3. AFFECTED ENVIRONMENT

This chapter describes the existing conditions at and near the proposed American Centrifuge Plant (ACP) site in Piketon, Ohio (see Figure 3-1). After an initial overview of the site location and activities, the chapter presents information on surrounding land use; historic and cultural resources; visual and scenic resources; climatology, meteorology, and air quality; geology, minerals, and soils; water resources; ecological resources; socioeconomic conditions; environmental justice considerations; noise levels; transportation systems; public and occupational health conditions; and current waste generation and management practices. This information forms the basis for assessing the potential impacts (see Chapter 4) of the proposed action (see Chapter 2).

3.1 Site Location and Description

The proposed ACP would be located within the confines of the U.S. Department of Energy (DOE) reservation in Pike County, Ohio, as described in Section 2.1.1. The DOE reservation is approximately 35 kilometers (22 miles) north of the Kentucky/Ohio State line and 113 kilometers (70 miles) southeast of Columbus, Ohio. The largest cities within an approximately 80-kilometers (50-mile) radius are Portsmouth, Ohio, located approximately 43 kilometers (27 miles) to the south, and Chillicothe, Ohio, located approximately 43 kilometers (27 miles) to the north. The reservation occupies approximately 304 controlled access hectares (750 acres) and is located about 2.4 kilometers (1.5 miles) east of U.S. Route 23, 3.2 kilometers (2 miles) south of Ohio State Road 32, and 3.2 kilometers (2 miles) east of the Scioto River.

Within the DOE reservation, the Portsmouth Gaseous Diffusion Plant occupies approximately 223 hectares (550 acres) of the controlled access area surrounded by the Perimeter Road, as described in Section 2.1.1. This plant began operations in the mid-1950s using gaseous diffusion technology to produce enriched uranium for government and commercial use. In the late 1970s, DOE selected the plant as the site for a new enrichment facility using gas centrifuge technology. Construction of this facility, called the Gas Centrifuge Enrichment Plant, began in 1979, but was halted in 1985 because the projected demand for enriched uranium decreased. In 1991, DOE suspended the production of highly enriched uranium at the Portsmouth plant, but continued to produce low-enriched uranium for use by commercial nuclear power plants. (USEC, 2005)

In accordance with the *Energy Policy Act of 1992*, the United States Enrichment Corporation, a subsidiary of USEC Inc. (USEC), assumed full responsibility for uranium enrichment operations at the Portsmouth Gaseous Diffusion Plant on July 1, 1993. Since that time, DOE has leased the uranium enrichment production and operations facilities to the United States Enrichment Corporation, while retaining certain responsibilities for decontamination and decommissioning, waste management, depleted uranium hexafluoride (UF_6) storage, and environmental remediation. In May 2001, the United States Enrichment Corporation ceased uranium enrichment operations at the Portsmouth plant and consolidated its enrichment operations at the Paducah Gaseous Diffusion Plant in Paducah, Kentucky. The United States Enrichment Corporation continued to operate its transfer and shipping activities at the DOE reservation until July 2002 in support of its enrichment business. At the request of DOE, the gaseous diffusion plant was placed in cold standby, a nonoperational condition in which the plant retains the ability to resume operations within 18 to 24 months. Currently, in accordance with a U.S. Nuclear Regulatory Commission (NRC) Certificate of Compliance, the United States Enrichment Corporation maintains the gaseous diffusion plant in cold standby status, performs uranium deposit removal activities in the cascade facilities, and removes technetium-99 from potentially contaminated uranium feed (USEC, 2005) from fuel reprocessing plants transferred to the United States Enrichment Corporation by DOE prior to privatization.

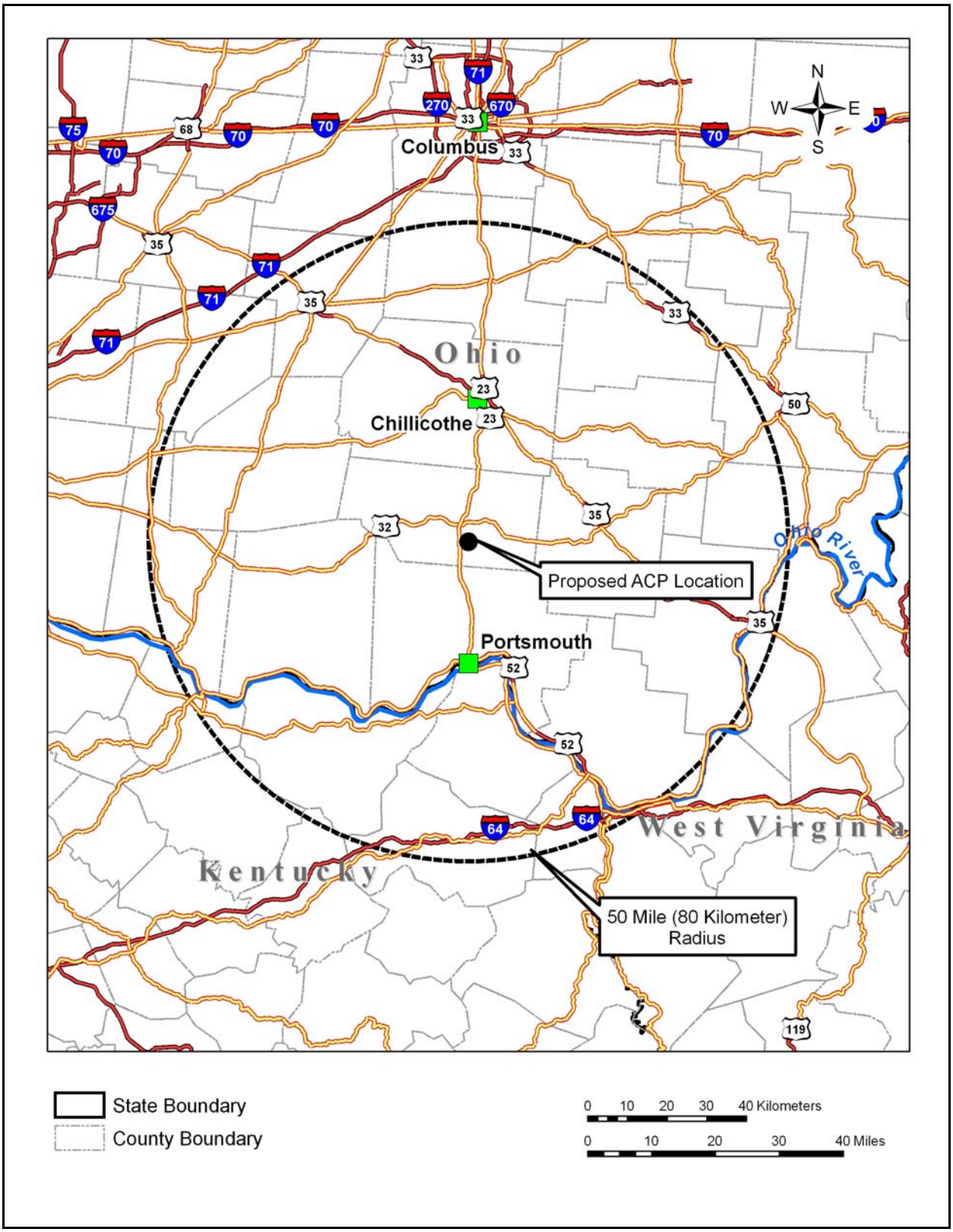

Figure 3-1 Proposed ACP Site and Surrounding Areas

The proposed ACP would be situated on approximately 81 hectares (200 acres) of the southwest quadrant of the controlled access area. In addition to this space, two UF_6 cylinder storage yards (the existing X-745G-2 and proposed X-745H), occupying a total of 11 hectares (27 acres), would be located in the northeast part of the DOE reservation just north of the Perimeter Road. The proposed ACP would consist of refurbished existing buildings and land formerly used for the Gas Centrifuge Enrichment Plant, as well as newly constructed facilities in that same area. This is the same location as the Lead Cascade Demonstration Facility, a test and demonstration facility designed to provide information on the reliability, performance, and cost of the gas centrifuge technology that will be used in the proposed ACP. In accordance with an NRC license issued to USEC on February 24, 2004, the Lead Cascade Demonstration Facility is presently under construction and scheduled to begin operation in late 2005.

The DOE reservation is not listed on the *Comprehensive Environmental Response, Compensation, and Liability Act* National Priorities List (also known as the Superfund List). Investigation and cleanup of hazardous substances (as defined in the *Comprehensive Environmental Response, Compensation, and Liability Act*) and hazardous wastes (as defined in the *Resource Conservation and Recovery Act*) that have been released to air, surface water, groundwater, soils, and solid waste management units as a result of past operational activities at the DOE reservation are being conducted under the provisions of the *Resource Conservation and Recovery Act*; the *Comprehensive Environmental Response, Compensation, and Liability Act*; and/or Ohio State law. The United States Enrichment Corporation maintains permits for the storage, handling, and use of hazardous materials and effluent discharges (air and water), as described in Section 1.5.4.

3.2 Land Use

The DOE reservation is located in Scioto Township of Pike County in south central Ohio. The region is characterized by steep to gently rolling hills in the general range of 130 to 250 meters (427 to 820 feet) above the Scioto River valley. Pike County is one of the State's lesser populated counties, with a population density of 24 people per square kilometer (63 people per square mile). Towns in the vicinity of the reservation include Piketon (6.4 kilometers [4 miles] north), Waverly (13 kilometers [8 miles] north), Jasper (1.9 kilometers [1.2 miles] northwest), and Wakefield (13 kilometers [8 miles] south). Brush Creek State Forest (8 kilometers [5 miles] southwest) and Lake White State Park (9.7 kilometers [6 miles] north) are two public recreational areas located in the vicinity of the reservation.

The general land use adjacent to the DOE reservation includes residential homes, private and commercial farms, light industry, and transportation corridors (rail and highway). Figure 3-2 presents a general land use map for the area surrounding and including the DOE reservation. Land within 8 kilometers (5 miles) of the reservation is used primarily for farms, pastures, forests, and rural residences. Dominant land use within an 8-kilometer (5-mile) radius includes about 10,291 hectares (25,430 acres) of farmland (including cropland, wooded lot, and pasture) and 9,874 hectares (24,400 acres) of forest (including commercial woodlands and recreational forest) (USEC, 2005). There are no State or national parks, conservation areas, or designated wild and scenic rivers within the immediate vicinity of the reservation (DOE, 2001a). Greater regional land use in the counties surrounding the DOE reservation is depicted in Table 3-1.

Farmland that qualifies for protection under the *Farmland Protection and Policy Act of 1981* (prime farmland) is located in Pike County, primarily along the floodplain of the Scioto River. Marginal quality farmland is located within and adjacent to the DOE reservation, and does not qualify as prime farmland under the *Farmland Protection and Policy Act of 1981* (Borchelt, 2003; and Yost, 2005). The Soil Survey for Pike County, Ohio indicates that the soil within and adjacent to the reservation is of low fertility and does not qualify as prime farmland (USDA, 1990).

