on site, mostly for heating buildings. Propane is also stored on site for use in heating on the PEZ Lake Development site.

3.7.10.4 Water

The PEZ Lake Development Site is provided water service from the Seneca County Water District #1 (Palumbo 2002). The Water District recently began supplying water to the site after installing new piping, replacing the old water system used by the Seneca Army Depot. A pump station supplies water to a 1 million-gal (3.8 million-l), below ground reservoir, which is located on the north side of the warehouse area. The water is pumped from this location to a 750,000-gal (2,839,050-1) aboveground reservoir. The water system also provides sufficient supply for firefighting (Chazen 2002:26).

3.7.10.5 Site Safety Services

Law enforcement services in Seneca County are provided by the County Sheriff's Department and the New York State Police Department, which are located 10 mi (16 km) and 12 mi (19 km) away respectively. The County Public Safety Building and Jail may relocate to the parcel of land adjacent to and east of the PEZ Lake Development (Chazen 2002).

Fire protection is provided by the Romulus Fire Department, located approximately 2 mi (3.2 km) north of the PEZ Lake Development site, in Romulus, New York. Local and state agencies that would be notified in the event of a mercury spill at the site include the Seneca County Health and Emergency Services Office and the New York State Department of Environmental Conservation.

3.7.11 Environmental Justice

Under Executive Order 12898 (59 FR 7629), the Defense National Stockpile Center is responsible for identifying and addressing disproportionately high and adverse impacts on minority or low-income populations. As discussed in Appendix G, Environmental Justice, minority persons are those who identify themselves as American Indian or Alaska Native, Asian, Black or African American, Hispanic or Latino (of any race), Native Hawaiian or Other Pacific Islander, or multiracial (CEQ 1997). Persons who report that their income is less than the Federal poverty threshold are designated as low-income.

Figure 3.7–2 shows populations residing in Seneca County as reported in the 1990 census and 2000 census (DOC 1992, 2001g). In this figure, lightly shaded bars show populations in 1990, while the darker bars show those in 2000. In the decade between 1990 and 2000, the total population of Seneca County declined by approximately 1 percent, and the minority population increased by approximately 60 percent. The 2000 census found that Black or African American, Asian, and Hispanic populations comprised approximately 82 percent of the total minority population resident in Seneca County. Persons who declared that they are multiracial and not Hispanic or Latino were

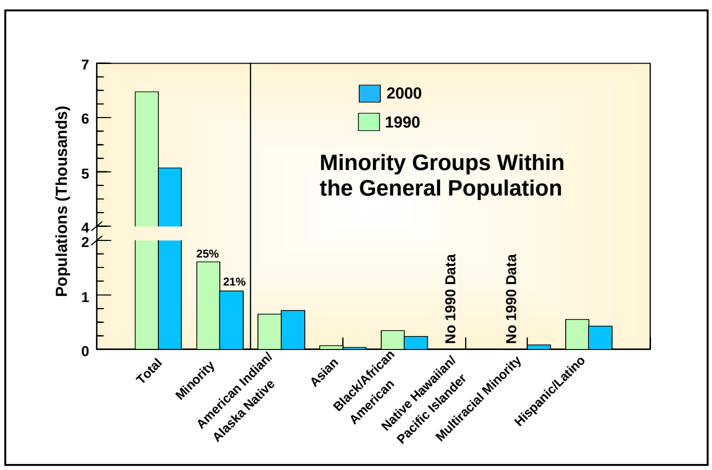


Figure 3.7–2. Populations Residing in Seneca County, New York, in 1990 and 2000

included in the minority population shown in Figure 3.7–2 provided that they designated themselves as members of at least one minority race. They comprised approximately 14 percent of the total minority population residing in Seneca County in 2000.

The 2000 census was the first decennial census in which multiracial selections were counted. There is no data for this category available from the 1990 census. Also, during the 1990 census, Asian and Pacific Islander designations were placed together in a single category, whereas during the 2000 census, Native Hawaiians and Other Pacific Islanders were counted separately from Asian respondents. Therefore, direct comparison of 1990 census data and 2000 census data for these two categories is not possible.

Approximately 1,333 minority individuals and 1,467 low-income persons lived within 10 mi (16 km) of the Seneca Army Depot in 2000 (DOC 2001g, 2002a). The non-minority population residing in the same area was approximately 14,867 persons. Figure 3.7-3 shows the cumulative percentage of these populations living at a given distance from PEZ Lake Development on the Seneca Army Depot. The minority percentage shown in Figure 3.7–3 increases sharply at the outskirts of the minority community of Willard, New York. Approximately 50 percent of the minority population living within 10 mi (16 km) of the PEZ Lake Development is concentrated in Willard.

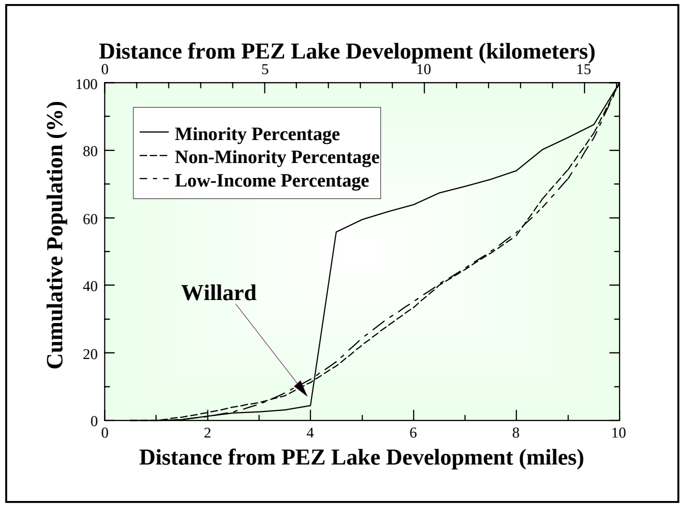


Figure 3.7–3. Percent Resident Populations Within 10 Miles of the PEZ Lake Development

3.8 UTAH INDUSTRIAL DEPOT

The Utah Industrial Depot is located in Tooele County, Utah, approximately 35 mi (56 km) west of Salt Lake City. It consists of approximately 1,700 acres (688 ha) of land owned by Depot Associates, LCC. Public access to the depot is from the north via State Route 112. The City of Tooele lies to the east with the 23,032-acre (9,321-ha) Tooele Army Depot to the northwest, west, and south (Army 1996:2-1, 4-3; Simonich 2002).

Figure 2–8 shows the layout of the warehouses at the depot. The depot contains approximately 250 buildings and has a storage capacity of 2,600,000 ft^2 (242,000 m^2) (Army 1996:4-6).

Two warehouses would be used to store mercury at the depot. The warehouses are 500 ft (152 m) long by 180 ft (55 m) wide. The warehouses have concrete floors, with wood walls, ceiling, roof, and ceiling supports, and dry-pipe (water supply) fire suppression systems. Although the buildings are vented, there are no floor drains through which leaked or spilled materials could escape to the environment (Smith 2002a).

3.8.1 Meteorology, Air Quality, and Noise

3.8.1.1 Meteorology

The climate of the Tooele area is typically semi-desert with hot summers and cold winters. The Great Salt Lake creates a classic sea breeze circulation with wind toward the lake at night and away from the lake during the daytime. The average annual rainfall in Tooele is 16.5 in (41.9 cm) with the largest amounts occurring in the spring. Most precipitation occurs as snow (Army 1996:4-1). The average annual snowfall at Salt Lake City is 64 in (162 cm); the maximum snow depth, 25 in (64 cm), occurred in 1993 (NCDC 2001j). Damaging hailstorms occur infrequently (NCDC 2002c).

Five tornadoes were reported in Tooele County between January 1950 and April 2002. Several occurrences of high winds usually associated with thunderstorm activity typically occur every year (NCDC 2002c). The mean number of days per year with thunderstorm activity at Salt Lake City is 36.6 (NCDC 2001j.) The average annual wind speed is 8.9 mph (4 m/s) (NCDC 2001j). The maximum wind speed, based on the minimum for 1 mile of wind to pass, is 71 mph (32 m/s) (NOAA 2000).

The average annual temperature in Tooele is 62 °F (17 °C) (Army 1996); temperatures at Salt Lake City range from a monthly average minimum temperature of 20.2 °F (-6.6 °C) in January to a monthly average maximum of 92.5 °F (33.6 °C) in July (NCDC 2001j). The maximum recorded temperature is 110 °F (43 °C) (Army 1996:4-2).

3.8.1.2 Air Quality

The Utah Industrial Depot is in an area of Tooele County that is designated better than national standards for sulfur dioxide and better than national standards or cannot be classified for nitrogen dioxide. Higher elevations (above 5,600 ft [1,707 m]) of the Oquirrh Mountains to the east are designated as a sulfur dioxide nonattainment area. The area is unclassifiable/attainment regarding attainment of the standard for carbon monoxide. Under the EPA's rule change, which reinstated the 1-hr ozone standard, the area is unclassifiable regarding attainment of the standard for ozone. EPA has not assigned an attainment status designation for lead, and the attainment status for PM_{10} is unclassifiable (EPA 2000h).

There are no PSD Class I areas within 100 mi (161 km) of the Utah Industrial Depot. A Class I area is one in which very little increase in pollution is allowed due to the pristine nature of the area. Tooele and its vicinity are classified as a Class II area in which more moderate increases in pollution are allowed. No PSD permits are required for any emission source at the Utah Industrial Depot.

The primary sources of criteria pollutants at the Utah Industrial Depot include boilers, furnaces, natural gas fired heating systems, paint spray booths, fuel dispensing facilities, degreasing facilities, dynamometers, and solvent tanks (Army 1996:4-45; Smith 2002b). There are no boilers, heaters, or other air pollutant sources associated with the two warehouses that could be used for mercury storage that are required to be permitted under the Clean Air Act or state regulations (Smith 2002b).

The closest offsite monitors are operated by the State of Utah in Salt Lake County. In 2001, these monitors reported a maximum 8-hr average carbon monoxide concentration of 4,900 $\mu g/m^3$ and a maximum 1-hr average concentration of 8,200 $\mu g/m^3$. For PM_{10}, an annual average concentration of 22.5 $\mu g/m^3$ and a maximum 24-hr average concentration of 105 $\mu g/m^3$ were reported. A 1-hr average ozone concentration of 235 $\mu g/m^3$ was reported. For nitrogen dioxide an annual average concentration of 45 $\mu g/m^3$ was reported. For sulfur dioxide an annual average concentration of 2.6 $\mu g/m^3$, 24-hr concentration of 18.3 $\mu g/m^3$, and a 3-hr concentration of 73.4 $\mu g/m^3$ were reported. The reported highest quarterly concentration for lead was 0.04 $\mu g/m^3$ (EPA 2002f). Monitored concentrations in the region are well below ambient standards except for ozone. There is no nearby monitor for mercury.

3.8.1.3 Noise

Major noise emission sources within the Utah Industrial Depot include various equipment and machines—heating, ventilation, and air conditioning equipment, material-handling equipment (i.e., forklifts and loaders), and vehicles. Levels of activity at the depot are low, and noise levels produced are expected to be compatible with the adjoining industrial, commercial, agricultural, and recreational uses. The nearest noise sensitive receptors are residences east of the depot. The closest residences are over 1 mi (1.6 km) east of the warehouse and about 1,200 ft (366 m) east of the nearest access road.

The city of Tooele has established a community noise ordinance, which specifies acceptable noise levels for receiving zones. Limits for noise specified for adjacent industrial/manufacturing uses are ninetieth percentile (L_{90}) sound pressure levels of 75 dBA and 80 dBA for nighttime and daytime periods (Tooele City 1991).

Sound-level measurements have not been recorded near the depot; however, it is expected that the acoustic environment near the site boundary ranges from that typical of rural to industrial locations. The *Final Environmental Impact Statement for Disposal and Reuse of the BRAC Parcel at Tooele Army Depot, Tooele, Utah,* concluded that noise levels are compatible with the nearby land use, which include office, industrial, and warehouse uses. Residential uses are at some distance from these access routes and are exposed to acceptable levels of traffic noise (Army 1996:5-31). Blast noise from ordnance disposal at Tooele Army Depot are at acceptable levels for the land use categories in the BRAC parcel, typically less than 100 dB (peak overpressure) (Army 1996:5-31). Traffic is the primary source of noise at the site boundary. The traffic generated by the depot (typically 4,000 trips per day) (Smith 2002b) is a major contributor to traffic on nearby roads and the associated traffic noise. Roads that provide access to the Utah Industrial Depot include SR 112/Utah Avenue and Westloop Road. Average daily traffic flow (vehicles per day) on State Route 112 west of Tooele is 7,665 (UTDOT 2002). Railroad activity related to the depot (i.e., delivery or removal of railcars) is occasional, varying from none to six to eight railcars per month, and would result in a short-term increase in sound levels near the depot (Smith 2002b). Aircraft operations at Tooele Valley Airport also contribute to noise levels in the vicinity of the Utah Industrial Depot.

3.8.2 Waste Management

Waste management includes minimization, characterization, treatment storage, transportation, and disposal of waste generated from ongoing depot activities. Waste is managed using appropriate treatment, storage, and disposal technologies in compliance with applicable Federal and state statutes. Hazardous and nonhazardous wastes are the waste types generated by routine operations at the Utah Industrial Depot.

Tenants at the Utah Industrial Depot may generate hazardous waste as part of their industrial process. This may include rags and wipes contaminated with lubricants, paints and solvents, spent solvents, and acidic or caustic solutions. The Detroit Diesel Remanufacturing Facility is considered to be a RCRA small quantity generator (EPA 2002b).

All hazardous waste is shipped off site for treatment and disposal at commercial facilities (Army 1996:4-53). Much of the solid hazardous waste is sent for disposal at the Safety-Kleen facility 40 mi (64 km) west in Clive, Utah (Smith 2002b).

The north area of the Tooele Army Depot was listed on the Superfund National Priority List on October 1, 1990 (Army 1996:4-47). The Army entered into a Federal facility agreement on September 16, 1991, and a RCRA Post-Closure Permit on January 7, 1991, to investigate and cleanup the site under CERCLA and RCRA. The Army investigated 26 sites for release of hazardous materials to the environment on the property that is now the Utah Industrial Depot. Most of these areas were found to be clean or were clean before the property was leased. Groundwater contaminated with volatile organic compounds remains beneath a portion of the depot (TAD 1998:5, 6). This groundwater contamination is described in Section 3.8.6.

Nonhazardous wastes generated by tenants at the Utah Industrial Depot include industrial scrap and waste, office wastes, lunchroom wastes, and janitorial wastes. Nonhazardous wastes are collected by commercial waste hauling contractors and disposed of at the Tooele Municipal Landfill or at a landfill operated by East Carbon Development Corporation (ECDC) Environmental in East Carbon, Utah (Smith 2002b). Approximately 100 yd^3 (76 m^3) of nonhazardous waste are generated each month at the Utah Industrial Depot (Smith 2002c). In 2001, 28,629 tons (25,972 metric tons) of waste were disposed of in the Tooele Municipal Landfill, while 1,037,058 tons (940,798 metric tons) of waste were disposed of in the ECDC Landfill (Utah 2002a). The ECDC landfill has a capacity of 203 million tons (184 million metric tons) (Army 1996:4-31).

Tenants at the Utah Industrial Depot generate approximately 110,000 gal/day (416,000 l/day) of sanitary wastewater. This wastewater is discharged to the Tooele Wastewater Treatment Plant (Smith 2002d:3). The wastewater treatment plant, which currently processes 1.6 million gal/day (6.06 million l/day), has a design capacity of 2.25 million gal/day (8.52 million l/day) (Olson 2002).

3.8.3 Socioeconomics

The Utah Industrial Depot is located in Tooele County, Utah. Therefore, all statistics for the local economy, population, housing, and community services as defined in Appendix E, will be presented for Tooele County. In 2002, the Utah Industrial Depot employed 827 persons (about 6.8 percent of the county's 2000 civilian labor force) (DOL 2002; Smith 2002b).

3.8.3.1 Regional Economic Characteristics

From 1990 to 2000, the estimated civilian labor force in Tooele County decreased by 1.2 percent to 12,141 persons. In 2000, the estimated unemployment rate for the county was 5.3 percent, which was greater than the 2000 unemployment rate for Utah (3.2 percent) (DOL 2002).

3.8.3.2 Population and Housing

In 2000, the estimated population of Tooele County totaled 40,735. From 1990 to 2000, the county's population grew by 34.7 percent, compared with the 22.8 percent growth in Utah (DOC 2001i:3, 60). The percentage of the county's population under the age of 5 is 5.6 percent, with women age 18 to 39 comprising 17.9 percent (DOC 2002a, 2002b). There were 13,812 housing units in the county in 2000, of which 71.9 percent were owner occupied; 19.9 percent, renter occupied; and 8.2 percent, vacant (DOC 2002a).

3.8.3.3 Community Services

3.8.3.3.1 Education

In 2001–2002, student enrollment in Tooele County was 9,507, and there were 565 teachers for an average student-to-teacher ratio of 16.8:1 (TCSD 2002).

3.8.3.3.2 Public Safety

In 2002, 60 sworn police officers served Tooele County, with a ratio of 1.4 officers per 1,000 persons (TC 2002). If a mercury incident should occur at the Utah Industrial Depot, the Utah State Department of Environmental Quality would be notified, and the Tooele City Fire Department/U.S. Army would respond, as well as the Tooele County Hazmat unit (Smith 2002b). In 2002, about 95 firefighters provided fire protection services in the county (TC 2002). The average ratio was 2.3 firefighters per 1,000 persons.

3.8.3.3.3 Health Care

In 2002, approximately 32 physicians served Tooele County (MWMC 2002). The average ratio was 1 physician per 1,000 persons. In 2002, there was one hospital in the county, with a total of 35 hospital beds (Mims 2002).

3.8.4 Human Health Risk

3.8.4.1 Health Effects Studies

Facilities located in the immediate vicinity of the proposed mercury storage buildings include general purpose storage warehouses, vehicle storage facilities, administrative buildings, maintenance facilities, and open storage lots. The Tooele Army Depot does not currently maintain any mercury storage and has not conducted any regular monitoring or studies pertaining to the health effects of mercury at the Utah Industrial Depot (McFarland 2002a).