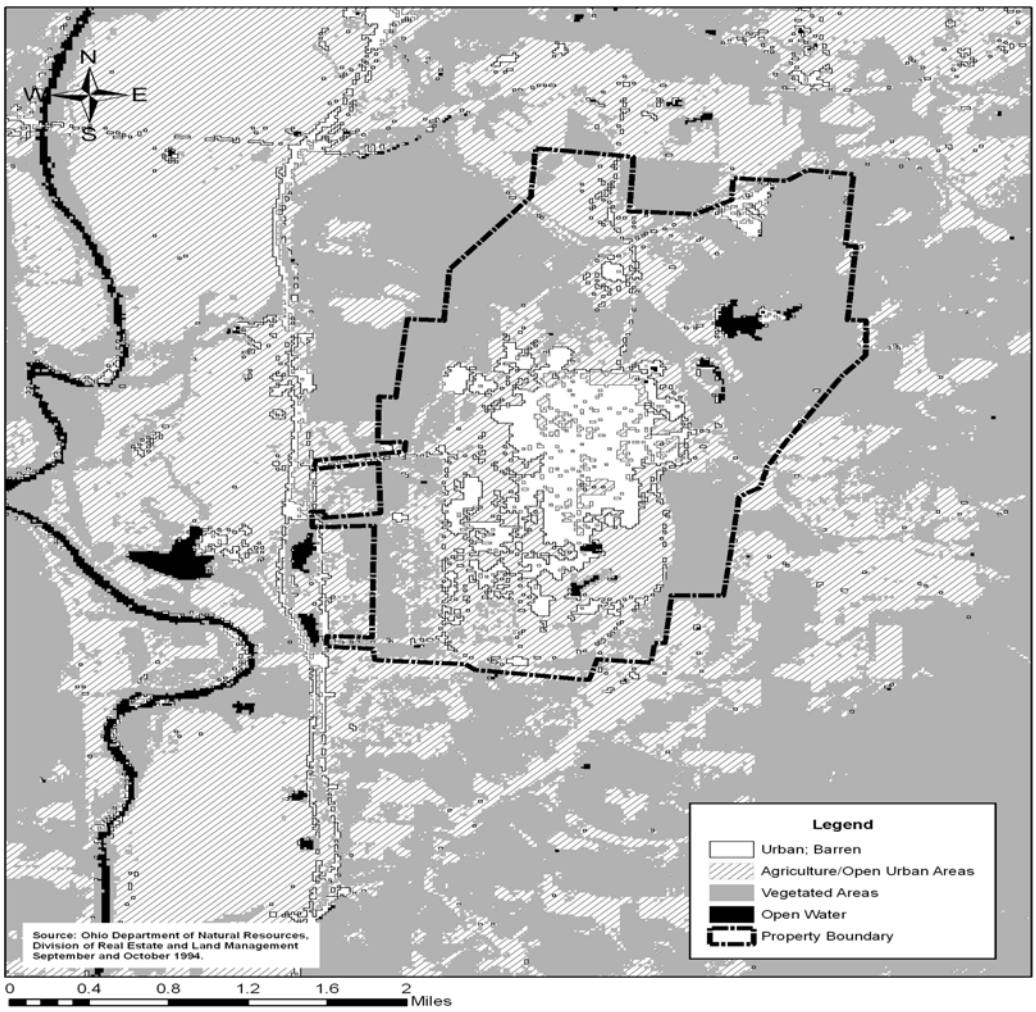

Figure 3-2 Land Use Surrounding the DOE Reservation at Piketon

Table 3-1 Percentage of Different Land Uses in the Region of Influence in 2000

County	Total Hectares[a]	Urban %	Agriculture %	Wooded %	Other % [b]
Jackson	109,126	2	32	60	6
Pike	114,917	1	27	66	6
Ross	179,348	1	48	45	6
Scioto	159,755	2	21	72	5

Notes:
[a] To convert hectares to acres multiply by 2.471.
[b] Other: Water/barren/scrub.
Source: ODOD, 2003.

The DOE reservation is situated on an approximately 1,497-hectare (3,700-acre) parcel of DOE-owned land in Scioto Township. Perimeter Road surrounds a 526-hectare (1,300-acre) central area, which includes a 304-hectare (750-acre) controlled access area. Approximately 150 buildings, trailers, and sheds are located within the central area, with the gaseous uranium enrichment facilities (now in cold standby) in the controlled access area. The central area is largely devoid of trees except for ornamental trees, with managed lawns, parking lots, and paved roadways dominating the open space. The portion of the reservation land outside of the Perimeter Road, consisting of 1,017 hectares (2,514 acres), is used for a variety of purposes including a water treatment plant, holding ponds, sanitary and inert landfills, cylinder storage yards, parking areas, and open fields and forested buffer areas.

The limited activities that occur on the DOE reservation include the cold standby management of the uranium enrichment facilities, ongoing remediation and waste management activities, the development of the DOE uranium conversion facility (described in the section on Management and Disposal of depleted UF_6 from Facility Operation, within Section 2.1.4.3), and general up-keep and security activities. In addition, DOE leases portions of the reservation to the United States Enrichment Corporation and the Ohio National Guard. The United States Enrichment Corporation also maintains office space at the facility. The Ohio National Guard uses the facility for classroom training/meeting activities and does not store weapons onsite. There are no other military installations located near the DOE reservation at Piketon. Other activities on the reservation that are managed by DOE's contractor, Bechtel Jacobs Company LLC, include environmental remediation, waste management, and management of depleted UF_6. (USEC, 2005)

3.3 Historic and Cultural Resources

"Cultural resources" include any prehistoric or historic district, site, building, structure, or object resulting from, or modified by, human activity. Under Federal regulation (Title 36 of the *Code of Federal Regulations* (36 CFR) Part 800), cultural resources designated as "historic properties" must be considered in assessing impacts of proposed Federal actions. "Historic properties" are cultural resources listed in, or eligible for listing in, the National Register of Historic Places because of their significance, as defined in 36 CFR § 60.4:

> *The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and that (a) are associated with events that have made a significant contribution to the broad patterns of our history; or (b) that are associated with the lives of persons significant in our past; or (c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant distinguishable entity whose components may lack individual distinction; or (d) that have yielded or may be likely to yield information important in history or prehistory.*

To comply with Federal historic preservation laws and regulations as well as mandates of the *National Environmental Policy Act*, the NRC is required to identify historic properties in the area potentially affected by its actions and to consider potential effects on those properties. The principal driver for this process is Section 106 of the *National Historic Preservation Act*, as amended (16 U.S.C. 470 et seq.), and implementing regulations at 36 CFR Part 800, as amended through August 2004. Under Section 106, Federal agencies are required to consider the effects of their undertakings on historic properties; 36 CFR Part 800 describes the process by which this is done in consultation with the State Historic Preservation Officer. The *National Historic Preservation Act* and 36 CFR Part 800 also require that consultation in the Section 106 process should provide Indian tribes the opportunity to identify concerns about historic

properties on or off Tribal lands, present views about an undertaking's effects on such properties, and participate in the resolution of adverse effects.

The regulation (36 CFR § 800.16) defines the concept of "area of potential effect:"

> *(d) Area of potential effects means the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.*

Historic properties could potentially be affected directly or indirectly by construction or operation of the proposed ACP. In accordance with 36 CFR Part 800, NRC defined the area of potential direct effects to include the footprint of all ground-disturbing activities and the perimeter of all buildings to be refurbished plus a 100-meter (328-foot) buffer around all such areas to account for heavy equipment operations, workers, and temporary staging of construction materials adjacent to the proposed work sites. NRC defined the area of potential indirect effects to include all area within the property boundary of the DOE reservation. This conservative area for indirect impacts accounts for potential indirect impacts, such as vandalism of historic properties or alterations of the setting or other qualities that contribute to the significance of historic properties, that could occur beyond the area of construction disturbance.

As a result of scoping comments that indicated concern that pumping from water supply wells might have an effect on prehistoric earthworks, NRC considered including the supply well locations within the area of potential effects, even though they are not contiguous DOE property. Because there will be no construction activity, increased vehicle traffic, nor subsidence associated with pumping that could directly or indirectly cause alterations in the character or use of prehistoric earthworks that may be located in the vicinity, NRC did not include the well locations within the area of potential effects for historic and cultural resources. Water resource impacts and ground subsidence impacts of pumping from the well locations are considered in Section 4.2.6.

As a result of scoping comments, NRC evaluated the historic properties (eligible or potentially eligible sites, structures or buildings) that are adjacent to the property boundary of the DOE reservation. NRC considers such properties to be outside of the area of potential effects (direct or indirect), but they were reviewed because they are adjacent to the boundary of indirect effects.

3.3.1 Historical Setting

Southern Ohio, where the DOE reservation is located, contains evidence of human presence dating back more than 10,000 years. Archaeologically, the area is best known for the Adena and Hopewell Indian mounds (elaborate geometric earthworks, enclosures, and mounds) that were constructed during the Woodland Period (900 B.C. to A.D. 900) (DOE, 2004a). During the early historic period (A.D. 1500), the Shawnee Indians had villages within the Scioto Valley, in the general area of Portsmouth. There is evidence of European presence in the region around A.D. 1550. European settlement in the region began in the late 1700s, with the first permanent Euro-american settlers arriving in Pike County in 1796 (Schweikert, 1997). The early development and economy in the region was almost entirely based on agriculture. The populations in the Portsmouth region grew slowly, with the growth of the transportation routes in the Scioto Valley as the primary impetus. During the 19th and early 20th centuries, several canals, roads, and, finally, railroads were constructed in the Scioto Valley region, and rural development of the area continued.

Large-scale industrial development began in 1952, when the Atomic Energy Commission, the present day DOE and NRC, selected a 9.3-square kilometer (5.8-square mile) tract of land in the Ohio Valley along the Scioto River in Pike County as the location for the Portsmouth Gaseous Diffusion Plant, to

complement gaseous diffusion facilities at Oak Ridge, Tennessee, and Paducah, Kentucky. Construction of the Portsmouth Gaseous Diffusion Plant began in 1952 and was completed in 1956. During construction, more than 486 hectares (1,200 acres) were cleared and more than 3.44 million cubic meters (4.5 million cubic yards) of earth were removed. The majority of the clearing, grading, and soil removal occurred within the central area of the Portsmouth Gaseous Diffusion Plant within the Perimeter Road (Schweikert, 1997). Since the initial development of the Portsmouth Gaseous Diffusion Plant in the 1950s, other construction activities have been initiated on the reservation to include additional administrative offices, warehouses, and the development of the Gas Centrifuge Enrichment Process facilities from 1979 to 1985 in the southwest portion of the reservation.

3.3.2 Methods

To identify the cultural resources present in and around the DOE reservation, NRC reviewed existing environmental documentation, including documents prepared under the *National Environmental Policy Act*, archaeological and architectural studies, the National Register of Historic Places, the Ohio Archaeological Inventory, and the Ohio Historic Inventory. The NRC initiated consultation with the State Historic Preservation Officer and with Indian tribes with possible ties to the reservation vicinity. The NRC also reviewed information about local cultural resources provided by the public. Copies of the consultation letters are provided in Appendix B.

3.3.3 Results of Document Review

An initial survey of the DOE reservation was completed in July and August of 1952, before construction of the facility began. The survey, under the supervision of Dr. Raymond S. Baby, Curator of Archaeology, the Ohio State Historical Society, reportedly found no evidence of archaeological materials within the reservation boundary (ERDA, 1977). In 1996, the DOE initiated additional studies, including an architectural survey and an archeological survey (Coleman, 1997; Schweikert, 1997). Figure 3-3 shows the four quadrants of the DOE reservation that were investigated as part of these surveys. In 2003, test excavations were conducted at one archaeological site (DuVall & Associates, 2003).

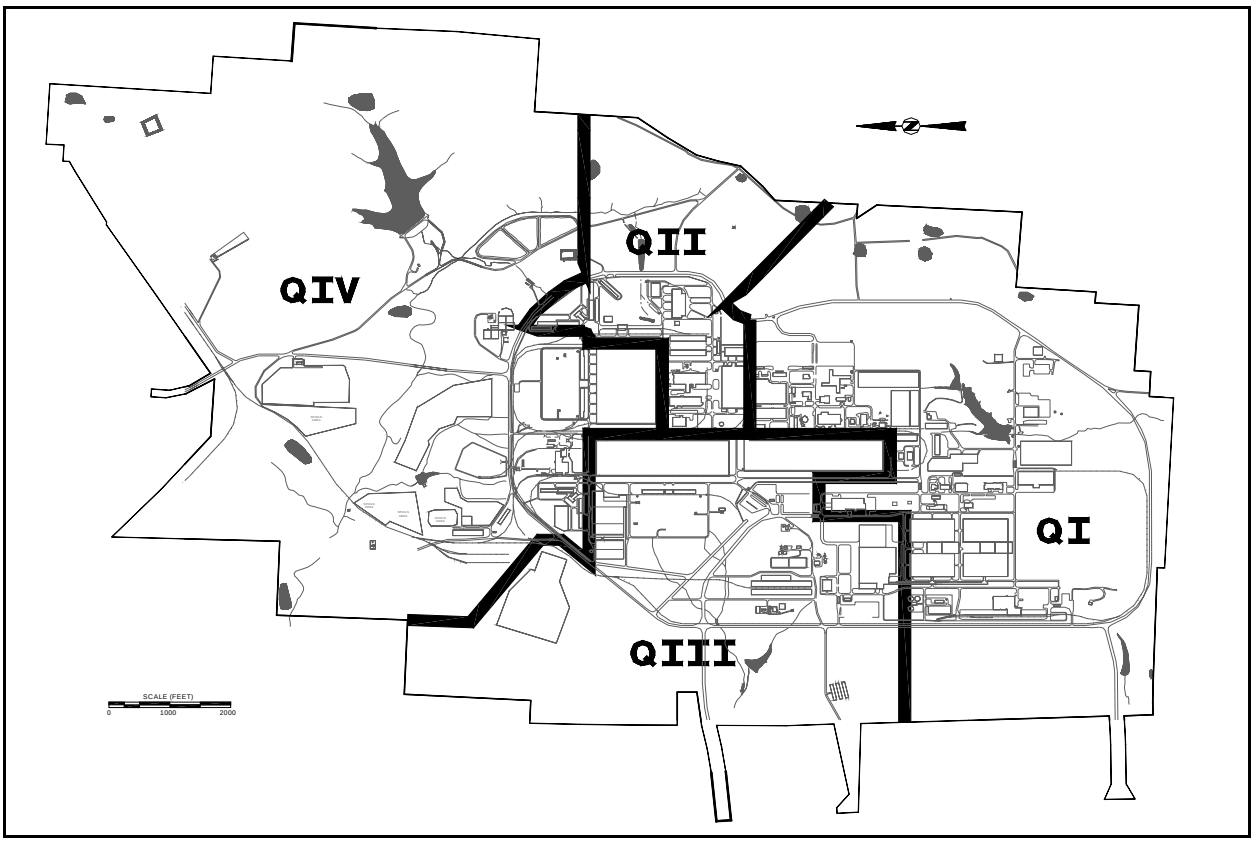

Figure 3-3 Quadrants Investigated at the DOE Reservation at Piketon

As reported by Schweikert (1997), a literature review of the following sources at the Ohio Historical Society and the Genealogy Section of the Pike County Public Library was conducted prior to the archaeological survey: United States Geological Survey 7.5' and 15' series topographic maps, Ohio Historic Preservation Office Archaeological Inventory files, National Register of Historic Places file, Ohio Historical Society Archaeological and Architectural Information files, Ohio Archaeological Council Report files, Pike County maps and histories, and Archaeological Atlas of Ohio (Mills, 1914). In addition, aerial photographs from 1939 and 1951 flights (predating construction of the Portsmouth Gaseous Diffusion Plant) were reviewed. The review focused on an area centered on the reservation, extending out 6.5 kilometers (4 miles) from the center of the reservation.

The search found no sites within reservation boundaries recorded in the State archaeological inventory, although 71 prehistoric sites were recorded within the study area (an area extending 6.5 kilometers [4 miles] from the center of the reservation). Likewise, no buildings within the reservation were listed on the Ohio Historic Inventory. Three buildings were listed within the study area. Of the three, only the Bailey Chapel is directly adjacent to the reservation boundary. The other two, former residences, are located in Seal township north of the reservation. Although not listed in the inventory, 49 other historic structures were observed on maps and photographs.

Three properties within 6.5 kilometers (4 miles) of the reservation are listed on the National Register of Historic Places. The Piketon Mounds (33 Pk 1), located 3.2 kilometers (2 miles) north of the boundary, consist today of a single large mound and two smaller mounds that are the remnants of a mound complex and series of graded ways that descended from one terrace to another and ran towards the banks of the Scioto River (Squire and Davis, 1848, as referenced in Schweikert, 1997).

The Scioto Township Works (33 Pk 22) are located to the southwest of the DOE reservation, approximately 250 meters (820 feet) from the boundary and approximately 1 kilometer (0.6 mile) from the Perimeter Road. The Scioto Township Works:

> *consisted of a circle and square works with gates on the northwest and southeast sides, parallel walls running out from two gateways, and a single mound just north of the works. This complex was surveyed by Squier and Davis in 1847, and excavations were conducted by the Bureau of American Ethnology before 1891. According to Fowke (1902) the square measured 260.3 meters (854 feet) per side east to west and 259.6 meters (852 feet) per side north to south. The parallel walls were 20.7 meters (68 feet) apart and extended 130 meters (427 feet) for the eastern wall and 122 meters (400 feet) for the western wall. Even by 1902, the large circle to the north had been all but obliterated (Fowke 1902). Recent gravel quarrying and cultivation has destroyed virtually all of this earthwork complex.* (Schweikert, 1997)

Currently, the Scioto Township Works (33 Pk 22) consists of two separate areas that have been heavily disturbed adjacent to Route 23 (DuVall & Associates, 2003).

The Van Meter Stone House and Outbuildings, located at a road intersection approximately 3.2 kilometers (2 miles) north of the boundary, dates from the early 1800s, is associated with one of the early farming families in the county, and includes what is thought to be the first school in the county (Schweikert, 1997).

An intensive archaeological reconnaissance was performed in September 1996, April 1997, and May 1997 on the entire DOE reservation, with the exception of areas occupied by plant-related buildings or structures, sanitary landfills, or lagoons. The archaeologist noted that buildings represented a small percentage of the overall reservation area outside of the Perimeter Road, although the Don Marquis power station and sanitary landfills and sludge lagoons outside the Perimeter Road were relatively large areas that were not surveyed because the original ground surface was not accessible. Techniques included overall visual inspection, with some surface collection and shallow shovel probes (to 12.5 centimeters [5 inches]) or tests (to 30 centimeters [12 inches]). (Schweikert, 1997)

The surveys resulted in the identification of 36 previously undocumented archaeological sites within the boundary of the DOE reservation. These were recorded in the Ohio Archaeological Inventory as sites 33 Pk 184 through 33 Pk 219. The 36 sites included 13 remnants of historic farmsteads; seven historic scatters or open refuse dumps; two historic isolated finds; four DOE reservation plant-related structural remnants; one historic cemetery; five prehistoric isolated finds; two prehistoric lithic scatters; and two sites that contained both prehistoric and historic temporal components: an historic cemetery with a prehistoric isolated find, and a prehistoric lithic scatter on a historic farmstead.

Investigators determined that 22 of the sites did not meet National Register eligibility criteria, although the two historic cemeteries within this class were recommended for preservation. One prehistoric lithic scatter (33 Pk 210) and 13 historic farmsteads were found to be potentially eligible for listing on the National Register under Criterion D, "have yielded, or may be likely to yield information important in prehistory or history." All of these sites are located outside the Perimeter Road.

In response to a request after State Historic Preservation Officer review of the 1997 survey report, DOE conducted archaeological testing at the prehistoric lithic scatter, 33 Pk 210. Investigators interpreted the results to mean that the site is not Register-eligible (DuVall & Associates, 2003; DOE, 2003a). The OHPO agreed that the portion of the site that was tested did not produce evidence of sensitive archaeological features, but noted that more than half of the site appears to extend south of DOE property and that insufficient testing had been done to conclude that the entire site would not meet National

Register criteria for eligibility (OHPO 2003, provided as part of OHPO comments on the Draft EIS; see Appendix B).

Coleman's 1997 architectural survey report states that the State Historic Preservation Officer indicated in 1994 that the Portsmouth Gaseous Diffusion Plant was eligible for inclusion on the National Register as a historic district because of its association with important events in history, even though it had achieved significance within fewer than 50 years (OHPO, 1994). (Normally, historic properties must be more than 50 years old.) In 1995, the State Historic Preservation Officer added the clarification that the district was eligible because of its exceptional significance in the history of post-World War II U.S., in particular, in U.S. development of nuclear energy (OHPO, 1995). In 1996, DOE initiated an architectural survey of all the architectural locations (buildings and structures) on the reservation to evaluate which might be contributing elements to the historic district. Coleman's survey identified a total of 160 architectural locations that were identified and documented on Ohio Historic Inventory forms.

Coleman evaluated each architectural location against its place in historic periods and thematic groups that characterize the historic district. Historic periods include the following: (1) the period prior to the construction of the DOE reservation; (2) the original reservation period; (3) the DOE reservation facility additions period; and (4) the Gas Centrifuge Enrichment Process period. Five thematic groups were identified: gaseous diffusion process, portals for the gaseous diffusion facility, cooling structures, warehouses, and facilities owned by the Ohio Valley Electric Corporation. This information was used to define the contributing and non-contributing architectural resources of the Portsmouth Gaseous Diffusion Plant historic district. Of the 160 architectural locations, 132 were recommended as contributing resources of the historic district and 28 were recommended as non-contributing resources. All of the structures associated with the Gas Centrifuge Enrichment Process facility, (the buildings to be refurbished under the proposed action) were found to be contributing resources of the historic district. The cylinder storage yards (some of which would be refurbished under the proposed action) were not included in the survey because such features do not contain architectural elements that warranted recording (Coleman, 1997).

3.3.4 Information from the Interested Public

The Barnes House, located adjacent to the southwestern boundary of the reservation, 800 meters (2,625 feet) from the Perimeter Road, may be eligible for listing on the National Register of Historic Places. The property includes or is near the location where the last passenger pigeon was reportedly killed, and the preserved body of that specimen was exhibited for some time in the Barnes House. The Ohio Historic Preservation Office has encouraged the property owner to submit a National Register nomination addressing Criterion A for the historical significance associated with the Sargent's Passenger Pigeon and Criterion C for the property's architectural significance (OHPO, 2004).

A local property owner and several scholars expressed concern that an earthen embankment at the southern well field might be a prehistoric earthwork with archaeological and cultural significance (see Appendix J comments PMT-010-4 and 008-5). A local resident provided information about the origin of the embankment (see Appendix J comment 011-1). The commenter describes it as "partially located on a Department of Energy well field located next to the Scioto River on the old Bill Cutlip farm." When the DOE wells were being drilled in the 1980s, the line from the river to the steam plant required the addition of concrete and ground cover over the original concrete anchors in order to hold the line in place. According to the commenter, the "result is a levy-like [sic] appearance." Concurrently, and into the 1990s, the Standard Slag company, owners of a sand and gravel quarry on the former Cutlip farm, moved its overburden down to the river and built a levee between the wells and river to make space for expansion. At first the levee was kept mowed, but when Standard Slag determined that it would not be able to quarry the terrace next to the levee, it was no longer maintained.

3.3.5 Information from Indian Tribes

NRC initiated consultation with federally recognized tribes in March of 2005. The NRC staff followed up the initial letters with numerous phone calls to elicit information from the Tribes regarding their interest in participating in the Section 106 consultation process. The vast majority of these tribes indicated that they had no specific information or were not interested. After the initial letters were sent to the tribes, a follow-up phone call in June 2005 was placed to each tribe that had not responded or electronic communication was continued with some tribes that requested such methods. This process was repeated in August 2005. Through these various phone and electronic communications the NRC was able to determine that 15 of 17 recognized tribes either had no additional information or no interest in participating in the Section 106 process. The NRC designated the Seneca Nation as a consulting party based on their interest in the project. The Absentee Shawnee Tribe of Oklahoma provided a letter that was included in an intervention. Based on this expression of interest, the NRC designated the Absentee Shawnee Tribe as a consulting party, but received no additional communication from the tribe in spite of additional requests for information. In the letter included in the intervention, the Shawnee Tribe of Oklahoma has identified a number of village sites in its ancestral homelands in the Ohio Valley, including some along the Scioto River. The Tribe considers that it is descendant from the people of the Hopewell culture who built the many earthwork sites in the region. The Tribe refers to "the Barnes Works in Scioto Township" (a reference to the Scioto Township Works, near the Barnes property mentioned above) as "one of the largest sacred sites in North America" (see Appendix B).