Prior to a property transfer in 1998, soil collected at the solid waste management units in the vicinity of the proposed mercury storage buildings did not detect mercury. Volatile organic chemical constituents in groundwater have been delineated underlying the Utah Industrial Depot and the adjoining Tooele Army Depot property and are associated with releases from source areas located near the proposed mercury storage facilities. Groundwater samples are collected and analyzed semi-annually for volatile organic compounds; however, the samples are not analyzed for mercury because there have not been any previous detections at Tooele. Environmental studies in the larger area have not specifically focused on exposure to mercury; however, investigations are ongoing to delineate areas of environmental concern. The Tooele County Health Department, Environmental Health Department indicated that no human health studies have been conducted pertaining to mercury or Tooele Army Depot activities (Coombs 2002).

3.8.4.2 Accident History

The proposed mercury storage buildings at the Utah Industrial Depot have no history of mercury storage. The buildings have been previously used as open storage warehousing. There have been no reported accidents or incidents associated with the former building usage (Smith 2002a).

3.8.4.3 Emergency Preparedness

The Utah Industrial Depot has an established emergency response plan to maintain adequate response preparedness for fire, hazardous materials releases, and catastrophic emergencies (UID 2001). Tenant companies within the Utah Industrial Depot are responsible for personnel training, establishing observer and initial response protocols, and summoning outside aide from local fire, police, and medical and other appropriate response organizations in the event of a fire or hazardous materials emergency. Utah Industrial Depot managers are available to assist tenants, their employees, and the public in the event of an emergency. In accordance with the facility plan, tenants are required to maintain materials safety data sheets for all used or stored hazardous materials within their facilities and permitting is required for regulated substances.

The mercury storage buildings are constructed with wooden walls, ceiling, roof (not insulated), and support columns with concrete floors, truck dock, and rail dock. The outer shell building walls are protected by individual concrete/asbestos shake siding with mineral-based shake siding used for replacement of damaged panels. Fire suppression is through a dry system complete with two transmitters reporting to a common dispatcher. Each building is equipped with electricity, telephone, and natural gas services; however, systems are not presently configured for security, environmental monitoring, or reporting with the exception of fire.

Emergency response protocols for facilities within the Utah Industrial Depot, including the proposed mercury storage buildings, are based on assessment of the incident level to determine the appropriate level of response. The Utah Industrial Depot Asset Manager is responsible for notification of the appropriate emergency responders if no immediate danger to personnel and property exists. Small leaks would be managed by trained, onsite, mercury response technicians. Initial observer responsibilities include notification of the Tooele City Fire Department, Tooele County Hazmat, and emergency medical personnel through 911 emergency reporting.

3.8.5 Geology and Soils

Utah Industrial Depot is located approximately 25 mi (40 km) west of the Wasatch Front (Range) that marks the eastern edge of the Great Basin section of the Basin and Range Physiographic Province. Located in Tooele Valley, the Utah Industrial Depot and the adjacent Tooele Army Depot are bounded to the west by the Stansbury Mountains, to the east by the Oquirrh Mountains, on the south by South Mountain, and to the north by the lake plain of the Great Salt Lake. During the past 100,000 years, Tooele Valley has been periodically inundated by lake waters as individual lakes within the basins of Utah have coalesced to form a singe vast lake (Lake Bonneville). Topographically, the Utah Industrial Depot is located on a southeast to northwest progressing alluvial fan that emanates from the Oquirrh Mountains located about 2 mi (3.2 km) southeast of the depot. Elevations along this fan range from about 5,100 ft (1,554 m) just southwest of the city of Tooele along Route 36 to 4,800 ft (1,463 m) above mean sea level near the center of the Utah Industrial Depot (a distance of some 2 mi [3.2 km]) (Army 1996:4-63–4-66; USGS 1969). Within the Oquirrh Mountains southeast of the depot, elevations are over 6,000 ft (1,829 m) above mean sea level with Tooele Peak located approximately 5 mi (8 km) from the Utah Industrial Depot reaching a height of 7,008 ft (2,136 m) above mean sea level (USGS 1969).

Basin-fill sediments underlying the Utah Industrial Depot consist primarily of unconsolidated alluvial fan sediments and Bonneville Lake terrace deposits atop older moderately consolidated strata of the Salt Lake Group. Volcanic ash and other rocks may also be interspersed with the basin-fill across the valley. Depth to bedrock within the basin-fill is more than 700 ft (213 m) beneath the center of the Utah Industrial Depot, with depths increasing substantially just to the south to more than 1,500 ft (457 m). At depth, the basin-fill deposits are immediately underlain by carbonate bedrock (predominantly limestone and dolomites) of the Oquirrh Formation. The formation also constitutes the core of the Oquirrh Mountains and South Mountain. A number of volcanic intrusions also occur in the Oquirrh Mountains to the southeast of the depot (Army 1996:4-63, 4-65–4-67).

Tooele County's principal mineral products are varied and include gold, clay, magnesium compounds, dimension sandstone, potash, and construction sand and gravel (USGS 2000c). A variety of mineral resources have been developed in the Oquirrh Mountains adjacent to Tooele Valley. Most of the mining activity has taken place on the central and east ridge of the mountains. Metallic minerals include copper, gold, lead, mercury, silver, and zinc. The only known mineral resources within the immediate vicinity of the Utah Industrial Depot are sand and gravel used for construction aggregate (Army 1996:4-66).

The region is tectonically and seismically active. The Utah Industrial Depot lies on the western margin of the intermountain seismic belt, a zone of tectonic stress oriented north-south through central Utah centered on the Wasatch Front (UGS 1997a:2). The depot is located some 25 mi (40 km) west of the active Wasatch fault, a north-south trending, high-angle fault at the foot of the Wasatch Front that is capable of producing large magnitude earthquakes (Army 1996:4-66; UGS 1997a:2, 6, 7). The Oquirrh fault, located about 5 mi (8 km) east of the depot, is also active with significant movement having occurred along the fault within the last 4,000 to 7,000 years (Army 1996:4-66). This fault is also considered likely to produce land surface rupture, which generally indicates a potential to produce earthquakes of at least magnitude 6.5 (UGS 1997a:5, 7). No faults are known to underlie the Utah Industrial Depot (Army 1996:4-68).

Potentially damaging earthquakes (i.e., in the range of magnitude 5.5 to 6.5) occur on average every 10 to 50 years in Utah with most occurring in the intermountain seismic belt. Larger earthquakes in the range of magnitude 7.0 to 7.5 are expected on average every 150 years (UGS 1997a:1, 2). The Hansel Valley earthquake of March 12, 1934, with a magnitude of 6.6, is the largest earthquake recorded to date in Utah. The earthquake was centered near the north shore of the Great Salt Lake on the Hansel Valley fault about 84 mi (135 km) north of the depot. It produced MMI VIII shaking in the area of the epicenter and MMI V shaking in the Tooele area and other parts of central Utah. In the sparsely populated area of the epicenter, it destroyed chimneys in several towns and also cracked plaster in Salt Lake City. Two deaths were attributed to the earthquake. In addition, the earthquake caused extensive surface fracturing that caused springs to erupt from individual fractures and craters that developed in the area. Areas of subsidence of up to 15 in (38 cm) were also documented. Eight strong aftershocks ranging from magnitude 4.8 to 6.0 followed this earthquake over the next 2 months, with three, including the magnitude 6.0 earthquake, occurring later on the same day as the main earthquake (USGS 2002g, 2002h).

Within a radius of 100 mi (161 km) of the Utah Industrial Depot, a total of 35 significant earthquakes (i.e., having a magnitude of at least 4.5 or a MMI of VI or larger) have been documented going back to the 1876, including the Hansel Valley earthquake and eight aftershocks described above. Overall, these earthquakes have had recorded magnitudes ranging from 3.2 to 6.6, with most in the range of 4.5 to 5.5. The closest of these to the depot was a magnitude 5.2 earthquake on September 5, 1962. It was located about 18 mi (29 km) northeast of the depot and produced a MMI of VI at its epicenter (USGS 2002h).

Earthquake-produced ground motion is expressed in units of percent "g" (force of acceleration relative to that of the earth's gravity). Two differing measures of this motion are peak (ground) acceleration and response spectral acceleration (see Appendix E, Section E.6.1). New seismic hazard metrics and maps developed by the USGS have been adapted for use in the *International Building Code* and depict maximum considered earthquake ground motion of 0.2- and 1.0-second spectral acceleration, respectively, based on a 2 percent probability of exceedance in 50 years (ICC 2000; USGS 2001c). This corresponds to an annual probability of occurrence of about 1 in 2,500. The Utah Industrial Depot area lies within the 0.84g to 0.85g mapping contours for a 0.2-second spectral response acceleration and the 0.27g to 0.28g contours for a 1.0-second spectral response acceleration. The calculated peak ground acceleration for the given probability of exceedance is approximately 0.34g (USGS 2002d). The Utah Industrial Depot is located in the broadly defined region of low and moderate to high seismicity, but is adjacent to the Wasatch Front, which has a much higher ground motion hazard. The maximum considered earthquake ground motions encompass those that may cause significant structural damage to buildings and thus present safety concerns for occupants (equivalent to MMI VII and up). Specifically, maximum considered earthquake ground motions of about 0.50g at 0.2 seconds and 0.20g at 1.0 seconds are representative of MMI VII earthquake damage (BSSC 2001:381, 383, 387). Table E–11 in Appendix E shows the approximate correlation between MMI, earthquake magnitude, and peak ground acceleration.

The potential for future volcanic activity in the Tooele Valley is generally low, and north central Utah is not located in a volcano or ashfall hazard zone (USGS 2001o). The most recent period of volcanic activity in the region ended about 20 million years ago (Army 1996:4-66, 4-65). However, the Utah Industrial Depot is located about 140 mi (225 km) north of the Black Rock Desert Volcanic field in Millard County in which cinder cones and lava flows were active less than 800 years ago (CVO 2002).

The Utah Industrial Depot is mapped as encompassed by the Borvant-Abela-Kapod general soil map unit. The natural soils included within this mapping unit range from shallow to very deep, are well drained, and are gently sloping to moderately steep. Detailed soil maps show the natural soil unit across the Utah Industrial Depot to be Abela gravelly loam, 2 to 8 percent slopes. This soil is very deep (i.e., more than 60 in (152 cm), well drained, gravelly to very gravelly loam that formed in alluvium derived from limestone and quartzite. Soil permeability is moderately rapid. Runoff is medium and the hazard for both wind and water erosion is slight for this soil. The soil is well suited for building construction (USDA 2000:9, 10, 16, sheet 77). The soil is not listed by the state as a prime or other important farmland mapping unit (USDA 2002). Construction associated with development of the property is likely to have had substantial impact on the natural characteristics of site soils. As a result, actual soil characteristics are likely to vary across the Utah Industrial Depot.

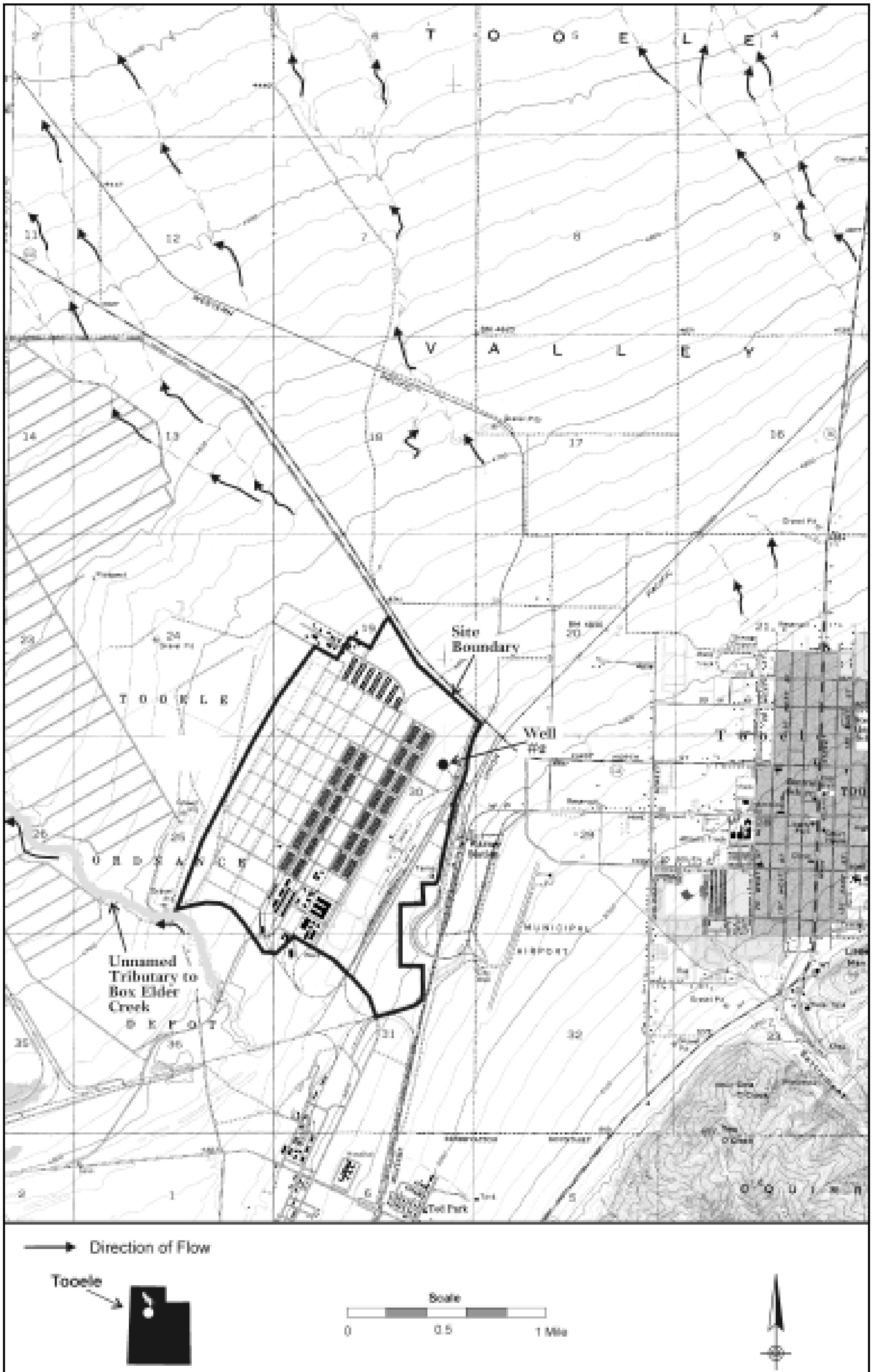
As part of environmental investigations conducted for the former Tooele Army Depot parcel that constitutes the Utah Industrial Depot, the Army previously identified 26 solid waste management units requiring investigation for possible releases of hazardous substances to the environment. The sites were investigated under either a RCRA facility investigation or a CERCLA remedial investigation in accordance with the Army's Installation Restoration Program. Suspected contaminants include, but are not limited to, metals, petroleum hydrocarbons, and volatile organic compounds. An Environmental Baseline Survey was also performed to collect additional information as to existing or potential environmental contamination. Mercury contamination was not found to be a problem at any of the investigated sites (Army 1996:4-47–4-50; Fatz 1998). To date, Corrective Measures Studies have been completed at all sites, with corrective actions completed at all but six sites (McFarland 2002b).

3.8.6 Water Resources

3.8.6.1 Surface Water

The Utah Industrial Depot is located in the western Great Salt Lake drainage basin, which encompasses the Tooele Valley watershed. As a result, all precipitation falling within the Tooele Valley, drainage from the mountains to the west and east, and groundwater flow is ultimately conveyed north toward the Great Salt Lake, which lies approximately 10 mi (16 km) north. Generally, because precipitation rapidly percolates into the subsurface, direct runoff seldom occurs in the valley except from paved areas (Army 1996:4-58; USGS 1979).

Surface drainage features within the Tooele Valley near the Utah Industrial Depot consist of a system of small, unnamed ephemeral streams (washes) that traverse the alluvial fan and terrace deposits before disappearing northwest of the depot (Figure 3.8–1). No washes originate within the confines of the depot or nearby, however. A tributary to Box Elder Wash originates just south of the Utah Industrial Property on retained Tooele Army Depot property. In turn, this tributary converges with Box Elder Wash near the confluence with South Willow Creek at a point about 5 mi (8 km) northwest of the Utah Industrial Depot.



Source: USGS 1969.

Figure 3.8–1. Surface Water Features at the Utah Industrial Depot, Utah

Box Elder Wash and South Willow Creek generally flow to the northeast and then north through the western portion of the adjoining Tooele Army Depot toward the Great Salt Lake (Army 1996:4-59; USGS 1955, 1969, 1979).

A storm drainage infrastructure consisting of catch basins, open ditches, and underground storm sewers serves the Utah Industrial Depot. A study previously conducted for the Army in October 1994 concluded that the former Industrial Area's storm water system that was installed in 1942 was approaching the end of its useful life. The drainage system was judged to be in poor condition, meeting neither Federal EPA nor city of Tooele design standards (Army 1996:4-58). Currently, only a portion of the surface runoff and roof drainage from the core developed area of the Utah Industrial Depot is collected and conveyed for settling. The remainder flows to catch basins with no outlet within the core area or percolates directly into the ground. Runoff that is collected is directed to a 7.2-acre (2.9-ha) detention basin that is designed for the 10-year storm. This basin is located on the west-northwest boundary of the depot. Overflow from the basin, when it occurs, is discharged off site to open ground on Army retained property in accordance with conditions detailed in the deed between the operators of the Utah Industrial Depot and the Army. The depot does not have an NPDES permit for storm water discharge. However, since acquiring the property from the Army, all storm water has been retained without the need to discharge.

The Utah Industrial Depot has implemented a storm drain master plan that involves upgrading and expanding the existing storm drain system. The plan includes constructing additional storm drain inlets, catch basins, culverts, and additional storm sewer lines to ensure that all runoff is collected and conveyed to the depot's settling basin for settling. Completion of the upgrades and expansion is scheduled for 2005 (Smith 2002e).