Tribes that were contacted are listed in Section 9.4. Copies of letters and records of communication are provided in Appendix B.

3.3.6 Historic Properties and Properties Considered Eligible for Listing on the National Register

Based on the results of the information review, one historic property, the Portsmouth Gaseous Diffusion Plant Historic District, is present within the reservation boundary. The State Historic Preservation Officer indicated the eligibility of the district under Criterion A ("associated with events that have made a significant contribution to the broad patterns of our history"). The specific buildings and other elements that contribute to the district's eligibility under Criterion A and the precise boundaries of the district have not been defined. However, the report by Coleman recommended 132 architectural locations as contributing resources and 28 architectural locations as non-contributing resources.

Outside of the reservation, but near the southwestern boundary, is one historic property, the Scioto Township Works, which today consists of two separate areas that have been heavily disturbed adjacent to Route 23 (DuVall & Associates, 2003). In addition to the archaeological values for which the site was listed on the National Register under Criterion D ("have yielded or may be likely to yield information important to history or prehistory"), the Absentee Shawnee Tribe has indicated that this site has cultural values.

Sites that have not received formal State Historic Preservation Officer concurrence as National Register eligible will be treated as if they are eligible for the purposes of this impact assessment. These include 13 historic farmstead sites within the reservation boundary that were identified by archaeologists as potentially eligible for listing on the National Register under Criterion D, although there is no record of State Historic Preservation Officer concurrence with the finding. In addition, prehistoric lithic scatter 33 Pk 210 will be treated as eligible under Criterion D in the absence of State Historic Preservation Officer concurrence with the finding that it is ineligible.

Adjacent to the reservation boundary is the Barnes House and property, which for the purpose of this review is considered potentially eligible for listing under Criteria A and C, although the State Historic Preservation Officer is awaiting submission of a formal nomination before making a determination.

Another cultural resource of local architectural and historical significance, the Bailey Chapel, is adjacent to the southeast boundary. The building is listed on the Ohio Historic Inventory, though not listed on the National Register.

Table 3-2 provides a summary of the historic properties and properties considered eligible for listing on the National Register, and the historic values associated with them. All of these properties were evaluated within the overall assessment of effects regardless of whether or not they are actually listed on the National Register.

Table 3-2 Historic Properties and Properties Considered Eligible for Listing on the National Register

Historic and Cultural Resource Name	Description of Historic Value
Portsmouth Gaseous Diffusion Plant Historic District	This site is eligible for listing on the National Register under Criterion A, "associated with events that have made a significant contribution to the broad patterns of our history." The specific buildings and other elements that contribute to the district's eligibility under Criterion A and the precise boundaries of the district have not yet been defined.
Prehistoric lithic scatter (33 Pk 210)	This site was thought to be eligible for listing on the National Register under Criterion D, "have yielded, or may be likely to yield information important in prehistory or history." However, further archaeological survey results indicated that the site does not meet this criterion and thus is not Register-eligible (DuVall & Associates, 2003; DOE, 2003a). For the purposes of this impact analysis, however, the site was treated as if it were eligible.
Thirteen historic farmsteads	These sites may be eligible for listing on the National Register under Criterion D, "have yielded, or may be likely to yield information important in prehistory or history," but a final determination has not been made. For the purposes of this impact analysis, the site was treated as if it were eligible.
Scioto Township Works	This site is listed on the National Register under Criterion D for its archaeological values. In addition, the Absentee Shawnee Tribe has indicated that this site has cultural values.
Barnes House	This site may be eligible for listing on the National Register under Criterion A for the historical significance associated with the Sargent's Passenger Pigeon and Criterion C for the property's architectural significance. However, a final determination has not been made. For the purposes of this impact analysis, the site was treated as if it were eligible.
Bailey Chapel	This site is listed on the Ohio Historic Inventory for its local architectural and historical significance, but is not listed on the National Register. For the purposes of this impact analysis, the site was treated as if it were listed.

3.4 Visual and Scenic Resources

The proposed ACP would be located within an existing industrial facility, close to existing production and support facilities, transmission lines, and vacant lots. The facilities are generally not visible off the reservation property or from the highway. Open areas within the facility are maintained as lawns and fields. Open and forested buffer areas, agricultural areas, limited residential areas, and densely forested hills are located adjacent to the proposed site. Rolling hills and small open farmlands dominate the nearby landscape.

The U.S. Bureau of Land Management developed criteria to assist in the protection of visual and scenic resources. Four Visual Resource Classes are used to represent the value of the visual resource, with Class I and II being the most valued, Class III having moderate value, and Class IV being the least valued. The proposed ACP site would be consistent in terms of scenic attractiveness and visual resources when compared with surrounding land within the DOE property, maintaining a Visual Resources Management Class III or IV designation both inside and outside the fenced area. Photographs of the proposed ACP site (existing buildings and future building locations) are shown in Figures 3-4 through 3-7.

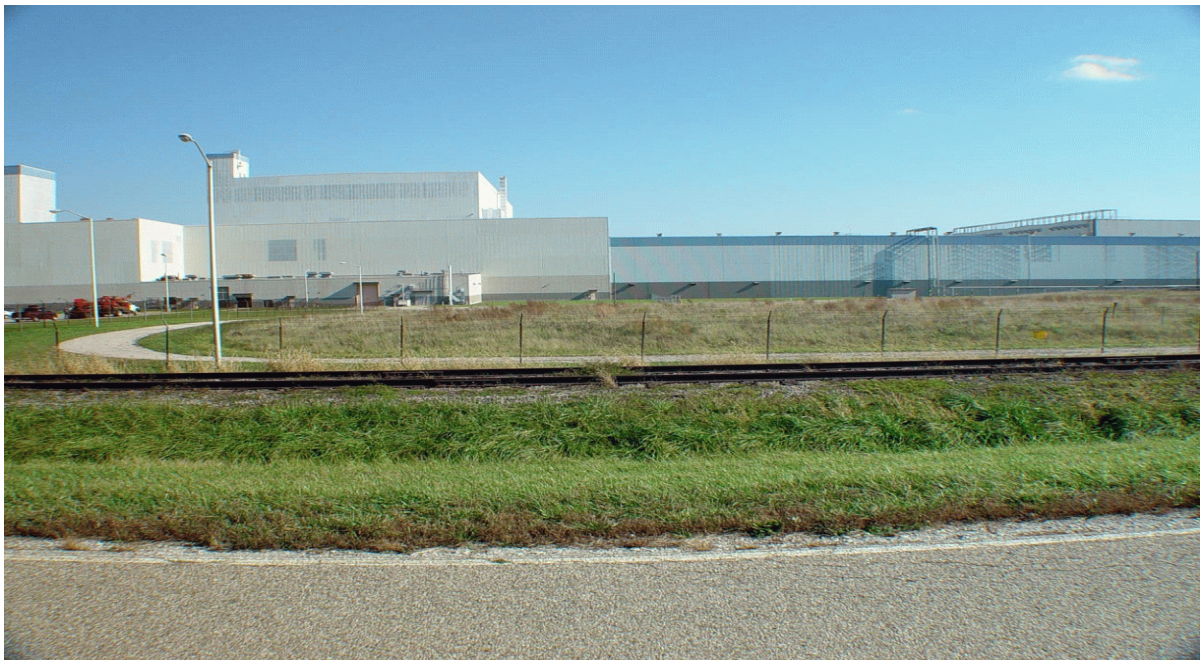

Figure 3-4 View of the X-7725 and X-7727H Facilities [Looking East] (USEC, 2005)

Figure 3-5 View of the X-7725 Facility [Looking Southwest] (USEC, 2005)

Figure 3-6 View of the X-3001 and X-3002 Process Buildings [Looking Northeast] (USEC, 2005)

Figure 3-7 Site of X-3346A Feed and Product Shipping and Receiving Building [Looking South] (USEC, 2005)

3.5 Climatology, Meteorology, and Air Quality

This section describes the climatology, meteorology, and air quality in the area surrounding the DOE reservation. This reflects the baseline condition for the Chapter 4 analysis of USEC's emissions under the proposed action.

3.5.1 Regional Climatology

The DOE reservation is located in south-central Ohio, west of the Appalachian Mountains. The area's climate is continental and moist and is characterized by moderate extremes of heat and cold. Summers are warm and humid with about 20 days per year reaching temperatures in excess of 32.2˚ Celsius (90˚ Fahrenheit), and winters are cold, with temperatures dipping below -17.7˚ Celsius (0˚ Fahrenheit) about two days a year. Precipitation averages about 7.5 to 10 centimeters (3 to 4 inches) per month; the fall months having slightly less precipitation than other months, in the range of 5 to 7.5 centimeters (2 to 3 inches) per month.

3.5.2 Site and Regional Meteorology

For the period 1961 through 1990 in Waverly, Ohio (about 16 kilometers [10 miles] to the north of the site), the mean annual temperature was about 11.6˚ Celsius (53˚ Fahrenheit). Average summer and winter temperatures are 23.4˚ Celsius (74˚ Fahrenheit) and -1.8˚ Celsius (29˚ Fahrenheit), respectively. Recorded extreme maximum and minimum temperatures are 39˚ Celsius (102˚ Fahrenheit) and -31˚ Celsius (-24˚ Fahrenheit). Moisture in the area is predominantly supplied by air moving northward from the Gulf of Mexico. The average amount of precipitation is about 102 centimeters (40 inches) per year and is usually well distributed throughout the year (DOE, 2001b). Occasionally, heavy amounts of rain

associated with strong thunderstorms or intense low pressure systems will fall in a short periods of time (USEC, 2003). Fall is the driest season. Although snowfall occurrence varies annually, snow is common from November through March, averaging approximately 52 centimeters per year (20 inches per year) (DOE, 2001b).

Surface meteorological data, including wind data, have been collected at the onsite meteorological tower at the 10-, 30-, and 60-meter (33-, 98-, and 197-foot) levels. The tower is in the southern part of the DOE reservation. A comparison of annual wind roses for the period 1995 through 2001 indicates that wind patterns at the 10-meter (33-foot) level are different from those at the 30-meter and 60-meter (98- and 197-foot) levels (DOE, 2002a). Winds at the 10-meter (33-foot) level appear to be influenced by local topographical and/or vegetative features, while wind data at the 30-meter (98-foot) level are believed to be more representative of the site. Accordingly, a wind rose at the 30-meter (98-foot) level is presented in Figure 3-8, which was prepared on the basis of data from the onsite tower from 1998 through 2002 (USEC, 2005). About a third of the time the wind blew from the south-southwest, with the prevailing wind blowing from the south. Average wind speed was about 2.7 meters per second (6.3 miles per hour). Directional wind speed was highest from the south at 3.6 meters per second (8.1 miles per hour), while lowest values were recorded in winds blowing from the east at 1.8 meters per second (4.0 miles per hour).

3.5.2.1 Severe Weather Conditions

According to weather observations from Columbus, thunderstorms occur an average of 35 days per year. Thunderstorms are most frequent during the period May through August, averaging 29 days per year, and the least frequent in winter, averaging only 2.5 days per year. (National Climatic Data Center, 2004)

Tornadoes are rare in the area surrounding the DOE reservation, and those that do occur are less destructive in this region than those occurring in other parts of the Midwest. For the period 1950 through 1995, 656 tornadoes were reported in Ohio, with an average of 14 tornadoes per year (Storm Prediction Center, 2002). Tornadoes are classified using the Fujita scale (F-scale) with classifications ranging from F0 to F5 (Fujita, 1971). F0-classified tornadoes have winds of 64 to 116 kilometers per hour (40 to 72 miles per hour) and F2-classified tornadoes have wind speeds of 182 to 253 kilometers per hour (113 to 157 miles per hour). While three tornadoes were reported in Pike County during the 1950-1995 period, most of these fell below the F2 level of the Fujita tornado scale (Storm Prediction Center, 2002).

3.5.2.2 Mixing Heights

Mixing height is defined as the height above the earth's surface through which relatively strong vertical mixing of the atmosphere occurs. Holzworth (1972) developed mean annual morning and afternoon mixing heights for the contiguous U.S. based on daily upper-air and surface climatological data. According to Holzworth's calculations, the mean annual morning and afternoon mixing heights at the DOE reservation at Piketon are approximately 510 meters (1,673 feet) and 1,700 meters (5,575 feet), respectively. Table 3-3 shows the average morning and afternoon mixing heights for Huntington,West Virginia, where the air station nearest to the DOE reservation is located.

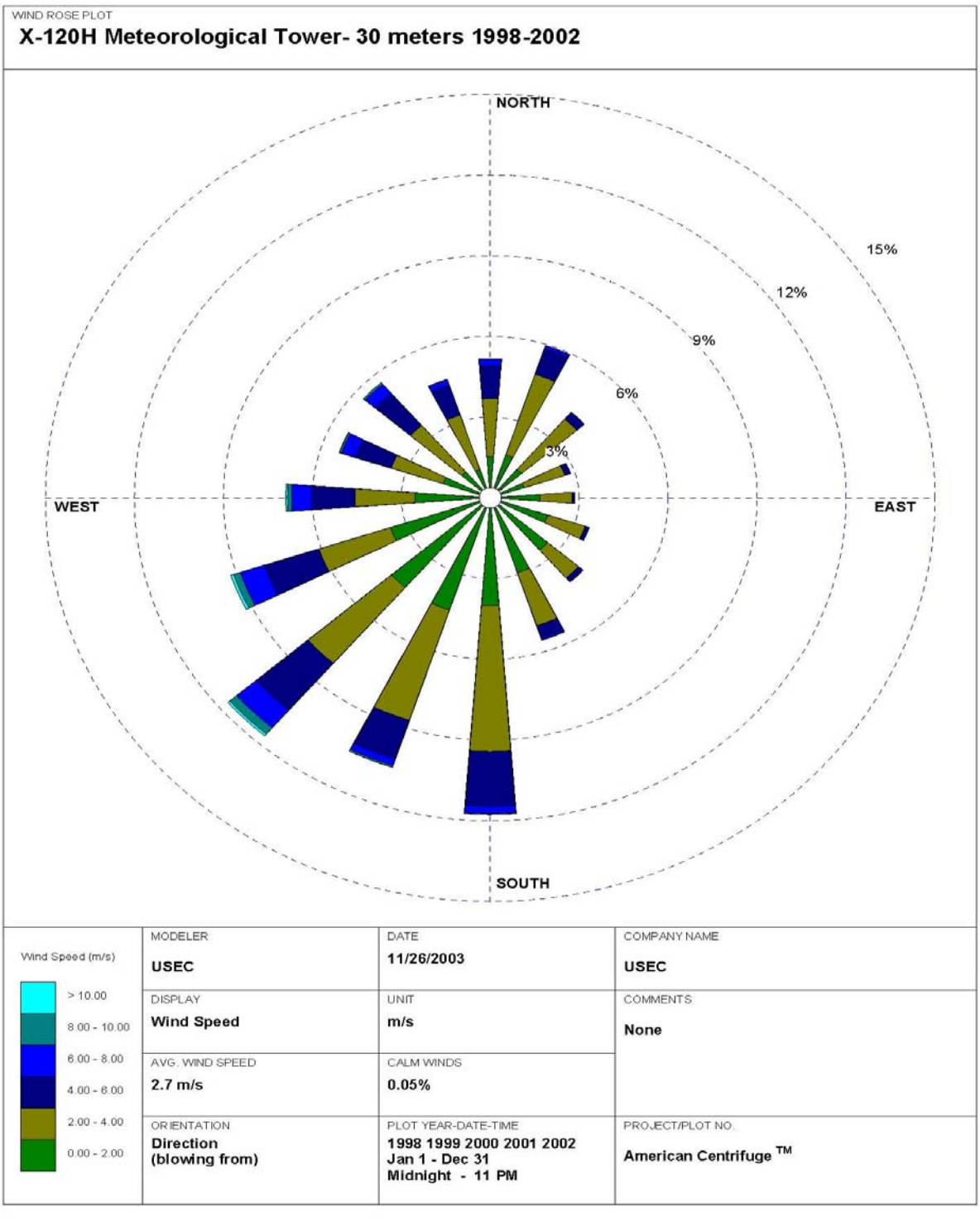

Figure 3-8 Wind Rose at 30 Meters (98 Feet) from the Onsite Meteorological Tower, 1998-2002 (USEC, 2005)

Table 3-3 Average Morning and Afternoon Mixing Heights for Huntington, West Virginia

Time Frame	Average Mixing Heights					
	Units	Winter	Spring	Summer	Fall	Annual
Morning	meters	634	721	338	403	524
	feet	2,080	2,365	1,109	1,322	1,719
Afternoon	meters	1,079	1,986	1,641	1,340	1,511
	feet	3,540	6,516	5,384	4,396	4,957

Source: Holzworth, 1972.

3.5.3 Air Quality

To assess air quality, the U.S. Environmental Protection Agency (EPA) has established maximum concentrations for pollutants that are referred to as the National Ambient Air Quality Standards (EPA, 2004). Table 3-4 presents a list of the National Ambient Air Quality Standards; Ohio State Ambient Air Quality Standards are identical. Six "criteria pollutants" are used as indicators of air quality: ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter, and lead (see Criteria Pollutants text box). The U.S. EPA has designated areas around the country that do not meet these standards as "nonattainment areas." Areas are designated as attainment/nonattainment for each criteria pollutant. Pike County is in attainment for all criteria pollutants (40 CFR § 81.336). However, nearby Scioto County (5 kilometers [3 miles] from the DOE reservation's southern boundary) has been designated as a nonattainment area for the $PM_{2.5}$ standard (40 CFR § 81.336).

Table 3-4 National Ambient Air Quality Standards

Pollutant	Primary Standard (to Protect Public Health)			Secondary Standard (to Protect Public Welfare)		
	Level [a]	Averaging Time	Form	Level [a]	Averaging Time	Form
Ozone	0.12 ppm	One-hour	More than three days over three years	Same as primary standard		
	0.08 ppm	Eight-hour	Three-year average of annual fourth highest daily maximum			
Particulate Matter 10 microns or smaller (PM_{10})	150 $\mu g/m^3$	24-hour	Three-year average of annual 99th percentiles	Same as primary standard		
	50 $\mu g/m^3$	Annual	Not to be exceeded			

Table 3-4 National Ambient Air Quality Standards (continued)

Pollutant	Primary Standard (to Protect Public Health)			Secondary Standard (to Protect Public Welfare)		
	Level [a]	Averaging Time	Form	Level [a]	Averaging Time	Form
Particulate Matter 2.5 microns or smaller ($PM_{2.5}$)	65 $\mu g/m^3$	24-hour	Three-year average of annual averages	Same as primary standard		
	15 $\mu g/m^3$	Annual	Three-year average of 98th percentile			
Carbon Monoxide	35 ppm	One-hour	More than once per year	No secondary standard		
	9 ppm	Eight-hour	More than once per year			
Sulfur Dioxide	0.14 ppm	24-hour	More than once per year	0.55 ppm	Three-hour	More than once per year
	0.03 ppm	Annual	Not to be exceeded			
Nitrogen Dioxide	0.053 ppm	Annual	Not to be exceeded	Same as primary standard		
Lead	1.5 $\mu g/m^3$	Quarterly	Not to be exceeded	Same as primary standard		

Notes:
[a] ppm = parts per million; $\mu g/m^3$ = micrograms per cubic meter.
Source: 40 CFR Part 50.

Criteria Pollutants

Nitrogen dioxide *is a brownish, highly reactive gas that is present in all urban atmospheres. Nitrogen dioxide can irritate the lungs, cause bronchitis and pneumonia, and lower resistance to respiratory infections. The major mechanism for the formation of nitrogen dioxide in the atmosphere is the oxidation of the primary air pollutant nitric oxide. Nitrogen oxides play a major role, together with volatile organic carbons, in the atmospheric reactions that produce ozone. Nitrogen oxides form when fuel is burned at high temperatures. The two major emissions sources are transportation and stationary fuel combustion sources such as electric utility and industrial boilers.*

Ozone *is a photochemical (formed in chemical reactions between volatile organic compounds and nitrogen oxides in the presence of sunlight) oxidant and the major component of smog. Exposure to ozone for several hours at low concentrations has been shown to significantly reduce lung function and induce respiratory inflammation in normal, healthy people during exercise. Other symptoms include chest pain, coughing, sneezing, and pulmonary congestion.*

Lead *can be inhaled and ingested in food, water, soil, or dust. High exposure to lead can cause seizures, mental retardation, and/or behavioral disorders, and/or premature death. Low exposure to lead can cause central nervous system damage.*

Carbon monoxide *is an odorless, colorless, poisonous gas produced by incomplete burning of carbon in fuels. Exposure to carbon monoxide reduces the delivery of oxygen to the body's organs and tissues. Elevated levels can cause impairment of visual perception, manual dexterity, learning ability, and performance of complex tasks.*

Particulate matter *such as dust, dirt, soot, smoke, and liquid droplets are emitted into the air by sources such as factories, power plants, cars, construction activity, fires, and natural windblown dust. Exposure to high concentrations of particulate matter can affect breathing, aggravate existing respiratory and cardiovascular disease, alter the body's defense systems against foreign materials, and damage lung tissue.*

Sulfur dioxide *results largely from stationary sources such as coal and oil combustion, steel and paper mills, and refineries. It is a primary contributor to acid rain and contributes to visibility impairments in large parts of the country. Exposure to sulfur dioxide can affect breathing and may aggravate existing respiratory and cardiovascular disease.*

Source: EPA, 2004.

3.5.3.1 Current Emissions at the DOE Reservation

Non-Radiological Emissions

Nonradiological air emissions from the DOE reservation are predominant sources in Pike County (EPA 2003a). Currently, the United States Enrichment Corporation has three Ohio EPA operating permits. The Title V permit issued for current operations was effective as of August 21, 2003, and is a sitewide, Federally enforceable operating permit to cover emissions of all regulated air pollutants at the facility. The United States Enrichment Corporation has identified the following criteria pollutant emissions for the year 2001 (see Table 3-5): 54.30 metric tons (59.86 tons) of particulate matter with a mean diameter of 10 micrometers or less, 1.29 metric tons (1.42 tons) of volatile organic compounds, 2,474 metric tons (2,628 tons) of sulfur dioxide, and 328 metric tons (362 tons) of nitrogen oxides. These emissions are

Table 3-5 Nonradiological Air Emissions from United States Enrichment Corporation and DOE Sources at the DOE Reservation in 2001

Major Emission Source	Units	Emission Rate [a]					
		SO_2	NO_x	CO	VOCs	PM_{10}	$PM_{2.5}$
United States Enrichment Corporation facilities [a]	metric tons/year	2,384	328	Not Available	1.3	54.3	Not Available
	tons/year	2,628	362	Not Available	1.4	59.9	Not Available
DOE facilities [b]	metric tons/year	20	85	53	5.2	4.8	Not Available
	tons/year	22	94	59	5.7	5.3	Not Available

Notes:
[a] SO_2 = sulfur dioxide; NO_X = nitrogen oxides; CO = carbon monoxide; VOCs = volatile organic compounds; PM_{10} = particulate matter with a mean diameter of 10 micrometers or less; $PM_{2.5}$ = particulate matter with a mean diameter of 2.5 micrometers or less.
[b] Source: DOE, 2001c.
[c] Proposed maximum annual emissions based on the assumption that two boilers would operate full time.
Source: Bechtel Jacobs Company, 2003.

associated primarily with the boilers at the X-600 Steam Plant (that provides steam for the DOE reservation), a boiler at the X-611 Water Treatment Plant, an emergency generator, and a trash pump(DOE, 2001c). DOE operates numerous small sources that release criteria pollutants and volatile organic compounds. In November 2001, DOE began operation of the X-6002 Recirculating Hot Water Plant to provide heat for the DOE facilities that were formerly heated by hot water from the gaseous diffusion process. Maximum annual emissions from plant operations account for most of the DOE emissions (Bechtel Jacobs Company, 2003; see Table 3-5). Other DOE emissions, including two landfill venting systems, two glove boxes (not used in 2001), two aboveground storage tanks in the X-6002A Fuel Oil Storage Facility, and two groundwater treatment facilities, emit less than 0.9 metric tons (1 ton) per year of conventional air pollutants (on an individual basis).