Potable water for the depot is provided by the city of Tooele water system and distributed through the depot's water distribution system. The city uses a combination of wells and reservoirs as the sources of its water supply. The Utah Industrial depot relied upon a former Army supply well (Well Number 2) located in the northeast corner of the depot as its water source until it was closed in 2000. The Utah Industrial Depot is in the process of implementing a water master plan to upgrade the depot's water distribution system (Smith 2002e). Water supply and use are further discussed in Section 3.8.10.

No portion of the Utah Industrial Depot is located in a delineated 100- or 500 year floodplain. Flash flooding and ponding of water is possible in low lying areas of the Utah Industrial Depot during heavy rainfall. To control flash flooding along Box Elder Wash, an earthen dam was constructed near the southern boundary of the Tooele Army Depot to the west of the Utah Industrial Depot (Army 1996:4-58; USGS 1955).

Utah has grouped waters of the state into classes and numeric water quality standards are assigned to each group so as to protect against controllable pollution. On a case-by-case basis, narrative standards are applied in lieu of numeric criteria. All surface water features within the Tooele Valley ultimately discharge toward the Great Salt Lake. Specifically, the waters of the Great Salt Lake have their own unique classification (i.e., Class 5). Great Salt Lake's protected beneficial uses include primary and secondary contact recreation, aquatic wildlife, and mineral extraction. The unnamed streams in the immediate vicinity of the Utah Industrial Depot are not specifically classified. South Willow Creek and its tributaries within Tooele County are designated Class 2B (protected for secondary contact recreation such as boating, wading, or similar uses); Class 3A (protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain); and Class 4 (protected for agricultural uses, including irrigation of crops and stock watering) (UTDEQ 2002a). None of the aforementioned streams are listed on the state's Clean Water Act Section 303(d) list as being impaired relative to attaining water quality standards and designated uses (UTDEQ 2002b).

Only sanitary wastewater and storm water runoff are generated as a result of current activities at the Utah Industrial Depot. Wastewater is collected by the depot's sanitary sewer system and discharged to the city of Tooele's wastewater treatment plant. Operators of the Utah Industrial Depot plan to implement a sanitary sewer system master plan project that involves upgrading and expanding the existing sanitary sewer system throughout the facility (Smith 2002d). Wastewater management is further discussed in Section 3.8.2.

As previously described under Section 3.8.5, RCRA Facility Investigations, CERCLA Remedial Investigations, and an environmental baseline survey were performed to investigate 26 solid waste management units for possible releases of hazardous substances to the environment. These analyses were used to determine the need to take appropriate corrective action to address the contaminants of concern. Corrective actions have been completed at all but six sites. Completion of corrective actions at identified sites of concern will help to ensure that existing site contamination does not migrate via the surface water pathway.

3.8.6.2 Groundwater

Tooele Valley contains one of the principal basin-fill aquifers in Utah (Army 1996:4-58). Groundwater may also be obtainable from carbonate bedrock that underlies the basin-fill. Some studies indicate that carbonate bedrock in west-central Utah might allow for groundwater flow between basins and that water might flow from recharge areas in the surrounding mountains to local basins (Robson and Banta 1995:C11).

In general, basin-fill sediments range from well to poorly sorted beds of gravel, sand, silt, and clay deposited on alluvial fans, lake bottoms, floodplains, and playas. Coarser-grained materials up to bolder size are more prevalent near the margin of the basin areas. Wells in these areas also tend to have the highest yields. Evaporite deposits (e.g., gypsum, halite) dominate in the deeper parts of the basin area (Robson and Banta 1995:C11). Groundwater within the basin-fill aquifer is generally under unconfined conditions beneath the Utah Industrial Depot but becomes confined toward the center of the basin north of the area. Localized perched groundwater has been reported based on drilling data, although isolated occurrences may be attributable to infiltration from manmade sources (e.g., landfills, lagoons) (Army 1996:4-60). Based on well completion data for Army supply wells, Well Number 2 located within the Utah Industrial Depot had a rated sustainable capacity of 555 gal/min (2,101 l/min) when it operated prior to 2000 with a completion depth of 760 ft (232 m). This well and two other Army supply wells are all completed within the confined portion of the aquifer (Army 1996:4-27, 4-61).

Aquifer recharge occurs primarily near the basin margins, such as the Oquirrh Mountains to the east and the Stansbury Mountains to the west. The normal groundwater flow pattern is controlled by the structure of the basin. Thus, groundwater generally flows from the basin margins toward the axis of the valley and then follows the northward trend of the valley before discharging in or near the Great Salt Lake. A large groundwater discharge area, marked by springs, wetlands, and artesian wells, exists in the area that is roughly between Route 138 near Grantsville and the margin of the Great Salt Lake, beginning about 6 mi (9.6 km) north and northwest of the Utah Industrial Depot (Army 1996:4-58; USGS 1979). Groundwater appears to be deepest in the southwest part of the basin. Static water levels in supply wells for the Tooele Army Depot and the Utah Industrial Depot range from about 200 ft (61 m) to over 700 ft (213 m) (Army 1996:4-60).

Water supply for the Utah Industrial Depot is provided by city of Tooele water system. As previously discussed above, the city of Tooele uses a system of reservoirs and wells as water sources. The Utah Department of Environmental Quality has classified groundwater beneath the Utah Industrial Depot as Class IA and II (Pristine and Drinking Water Quality) while groundwater across most of the eastern two-thirds of the adjoining Tooele Army Depot and areas extending north up the valley is designated Class II (Drinking Water Quality) (UGS 1997b). Water supply and use are further discussed in Section 3.8.10.

Natural groundwater quality in Tooele Valley varies depending on location in the valley and depth. For example, some shallow perched groundwater (18 to 20 ft [5.5 to 6.1 m]) contains high sulfate and chloride concentrations while deeper groundwater (338 to 623 ft [103 to 190 m]) is generally of better quality. Groundwater in the southwest portion of the valley near the recharge areas has a dissolved solids concentration of less than 1,000 mg/l, and indicative of a short residence time in the aquifer. Water from the north and central portion of the valley is of a sodium chloride type, with dissolved solids concentrations of 1,000 to 3,000 mg/l near the center of the valley. Sodium chloride (common salt) is a principal constituent of the water in the Great Salt Lake (Army 1996:4-62).

Groundwater in parts of both the alluvial and bedrock aquifers has been contaminated by past disposal of industrial chemicals in portions of the Tooele Army Depot to include the former Industrial Area (now the Utah Industrial Depot). As described earlier, the Army has investigated 26 solid waste management units within the current Utah Industrial Depot in accordance with the Army's Installation Restoration Program. One site (Solid Waste Management Unit 2) is associated with a plume of contaminated groundwater consisting of trichloroethylene and other organic compounds. The source was a former industrial wastewater lagoon located northwest of the former Industrial Area and an older seepage area. However, associated collection trenches leading to the lagoon were located in the vicinity of the former Consolidated Maintenance Facility within the current Utah Industrial Depot. The plume underlies a substantial portion of the current Utah Industrial Depot and extends to the northwest across and off the Tooele Army Depot. An extensive system of onsite and offsite monitoring wells has been installed to monitor groundwater conditions. Studies suggest that the shallow aquifer contaminated by trichloroethylene is hydraulically separated from deeper aquifer units. A groundwater pump and treat system is in place to prevent migration of the plume. Water is pumped to the surface, treated, and then reinjected to the aquifer. Remediation is expected to take about 25 years to complete (Army 1996:4-47–4-50, 4-52, 4-53, 4-62; Fatz 1998). Groundwater investigations conducted in 1997 indicated that other potential groundwater contamination sources may be present in the former Industrial Area. Investigation of these potential source areas has been initiated under a new Solid Waste Management Unit 58. In the early 1990s, an additional but separate trichloroethylene-contaminated groundwater plume was discovered near the northeast boundary of the Tooele Army Depot. It is known that this plume underlies a portion of the former Industrial Area, as well as property being retained by the Army, and privately owned off-post property. The source of this contamination has not been identified to date, but investigations are ongoing to determine if the contamination is the result of past installation activities (Fatz 1998:enclosure 7). A third plume, consisting of carbon tetrachloride, has been identified emanating from within the Utah Industrial Depot property. Investigations are ongoing to determine the extent of this plume (SWCA 2001:6, 9).

3.8.7 Ecological Resources

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

3.8.7.1 Nonsensitive Habitats and Species

Six vegetative communities, encompassing 250 species of vascular plants, occur on the Tooele Army Depot (Army 1996:4-70; 2001b:app. E, pg. 5). The Wyoming big Sagebrush, mountain big sagebrush, and pinyon-Utah juniper communities dominate most of the site. Other vegetation communities on the site include Utah juniper, black greasewood, and basin wildrye. While natural communities predominate on the Tooele Army Depot as a whole, this is not the case on the Utah Industrial Depot. This area is heavily disturbed by buildings and paved lots. Plant communities that are present on portions of the Utah Industrial Depot include mountain big sagebrush and pinyon-Utah juniper. Vegetation commonly found within mountain big sagebrush communities include mountain big sagebrush, rabbitbrush, bluebunch wheatgrass, antelope bitterbrush, Utah juniper, and bluegrass. Plants associated with the Pinyon-Utah juniper community include bluebunch wheatgrass, cheatgrass, mountain big sagebrush, Utah juniper, black sagebrush and bluegrass (Army 1996:4-70).

A variety of wildlife exists on the Tooele Army Depot, including 2 species of amphibians, 6 species of reptiles, over 60 species of birds, and nearly 31 species of mammals. Some common animals found on the depot include the woodhouse toad collared lizard, side-botched lizard, golden eagle, turkey vulture, pronghorn, mule deer, and coyote (Army 1996:4-70; Army 2001b:app. E, pg. 5). While specific studies of the Utah Industrial Depot have not been conducted, faunal diversity would be expected to be less than for the Tooele Army Depot as a whole due to the extensive development that has taken place there.

3.8.7.2 Sensitive Habitats and Species

There are no wetlands or surface waters on the site (Army 2001b:app. E, pg. 9).

The bald eagle is the only federally listed threatened species, a winter resident of the Tooele Army Depot (Army 2001b:app. E, pg. 20). On July 6, 1999, the Fish and Wildlife Service requested public comments concerning a proposal to remove the bald eagle from the agency's list of endangered wildlife. However, delisting the bald eagle as a threatened species under the act will not affect the protection provided under the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, and Utah State laws (DOI 1999a:36454). While the proposal to delist the bald eagle is moving forward, it was put on hold in order to develop new management guidelines (e.g., nesting considerations) and to review the regulations of the Bald and Golden Eagle Protection Act (Ragan 2001).

Five bird species and one mammal are classified as sensitive by the State of Utah, as shown in Table 3.8–1. There are no Federal- or state-listed plant species known to occur at the site. Although some of the sensitive animal species may occasionally be found on the Utah Industrial Depot, they would be unlikely to be permanent residents.

Table 3.8–1. Threatened and Endangered Species and Species of Special Concern Occurring in the Vicinity of the Utah Industrial Depot

Common Name	Scientific Name	Federal Status	State Status
Birds			
Bald eagle	*Haliaeetus leucocephalus*	T (AD)	T
Burrowing owl	*Athene cunicularia*		SP
Ferruginous hawk	*Buteo regalis*		T
Long-billed curlew	*Numenius americanus*		SP/SD
Swainson's hawk	*Buteo swainsoni*		SP
Mammals			
Brazilian free-tailed bat	*Tadarida brasiliensis mexicana*		SP/SD

Key: AD, proposed delisting; SP, species of special concern (due to declining populations); SP/SD, species of special concern (due to declining populations and limited distribution); T, threatened.

Source: Army 2001b; UDWR 1998.

3.8.8 Cultural Resources

The most recent cultural resource inventories of the site took place in November 2000 and March 2001, for a proposed highway project running through the Tooele Army Depot and included a literature search of three previously conducted inventories in 1988, 1995, and 1999. A Class II pedestrian inventory was conducted, which identified five historic archaeological sites that are eligible for nomination to the NRHP. Of the five, two are World War II related and three are railroad sites (Army 2001b:7-15). Further investigation is ongoing to determine if any NRHP-eligible sites are located on the Utah Industrial Depot.

While there is evidence of Paleoindian, Archaic, Formative, and Late Prehistoric sites within Utah, none are located on the Utah Industrial Depot. Two Archaic sites, Deadman Cave and Black Rock Cave, are located just north of the depot at the southern end of the Great Salt Lake. Within the vicinity of the depot near the towns of Tooele and Grantsville artifacts from the Formative period were discovered (Army 2001b:4-6, 9-15).

Nine tribal councils are located in Utah and two of these, the Goshute and Skull Valley Goshutes are located in Tooele County (AIHF 2002). The Goshute Nation has two bands: the Confederate Tribes of Goshute located on the border of Tooele County and Nevada and the Skull Valley Band of Goshute located below the southwest corner of the Great Salt Lake, west of the Utah Industrial Depot (Utah 2002b). Based on data from the 2000 census, the Skull Valley Reservation had a population of 31, while the Confederate Tribes of Goshute had a population of 105. A total of 694 persons living in Tooele County identified themselves as Native American or Alaskan Native during the 2000 census (DOC 2002e).

3.8.9 Land Use and Visual Resources

3.8.9.1 Land Use

Land use on the Utah Industrial Depot range from general manufacturing and assembly to light industrial storage and distribution (Smith 2002b). The facility consists of approximately 1,200 acres (486 ha) of land owned and operated by the Depot Associates LLC (Army 1996:ES-1; Smith 2002e) that formerly comprised an eastern portion of the larger, 23,611-acre (9,555-ha) Tooele Army Depot (Tooele Army Depot 2002). The site was annexed by Tooele City in 1994 and is zoned for heavy industrial use (Army 1996:ES-1; Smith 2002b). The Utah Industrial Depot contains approximately 250 buildings, open storage lots, and open space that provide manufacturing, warehousing, and office space for tenant customers (Army 1996:4-4; Smith 2002b). The Tooele Army Depot borders the Utah Industrial Depot property along much of its western, southern, and eastern perimeter. Utah State Highway 112 borders the facility to the north (Smith 2002e).

Land use in the vicinity of the Utah Industrial Depot include the ongoing ammunition storage, maintenance and demilitarization activities of the Tooele Army Depot to the west and south (Tooele Army Depot 2002). The Tooele City Commercial Park and low-to-medium residential development extend east of the facility. Land north of the Utah Industrial Depot is predominantly used for agricultural livestock grazing and limited cultivation (Army 1996:4-7).

3.8.9.2 Visual Resources

The developed areas of the Utah Industrial Depot are consistent with BLM's VRM Class III or IV. Class III includes areas in which there have been moderate changes in the landscape that could attract attention, but do not dominate the view of the casual observer. Class IV includes areas in which major modifications to the character of the landscape have occurred. These changes may be dominant features of the view and the major focus of viewer attention (DOI 1986:app. 2). The tallest structure located at the facility is a 40-ft (12-m) high building (Smith 2002d). The viewshed around the Utah Industrial Depot consists mainly of open rangeland containing low-profile military storage, residential, and light industrial areas dominated by views of the Stansbury Mountains to the west and the Oquirrh Mountains to the east. This viewshed is generally consistent with VRM Class II (where visible changes to the character of the landscape are low and do not attract the attention of the casual observer) and Class III.

3.8.10 Infrastructure

Site infrastructure includes those utilities and other resources (see Table 3.8.–2) required to support modification and continued operation of mission-related facilities identified under the various proposed alternatives.

Table 3.8–2. Utah Industrial Depot-wide Infrastructure Characteristics

Resource	Current Usage	Site Capacity
Transportation		
Roads (mi)	12.3	12.3
Railroads (mi)	11.3	11.3
Electricity		
Energy consumption (MWh/yr)	34,000	66,000[a]
Fuel		
Natural gas (ft^3/yr)	75,000,000	300,000,000
Oil (gal/yr)	0	0
Coal (ton/yr)	0	0
Gasoline (gal/yr)	0	0
Water (gal/yr)	268,272,080	525,600,000

[a] Capacity of Army Substation.

Source: Smith 2002b.

3.8.10.1 Transportation

The Utah Industrial Depot is located on the west side of Tooele, Utah, on State Route 112 (Utah Avenue). The major roadway access to this area includes State Route 36, which runs north/south; it is 1.5 mi (2.4 km) to the east. Interstate 80 runs east/west and is 7.5 mi (12 km) to the north. Interstate 80 connects to Interstate 15, another major north/south route 40 mi (64 km) to the east in Salt Lake City. The area is also served by a mainline rail of Union Pacific Railroad (Smith 2002b).

3.8.10.2 Electricity

Electricity is purchased from the Utah Power and Light Company of Salt Lake City, although the infrastructure is owned by the Army. The depot is served by 46 k-volt power lines that are routed into the Tooele-Stockton Distribution Center. From there, the power is distributed to two substations on site—Building 521, which serves the Administration/Community area, and Building 526, which supports the Consolidated Maintenance Facility and Industrial Area (Army 1996).

3.8.10.3 Fuel

Currently, natural gas is the main source of fuel used on the depot. Natural gas is supplied by Mountain Fuel through a main located in the northeast corner of the Administrative Area and distributed underground through polyvinyl chloride piping. Natural gas boilers are used to heat most of the buildings on the depot. However, some smaller buildings have individual natural gas furnaces. The heating system in the Consolidated Maintenance Facility primarily uses natural gas, but is also designed to use propane from a 60,000-gal (227,124-l) storage tank. Also, there are no gasoline dispensing facilities on site and no storage capacity. A small number of forklifts use propane, but the total amount of propane used is small, and there is no bulk storage on site.

3.8.10.4 Water

Prior to 2000, the Tooele Army Depot operated and maintained its own water supply and distribution system using six wells and four water storage tanks on site (Army 1996). In the last two years, the water distribution system has undergone significant changes and upgrades. The main onsite wells have been closed and new water mains have been installed, connecting the Utah Industrial Depot to the city of Tooele municipal water system. The total capacity of the depot water distribution system listed in Table 3.8–2 is the current 2002 capacity. Once the water system design upgrades are complete, the capacity will increase to over 700 million gal/yr (2,650 million l/yr).

3.8.10.5 Site Safety Services

Security for the Utah Industrial Depot is provided by Tooele City Police Department, which patrols the areas as a public service. The Tooele City Fire Department located approximately 3 mi (4.8 km) from the depot, would be the first responders in the event of emergency. The Tooele Army Depot Fire Department would be secondary responders (Smith 2002b).