The largest non-radiological airborne emissions from the DOE reservation are from the coal-fired boilers at the X-600 Steam Plant. These emissions are shown in Table 3-6. The boilers are permitted by Ohio EPA with opacity, particulate, and sulfur dioxide limits. Electrostatic precipitators on each of the boilers control opacity and particulate emissions. In addition, the boilers emit nitrogen dioxide and carbon monoxide. There are also minor contributions of these pollutants from oil-fired heaters, stationary diesel motors, and mobile sources (e.g., cars and trucks). Other air pollutants emitted from the DOE reservation in Piketon, Ohio, include gaseous fluorides, water treatment chemicals, cleaning solvent vapors, and process coolants. (USEC, 2005)

Radiological Emissions

Airborne discharges of radionuclides from the DOE reservation are regulated under the *Clean Air Act*, 40 CFR Part 61, Subpart H, National Emission Standards for Hazardous Air Pollutants. Currently, the United States Enrichment Corporation is responsible for most of the sources that emit radionuclides because DOE leases the production facilities to it. In 2001, United States Enrichment Corporation and DOE reported emissions of 7.40×10^9 and 2.33×10^7 becquerels (0.2 and 0.00063 curies) from their radionuclide emission sources, respectively. (DOE, 2004a)

Table 3-6 United States Enrichment Corporation's Non-Radiological Airborne Emissions

Total Particulate Matter	Air Permit Limit [a]	Stack Test Results [a, b]
Boiler Number 1	0.19 lbs/mmbtu	0.04 lbs/mmbtu
Boiler Number 2	0.19 lbs/mmbtu	0.05 lbs/mmbtu
Boiler Number 3	0.19 lbs/mmbtu	0.05 lbs/mmbtu
Sulfur Dioxide	**Air Permit Limit [a]**	**Analytical Results [a, c]**
Boiler Number 1	6.16 lbs/mmbtu	4.72 lbs/mmbtu
Boiler Number 2	6.16 lbs/mmbtu	
Boiler Number 3	6.16 lbs/mmbtu	

Notes:
[a] lbs/mmbtu = pounds per million British thermal unit.
[b] Boilers 1 and 2 tested in April 2003. Boiler 2 tested in November 2003.
[c] Steam plant total for 2002.
Source: USEC, 2005.

3.5.3.2 Current Air Quality Conditions

Non-Radiological Emissions

Ambient concentration data are not available for criteria pollutants around the site. The nearest monitoring site is in the City of Portsmouth, approximately 43 kilometers (27 miles) to the south of the reservation. On the basis of 1998 through 2003 monitoring data, the highest concentrations for sulfur dioxide, nitrogen dioxide, carbon monoxide, particulate matter with a mean diameter of 10 micrometers or less, and lead are less than 64 percent of their respective National Ambient Air Quality Standards listed in Table 3-4 (EPA, 2003b). It is expected that levels at the DOE reservation are equal to or lower than these reported concentrations. The highest concentrations of ozone and particulate matter with a mean diameter of 2.5 micrometers or less are approaching or are somewhat higher than the applicable standards. These high concentrations are of regional concern and are associated with high precursor emissions from the Ohio Valley region and long-range transport from southern States.

Radiological Emissions

Although not used to measure criteria pollutants, there is a network of 15 air samplers in and around the DOE reservation that primarily collect data on radionuclide concentrations at the site. These data are used to assess whether air emissions from the DOE reservation affect air quality in the surrounding area. In addition to radionuclides, samples for fluoride are collected weekly from 15 ambient monitoring stations in and around the reservation. With only one exception, the average ambient concentrations measured at these stations in 2001 were similar to or less than those collected at a background station located approximately 21 kilometers (13 miles) southwest of the reservation (see Table 3-7). The exception was for the network station that is located within the process area immediately east of the X-326 building.

Table 3-7 Background Air Concentrations

Chemical/ Radionuclide	Units [a]	Number of Samples (Measurement) [b]	Minimum [c]	Maximum [c]	Average [c, d]
Americium-241	pCi/m^3	12 (12)	ND	1.5×10^{-05}	
Fluoride	$\mu g/m^3$	52(8)	1.2×10^{-02}	1.9×10^{-01}	6.3×10^{-02}
Neptunium-237	pCi/m^3	12 (12)	ND	5.9×10^{-06}	
Plutonium-238	pCi/m^3	12 (12)	ND	1.2×10^{-05}	
Plutonium-239/240	pCi/m^3	12 (12)	ND	8.0×10^{-06}	
Technetium-99	pCi/m^3	12 (12)	ND	1.9×10^{-03}	
Uranium	$\mu g/m^3$	12 (1)	4.6×10^{-04}	1.2×10^{-03}	7.5×10^{-04}
Uranium-233/234	pCi/m^3	12 (0)	1.4×10^{-04}	4.6×10^{-04}	2.8×10^{-04}
Uranium-235	pCi/m^3	12 (6)	ND	1.5×10^{-05}	
Uranium-236	pCi/m^3	12 (12)	ND	6.0×10^{-06}	
Uranium-238	pCi/m^3	12 (1)	1.5×10^{-04}	3.9×10^{-04}	2.5×10^{-04}

Notes:
[a] pCi/m^3 = picoCuries per cubic meter, $\mu g/m^3$ = micrograms per cubic meter.
[b] Radiological samples are analyzed monthly, samples for fluoride are analyzed weekly. Number in parentheses is the number of samples that were below the detection limit.
[c] ND = Not detected above method detection limit. Results above the detection limit are provided in scientific notation.
[d] For radionuclides, averages are not calculated for locations that had greater than 15 percent of the results below the detection limit. If the analytical result for a sample was below the detection limit, the ambient air concentration was calculated based on the detection limit for the sample. Averages were calculated for fluoride at all sampling locations.
Source: DOE, 2002b.

3.6 Geology, Minerals, and Soil

This section provides a brief description of the regional and local geology, including bedrock and soil characteristics and seismicity. There are not any economically valuable mineral resources, including oil and gas resources, that could be recovered from the potentially affected area.

3.6.1 Regional Geology, Structure, and Seismicity

The DOE reservation is situated within the Appalachian Plateau Physiographic Province of the Appalachian Highland region near its northwestern terminus at the Central Lowlands Province. The Appalachian Plateau is characterized by deeply dissected valleys and even crested ridge tops. Just east of the Scioto River, the summits of the main ridges rise to an altitude of more than 355 meters (1,160 feet) above mean sea level, with relief of up to 150 meters (490 feet) from the bottom of the valleys. The proposed ACP site would be situated at an elevation of approximately 205 meters (670 feet).

Surface and near-surface geology at the site have been heavily influenced by glaciation and the associated meltwaters. The DOE reservation is located in an abandoned river valley that was later filled with lake sediments deposited during the existence of prehistoric Lake Tight (Rogers et al., 1988). Bedrock at the site is composed of sedimentary rocks, primarily shale and sandstone, deposited in a broad shallow sea during the Paleozoic Era more than 230 million years ago. The rock units of interest at the site are, in ascending order, Ohio Shale, Bedford Shale, Berea Sandstone, Sunbury Shale, Cuyahoga Shale, Gallia Sand, and Minford Clay. Figure 3-9 shows the relationship of the geologic units to the site and region.

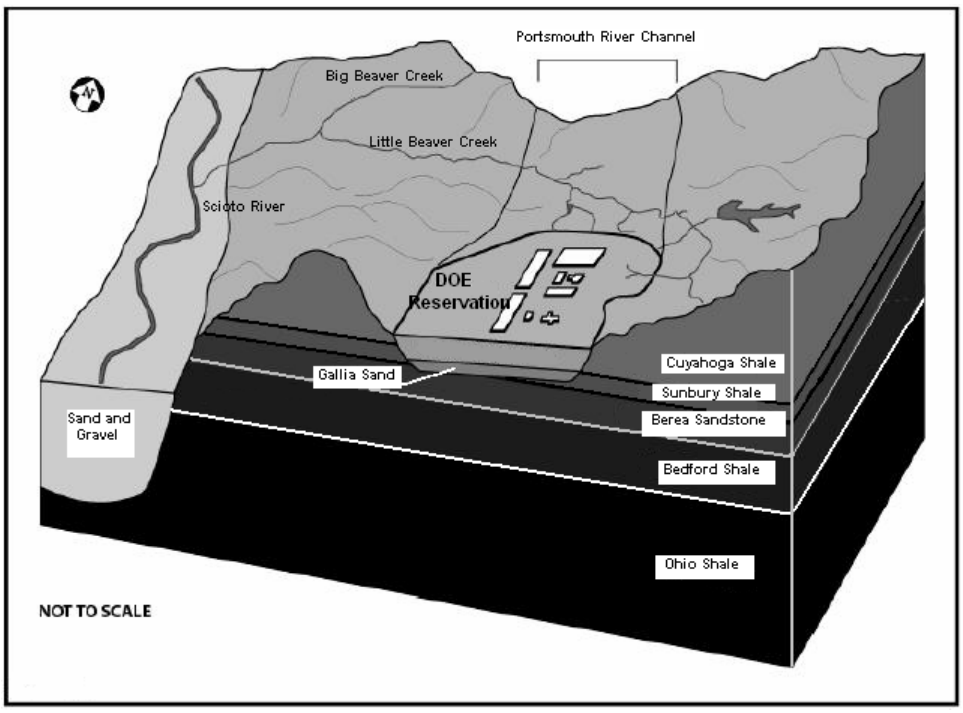

Figure 3-9 Site Geology in the Vicinity of the DOE Reservation at Piketon (NRC, 2004a)

The Ohio Shale is 90 to 120 meters (300 to 400 feet) thick at the site. It is black and thinly bedded and may contain noncommercial quantities of natural gas or oil. The Bedford Shale consists of interbedded thin sandstone and shale. The Berea Sandstone has a larger sand content than the Bedford Shale but is otherwise similar. At the proposed site, the Berea Sandstone forms an aquifer that has an average thickness of about 9 meters (30 feet). The Sunbury Shale is a black carbonaceous shale; this unit thins from east to west and may be completely absent in western portions of the site (DOE, 2004a)). The Teays Formation overlies the Sunbury Shale and is made up of Gallia Sand and Minford Clay, in ascending order. These unconsolidated deposits have a fluvial origin and occupy ancient channels of the Teays River System. The Gallia Sand member is a silty to clayey, coarse to fine-grained sand with a pebble base. The Minford Clay member contains interbedded silts and clays and is divided into two zones: an upper zone of clay and a lower zone of silty clay.

There are no major faults at the site. The nearest fault zone is the Kentucky River Fault Zone located approximately 40 kilometers (25 miles) south of the site. No seismic events have been associated with it. There have been no historical earthquakes within 40 kilometers (25 miles) of the site.