3.8.11 Environmental Justice

Under Executive Order 12898 (59 FR 7629), DNSC is responsible for identifying and addressing disproportionately high and adverse impacts on minority or low-income populations. As discussed in Appendix G, minority persons are those who identify themselves as American Indian or Alaska Native, Asian, Black or African American, Hispanic or Latino (of any race), Native Hawaiian or Other Pacific Islander, or multiracial (CEQ 1997). Persons who report that their income is less than the Federal poverty threshold are designated as low-income.

Figure 3.8–2 shows populations residing in Tooele County as reported in the 1990 census and the 2000 census (DOC 1992, 2001g). In this figure, lightly shaded bars show populations in 1990, while the darker bars show those in 2000. In the decade between 1990 and 2000, the total population of Tooele County increased by approximately 50 percent, and the minority population increased by approximately

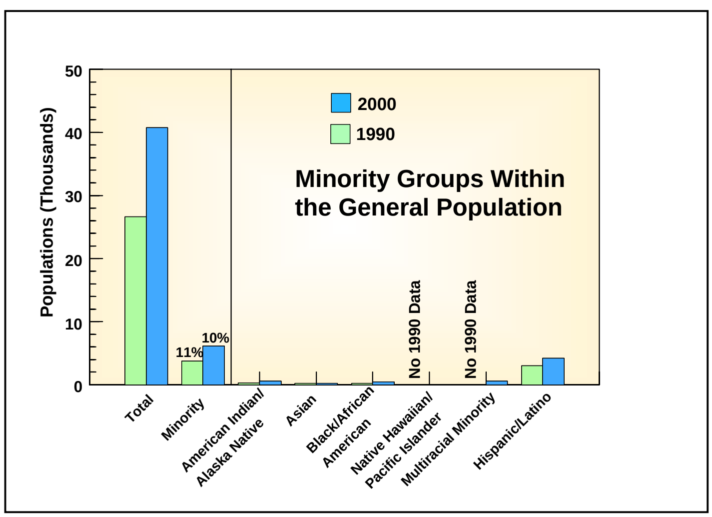


Figure 3.8–2. Populations Residing in Tooele County, Utah, in 1990 and 2000

60 percent. As indicated in the figure, minorities comprised approximately 11 percent of the total population in 1990 and approximately 10 percent of the total population in 2000. The Hispanic or Latino population comprised nearly 70 percent of the total minority population of Tooele County in 1990 and 2000. Persons who declared that they are multiracial and not Hispanic are included in the minority population shown in Figure 3.8–2, provided that they designated themselves as members of at least one minority race. They comprised approximately 9 percent of the total minority population residing in Tooele County in 2000.

The 2000 census was the first decennial census in which multiracial selections were counted. There is no data for this category available from the 1990 census. Also, during the 1990 census, Asian and Pacific Islander designations were placed together in a single category, whereas during the 2000 census, Native Hawaiians and Other Pacific Islanders were counted separately from Asian respondents. Therefore, direct comparison of 1990 census data and 2000 census data for these two categories is not possible.

Approximately 3,980 minority individuals and 1,853 low-income persons lived within 10 mi (16 km) of the Tooele Army Depot in 2000 (DOC 2001g, 2002a). The non-minority population residing in the same area was approximately 30,991 persons. Figure 3.8–3 shows the cumulative percentage of these populations living at a given distance from the Utah Industrial Depot. Over 60 percent of the populations shown in the figure live within 4 mi (6.4 km) of the Utah Industrial Depot, primarily in Tooele, Utah.

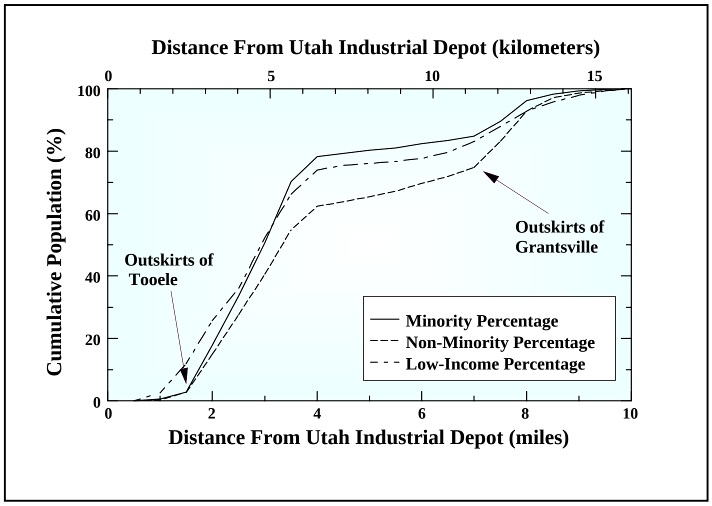


Figure 3.8–3. Percent Resident Populations Within 10 Miles of the Utah Industrial Depot

3.9 REFERENCES

A.D. Little (Arthur D. Little), 2000, *Environmental Audits of Five Defense National Stockpile Center Storage Depots*, Reference 69581, March.

Absolom, S., 2002a, Facility Manager, Seneca Army Depot, Romulus, NY, personal communication (e-mail) to J. DiMarzio, Science Application International Corporation, Germantown, MD, "Mercury Management EIS-Missing Information," October 23.

Absolom, S., 2002b, Facility Manager, Seneca Army Depot, Romulus, New York, personal communication (telephone) with L. Foersom, Science Applications International Corporation, Reston, VA, "Risk Assessment and Health Studies at PEZ Lake Development," September.

AHA (American Hospital Association), 1995, *American Hospital Association Guide to the Health Care Field*, 1995-96 ed., Chicago, IL.

AIHF (American Indian Heritage Foundation), 2000, *Federally Recognized American Indian Tribes—Northeast Tribes*, obtained from http://www.indians.org, July.

AIHF (American Indian Heritage Foundation), 2002, *Federally Recognized American Indian Tribes*, Southwest Region, obtained from http://www.indians.org, September 20.

Albers, J.W., L.R. Kallenbach, L.J. Fine, G.D. Langolf, R.A. Wolfe, P.D. Donofrio, A.G. Alessi, K.A. Stolp-Smith, M.B. Bromberg, and the Mercury Workers Study Group, 1988, *Neurological Abnormalities Associated with Remote Occupational Elemental Mercury Exposure*, Ann. Neurol. 24: 651-659.

Allen County, 2001, personal communication (telephone) between D. Avery, Allen County Highway Department, and R. Werth, Science Applications International Corporation, Germantown, MD, “1998 Traffic Counts,” February 8.

American Indian Heritage Foundation, 2002, *Federally Recognized American Indian Tribes*, Northeast Tribes, http://www.indians.org, September 20.

Andrews, L., 2002, U.S. Fish and Wildlife Service, personal communication (e-mail) to S. Pietzyk, Science Applications International Corporation, McLean, VA, “Species of Concern,” November 14.

Army (U.S. Army), 1996, *Final Environmental Impact Statement Disposal and Reuse of the BRAC Parcel at Tooele Army Depot*, U.S. Army Materiel Command, Alexandria, VA, January.

Army (U.S. Army), 1998, *Final Environmental Impact Statement for BRAC 95 Disposal and Reuse of Property at the Seneca Army Depot Activity, New York,* U.S. Army Materiel Command, Alexandria, VA, March.

Army (U.S. Army), 2000, *Environmental Baseline Survey, Hawthorne Army Depot, Hawthorne, Nevada*, U.S. Army Center for Health Promotion and Preventive Medicine, Ground Water and Solid Waste Program, Aberdeen Proving Ground, MD, February 4.

Army (U.S. Army), 2001a, *Fact Sheet, Hawthorne, Nevada*, Operations Support Command, Public Affairs Office, Rock Island, IL, obtained from http://www4.osc.army.mil/HOME/FACTSHEETS/HeadQuarters_OSC_Active_Sites/Hawthorne.doc, December.

Army (U.S. Army), 2001b, *Environmental Assessment for the Mid-Valley Highway Right-of-Way Through Tooele Army Depot, Utah and Connecting State Route 112 with State Route 36*, U.S. Army Materiel Command, Tooele Army Depot, Tooele, UT, May.

ATSDR (Agency for Toxic Substances and Disease Registry), 2000, *Public Health Assessment*, Seneca Army Depot, Romulus, Seneca County, New York, prepared by Federal Facilities Assessment Branch, March 30, 2000, obtained from http://www.atsdr.cdc.gov/HAC/PHA/seneca on September 19.

Bleuer, N.K., and M.C. Moore, 1978, Indiana Geological Survey Special Report 13, *Environmental Geology of Allen County, Indiana*.

Borngesser, D.G., 2001, Township of Hillsborough, Hillsborough Township, NJ, personal communication (letter) to R. Werth, Science Applications International Corporation, Germantown, MD, “Noise Pollution Ordinance,” February 14.

Bosma, W.J., 2000, *Facility Hazards Assessment Material Control Organization, Oak Ridge Y–12 Plant*, EMPO-514/HA-021, rev. 0, Oak Ridge, TN, March 2.

Bourn, S., 2002, Defense Logistics Agency, Defense National Stockpile Depot, New Haven, IN, personal communication with J. Holian, Science Applications International Corporation, Germantown, MD, “Site Infrastructure,” May 16.

Brockman, C.S., 1998, *Physiographic Regions of Ohio*, Ohio Department of Natural Resources, Division of Geological Survey, April, obtained from http://www.dnr.state.oh.us/odnr/geo_survey/gen/map/physio.htm.

Brooks, F., 2000, Defense Logistics Agency, Defense National Stockpile Depot, New Haven, IN, personal communication with C. Wilson, Science Applications International Corporation, Germantown, MD, "Site Infrastructure," June.

BSSC (Building Seismic Safety Council), 2001, *2000 Edition NEHRP Recommended Provisions (National Earthquake Hazards Reduction Program) for Seismic Regulations for New Buildings and Other Structures, Part 2: Commentary (FEMA 369)*, prepared by the Building Seismic Safety Council for the Federal Emergency Management Agency, Washington, D.C., obtained from http://www.bssconline.org/.

Callinan, C.W., 2001, *Water Quality Study of the Finger Lakes*, New York State Department of Environmental Conservation, Division of Water, July, obtained from http://www.dec.state.ny.us/website/dow/fingerlakes/, August 20, 2002.

Cangro, V.R., 2002, Defense Logistics Agency, OH, personal communication (e-mail) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Lease at Warren," November 14.

Carroll, C., 2002, Environmental Health Division, Seneca County Health Department, personal communication with L. Foersom, Science Applications International Corporation, Reston, VA, "Health Risk Information," September.

Cash, C.M., 1998a, *Natural Resources Assessment, Defense Logistics Agency/Defense National Stockpile Center, New Haven, Indiana*, U.S. Department of Agriculture, Forest Service, Gifford Pinchot National Forest, July.

Cash, C.M., 1998b, *Natural Resources Assessment for Defense Logistics Agency/Defense National Stockpile Center, Somerville, New Jersey*, U.S. Department of Agriculture, Forest Service, Gifford Pinchot National Forest, June.

Cash, C.M., 1998c, *Natural Resources Assessment for Defense Logistic Agency/Defense National Stockpile Center, Warren, Ohio*, U.S. Department of Agriculture, Forest Service, Gifford Pinchot National Forest, July.

Caswell, J., U.S. General Services Administration, 2001, personal communication with R. Werth, Science Applications International Corporation, Germantown, MD, "Information Regarding Reuse and Closure/Disposal Plans for the New Haven Depot," May 21.

CEQ (Council on Environmental Quality), 1986, "Human Environment," *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act*, 40 CFR 1508.14, Washington, DC, July 1.

CEQ (Council on Environmental Quality), 1997, *Environmental Justice Guidance Under the National Environmental Policy Act*, Executive Office of the President, Washington, DC, obtained from http://www.tis.eh.doe.gov/nepa/tools/guidance/volumei.htm, December 10.

Chazen (The Chazen Companies) 2002, *Supplemental Draft Environmental Impact Statement, Seneca County Public Safety Building and Jail at the Seneca Army Depot, Town of Romulus, Seneca County, New York*, June 17.

City of Oak Ridge, 1999, “Noise,” *City of Oak Ridge Zoning Ordinance*, Chapter 5, Section G-504, Oak Ridge, TN, August 26.

Clearly, J., 2003, U.S. Army, Seneca Army Depot, Romulus, NY, personal communication (e-mail) to J. DiMarzio, Science Applications International Corporation, Germantown, MD “Propane Storage Tanks and Natural Gas,” February 10.

Collins, H.R., 1979, *The Mississippian and Pennsylvanian (Carboniferous) Systems in the United States—Ohio*, Geological Survey Professional Paper 1110-E.

Coombs, J., 2002, Utah Industrial Depot, personal communication (telephone) with L. Foersom, Science Applications International Corporation, Reston, VA, “Health Effects Studies at the Utah Industrial Depot,” October.

Cragle, D. L., D.R. Hollis, J.R. Qualters, W.G. Tankersley, and S.A. Fry, 1984, *A Mortality Study of Men Exposed to Elemental Mercury*, J. Occup. Med. 26, 817-821.

Crone, A.J., and R.L. Wheeler, 2000, *Data For Quaternary Faults, Liquefaction Features, and Possible Tectonic Features in The Central and Eastern United States, East of the Rocky Mountain Front*, U.S. Geological Survey Open-File Report 00-260, obtained from http://greenwood.cr.usgs.gov/pub/open-file-reports/ofr-00-0260.

CVO (Cascades Volcano Observatory), 2002, *America's Volcanic Past–Utah*, U.S. Geological Survey, Cascades Volcano Observatory, Vancouver, Washington, obtained from http://vulcan.wr.usgs.gov/LivingWith/VolcanicPast/Places/volcanic_past_utah.html, August 28.

Day and Zimmermann (Day and Zimmermann Hawthorne Corporation), 2001, *Spill Prevention Control and Countermeasure Plan (SPCC) for the Hawthorne Army Depot*, rev. 1, serial no. 024, April.

Day and Zimmermann (Day and Zimmermann Hawthorne Corporation), 2002, *Hawthorne Army Depot Storm Water Pollution Prevention Plan, Annual Evaluation Summary*, rev. 13, serial no. 004, Safety Division, Environmental Branch, Hawthorne, NV, July.

DeLeon, M., and R.C. Whetsell, 1999a, *Cultural Resources Assessment for the Defense Logistics Agency, Defense National Stockpile Center, City of New Haven, Allen County, Indiana*, U.S. Department of Agriculture, Forest Service, February.

DeLeon, M., and R.C. Whetsell, 1999b, *Cultural Resources Assessment for the Defense Logistics Agency, Defense National Stockpile Center Warren, Trumbull County, Ohio*, U.S. Department of Agriculture, Forest Service, February.

DiMarzio, J., 2000a, Science Applications International Corporation, “Photo Log for New Haven Depot Site Visit,” Science Applications International Corporation, Germantown, MD, January 5.

DiMarzio, J., 2000b, Science Applications International Corporation, “Photo Log for Somerville Depot Visit,” March 7.

DiMarzio, J., 2000c, Science Applications International Corporation, Germantown, MD, “Photo Log for Warren Depot Site Visit,” January 19.

DLA (Defense Logistics Agency), 1999, *Spill Prevention Control and Countermeasures Plan, New Haven Depot*, New Haven, IN, March.

DLA (Defense Logistics Agency), 2000a, *Mercury Reflasking Environmental Assessment,* Defense National Stockpile Center, Ft. Belvoir, VA, October.

DLA (Defense Logistics Agency), 2000b, *Spill Prevention Control and Countermeasures Plan, Warren Depot,* Warren, OH, June.

DLA (Defense Logistics Agency), 2001, *Mercury Overpacking at Somerville, New Jersey Environmental Assessment*, Defense National Stockpile Center, Ft. Belvoir, VA, May.

DLA (Defense Logistics Agency), 2003, *Draft Human Health and Ecological Risk Assessment Report for the Mercury Management Environmental Impact Statement*, Defense National Stockpile Center, Ft. Belvoir, VA.

DNSC (Defense National Storage Center), 2001a, personal communication (e-mail with attachment) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Information Request – Mercury Storage Locations, New Haven Depot Response," April 30.

DNSC (Defense National Stockpile Center), 2001b, personal communication (facsimile) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Information Request – New Haven and Somerville Depots," April 2.

DNSC (Defense National Stockpile Center), 2001c, personal communication (e-mail with attachment) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Information Request for the Affected Environment Data for Somerville," April 12.

DNSC (Defense National Stockpile Center), 2001d, personal communication (facsimile) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Response to Information Request– Warren," February 26.

DOC (U.S. Department of Commerce), 1992, *1990 Census of Population and Housing, Summary Tape File 3 on CD-ROM*, U. S. Census Bureau, Washington, DC, May.

DOC (U.S. Department of Commerce), 2001a, "Census 2000 Summary File 1 (SF 1) 100-Percent Data: Indiana, New Jersey, Ohio, and Tennessee," *Profile of General Demographic Characteristics: 2000*, DP-1, available at factfinder.census.gov/, November 9.

DOC (U.S. Department of Commerce), 2001b, "1990 Summary Tape File 1 (STF 1) – 100-Percent Data by County and State: Allen County, Indiana; Somerset County, New Jersey; Trumbull County, Ohio; and Anderson County, Tennessee," *Age, Sex, and Group Quarters: 1990,* GCT-Pa, obtained from http://www.factfinder.census.gov/, November 9.

DOC (U.S. Department of Commerce), 2001c, "Census 2000 Summary File 1 (SF 1) 100-Percent Data: Allen County, Indiana; Somerset County, New Jersey; Trumbull County, Ohio; and Anderson County, Tennessee," P*rofile of General Demographic Characteristics: 2000,* DP-1, obtained from http://www.factfinder.census.gov/, October 17.

DOC (U.S. Department of Commerce), 2001d, "Census 2000 Summary File 1 (SF 1) 100-Percent Data by County and State: Allen County, Indiana; Somerset County, New Jersey; Trumbull County, Ohio; and Anderson County, Tennessee," *Sex by Age [49] – Universe: Total Population,* P12, obtained from http://wwww.factfinder.census.gov/, November 9.

DOC (U.S. Department of Commerce), 2001e, "Census 2000 Summary File 1 (SF 1) 100-Percent Data: Indiana, New Jersey, Ohio, and Tennessee," *Race and Hispanic or Latino,* by state, QT-P3, obtained from http://www.factfinder.census.gov/, November 9.

DOC (U.S. Department of Commerce), 2001f, "Census 2000 Summary File 1 (SF 1) 100-Percent Data: Allen County, Indiana; Somerset County, New Jersey; Trumbull County, Ohio; and Anderson County, Tennessee," *Race and Hispanic or Latino: 2000,* by county, QT-P3, obtained from http://www.factfinder.census.gov/, November 9.

DOC (U.S. Department of Commerce), 2001g, *Overview of Race and Hispanic Origin,* Bureau of the Census, Census 2000 Brief C2KBR/01-1, obtained from http://www.census.gov/population/www/cen2000/briefs.html, Washington, D.C., March.

DOC (U.S. Department of Commerce), 2001h, *County and City Data Book: 2000,* 13th ed., U.S. Census Bureau, Washington, DC, November.

DOC (U.S. Department of Commerce), 2001i, *Census 2000 Summary File 1 Technical Documentation*, Prepared by the U.S. Census Bureau, obtained from http://www.census.com, December.

DOC (U.S. Department of Commerce), 2002a, "Census 2000 Summary File 1 (SF 1) 100-Percent Data: Mineral County, Nevada; Seneca County, New York; and Tooele County, Utah," *Profile of General Demographic Characteristics: 2000,* DP-1, U.S. Census Bureau, obtained from http://www.factfinder.census.gov, August 26.

DOC (U.S. Department of Commerce), 2002b, "Census 2000 Summary File 1 (SF 1) 100-Percent Data by County and State: Mineral County, Nevada; Seneca County, New York; and Tooele County, Utah," *Sex by Age [49] – Universe: Total Population,* P12, U.S. Census Bureau, obtained from http://www.factfinder.census.gov, August 26.

DOC (U.S. Department of Commerce), 2002c, "Profile of General Demographic Characteristics: 2000, Data Set: Census 2000 Summary File 1 (SF 1) 100 Percent Data, Geographic Area: Mineral County and Walker River Reservation, NV," *Quick Tables,* DP-1, U.S. Census Bureau, obtained from http://www.factfinder.census.gov, September 19.

DOC (U.S. Department of Commerce), 2002d, "Profile of General Demographic Characteristics: 2000, Data Set: Census 200 Summary File 1 (SF 1) 100 Percent Data, Geographic Area: Seneca County, NY," *Quick Tables*, DP-1, U.S. Census Bureau, http://www.factfinder.census.gov, September 20.

DOC (U.S. Department of Commerce), 2002e, "Profile of General Demographic Characteristics: 2000, Data Set: Census 2000 Summary File 1 (SF 1) 100 Percent Data, Geographic Area: Goshute Reservation, NV-UT; Skull Valley Reservation, UT; and Tooele County, UT," *Quick Tables,* DP-1, U.S. Census Bureau, obtained from http://www.factfinder.census.gov, September 19.

DOE (U.S. Department of Energy), 1996, *Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic Environmental Impact Statement*, DOE/EIS-0229, Office of Fissile Materials Disposition, Washington, DC, December.

DOE (U.S. Department of Energy), 1998, *Report on the Remedial Investigation of the Upper East Fork Poplar Creek Characterization Area at the Oak Ridge Y–12 Plant, Oak Ridge, Tennessee*, DOE/OR/01-1641/V1&D2, Office of Environmental Management, U.S. Department of Energy, Oak Ridge, TN, August.

DOE (U.S. Department of Energy), 1999a, *Final Environmental Assessment for the U.S. Department of Energy, Oak Ridge Operations Receipt and Storage of Uranium Materials from the Fernald Environmental Management Project Site,* DOE/EA-1299, Oak Ridge National Laboratory, Oak Ridge, TN, May.

DOE (Department of Energy), 1999b, *Comprehensive Integrated Planning Process for the Oak Ridge Operations Sites*, ORNL/M-6717, prepared by Bechtel Jacobs Company LLC, Lockheed Martin Energy Research Corporation, and Lockheed Martin Energy Systems, Inc., September.

DOE (U.S. Department of Energy), 2000, *Final Programmatic Environmental Impact Statement for Accomplishing Expanded Civilian Nuclear Energy Research and Development and Isotope Production Missions in the United States, Including the Role of the Fast Flux Test Facility*, DOE/EIS-0310, Office of Nuclear Energy, Science and Technology, Washington, DC, December.

DOE (U.S. Department of Energy), 2001, *Final Site-Wide Environmental Impact Statement for the Y–12 National Security Complex*, DOE/EIS-0309, Oak Ridge Y–12 Area Office, National Security Administration, Oak Ridge, TN, September.

DOI (U.S. Department of the Interior), 1986, *Visual Resource Contrast Rating*, BLM Manual Handbook H-8431-1, January 17.

DOI (U.S. Department of the Interior), 1999a, *Endangered and Threatened Wildlife and Plants; Proposed Rule to Remove the Bald Eagle in the Lower 48 States From the List of Endangered and Threatened Wildlife*, 64 FR 36454, Office of the Federal Register, Washington, DC, July 6.

DOI (U.S. Department of the Interior), 1999b, *Endangered and Threatened Wildlife and Plants; Final Rule to Remove the American Peregrine From the Federal List of Endangered and Threatened Wildlife, and to Remove the Similarity of Appearance Provision for Free-Flying Peregrines in the Conterminous United States*, 64 FR 46542, Office of the Federal Register, Washington, DC, August 25.

DOI, (U.S. Department of the Interior), 2002, "National Register System Database: Seneca County, New York," *National Register of Historic Places*, National Park Service, obtained from http://www.cr.nps.gov, October 2.

DOL (U.S. Department of Labor), 2001, "Local Area Unemployment Statistics for Indiana; New Jersey; Ohio; Tennessee; Allen County, Indiana; Somerset County, New Jersey; Trumbull County, Ohio; and Anderson County, Tennessee," *Bureau of Labor Statistics Data*, obtained from http://www.data.bls.gov, November 6.

DOL (U.S. Department of Labor), 2002, "Local Area Unemployment Statistics for Nevada; New York; Utah; Mineral County, Nevada; Seneca County, New York; and Tooele County, Utah," *Bureau of Labor Statistics Data*, Bureau of Labor Statistics, obtained from http://www.bls.gov/data, August 26.

Dombroski, D.R., Jr., 1998, *Earthquake Risk in New Jersey*, State of New Jersey, obtained from http://www.state.nj.us/dep/njgs/pricelst/index.htm.

Downs, Y., 2002a, Day and Zimmermann Hawthorne Corporation, Hawthorne, NV, personal communication (e-mail) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Additional Questions from Review of Internal Draft Affected Environment Section," October 2.

Downs, Y., 2002b, Day and Zimmermann Hawthorne Corporation, Hawthorne, NV, personal communication (e-mail) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Information Request—Mercury Storage Locations," September 25.

Downs, Y., 2002c, Day and Zimmermann Hawthorne Corporation, Hawthorne, NV, personal communication (e-mail) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Question – Gasoline Consumption," November 21.

Duddleston, D., 2002, Seneca County Sewer District #2, Romulus, NY, personal communications (telecon) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Sewage Treatment Plant that Services Seneca County Sewer District #2," December 31.

Ensminger, J.T., and S.N. Storch, 2002, *Defense Logistics Agency Decisions Support Summary Thorium Nitrate Storage Options*, Oak Ridge National Laboratory, Oak Ridge, TN, July 26.

EPA (U.S. Environmental Protection Agency), 1974, *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, EPA-550/9-74-004, Washington, DC, March.

EPA (U.S. Environmental Protection Agency), 2000a, "Rescinding Findings that the 1-Hour Ozone Standard No Longer Applies in Certain Areas," Final Rule, 65 Federal Register 45181, July 20.

EPA (U.S. Environmental Protection Agency), 2000b, "Indiana," *Designation of Areas for Air Quality Planning Purposes, Attainment Status Designations*, 40 CFR 81.315, July 1.

EPA (U.S. Environmental Protection Agency), 2000c, "New Jersey," *Designation of Areas for Air Quality Planning Purposes*, 40 CFR 81.331, July 1.

EPA (U.S. Environmental Protection Agency), 2000d, "Ohio," *Designation of Areas for Air Quality Planning Purposes*, 40 CFR 81.336, July 1.

EPA (U.S. Environmental Protection Agency), 2000e, "Tennessee," *Designation of Areas for Air Quality Planning Purposes*, 40 CFR 81.343, July 1.

EPA (U.S. Environmental Protection Agency), 2000f, "Nevada," *Designation of Areas for Air Quality Planning Purposes*, 40 CFR 81.329, July 1.

EPA (U.S. Environmental Protection Agency), 2000g, "New York," *Designation of Areas for Air Quality Planning Purposes*, 40 CFR 81.333, July 1.

EPA (U.S. Environmental Protection Agency), 2000h, "Utah," *Designation of Areas for Air Quality Planning Purposes*, 40 CFR 81.345, July 1.

EPA (U.S. Environmental Protection Agency), 2001a, *AIRData – Monitor Values Report*, "Indiana 2000," obtained from http://www.epa.gov/air/dta/reports.html, April.

EPA (U.S. Environmental Protection Agency), 2001b, Watershed Profile, Upper Maumee, 303(d) Listed Waters, Watershed Information Network, obtained from http://www.epa.gov/iwi/303d/04100005_303d.html, April 26.

EPA (U.S. Environmental Protection Agency), 2001c, *Designated Sole Source Aquifers in EPA Region V, Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin*, obtained from http://www.epa.gov/safewater/swp/ssa/reg5.html, June 12.

EPA (U.S. Environmental Protection Agency), 2001d, *AIRData – Monitor Values Report*, "New Jersey 2000," obtained from http://www.epa.gov/air/dta/reports.html, April 20.

EPA (U.S. Environmental Protection Agency), 2001e, "Watershed Profile, Raritan, 303(d) Listed Waters," *Watershed Information Network*, obtained from http://www.epa.gov/iwi/303d/02030105_303d.html, July 16.

EPA (U.S. Environmental Protection Agency), 2001f, *Region II Sole Source Aquifers, Northwest New Jersey Fifteen Basin Aquifer Support Document*, obtained from http://www.epa.gov/region02/water/aquifer/, July 20.

EPA (U.S. Environmental Protection Agency), 2001g, *Designated Sole Source Aquifers in EPA Region 2, New York, New Jersey, Puerto Rico, U.S. Virgin Islands*, obtained from http://www.epa.gov/safewater/swp/ssa/reg2.html, June 12.

EPA (U.S. Environmental Protection Agency), 2001h, *AIRData – Monitor Values Report,* "Ohio 2000," obtained from http://www.epa.gov/air/dta/reports.html, April 20.

EPA (U.S. Environmental Protection Agency), 2001i, "Watershed Profile, Mahoning, 303(d) Listed Waters," *Watershed Information Network*, obtained from http://www.epa.gov/iwi/303d/05030103_303d.html, June 1 and August 9.

EPA (U.S. Environmental Protection Agency), 2001j, *AIRData – Monitor Values Report*, "Tennessee 2000," obtained from http://www.epa.gov/air/dta/reports.html, April 20.

EPA (U.S. Environmental Protection Agency), 2001k, *Designated Sole Source Aquifers in EPA Region IV, Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee*, obtained from at http://www.epa.gov/safewater/swp/ssa/reg4.html, June 12.

EPA (U.S. Environmental Protection Agency), 2002a, *AIRData – Monitor Values Report*, "Nevada 2001," obtained from http://www.epa.gov/air/dta/reports.html, August 9.

EPA (U.S. Environmental Protection Agency), 2002b, *RCRA Info*, obtained from http://www.epa.gov/enviro/html/rcris/rcris_query_java.html, August 27.

EPA (U.S. Environmental Protection Agency), 2002c, *Designated Sole Source Aquifers in EPA Region IX, Arizona, California, Hawaii, Nevada, Guam, and American Samoa*, obtained from http://www.epa. gov/safewater/swp/ssa/reg9.html, August 27.

EPA (U.S. Environmental Protection Agency), 2002d, *AIRData – Monitor Values Report*, "New York 2001," obtained from http://www.epa.gov/air/dta/reports.html, August 9.

EPA (U.S. Environmental Protection Agency), 2002e, *Seneca Army Depot,* Region 2 Superfund, http://www.epa.gov/region02/superfund/npl/0202425c.htm, August 27.

EPA (U.S. Environmental Protection Agency), 2002f, *AIRData – Monitor Values Report,* "Utah 2001," obtained from http://www.epa.gov/air/dta/reports.html, August 9.

Espinoza, R.E., and C.R. Tracy, 1999, An Inventory of the Herpetofauna of Hawthorne Army Depot, Mineral County, Nevada, Biological Resources Research Center, University of Nevada, Reno NV, obtained from http://www.brrc.unr.edu/data/animals/hawthorne/, September.

Farley, J., 2000, Defense Logistics Agency, Defense National Stockpile Depot, Somerville, NJ, personal communication with C. Wilson, Science Applications International Corporation, Germantown, MD, "Site Infrastructure," June.

Farley, J., 2002a, Defense Logistics Agency, Somerville, NJ, personal communication (e-mail) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Data Gaps for Chapter 3 of the Mercury Management EIS," May 30.

Farley, J., 2002b, Defense Logistics Agency, Somerville, NJ, personal communication (e-mail) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Data Gaps for Chapter 3 of the Mercury Management EIS," June 13.

Fatz, R. J., Colonel, 1998, *Finding of Suitability for Early Transfer (FOSRT)*, Tooele Army Depot (TEAD), Tooele, UT, Administration and Industrial Areas, October 5, Deputy Assistant Secretary of the Army, Environment, Safety, and Occupational Health.

FEMA (Federal Emergency Management Agency), 1978, *Flood Insurance Rate Map, Trumbull County, Ohio (Unincorporated Areas)*, Panel 175 of 225, Community-Panel No. 390535 0175 B, National Flood Insurance Program, September 29.

FEMA (Federal Emergency Management Agency), 1981, *Flood Insurance Rate Map, Township of Hillsboro, New Jersey, Somerset County*, Panel 5 of 30, Community-Panel No. 340436 0005 B, National Flood Insurance Program, March 2.

FEMA (Federal Emergency Management Agency), 1990, *Flood Insurance Rate Map, Allen County, Indiana and Incorporated Areas*, Panel 305 of 475, Map No. 18003C0305D, National Flood Insurance Program, September 28.

Fleming, A.H., 1994, *The Hydrogeology of Allen County, Indiana: A Geologic and Ground-Water Atlas*, Indiana Geological Survey Special Report 57.

Fort Wayne/Allen County, 1997, Fort Wayne/Allen County Databook, September.

Geo-Marine, Inc., 1996, *Hawthorne Army Depot Cultural Resources Management Plan,* October.

Goodman, K., 2002, Nevada State Health Division, Bureau of Health Protection Services, personal communication (telephone) with L. Foersom, Science Applications International Corporation, Reston, VA, "Risk Assessment and Health Studies at Hawthorne Army Depot," September.

Gravenstein, A., 2002, Nevada Division of Environmental Protection, personal communication (telephone) with L. Foersom, Science Applications International Corporation, Reston, VA, “Risk Assessment and Health Studies at Hawthorne Army Depot,” September.

Guida, V., 2001, Defense Logistics Agency, Ft. Belvoir, VA, personal communication with J. DiMarzio, Science Applications International Corporation, Germantown, MD, “Information Request – Mercury Storage Locations,” April 12.

Gulino, G., 2002, Defense Logistics Agency, Defense National Stockpile Depot, Somerville, NJ, personal communication with J. Holian, Science Applications International Corporation, Germantown, MD, “Site Infrastructure,” May 16.

Hamilton, L.V., S.D. Thompson, L.W. McMahon, and M.L. Coffey, 1999, *Oak Ridge Reservation Annual Site Environmental Report for 1998*, DOE/ORO/2091, Oak Ridge National Laboratory, Oak Ridge, TN, December.

Hansen, M.C., 1997, “The Geology of Ohio-The Precambrian,” *GeoFacts No. 13*, Ohio Department of Natural Resources, Division of Geological Survey, July, obtained from http://www.dnr.state.oh.us/odnr/geo_survey/geo_fact/geo_f13.htm, July 30, 2001.

Hawthorne Army Depot, 2001, *Table of Inter-Depot Rail Movement for Calendar Year 2001*.

Hellmich, R., 2001, Indiana Department of Natural Resources, Indianapolis, IN, personal communication (letter) to S. Pietzyk, Science Applications International Corporation, McLean, VA, “Endangered, Threatened, or Rare Species (ETR) Information,” February 8.

Hill, D.P., RA. Bailey, C.D. Miller, J.W. Hendley II, and P.H. Stauffer, 1998, *Future Eruptions in California’s Long Valley Area–What’s Likely?*, USGS Fact Sheet 073-97, revised November 1998, U.S. Geological Survey, obtained from http://lvo.wr.usgs.gov/index.html#glance, August 26.

Hirrlinger, D., 2002a, Science Applications International Corporation, Germantown, MD, personal communication (telephone) with W. Cadwallader, Western Nevada Development District, Carson, City, NV, “Land Use Around Hawthorne Army Depot,” July 25.

Hirrlinger, D., 2002b, Science Applications International Corporation, Germantown, MD, personal communication (telephone) with A. Lawrence, Town of Romulus, NY, “Zoning Information,” July 28.

Holland, C., 2001, U.S. Public Health Service, personal communication (e-mail) to L. Meredith, Science Applications International Corporation, Oak Ridge, TN, “Health Studies,” April 10.

Hughes J.F., S.D. Thompson, L.W. McMahon, and M.L. Coffey, 2002, *Oak Ridge Reservation Annual Site Environmental Report for 2001*, DOE/ORO/2133, Oak Ridge National Laboratory, Oak Ridge, TN, September.

I&SA (Installation and Services Activity), 1998, *Integrated Natural Resources Management Plan, Hawthorne Army Depot, Hawthorne, Nevada*, U.S. Army Materiel Command.

ICC (International Code Council, Inc.), 2000, *International Building Code*, Falls Church, VA, March.