The largest recorded seismic event in the area was the Sharpsburg, Kentucky, earthquake of July 1980. Sharpsburg is located approximately 115 kilometers (70 miles) south of the DOE reservation. That earthquake registered a magnitude of 5.3 on the Richter Scale and a Modified Mercalli intensity of VII.

Ground motion from earthquakes causes damage to buildings and structures. Ground motion is measured as a percent of the acceleration of gravity. At 10 percent gravity (0.1g) some damage may occur in poorly constructed buildings. At 0.1g to 0.2g most people have trouble keeping their footing. In the 1980's DOE studied the historical seismicity of the areas surrounding the Portsmouth plant. Data were developed on probable seismic activity and the intensity levels were converted into acceleration values. They determined that the maximum earthquake likely to occur would produce a ground motion equal to 0.15

gravity, and a recurrence of 1,000 years. The GCEP and ACP were designed based on the Design Basis Earthquake of 0.15 gravity and 1,000 year recurrence. (DOE, 1980 and DOE, 1982)

3.6.2 Soils

A majority of the soils at the DOE reservation are formed on ancient river or lake deposits. Other important soil-forming materials are parent material from the underlying shale bedrock, colluvium, and loess (windblown material) (DOE, 2004a). Approximately 600 hectares (1,500 acres) of the site consist of moderately drained soils of the Urban Land-Omulga silt loam complex. The Omulga soil at the site is a dark grayish brown silt loam about 25 centimeters (10 inches) thick. Beneath this layer is about 137 centimeters (54 inches) of yellowish-brown subsoil. This material is characterized by a friable silt loam, a silty clay fragipan (low-permeability layer), and, near the bottom, a friable silt loam. Within the fragipan, the subsoil has low permeability. Other soils of the reservation include the Clifty and Wilbur silt loams, which occur in stream valleys. The upland areas contain a mixture of Coolville, Blairton, Latham, Princeton, Shelocta, and Wyatt soils. A description of these soils is provided in Hendershot et al. (1990).

Soil samples are collected semianually from nine onsite locations, six off-site locations within 5 kilometers (3 miles) of the site, and 12 remote locations 5 to 16 kilometers (3 to 10 miles) from the site. Samples are analyzed for total uranium, technetium-99, gross-alpha activity, and gross-beta activity. Table 3-8 summarizes the data from 1998 to 2002 and shows that the results from the different sampling locations are not significantly different. There are no soil data specifically from the proposed ACP site.

Table 3-8 Results of Baseline Soil Samples, 1998-2002 [a]

	Total Uranium mg/g	Technetium pCi/g	Gross Alpha pCi/g	Gross Beta pCi/g
Reservation (9 Soil Sampling Locations)				
No. of Samples [b]	117 (0)	117 (93)	117 (59)	117 (64)
Average	2.8	<0.2	<8	<14
Minimum	0.6	<0.1	<2	8
Maximum	4.4	1.5	21	36
Off Reservation (6 Soil Sampling Locations)				
No. of Samples [b]	74 (0)	74 (32)	74 (38)	74 (41)
Average	2.9	<0.2	<7	<14
Minimum	0.7	<0.1	<2	<8
Maximum	4.6	3.8	14	47
Remote (12 Soil Sampling Locations)				
No. of Samples [b]	139 (0)	139 (133)	139 (73)	139 (77)
Average	3.0	<0.2	<7	<14
Minimum	0.7	<0.1	<3	<7
Maximum	5.9	0.8	16	22

Notes:
[a] mg/g = milligrams per gram; pCi/g = picoCuries per gram.
[b] The "number of samples" shows the total number of samples collected, including replicate and duplicate samples collected for quality assurance purposes, followed by the number of samples that were lower than the Minimum Detectable Concentration in parentheses.
Source: USEC, 2004a.

3.7 Water Resources

This section presents a discussion of the surface water and its associated resources (floodplains) and groundwater in the vicinity of the DOE reservation, including the regional and local surface water features (rivers/streams and lakes/ponds) surrounding the reservation, as well as the floodplains located on the reservation. The discussion of surface water describes the existing features, summarizes the existing National Pollutant Discharge Elimination System permitted outfalls from the reservation to such features, and concludes with a discussion of water quality and its designated uses. The discussion of floodplains present the location and attributes of such features on the reservation. The groundwater discussion describes the regional groundwater aquifers, the groundwater well fields associated with the DOE reservation, and the onsite groundwater conditions and remediation activities.

3.7.1 Surface Water Features

The DOE reservation is within the Lower Scioto River watershed, U.S. Geological Survey Cataloging Unit: 05060002. The reservation occupies an upland area at an elevation of 200 meters (670 feet) above mean sea level and is bordered by ridges of low-lying hills. Surface waters drain from the DOE reservation via a network of tributaries to the Scioto River located approximately 3.2 kilometers (2 miles) to the west (Rogers et al., 1988). The average flow in the Scioto River measured at Higby (approximately 32 kilometers [20 miles] northeast and upstream of the reservation) is 133 cubic meters per second (2.1 x 10^6 gallons per minute). The 10-year low-flow discharge at Higby is 8.58 cubic metes per second (1.4 x 10^5 gallons per minute). The Scioto River discharges into the Ohio River approximately 40 kilometers (25 miles) south and downstream of the reservation. There are no known public or private water supplies draw from this section of the Scioto River (USEC, 2005).

Surface water features on the DOE property include streams, ditches, holding ponds, and lagoons as shown on Figure 3-10. There are four lagoons, eight holding ponds, several unnamed tributaries and drainage pathways, and four named streams and ditches on the DOE reservation. The four streams include Little Beaver Creek, Big Run Creek, the West Ditch, and the DOE Piketon Tributary. Little Beaver Creek drains the northern portion of the reservation, Big Run Creek drains the east-central and southern portions of the reservation, the West Ditch drains the west-central portion of the reservation, and the DOE Piketon Tributary drains the south-western portion of the reservation. Storm water at the DOE reservation is collected by a series of storm water sewers and open culverts. The reservation has eight specific storm water collection areas, which transmit the storm water flow to one of the onsite streams or ditches. All of the streams and ditches transport the surface water, including storm water, from the reservation to the Scioto River.

The largest stream on the DOE reservation is Little Beaver Creek, which discharges into Big Beaver Creek, which then discharges into the Scioto River. Upstream of the plant, Little Beaver Creek flows intermittently during the year. Onsite, it receives treated wastewater from a holding pond (via the east drainage ditch) and storm water runoff from the northwestern and northern sections of the reservation via several storm sewers, water courses, and the north holding pond. The average release to Little Beaver Creek for 1993 was 0.06 cubic meter per second (951 gallons per minute).

The next largest stream, Big Run Creek, receives effluent from the South Holding Pond (X-230K), and flows offsite to the southwest where it joins the Scioto River approximately 6.4 river-kilometers (4 river-miles) from the reservation. Storm sewers in the southern end of the reservation discharge to the South Holding Pond. The DOE Piketon Tributary, is a small intermittent watercourse leading from Holding Pond No. 1 (X-2230M, National Pollutant Discharge Elimination System permit number 012) to the

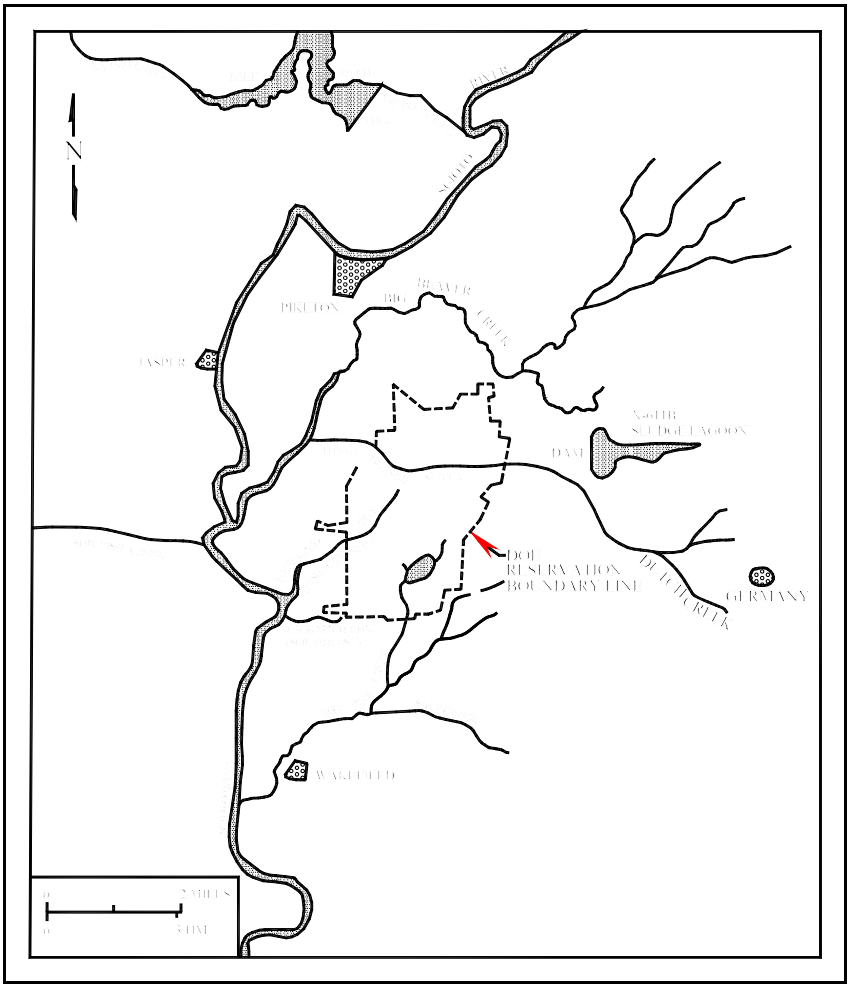

Figure 3-10 Surface Water Features at the DOE Reservation at Piketon (USEC, 2005)

Scioto River, 1.6 stream-kilometers (1 stream-mile) downstream. The West Ditch receives surface water from existing open drainage swales and from Holding Pond No. 2, X-2230N and flows for 6.4 stream-kilometers (4 stream-mile) before discharging into the Scioto River.

The Ohio Administrative Code (3745-1-09) for the Scioto river drainage basin classifies the designated uses of the surface waters within and surrounding the DOE reservation. The aquatic life habitat, water supply, and recreational use designations are defined in rule 3745-1-07 of the Ohio Administrative Code. The State resource water use designation is defined in rule 3745-1-05 of the Ohio Administrative Code. The most stringent criteria associated with any one of the use designations assigned to a water body will apply to that water body.

The surface water features that drain the DOE reservation as well as the Scioto River and their designated uses are as follows:

- Little Beaver Creek: State Resource Water; Warm Water Habitat; Agricultural Water Supply; Industrial Water Supply; and Primary Contact Recreation.

- Big Run Creek: Warm Water Habitat; Agricultural Water Supply; Industrial Water Supply; and Primary Contact Recreation.

- DOE Piketon Tributary: Limited Resource Water; Agricultural Water Supply; Industrial Water Supply; and Secondary Contact Recreation.

- West Ditch: Warm Water Habitat; Agricultural Water Supply; Industrial Water Supply; Secondary Contact Recreation.

- Scioto River: Warm Water Habitat; Public Water Supply; Agricultural Water Supply; Industrial Water Supply; Primary Contact Recreation.

The designated uses of the rivers, streams, and ditches aid in defining the parameters associated with the National Pollutant Discharge Elimination System permits issued by the State of Ohio. Currently, the DOE reservation maintains a total of 19 permitted outfalls, which are managed by both DOE and the United States Enrichment Corporation. DOE is responsible for eight of the 19 permitted outfalls, including:

- Three DOE outfalls that discharge directly to surface water (to the DOE Piketon Tributary, the West Ditch, and Little Beaver Creek).

- Three outfalls discharge to USEC building X-6619, Sewage Treatment Plant, which are subsequently discharged through a permit issued to USEC for Outfall 003. These three are Outfalls 608, 610, and 611.