IDEM (Indiana Department of Environmental Management), 2001a, *1998 303(d) List of Impaired Waterbodies with 15 Year Schedule*, Office of Water Quality, obtained from http://www.in.gov/idem/water/planbr/wqs/303d.html, July 2.

IDEM (Indiana Department of Environmental Management), 2001b, *NPDES General Permit Rule Program, Indiana Administrative Code, Title 327, Article 15*, Water Pollution Control Board, obtained from http://www.state.in.us/legislative/iac/title327.html, July 2.

IDEM (Indiana Department of Environmental Management), 2001c, *Water Quality Standards, Indiana Administrative Code, Title 327, Article 2*, Water Pollution Control Board, obtained from http://www.state.in.us/legislative/iac/title327.html, June 28.

IDEM (Indiana Department of Environmental Management), 2002, Public Water Supply, Indiana Administrative Code, Title 327, Article 8, Water Pollution Control Board, obtained from http://www.ai.org/legislative/iac/title327.html, June 4.

IDNR (Indiana Department of Natural Resources), 1996a, *Water Resources Availability in the Maumee River Basin, Indiana*, Water Resources Assessment 96-5, Division of Water, obtained from http://www.ai.org/dnr/water/maumee/maumee.html, June 28, 2001.

IDNR (Indiana Department of Natural Resources), 1996b, *Water Resources Availability in the Maumee River Basin, Indiana- Executive Summary*, obtained from http://www.in.gov/dnr/water/basinsums/index.html, June 28, 2001.

IHB (Indiana Historical Bureau), 2000, *Indiana's People*, obtained from http://www.statelib.lib.us/www/ihb/people.html, July.

Jones, P., 2002a, Seneca County Industrial Development Agency, Waterloo, NY, personal communication (e-mail) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Mercury Management EIS – PEZ Lake Tenants," August 15.

Jones, P., 2002b, Seneca County Industrial Development Agency, Waterloo, NY, personal communication (telecon) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Sewage Treatment Plant that Services the PEZ Lake Development," December 31.

Kayler, J., U.S. General Services Administration, 2001, personal communication with R. Werth, Science Applications International Corporation, Germantown, MD, "Information Regarding Reuse and Closure/Disposal Plans for the Somerville Depot," May 15.

Kirby, J., 2000, *Earthquakes in Indiana*, Indiana Geological Survey, January, obtained from http://adamite.igs.indiana.edu/indgeol/geology/eq/index.htm, May 21, 2001.

Larsen, G.E., 1998, *Generalized Correlation Chart of Bedrock Units in Ohio*, Open-File Report 98-2, Ohio Department of Natural Resources, Division of Geological Survey.

Lloyd, O.B. and W.L. Lyke, 1995, *Ground Water Atlas of the United States*, Segment 10, Illinois, Indiana, Kentucky, Ohio, Tennessee, Hydrologic Investigations Atlas 730-K, Reston, VA, available at http://capp.water.usgs.gov/gwa/gwa.html.

Lohrbach, K., U.S. General Services Administration, 2001, personal communication with R. Werth Science Applications International Corporation, Germantown, MD, "Information Regarding Reuse and Closure/Disposal Plans for the Warren Depot," May 18.

Lynch, D., 2000, Defense Logistics Agency, Ft. Belvoir, VA, personal communication with J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Periodic Inspection Reports for the New Haven and Warren Depots," July 19.

Lynch, D., 2001a, Defense Logistics Agency, Ft. Belvoir, VA, personal communication (facsimile) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Depot Information Request – Projected Depot Employment and Closure Dates," March 13.

Lynch, D., 2001b, Defense Logistics Agency, Ft. Belvoir, VA, personal communication (facsimile) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Depot Information Request, No Action Alternative, New Haven and Somerville," April 2.

Lynch, D., 2001c, Defense Logistics Agency, Ft. Belvoir, VA, personal communication (facsimile) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Warren Depot Information," February 26.

Lynch, D., 2002a, Defense National Stockpile Center, Ft. Belvoir, VA, personal communication (e-mail) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Cleanup Actions at Somerville, Warren, and New Haven," August 9.

Lynch, D., 2002b, Defense National Stockpile Center, Ft. Belvoir, VA, personal communication (facsimile) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Depot Closure Dates," June 28.

McFarland, L., 2002a, Environmental Engineer, Environmental Management Office, Tooele Army Depot, Tooele, UT, personal communication (telephone) with L. Foersom, Science Applications International Corporation, Reston, VA, "Risk Assessment and Health Studies of Utah Industrial Depot," September.

McFarland, L., 2002b, Environmental Engineer, Environmental Management Office, Tooele Army Depot, Tooele, UT, personal communication (e-mail) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Soil and Groundwater Investigations," September 4.

McLeod, C.M., and R.C. Whetsell, 1998, *Cultural Resources Assessment of the Defense Logistics Agency*, Defense National Stockpile Center, Somerville, New Jersey, Hillsborough Township, Somerset County, New Jersey, Forest Service, U.S. Department of Agriculture, June.

Medical-Net, Inc., 2001, Hospital Select, East Lansing, MI, obtained from http://www.hospitalselect.com, April 3.

MCC (Midwestern Climate Center), 2000, Youngstown Summary Data, obtained from http://www.mcc.sws.uiuc.edu/Summary/Data/339406.txt, July 26.

Miller, C.D., and J. Johnson, 1999, *Potential Hazards from Tephra Fall for Small to Moderate-Sized Eruptions in the Long Valley–Mono Lake Area*, California, U.S. Geological Survey, Volcano Hazards Program, Long Valley Observatory, obtained from http://lvo.wr.usgs.gov/zones/TephraFall.html, August 26, 2002.

Mims, B., 2002, “New Tooele Hospital Opens Doors to Serve Fast-Growing Population,” *The Salt Lake Tribune*, April 30.

Mineral County Chamber (Mineral County Chamber of Commerce), 2002, *Walker Lake History*, obtained from http://www.mineralcountynvchamber.org, September 20.

Morefield, J.D. (editor), 2001, *Nevada Rare Plant Atlas*, Carson City: Nevada Natural heritage Program, compiled for the U.S. Department of Interior, Fish and Wildlife Service, Portland, OR and Reno, NV, June.

Morris, D., 2002, National Nuclear Security Administration, Washington, DC, personal communication (e-mail) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, “MM EIS-Review of Y–12 Affected Environment Sections,” May 14.

MWMC (Mountain West Medical Center), 2002, “Find a Physician,” Tooele, UT, obtained from http://www.mountainwestmc.com, September 15.

Nachlinger, J., 2001, *Rare Plant Survey of the Hawthorne Army Depot, Mineral County, Nevada*, Part I: Survey Results, The Nature Conservancy, Reno, NV, unpublished, August.

NBCP (Newark Basin Coring Project), 2001, The Newark Basin Cores from the NBCP, Somerset # 1 &2, obtained from http://www.ldeo.columbia.edu/~polsen/nbcp/cores.html, July 11.

NCDC (National Climactic Data Center), 2001a, Local Climatological Data – Annual Summary with Comparative Data - Fort Wayne, Indiana.

NCDC (National Climactic Data Center), 2001b, Local Climatological Data – Annual Summary with Comparative Data – Newark, New Jersey.

NCDC (National Climactic Data Center), 2001c, NCDC Storm Events – New Jersey, obtained from http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent-storms, April.

NCDC (National Climactic Data Center), 2001d, Local Climatological Data – Annual Summary with Comparative Data – Youngstown, Ohio.

NCDC (National Climactic Data Center), 2001e, Local Climatological Data – Annual Summary with Comparative Data – Oak Ridge, Tennessee.

NCDC (National Climatic Data Center), 2001f, NCDC Storm Events – Anderson County, obtained from http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent-storms, April.

NCDC (National Climatic Data Center), 2001g, Local Climatological Data – Annual Summary with Comparative Data – Reno, Nevada.

NCDC (National Climatic Data Center), 2001h, Local Climatological Data – Annual Summary with Comparative Data – Rochester, New York.

NCDC (National Climatic Data Center), 2001i, Local Climatological Data – Annual Summary with Comparative Data – Syracuse, New York.

NCDC (National Climatic Data Center), 2001j, Local Climatological Data – Annual Summary with Comparative Data – Salt Lake City, Utah.

NCDC (National Climatic Date Center), 2002a, NCDC Storm Events - Mineral County, Nevada, obtained from http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms, July 31.

NCDC (National Climatic Date Center), 2002b, NCDC Storm Events - Seneca County, New York, obtained from http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms, July 31.

NCDC (National Climatic Date Center), 2002c, NCDC Storm Events - Tooele County, Utah, obtained from http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms, July 31.

Nemeth, D., 2002a, Science Applications International Corporation, Germantown, MD, personal communication (telephone) with J. Sewell, On-Scene Coordinator, Indiana Department of Environmental Management, “Emergency Response Time,” April 29.

Nemeth, D., 2002b, Science Applications International Corporation, Germantown, MD, personal communication (telephone) with T. Bennigan, Deputy Chief, New Haven-Adams Township Fire Department, “Emergency Response Time,” April 30.

Nemeth, D., 2002c, Science Applications International Corporation, Germantown, MD, personal communication (telephone) with L. Gunzelman II, Director, Somerset County Office of Emergency Management, “Emergency Response Time,” May 1.

Nemeth, D., 2002d, Science Applications International Corporation, Germantown, MD, personal communication (telephone) with R. Pugh, Fire Chief, Weathersfield Township, OH, “Emergency Response Time,” May 2.

Nemeth, D., 2002e, Science Applications International Corporation, Germantown, MD, personal communication (telephone) with D. Waldron, Assistant Chief, Trumbull Hazardous Material Bureau and Local Emergency Planning Coordinator, “Emergency Response Time,” May 3.

Nemeth, D., 2002f, Science Applications International Corporation, Germantown, MD, personal communication (telephone) with T. Hill, Assistant Chief, Oak Ridge, Tennessee Fire Department, “Emergency Response Time,” May 3.

Nemeth, D., 2002g, Science Applications International Corporation, Germantown, MD, personal communication (telephone) with A. Zaslow, Environmental Specialist, Tennessee Emergency Management Agency, “Emergency Response Time,” May 2.

Nemeth, D., 2002h, Science Applications International Corporation, Germantown, MD, personal communication (telephone) with K. Trujillo, Mineral County School District, NV, “Number of Students and Teachers for the 2001/2002 School Year,” July 23.

Nemeth, D., 2002i, Science Applications International Corporation, Germantown, MD, personal communication (telephone) with S. Fisk, Sheriff’s Office, Mineral County, NV, “Number of Uniformed Officers,” July 23.

Nemeth, D., 2002j, Science Applications International Corporation, Germantown, MD, personal communication (telephone) with Mr. Ferrell, Fire Department, Mineral County, NV, “Firefighters in County,” July 23.

Nemeth, D., 2002k, Science Applications International Corporation, Germantown, MD, personal communication (telephone) with R. Martinez, PBX Operator, Mount Grant Hospital, "Number of Hospital Beds and Other Hospitals Within Mineral County, NV," October 3.

Nemeth, D., 2002l, Science Applications International Corporation, Germantown, MD, personal communication (telephone) with R. Palmer, Nevada Cultural Affairs Department, Historic Preservation Office, Carson City, "Archeological Surveys at Hawthorne Army Depot," October 4.

Nemeth, D., 2002m, Science Applications International Corporation, Germantown, MD, personal communication (telephone) with C. McCann, Emergency Management Fire Coordination for Seneca County, "Number of Firefighters and Police Officers in Seneca County," July 24.

Nemeth, D., 2002n, Science Applications International Corporation, Germantown, MD, personal communication (facsimile) to N. Todd, New York State Office of Parks, Recreation and Historic Buildings, Historic Preservation Field Services Bureau, Peebles Island, Waterford, New York, "Resource Evaluation: Seneca Army Depot," October 4.

Nemeth, D., 2002o, Science Applications International Corporation, Germantown, MD, personal communication (telephone) with R. Kuhn, New York State Office of Parks, Recreation and Historic Buildings, Historic Preservation Field Services Bureau, Peebles Island, Waterford, NY, "Completion of 1999 Archeological Investigation," October 4.

Nevada, 1999, Nevada Department of Conservation and Natural Resources, Bureau of Waste Management, "Hazardous Waste Storage and Treatment Permit NEV HW0013 Revision I," HWAD Hawthorne Army Depot, Hawthorne, Mineral County, Nevada, April.

Nevada, 2002, *Indian Territory*, Welcome to Indian Territory, obtained from http://www.travelnevada.com, September 20.

Nevada DOT (Department of Transportation), 2002, *Nevada Free 2002-2003 Official State Map.*

Newbrough, G.E. (Trumbull County Planning Commission), 2001, personal communication (letter) to J. Rhodes, Science Applications International Corporation, *Information Related to the Howland Township, Trumbull County, Ohio DNSC Site*, January 10.

New Jersey, 1995, New Jersey Noise Control Statute, New Jersey Administrative Code, Section 7:29, May.

New York (New York State Office of Parks, Recreation and Historic Preservation), 1998, *Resource Evaluation – Seneca Army Depot*, Historic Preservation Field Services Bureau, August. 11.

New York (New York State Office of Parks, Recreation and Historic Preservation), 1999, *Resource Evaluation – Seneca Army Depot*, Historic Preservation Field Services Bureau, March 8.

NJDEP (New Jersey Department of Environmental Protection) 1998, Surface Water Quality Standards, New Jersey Administrative Code, Section 7, Chapter 9B, obtained from http://www.state.nj.us/dep/landuse/njac/njac.html, June 4, 2001.

NJDFW (New Jersey Fish and Wildlife Division), 2001, *Endangered and Threatened Wildlife of New Jersey*, obtained from http://www.state.nj.us/dep/fgw/tandespp.htm, January 24.

NJDOL (New Jersey Department of Labor), 2001, "Somerset County, Estimated and Projected Employment by Occupation, 1998–2008," *Workforce New Jersey Public Information Network*, Trenton, NJ, obtained from http://www.wnjpin.com/OneStopCareerCenter/LaborMarketInformation, April 6.

NJDOT (New Jersey Department of Transportation), 2001, *Traffic Count Lookup Results* (for Somerset County, Hillsborough Twp., U.S. 206), Division of Transportation and Data Technology, obtained from http://www.state.nj.us/transportation/count.

NJGS (New Jersey Geological Survey), 1999, *Geologic Map of New Jersey*, Department of Environmental Protection, Division of Science, Research and Technology, obtained from http://www.state.nj.us/dep/njgs/pricelst/index.htm.

NNHP (Nevada Natural Heritage Program), 2002a, *Mineral County Rare Species List*, Department of Conservation and Natural Resources, Carson City, Nevada, August 5, 2002, obtained from http://www.heritage.nv.gov/lists/cominera.htm, November 15.

NNHP (Nevada Natural Heritage Program), 2002b, *Detailed Rare Plant and Lichen List*, Department of Conservation and Natural Resources, Carson City, Nevada, April, obtained from http://www.state.nv.us/nvnhp/plantbig.htm.

NOAA (National Oceanic and Atmospheric Administration), 2000, *Comparative Climatic Data for the United States through 1999*.

NSSL (National Severe Storms Laboratory), 2002, "Tornado Days Per Year 1980–1999," *Total Annual Severe Weather Threat*, obtained from http://www.nssl-noaa.gov/hazard/totalthreat.html.

NVDEP (State of Nevada, Department of Environmental Protection), 2000, Re: Issuance of Class I Significant Revision, Air Quality Operating Permit AP9711-0863, July 7.

NVDEP (State of Nevada, Department of Environmental Protection), 2002a, Re: Request for Air Quality Operating Permit AP9711-0863-PODS, January 2.

NVDEP (Nevada Department of Environmental Protection), 2002b, *Standards for Water Quality*, Nevada Administrative Code (NAC), Chapter 445A.119-445A.225, February 2002, Bureau of Water Quality Planning, Water Quality Standards Branch, obtained from http://ndep.state.nv.us/bwqp/stdsw1.htm, August 26.

NVDEP (Nevada Department of Environmental Protection), 2002c, *Summary of Most Recent Significant Standards Reviews and Revisions for Designated and Class Waters, Proposed New Walker Lake Water Quality Standards Fact Sheet September 2001,* Water Quality Standards Branch, obtained from http://ndep.state.nv.us/bwqp/stdsw2.htm, August 26.

NVDEP (Nevada Department of Environmental Protection), 2002d, *Draft Nevada's 2002 303(d) Impaired Waters List*, June 2002, Bureau of Water Quality Planning, obtained from http://ndep.state.nv.us/bwqp/303dlist.htm, August 26.

NV DOT (Nevada Department of Transportation), 2002, *2001 Annual Traffic Report, Mineral County*, obtained from http://www.nevadadot.com/reports_pubs/traffic_report/2001/, August.

NYDOT (New York State Department of Transportation), 2002, *2000 Traffic Volume Report for Seneca County*, obtained from http://www.dot.state.ny.us/tech_serv/high/tvwebpag.html, August.

NYSDEC (New York State Department of Environmental Conservation), 1998, *Classifications-Surface Waters and Groundwaters*, New York State Codes, Rules and Regulations, Title 6, Chapter X, Parts 701 et seq, amended March 1998, obtained from http://www.dec.state.ny.us/website/regs/701.htm, August 20.

NYSDEC (New York State Department of Environmental Conservation), 1999, *New York State Oil, Gas and Mineral Resources 1999*, Division of Mineral Resources, obtained from http://www.dec.state.ny.us/website/dmn/divrpts.htm, August 16, 2002.

NYSDEC (New York State Department of Environmental Conservation), 2000, *Mineral Resources of New York State, Clay Mines in New York, Limestone Quarries in New York, Sand and Gravel Mines in New York*, Division of Mineral Resources, obtained from http://www.dec.state.ny.us/website/dmn/index.html and http://www.dec.state.ny.us/website/dmn/minres/ minres.htm, August 16, 2002.

NYSDEC (New York State Department of Environmental Conservation), 2001, *List of Endangered, Threatened and Special Concern Fish & Wildlife Species of New York State*, Division of Fish, Wildlife and Marine Resources, obtained from http:/www.dec.state.ny.us/website/dfwmr/wildlife/endspec/etsclist.html, July 2.

NYSDEC (New York State Department of Environmental Conservation), 2002, *New York State 2002 Section 303(d) List of Impaired Waters Requiring a TMDL*, Division of Water, June 3, 2002, obtained from http://www.dec.state.ny.us/website/dow/303dcalm.html, obtained August 20.

NYSDOH (New York State Department of Health), 2002a**,** *New York State Physician Profile*, "Seneca County," obtained from http://www.nydoctorprofile.com, August 27.

NYSDOH (New York State Department of Health), 2002b**,** *Hospitals in New York*, "Seneca County," obtained from http://www.health.state.ny.us, October 3.

NYSDOH (New York State Department of Health), 2002c**,** *Local Cancer Incidence Information*, "Seneca County," obtained from http://www.healthstate.ny.us./nysdoh/cancer, September 19.

NYSED (New York State Education Department), 2002, *Seneca County School Districts 2000–2001, School Report Card*, obtained from http://www.emsc.nysed.gov/repcrd2002, March 30.

ODD (Ohio Department of Development), 1999, "Trumbull County," Ohio County Profiles, Office of Strategic Research, Columbus, OH, obtained from http://www.odod.state.oh.us/osr/profiles, December.

OEPA (Ohio Environmental Protection Agency), 2001a, Water Quality Standards, Ohio Administrative Code, Chapter 3745-1, Sections 07 and 25, Division of Surface Water, rule review October 1, 2001, obtained from http://www.epa.state.oh.us/dsw/rules/3745-1.html, June 4.

OEPA (Ohio Environmental Protection Agency OEPA), 2001b, *Lower Mahoning River Stream Segment Data (Ohio 305b Report), Explore Your Watershed*, Division of Surface Water, obtained from http://www.epa.state.oh.us/dsw/watershed/attain/305b01.htm, June 1 and August 9, 2001.

OGS (Ohio Division of Geological Survey), 1996, *Reconnaissance Bedrock Geology of the Warren, Ohio Quadrangle*, Open-File Map BG-D1B7, Ohio Department of Natural Resources, Division of Geological Survey.

OGS (Ohio Division of Geological Survey), 1997, *Glacial Deposits of Ohio*, Ohio Department of Natural Resources, Division of Geological Survey, October, obtained from http://www.dnr.state.oh.us/odnr/geo_survey/gen/map/glacial.htm.

OGS (Ohio Division of Geological Survey), 2000a, *Geologic Map and Cross Section of Ohio*, Ohio Department of Natural Resources, Division of Geological Survey, June, obtained from http://www.dnr.state.oh.us/odnr/geo_survey/gen/map/geologic.htm.

OGS (Ohio Division of Geological Survey), 2000b, GeoFacts No. 3, *Earthquakes and Seismic Risk in Ohio*, Ohio Department of Natural Resources, Division of Geological Survey, January, obtained from http://www.dnr.state.oh.us/odnr/geo_survey/geo_fact/geo_f03.htm.

OGS (Ohio Division of Geological Survey), 2001, *Map Showing Areas Productive from the Lower Silurian Cataract/Medina Sandstone and Dayton Formation, or "Clinton" and "Packer Shell,"* Ohio Department of Natural Resources, Division of Geological Survey, obtained from http://www.dnr.state.oh.us/geo_survey/ogcim/petrol/dcmsabs.htm, September 10.

OHDOT (Ohio Department of Transportation), 2000, *Traffic Survey Report*, 2000 Trumbull Co., obtained from http://www.dot.state.oh.us/techservsite/availpro/traffic%20Survey/tru.htm.

OHS (Ohio Historical Society), 2000, Ohio History Central, obtained from http://www.ohiokids.org/ohc/history/h_indian/periods/ohiost.html, July.

Olcott, P.G., 1995, *Ground Water Atlas of the United States,* Segment 10, Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, Vermont, U.S. Geological Survey, Hydrologic Investigations Atlas 730-M, Reston, VA, obtained from http://capp.water.usgs.gov/gwa/gwa.html.

Olson, D., 2002, Tooele City Wastewater Superintendent, personal communication (e-mail) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, “Treatment Plant Capacity,” August 16.

Olszewski, J., 2002, Defense Logistics Agency, New Haven, IN, personal communication with J. DiMarzio, Science Applications International Corporation, Germantown, MD, “Data Gaps for Chapter 3 of the Mercury Management EIS,” June 3.

ORHASP (Oak Ridge Health Agreement Steering Panel), 1999, *Releases of Contaminants from Oak Ridge Facilities and Risks to Public Health*, Tennessee Department of Health, Nashville, Tennessee, December.

OSN (Ohio Seismic Network), 2001a, *Map of Deep Structures in Ohio,* Ohio Department of Natural Resources, updated March 29, 2001, obtained from http://www.dnr.state.oh.us/odnr/OhioSeis/html/fltmap.htm, July 30.

OSN (Ohio Seismic Network), 2001b, *September 25, 1998, Pymatuning Earthquake,* Ohio Department of Natural Resources, obtained from http://www.dnr.state.oh.us/odnr/OhioSeis/earthquakes/980925/980925.htm, July 30.

Palumbo, M., 2002, Flaum Management Company Inc., personal communication (e-mail) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, “Mercury Management EIS – Missing Information,” October 24.

Pennington, D., 2002, Nevada State Health Division, Bureau of Drinking Water, personal communication (telephone) with L. Foersom, Science Applications International Corporation, Reston, VA, "Risk Assessment and Health Studies at Hawthorne Army Depot," September.

Pittano, J., 2000, Defense Logistics Agency, Defense National Stockpile Center, Warren, OH, personal communication with C. Wilson, Science Applications International Corporation, Germantown, MD, "Site Infrastructure," June.

Pittano, J., 2001, Defense National Stockpile Center, personal communication (facsimile) to D. Lynch, Defense National Stockpile Center, Warren Depot, "Follow-up Information Needed for Warren," March 13.

Pittano, J., 2002a, Defense Logistics Agency, Defense National Stockpile Center, Warren, OH, personal communication with J. Holian, Science Applications International Corporation, Germantown, MD, "Site Infrastructure," May 16.

Pittano, J., 2002b, Defense Logistics Agency, Defense National Stockpile Center, Warren, OH, personal communication with J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Data Gaps for Chapter 3 of the Mercury Management EIS," June 5.

Planert, M.S., and J.S. Williams, 1995, *Ground Water Atlas of the United States, Segment 1, California, Nevada,* U.S. Geological Survey, Hydrologic Investigations Atlas 730-B, Reston, VA, obtained from http://capp.water.usgs.gov/gwa/gwa.html.

Ragan, L., 2001, U.S. Fish and Wildlife Service, personal communication (e-mail) to S. Pietzyk, Science Applications International Corporation, McLean, VA, "Bald Eagle Status," February 7.

Robson, S.G., and E.R. Banta, 1995, *Ground Water Atlas of the United States, Segment 2, Arizona, Colorado, New Mexico, Utah,* U.S. Geological Survey, Hydrologic Investigations Atlas 730-C, Reston, VA, obtained from http://capp.water.usgs.gov/gwa/gwa.html.

Rowley, D.L., P. Turri, and D.C. Paschal, 1985, *A Pilot Survey of Mercury Levels in Oak Ridge, Tennessee,* Division of Environmental Hazards and Health Effects, Centers for Disease Control, Department of Health and Human Services, Atlanta, GA; and Environmental Epidemiology Unit, Bureau of Environment, Tennessee Department of Health and Environment, Nashville, Tennessee, October.

Royce, M., 2001, Allen County Department of Planning Services, Fort Wayne, IN, personal communication (letter) to J. Rhodes, Science Applications International Corporation, Germantown, MD, "Site Infrastructure," February 7.

Rupp, J.A., 1997, Tectonic Features of Indiana, Indiana Geological Survey, obtained from http://www.adamite.igs.indiana.edu/indgeol/geology/tectonics.htm, May 21, 2001.

Sawyer, C., 2001a, Science Applications International Corporation, Germantown, MD, personal communication (telephone) with D. Meyer, 2001, Allen County Sheriff's Department, Ft. Wayne, IN, "Number of Police Officers in Allen County Sheriff's Department," March 19.

Sawyer, C., 2001b, Science Applications International Corporation, Germantown, MD, personal communication (telephone) with New Haven Police Department, 2001, New Haven, IN, "Number of Police Officers in New Haven, IN," March 19.

Sawyer, C., 2001c, Science Applications International Corporation, Germantown, MD, personal communication (telephone) with M. Shafer, Fort Wayne Police Department, Ft. Wayne, IN, "Number of Police Officers in Fort Wayne, IN," March 19.

Sawyer, C., 2001d, Science Applications International Corporation, Germantown, MD, personal communication (telephone) with D. Patnoude, Southwest Allen County Fire District, Yoder, IN, "Number of Firefighters in Allen County, IN," March 19.

Sawyer, C., 2001e, Science Applications International Corporation, Germantown, MD, personal communication (telephone) with B. Seidman, American Medical Association, Chicago, IL, "Number of Physicians in Allen County, IN," March 23.

Sawyer, C., 2001f, Science Applications International Corporation, Germantown, MD, "Police Departments Contacted in Trumbull County," *Memorandum to the Administrative Record for the Mercury Management Environmental Impact Statement*, April 9.

Sawyer, C., 2001g, Science Applications International Corporation, Germantown, MD, personal communication (telephone) with L. Beil, Emergency Management Agency of Trumbull County, Warren, OH, "Number of Firefighters in Trumbull County," March 26.

Shevenell, L., L.J. Garside, and R.H. Hess, 2000, *Nevada Geothermal Resources*, Map 126, Nevada Bureau Mines and Geology, obtained from http://www.nbmg.unr.edu/dox.htm, August 27, 2002.

Simonich, M., 2002, Utah Industrial Depot, personal communication (e-mail) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Leased or Owned by Depot Associates, LLC," November 13.

Smith, M.D., 2002a, Asset Manager, Utah Industrial Depot, Tooele, UT, personal communication (letter with attachments) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Mercury Storage EIS Information/Utah Industrial Depot Locations," July 22.

Smith, M.D., 2002b, Asset Manager, Utah Industrial Depot, Tooele, UT, personal communication (e-mail) from M. Simonrich to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Mercury Management EIS Information Request," August 7.

Smith, M.D., 2002c, Asset Manager, Utah Industrial Depot, Tooele, UT, personal communication (e-mail) from M. Simonich to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Waste Generation," December 18.

Smith, M.D., 2002d, Asset Manager, Utah Industrial Depot, Tooele, UT, personal communication (e-mail) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Nonhazardous Solid Waste Disposal," August 20.

Smith, M.D., 2002e, Asset Manager, Utah Industrial Depot, Tooele, UT, personal communication (letter and attachments and e-mail) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Information Request–Mercury Storage Sites," July 23 and August 8, 2002.

Somerset County Planning Board, 2001, facsimile to Science Applications International Corporation, Germantown, MD, "Somerset County Schools, Public School Enrollment Report – October 15, 1999," February 7.

Stacey, C., 2000, American Premier Underwriters, Inc., Cincinnati, OH, Personal communication (fax) to J.D. Pittano, Defense Logistics Agency, Defense National Stockpile Center, Warren, OH, "Physical Inspection of APU Property," February 24.

Stanford, S.D., 1992, *Surficial Geology of the Bound Brook Quadrangle, Somerset and Middlesex Counties, New Jersey*, Department of Environmental Protection and Energy, Division of Science and Research, New Jersey Geological Survey.

SuperPages.com, 2002, "Hospitals, Hawthorne, Nevada," obtained from http://yp107.superpages.com, October 3.

Surface, S., 2002, Defense National Stockpile Center, personal communication (e-mail) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, "Executive Summary Reports of Mercury Over-packing Projects," September 30.

SWCA Inc., 2001, Environmental Assessment for the Utah Industrial Depot West Loop Road Right-of-Way Through Tooele Army Depot, Utah and the Use of Adjoining Land Parcels Within Tooele Army Depot, Utah, prepared for Army Materiel Command, Tooele Army Depot, Tooele, Utah, June.

Swinford, E.M., Schumacher, G.A., Shrake, D.L., Larsen, G.E., and E.R. Slucher, 2000, Descriptions of Geologic Map Units, A Compendium to Accompany Division of Geological Survey Open-File Bedrock-Geologic Maps, Open-File Report 98-1, Ohio Department of Natural Resources, Division of Geological Survey, updated November 22.

TAD (Tooele Army Depot), 1998, Environmental Management Office, "Finding of Suitability for Early Transfer (FOSET) Tooele Army Depot (TEAD), Tooele, UT, Administration and Industrial Areas," October 5.

TAG (The Advantage Group), 2002, *PEZ Lake Homepage*, obtained from http://www.theadvantagegroup.com/pezlake/Pez_home.asp, August 13.

TC (Tooele County), 2002, "Tooele County, Utah, Other Information, County Information," Tooele, UT, obtained from http://www.co.tooele.ut.us, July 26.

TCSD (Tooele County School District), 2002, "Annual Report to Patrons, January 2002," Tooele, UT, obtained from http://www.tooele.k12.ut.us, July 26.

TDEC (Tennessee Department of Environment and Conservation), 1999a, "Ambient Air Quality Standards," *Rules of the Tennessee Department of Environment and Conservation*, Bureau of Environment, Division of Air Pollution Control, Chapter 1200-3-3, Nashville, TN, April.

TDEC (Tennessee Department of Environment and Conservation), 1999b, "Use Classifications for Surface Waters," *Rules of the Tennessee Department of Environment and Conservation*, Division of Water Pollution Control, Amendments, Chapter 1200-4-4, Nashville, TN, October, obtained from http://www.state.tn.us/sos/rules/1200/1200.htm.

TDEC (Tennessee Department of Environment and Conservation), 2001, Posted Streams and Lakes in Tennessee, obtained from http://www.state.tn.us/environment/wpc/advisory.htm, May 15.

TDEC (Tennessee Department of Environment and Conservation), 2002a, *Natural Heritage Program Rare and Endangered Vascular Plant List of Tennessee*, obtained from http://www.state.tn.us/environment/nh/vascular.htm, November 13.

TDEC (Tennessee Department of Environment and Conservation), 2002b, *Tennessee Natural Heritage Program Rare Vertebrates List*, obtained from http://www.state.tn.us/environment/nh/vert.htm, November 13.

TDH (Tennessee Department of Health), 2000, *Reports of the Oak Ridge Dose Reconstruction, Vol. 7. Oak Ridge Dose Reconstruction Project Summary Report*, Tennessee Department of Health, Nashville, Tennessee, March.

TDOT (Tennessee Department of Transportation), 2000, *Tennessee City and County Traffic Maps Showing 2000 Average Daily Traffic*, Bureau of Planning and Development in cooperation with the U.S. Department of Transportation, Federal Highway Administration.

Theisen, C.P., 2002, Day & Zimmermann Hawthorne Corporation, personal communication (letter) to J. DiMarzio, Science Applications International Corporation, Germantown, MD, “Mercury Management Environmental Impact Statement – Additional Information,” September 9.

Thomas, J.M., 1995, *Water Budget and Salinity of Walker Lake, Western Nevada*, Fact Sheet FS-115-95, U.S. Geological Survey, April, obtained from http://www.usgs.gov, August 27.

Tooele Army Depot, 2002, *Tooele Army Depot History*, obtained from http://www.tead.army.mil/history.html, June 5.

Tooele City, 1991, *Tooele City Ordinance*, “Chapter 2, Noise Control,” December 18.

Township of Romulus, 2001, “Town of Romulus Noise Ordinance,” June 20.

Trapp, H. and M.A. Horn, 1997, *Ground Water Atlas of the United States*, Segment 11, Delaware, Maryland, New Jersey, North Carolina, Pennsylvania, Virginia, West Virginia, Hydrologic Investigations Atlas 730-L, Reston, VA, obtained from http://capp.water.usgs.gov/gwa/gwa.html.

TVA (Tennessee Valley Authority), 2000, *Mercury Investigation Report*, Muscle Shoals, AL, January.

UDWR (Utah Division of Wildlife Resources), 1998, *Utah Sensitive Species List*, February.

UGS (Utah Geological Survey), 1997a, *Earthquakes and Utah*, Public Information Series 48, Department of Natural Resources, obtained from http://geology.utah.gov/utahgeo/hazards/eqfault/index.htm, August 7, 2002.

UGS (Utah Geological Survey), 1997b, *Ground-Water-Quality Classification Map for the Principal Valley-Fill Aquifer, Tooele Valley, Tooele County, Utah*, plate 1, Utah Department of Natural Resources, Geological obtained from http://www.waterquality.utah.gov, August 28, 2002.

UDWR (Utah Division of Wildlife Resources), 1998, *Utah Sensitive Species List*, February.

UID (Utah Industrial Depot), 2001, *Fire and Hazardous Material Emergency Response Plan*, prepared by Ward Engineering Group, Tooele, UT, November, 29.

USACE (U.S. Army Corps of Engineers), 1998, *Final Preliminary Assessment Report, Somerville Depot, Somerville, New Jersey*, prepared by Parsons Engineering Science, Inc., December.

USACE (U.S. Army Corps of Engineers), 1999a, *Final Preliminary Assessment, New Haven Depot, New Haven, Indiana,* prepared by Parsons Engineering Science, Inc., Atlanta, Georgia, January.

USACE (U.S. Army Corps of Engineers), 1999b, *Final Preliminary Assessment, Warren Depot, Warren, Ohio,* Parsons Engineering Science, Inc., January.

USACE (U. S. Army Corps of Engineers), 2000a, *Site Investigation Report, New Haven Depot, New Haven, Indiana,* Parsons Engineering Science, Inc., March.

USACE (U.S. Army Corps of Engineers), 2000b, *Draft Focused Site Investigation Report, New Haven Depot, New Haven, Indiana,* Parsons Engineering Science, Inc., Oak Brook, IL, March.

USACE (U.S. Army Corps of Engineers), 2000c, *Final Focused Site Investigation Report, Somerville Depot, Somerville, New Jersey,* Parsons Engineering Science, Inc., March.

USACE (U.S. Army Corps of Engineers), 2000d, *Site Investigation Report, Warren Depot, Warren, Ohio,* Parsons Engineering Science, Inc., March.

USACE (U.S. Army Corps of Engineers), 2000e, *Draft Site Investigation Report, Warren Depot, Warren, Ohio*, prepared by Parsons Environmental Science, Inc., March.

USACE (U.S. Army Corps of Engineers), 2002, *Draft Remedial Investigation Report, Somerville Depot, Somerville, New Jersey,* prepared by Parsons Environmental Science, Inc., February.

USACHPPM (U.S. Army Center for Health Promotion and Preventive Medicine), 1996a, *Wastewater Management Study No. 32-EE-4636-96, Storm Water Characterization, New Haven Defense National Stockpile Center, New Haven, Indiana,* Aberdeen Proving Ground, MD, September.

USACHPPM (U.S. Army Center for Health Promotion and Preventive Medicine), 1996b, *Storm Water Pollution Prevention Plan for Defense Logistics Agency National Stockpile Center New Haven Depot, New Haven, Indiana,* Defense Logistics Agency, Ft. Belvoir, VA, April 20–24.

USACHPPM (U.S. Army Center for Health Promotion and Preventive Medicine), 1998, *Storm Water Pollution Prevention Plan for Defense Logistics Agency/Defense National Stockpile Center, Warren Depot, Warren, Ohio,* Aberdeen Proving Ground, Maryland, May.

USAEHA (U.S. Army Environmental Hygiene Agency), 1991, *Environmental Noise Study, Environmental Noise Contours for Hawthorne Army Ammunition Plant, Hawthorne, Nevada,* March.

USDA (U.S. Department of Agriculture), 1969, *Soil Survey of Allen County, Indiana,* Soil Conservation Service.

USDA (U.S. Department of Agriculture), 1972, *Soil Survey of Seneca County,* Soil Conservation Service, April.

USDA (U.S. Department of Agriculture), 1989, *Soil Survey of Somerset County, New Jersey,* reissued February.

USDA (U.S. Department of Agriculture), 1992a, *List of Map Units Showing Prime Farmland Classification, Allen County, Indiana,* December.

USDA (U.S. Department of Agriculture), 1992b, *Soil Survey of Trumbull County, Ohio,* March.

USDA (U.S. Department of Agriculture), 2000, *Soil Survey of Tooele Area, Utah*, Natural Resources Conservation Service.

USDA (U.S. Department of Agriculture), 2001, *Official Soil Series Descriptions Data Access*, USDA-NRCS Soil Survey Division, obtained from http://www.statlab.iastate.edu/soils/osd, June 26.

USDA (U.S. Department of Agriculture), 2002, *Prime Farmland Legends* (UT611 Tooele Area), Natural Resources Conservation Service, Utah, obtained from http://www.ut.nrcs.usda.gov/soils/flashsite/soilframeset.html, August 28.

USFWS (U.S. Fish and Wildlife Service), 2001, *Threatened and Endangered Species System (TESS)*, obtained from http://www.ecos.fws.gov/servlet/TESSSpeciesReport/generate, February 20.

USFWS (U.S. Fish and Wildlife Service), 2002a, *National Wetlands Inventory*, *Mineral County*, obtained from http://www.nwi.fws.gov/mapper_tool.htm, September 19.

USFWS (U.S. Fish and Wildlife Service), 2002b, *Threatened and Endangered Species System (TESS) - Western Snowy Plover*, obtained from http://www.ecos.fws.gov/servlet/TESSSpeciesReport/generate, November 15.

USFWS (U.S. Fish and Wildlife Service), 2002c, *Nevada's Endangered, Threatened and Candidate Species by County,* obtained from http://nevadafwo.fws.gov/species/countyt&e.PDF, June 14.

USGS (U.S. Geological Survey), 1955, *Grantsville Quadrangle, Utah-Tooele Co.*, 7.5 Minute Series (Topographic).

USGS (U.S. Geological Survey), 1969, *Tooele Quadrangle, Utah-Tooele Co.*, 7.5 Minute Series (Topographic), 1955 (photo revised 1969).

USGS (U.S. Geological Survey), 1970, *Ovid Quadrangle, New York-Seneca Co.*, 7.5 Minute Series (Topographic).

USGS (U.S. Geological Survey), 1975, *Winrock Quadrangle*, *Tennessee*, 7.5 Minute Series (Topographic), 1968 (photo revised 1975).

USGS (U.S. Geological Survey), 1978, *Dresden Quadrangle*, *New York*, 7.5 Minute Series (Topographic), *1943* (photo revised 1978).

USGS (U.S. Geological Survey), 1979, *Tooele, Utah*, 30X60 Minute Series (Topographic).

USGS (U.S. Geological Survey), 1981, *Raritan Quadrangle, New Jersey*, 7.5 Minute Series (Topographic), 1955 (photo revised 1981).

USGS (U.S. Geological Survey), 1985, *Walker Lake, Nevada*, 30X60 Minute Series (Topographic).

USGS (U.S. Geological Survey), 1987a, Hawthorne East *Quadrangle, Nevada*, 7.5 Minute Series (Topographic), provisional edition.

USGS (U.S. Geological Survey), 1987b, *Powell Mountain NE Quadrangle, Nevada*, 7.5 Minute Series (Topographic), provisional edition.

USGS (U.S. Geological Survey), 1987c, *Hawthorne West Quadrangle, Nevada*, 7.5 Minute Series (Topographic), provisional edition.

USGS (U.S. Geological Survey), 1989, *Bethel Valley Quadrangle, Tennessee*, 7.5 Minute Series (Topographic).

USGS (U.S. Geological Survey), 1990a, *Lovell Quadrangle, Tennessee*, 7.5 Minute Series (Topographic), 1968 (photo revised 1990).

USGS (U.S. Geological Survey), 1990b, *Clinton Quadrangle, Tennessee-Anderson Co*., 7.5 Minute Series (Topographic), 1968 (photo revised 1990).

USGS (U.S. Geological Survey), 1994a, *Maples Quadrangle, Indiana-Allen CO*., 7.5 Minute Series (Topographic).

USGS (U.S. Geological Survey), 1994b, *Warren Quadrangle, Ohio*, 7.5 Minute Series (Topographic).

USGS (U.S. Geological Survey), 1995, Bound Brook Quadrangle, New Jersey, 7.5 Minute Series (Topographic).

USGS (U.S. Geological Survey), 1999a, *Map of Principal Mineral-Producing Localities, Indiana*, Indiana Geological Survey, obtained from http://minerals.usgs.gov/minerals/pubs/state/nj.html on September 5, 2001.

USGS (U.S. Geological Survey), 1999b, *Map of Principal Mineral-Producing Localities, New Jersey*, New Jersey Geological Survey, obtained from http://minerals.usgs.gov/minerals/pubs/state/oh.html on September 5, 2001.

USGS (U.S. Geological Survey), 1999c, *Map of Principal Mineral-Producing Localities, Ohio*, Ohio Geological Survey, obtained from http://minerals.usgs.gov/minerals/pubs/state/in.html on September 5, 2001.

USGS (U.S. Geological Survey), 2000a, *Map of Principal Mineral-Producing Localities, Nevada, Nevada State Minerals Information*, Nevada Bureau of Mines and Geology/U.S. Geological Survey, obtained from http://minerals.usgs.gov/minerals/pubs/state/nv.html on August 16, 2002.

USGS (U.S. Geological Survey), 2000b, *Map of Principal Mineral-Producing Localities, New York, New York State Minerals Information*, New York State Geological Survey/U.S. Geological Survey, obtained from http://minerals.usgs.gov/minerals/pubs/state/ny.html on August 16, 2002.

USGS (U.S. Geological Survey), 2000c, *Map of Principal Mineral-Producing Localities, Utah, Utah State Minerals Information*, Utah Geological Survey/U.S. Geological Survey, obtained from http://minerals.usgs.gov/minerals/pubs/state/ut.html on August 16, 2002.

USGS (U.S. Geological Survey), 2001a, Earthquake Search, Significant U.S. Earthquakes (1568-1989), (search for Latitude 41.075, Longitude -84.942[New Haven Depot, New Haven, IN]), *National Earthquake Information Center*, obtained from http://www.neic.cr.usgs.gov/neis/epic/epic_circ.html, June 15.

USGS (U.S. Geological Survey), 2001b, Indiana Seismicity, Earthquake History of Indiana, *National Earthquake Information Center*, obtained from http://neic.usgs.gov/neis/states/indiana/indiana.html, June 15.

USGS (U.S. Geological Survey), 2001c, National Seismic Hazard Mapping Project, Frequently Asked Questions (How do I use these maps?), *Earthquake Hazards Program*, obtained from http://geohazards.cr.usgs.gov/eq/html/faq.html, June 15.

USGS (U.S. Geological Survey), 2001d, Probabilistic Hazard Lookup by Latitude Longitude, (search for Lat. 41.0752, Long. -84.9424, New Haven Depot, New Haven, IN; Lat. 35.9851, Long. -84.2574, Y–12 Plant, Oak Ridge, TN; Lat. 40.5369, Long. -74.6338, Somerville Depot, Somerville, NJ; and Lat. 41.1950, Long. -80.7974, Warren Depot, Warren, OH), *Earthquake Hazards Program*, obtained from http://eqint.cr.usgs.gov/eq/html/lookup.shtml, June 15.

USGS (United States Geological Survey), 2001e, *Indiana Current Streamflow Conditions, Maumee River Basin* (Maumee River at New Haven), obtained from http://in.water.usgs.gov/rts_table.html, in.water.usgs.gov/rt-cgi/gen_stn_pg?station=04183000, June 15 and August 10.

USGS (U.S. Geological Survey), 2001f, Earthquake Search, Significant U.S. Earthquakes (1568-1989), (search for Latitude 40.537, Longitude -74.634 [Somerville Depot, Somerville, NJ]), *National Earthquake Information Center*, obtained from http://wwwneic.cr.usgs.gov/neis/epic/epic_circ.html, June 15.

USGS (U.S. Geological Survey), 2001g, New Jersey Seismicity, Earthquake History of New Jersey, *National Earthquake Information Center*, obtained from http://wwwneic.cr.usgs.gov/neis/ states/new_jersey/new_jersey.html, June 15.

USGS (United States Geological Survey), 2001h, *Calendar Year Streamflow Statistics For New Jersey*, USGS 01400500 Raritan River At Manville NJ, USGS 01402000 Millstone River at Blackwells Mills NJ, obtained from http://water.usgs.gov/nj/nwis/annual/calendar_year/?site_no=01400500, http://water.usgs. gov/ nj/nwis/annual/calendar_year/?site_no=01402000, July 16.

USGS (U.S. Geological Survey), 2001i, Earthquake Search, Significant U.S. Earthquakes (1568-1989), (search for Latitude 40.195, Longitude -80.797 [Warren Depot, Warren, Ohio]), *National Earthquake Information Center*, obtained from http://wwwneic.cr.usgs.gov/neis/epic/epic_circ.html, June 15.

USGS (U.S. Geological Survey), 2001j, Earthquake Search, USGS/NEIC (PDE) 1973- Present (search for Latitude 40.195, Longitude -80.797 [Warren Depot, Warren, Ohio]), *National Earthquake Information Center*, obtained from http://wwwneic.cr.usgs.gov/neis/epic/epic_circ.html, June 15.

USGS (United States Geological Survey), 2001k, *Calendar Year Streamflow Statistics for Ohio*, USGS 03097550 Mahoning R at Ohio Edison P Plt at Niles OH, obtained from http://water.usgs.gov/oh/nwis/ annual/calendar_year/?site_no=03097550, http://oh.water.usgs.gov/rt-cgi/gen_stn_pg?station=03097550, June 4 and August 3.

USGS (United States Geological Survey), 2001l, General Earthquake Information, Large Earthquakes in the United States Magnitude 7.0 and Greater, The Largest Earthquakes, State by State, *National Earthquake Information Center*, Geologic Hazards, obtained from http://neic.usgs.gov/neis/general/handouts/general_seismicity.html, June 15.

USGS (U.S. Geological Survey), 2001m, Earthquake Search, Significant U.S. Earthquakes (1568-1989), (search for Latitude 35.985, Longitude -84.257 [Y–12 Plant, Oak Ridge, TN]), *National Earthquake Information Center*, obtained from http://wwwneic.cr.usgs.gov/neis/epic/epic_circ.html, April 27.

USGS (U.S. Geological Survey), 2001n, Earthquake Search, USGS/NEIC (PDE) 1973-Present (search for Latitude 35.985, Longitude -84.257 [Y–12 Plant, Oak Ridge, TN]), *National Earthquake Information Center*, obtained from http://wwwneic.cr.usgs.gov/neis/epic/epic_circ.html, April 27.

USGS (U.S. Geological Survey), 2001o, *Geographic Distribution of Major Hazards in the United States*, Map 6, "Tornado Risk Areas in the Conterminous United States," Map 5, "Hurricane Activity in the Conterminous United States," obtained from http://www.usgs.gov/themes/hazards.html, October 26.

USGS (U.S. Geological Survey), 2002a, National Seismic Hazard Mapping Project, Frequently Asked Questions (What is "% g"? What is the relation to building damage?), *Earthquake Hazards Program*, obtained from http://geohazards.cr.usgs.gov/eq/faq/parm01.html, May 20.

USGS (U.S. Geological Survey), 2002b, Nevada Seismicity, Earthquake History of Nevada, *National Earthquake Information Center*, Earthquake hazards program, obtained from http://neic.usgs.gov/neis/states/nevada/nevada.html, August 7.

USGS (U.S. Geological Survey), 2002c, Earthquake Search, Significant U.S. Earthquakes (1568-1989) (search for Latitude 38.5222, Longitude –118.574; 160 and 250 km radius [Hawthorne Army Depot, Hawthorne, NV]), *National Earthquake Information Center*, obtained from http://wwwneic.cr.usgs.gov/neis/epic/epic_circ.html, August 7.

USGS (U.S. Geological Survey), 2002d, Probabilistic Hazard Lookup by Latitude Longitude, (search for Lat. 38.5222, Long. -118.5744, Hawthorne Army Depot, Hawthorne, NV; Lat. 42.7296, -76.8398, PEZ Lake Development, Romulus, NY; Lat. 40.5319, Long. -112.3382, Utah Industrial Depot, Tooele, UT), *Earthquake Hazards Program*, obtained from http://eqint.cr.usgs.gov/eq/html/lookup.shtml, August 7.

USGS (U.S. Geological Survey), 2002e, "New York Seismicity, Earthquake History of New York, Largest Earthquake in New York," *National Earthquake Information Center*, Earthquake hazards program, obtained from http://wwwneic.cr.usgs.gov/neis/states/new_york/new_york.html, August 7.

USGS (U.S. Geological Survey), 2002f, Earthquake Search, Significant U.S. Earthquakes (1568-1989) (search for Latitude 42.7296, Longitude -76.8398 [PEZ Lake Development (Warehouse Area), Romulus, NY]), *National Earthquake Information Center*, obtained from http://wwwneic.cr.usgs.gov/neis/epic/epic_circ.html, August 7.

USGS (U.S. Geological Survey), 2002g, "Utah Seismicity, Earthquake History of Utah, Largest Earthquake in Utah," *National Earthquake Information Center*, Earthquake hazards program, obtained from http://wwwneic.cr.usgs.gov/neis/states/utah/utah.html, August 7, 2002.

USGS (U.S. Geological Survey), 2002h, Earthquake Search, Significant U.S. Earthquakes (1568-1989) (search for Latitude 40.5319, Longitude -112.3382 [Utah Industrial Depot, Tooele, UT]), *National Earthquake Information Center*, obtained from http://wwwneic.cr.usgs.gov/neis/epic/epic_circ.html, August 7.

UTDEQ (Utah Department of Environmental Quality), 2002a, *Standards of Quality for Water of the States*, Utah Administrative Code, Title R317, Environmental Quality, Water Quality, Rule 317-2, effective date June 1, 2002, obtained from http://www.waterquality.utah.gov/documents/DOC_RULE.HTM, August 29.

UTDEQ (Utah Department of Environmental Quality), 2002b, *Utah's 2002 303(d) List of Waters*, Department of Environmental Quality, Division of Water Quality, April 2002, obtained from http://www.waterquality.utah.gov/, August 29.

UTDOT (Utah Department of Transportation), 2002, Traffic on State Routes, 2000 by County – Tooele County State Routes AADTs 1998-2000, obtained from http://www.state.ut.us/progdev/traffic/ntysr00.htm, August.

Utah, 2002a, *Utah Landfill Inventory,* Division of Solid and Hazardous Waste, obtained from http://www.deq.state.ut.us/EQSHW/sws.htm, August 16.

Utah, 2002b, *Utah Indian Tribal Councils, Histories of the Utah Tribes, Tribal Land Map,* Utah Division of Indian Affairs, Utah, obtained from http://dced.utah.gov/Indian/History/history.htm.

Walker Lake Working Group, 1997, "Story of Walker Lake, Nevada," obtained from http://web0.greatbasin.net/frankly/lake.html, October.

Walker Lake Working Group, 2002, "Walker Lake's History," obtained from http://walkerlake.org/about/about_hist.html.

Waite, P.R., 1996, *Hawthorne Army Depot Cultural Resources Management Plan,* U.S. Army Corps of Engineers, Forth Worth District, October.

Weisgarber, S.L., 1997, *GeoFacts No. 11, Rocks and Minerals Mined in Ohio and Their Uses,* Ohio Department of Natural Resources, Division of Geological Survey, obtained from http://www.dnr.state.oh.us/geo_fact/geo_f11.htm.

White, M.G., S.D. Thompson, L.W. McMahon, and M.L. Coffey, 2000, *Oak Ridge Reservation Annual Site Environmental Report for 1999*, DOE/ORO/2100, U.S. Department of Energy, Oak Ridge, TN, September, obtained from http://www.ornl.gov/Env_Rpt.

Woodward-Clyde (Woodward-Clyde Federal Services), 1997, *Final Environmental Baseline Survey Report, Seneca Army Depot Activity, New York*, prepared for U.S. Army Corps of Engineers, New York District, Settle District, March 12.

Young, C. J., Colonel, 2001, *Finding of Suitability to Lease (FOSL), Seneca Army Depot Activity*, New York, Planned Industrial Development Area (Phase II*)*, February, Deputy Chief of Staff for Installations.

Young, S.M., 2002, *New York Rare Plant Status List, May 2002,* New York Natural Heritage Program, Albany, NY, May.