- Two outfalls discharge to holding ponds.

The United States Enrichment Corporation is responsible for 11 of the 19 National Pollutant Discharge Elimination System permitted outfalls, including:

- Eight outfalls that discharge directly to surface water (DOE Piketon Tributary, West Ditch, Little Beaver Creek, Big Run Creek, and the Scioto River).

- Two outfalls that discharge to the X-6619 Sewage Treatment Plant (Outfall 003).

- One outfall that discharges to the X-230K South Holding Pond (Outfall 002). (USEC, 2003)

Table 3-9 lists the 19 outfalls by permit number and includes information on the operator (DOE or the United States Enrichment Corporation), a description of the outfall, and the ultimate receiving water body. These United States Enrichment Corporation outfalls are illustrated in Figure 3-11.

The domestic wastewater generated by the offices and change houses is treated on the reservation at the sewage treatment plant. The design capacity of the sewage treatment plant is 2,275,032 liters per day (601,000 gallons per day), and in 2003, the facility operated at 27 percent of that capacity (USEC, 2003). The discharge from the sewage treatment plant is within its National Pollutant Discharge Elimination System permit criteria.

Table 3-9 National Pollutant Discharge Elimination System Permit Operator, Description, and Receiving Water Body

Operator	Outfall	Description	Receiving Water Body
United States Enrichment Corporation	001	X-230J7 - East Holding Pond	Tributary of Little Beaver Creek
United States Enrichment Corporation	002	X-230K - South Holding Pond	Big Run
United States Enrichment Corporation	003	Building X-6619, sewage treatment plant	Scioto River
United States Enrichment Corporation	004	Cooling tower blowdown	Scioto River
United States Enrichment Corporation	005	X-611B - lime sludge lagoon	Little Beaver Creek
United States Enrichment Corporation	009	X-230L - North Holding Pond	Tributary to Little Beaver Creek
United States Enrichment Corporation	010	X-230J5 - Northwest Holding Pond	West ditch
United States Enrichment Corporation	011	X-230J6 - Northeast Holding Pond	Tributary to Little Beaver Creek
DOE	012	X-2230M pond	DOE Piketon Tributary
DOE	013	X-2230N pond	West ditch
DOE	015	Groundwater treatment facility	Tributary to Little Beaver Creek
DOE	608 [a]	Groundwater treatment plant	Sewage treatment plant
DOE	610 [a]	Groundwater treatment plant	Sewage treatment plant
DOE	611 [a]	Groundwater treatment plant	Sewage treatment plant
DOE	612 [a]	Groundwater treatment plant discharging to X-2230M pond	DOE Piketon Tributary - inactive
DOE	613	Particulate separator	Not applicable
United States Enrichment Corporation	602	X-621 coal pile runoff treatment facility	Big Run Creek
United States Enrichment Corporation	604	X-700 bio-nitrification facility	Sewage treatment plant
United States Enrichment Corporation	605	X-705 decontamination microfiltration facility	Sewage treatment plant

Notes:
[a] Discharging to receiving waters downstream of the surface water runoff pathway associated with the proposed action.
Note: DOE internal Outfalls 608, 610, and 611 discharge to United States Enrichment Corporation Outfall 003 (X-6619 Sewage Treatment Plant). DOE internal Outfall 612 discharges to DOE Outfall 012.

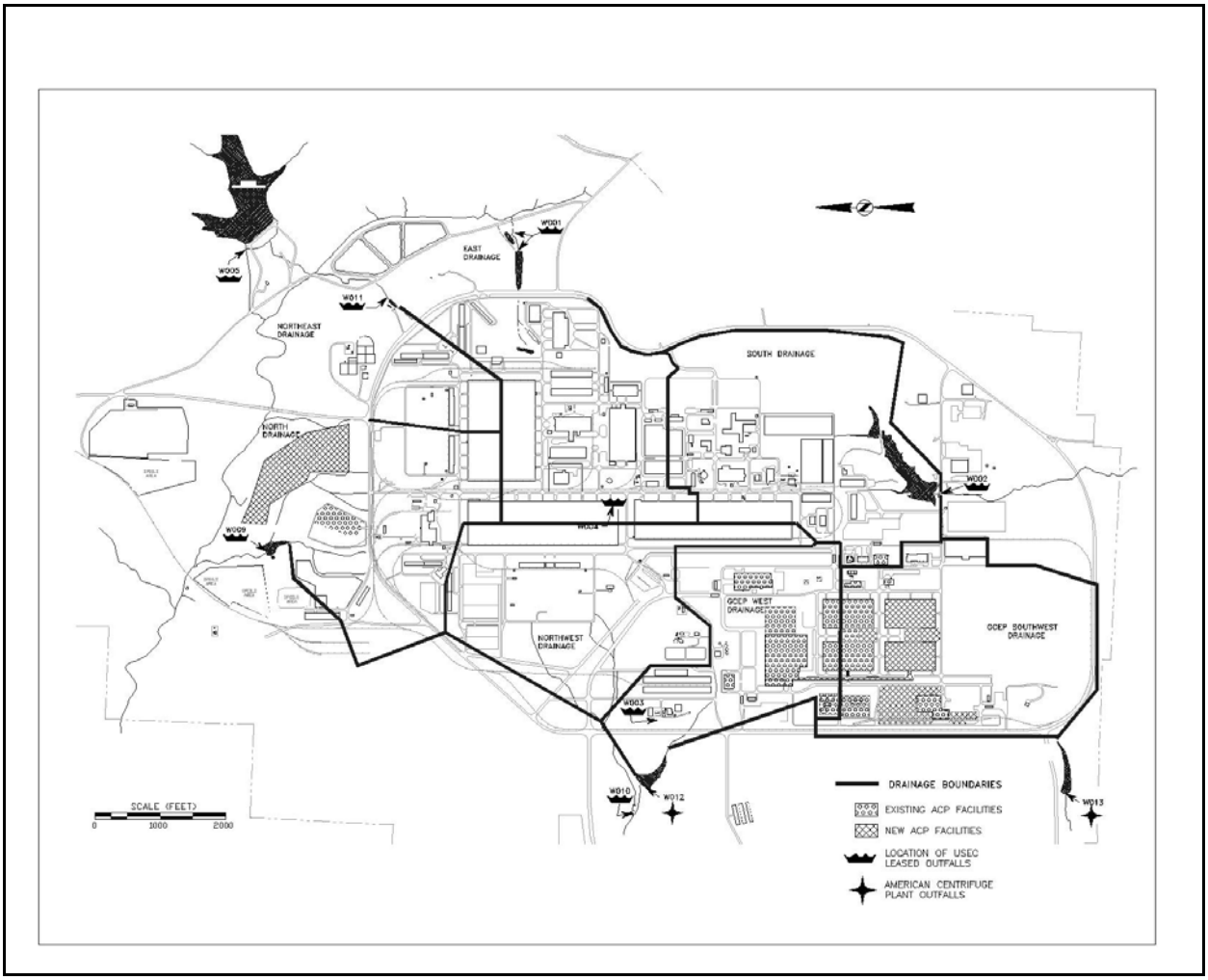

Figure 3-11 United States Enrichment Corporation National Pollutant Discharge Elimination System Outfalls at the DOE Reservation at Piketon

3.7.1.1 Surface Water Quality

At the DOE reservation at Piketon, DOE is responsible for eight permitted outfalls and the United States Enrichment Corporation is responsible for 11 permitted outfalls, as discussed earlier (DOE, 2002c). In addition to monitoring the water quality parameters required by Ohio EPA, DOE monitors radionuclides contained in the discharges. Ohio EPA selects the chemical parameters that must be monitored at each outfall based on the chemical characteristics of the water that flows into the outfall. Table 3-10 lists the parameters required by Ohio EPA for the outfalls that may be used for the development and operation of the proposed ACP.

Permitted outfalls managed by the United States Enrichment Corporation were in compliance with contaminant concentration discharge limits in 2002 (DOE, 2003b; NRC, 2004a). Permitted outfalls managed by DOE were in compliance with contaminant concentration discharge limits in 2003 (DOE, 2004a).

Table 3-10 National Pollutant Discharge Elimination System Permit and Monitoring Parameters

Operator	Outfall	Parameters
United States Enrichment Corporation	003	Ammonia-nitrogen, biochemical oxygen demand, chlorine, copper, fecal coliform (May-October only), mercury, nitrate-nitrogen, oil and grease, silver, suspended solids, zinc
United States Enrichment Corporation	009	Fluoride, cadmium, oil and grease, suspended solids, zinc
United States Enrichment Corporation	010	Cadmium, mercury, oil and grease, suspended solids, zinc
DOE	012	Chlorine, iron, oil and grease, suspended solids, total PCBs, and trichloroethene
DOE	013	Chlorine, oil and grease, suspended solids, and total PCBs
DOE	608 [a]	Trichloroethene and trans-1,2-dichloroethene
DOE	610 [a]	Trichloroethene and *trans*-1,2-dichloroethene
DOE	611 [a]	Trichloroethene

Source: DOE, 2002b.

In addition to the characteristics of the water the flows into the outfall, the National Pollutant Discharge Elimination System permits consider the designated use and the associated water quality of the receiving water body. The following uses have been designated for one or more of the surface water features that drain the DOE Reservation:

- Warm Water Habitat. Exhibits typical assemblages of fish and invertebrates belonging to any other than cold or cool water species. Warm water habitats are waters capable of supporting and maintaining a balanced, integrated, adaptive community of warm water aquatic organisms having a diverse species composition and functional organization.

- Limited Resource Water. These are waters that have been the subject of a use attainability analysis and have been found to lack the potential for any resemblance of any other aquatic life habitat as determined by the biological criteria in Table 7-15 of Ohio Administrative Code 3745-1-07. The use attainability analysis must demonstrate that the extant fauna is substantially degraded and that the potential for recovery of the fauna to the level characteristic of any other aquatic life habitat is realistically precluded due to natural background conditions or irretrievable human-induced conditions.

- Agricultural Water Supply. These are waters suitable for irrigation and livestock watering without treatment.

- Primary Contact Recreation. These are waters that, during the recreation season, are suitable for full-body contact recreation such as, but not limited to, swimming, canoeing, and scuba diving with minimal threat to public health as a result of water quality.

- Secondary Contact Recreation. These are waters that, during the recreation season, are suitable for partial body contact recreation such as, but not limited to, wading with minimal threat to public health as a result of water quality.

The specific water quality conditions and parameters associated with each designated use can be found in Ohio Administrative Code 3745-1-07 (water use designations and Statewide criteria).

With the exception of DOE outfall 613, a monthly grab water sample is collected from DOE external outfalls and analyzed for total uranium, uranium isotopes (uranium-233/234, uranium-235, uranium-236, and uranium-238), technetium-99, and transuranic radionuclides (americium-241, neptunium-237, plutonium-238, and plutonium-239/240). Outfall 613 is not monitored for radionuclides because there is no source for radiological contamination of the water discharged from this outfall. Also, water samples are collected from all external United States Enrichment Corporation outfalls and analyzed for total uranium, technetium-99, and transuranic radionuclides (americium-241, neptunium-237, plutonium-238, and plutonium-239/240). (DOE, 2004c)

Total radioactivity released from the DOE external outfalls was 0.0049 curie of uranium isotopes and 0.00004 curie of technetium-99. These values were calculated using monthly monitoring data from the DOE NPDES outfalls. Neptunium-237 was detected at 0.04637 picocurie per liter (pCi/L) in the sample collected from DOE Outfall 015 in the fourth quarter of 2003. Neptunium-237 was not detected at Outfall 015 in the other three quarterly samples collected in 2003. Americium-241, plutonium-238, and plutonium-239/240 were not detected in samples collected from any of the DOE outfalls in 2003. (DOE, 2004c). Total radioactivity released from the United States Enrichment Corporation external outfalls was 1.1×10^9 bequerels (0.0296 curies) of uranium and 1.2×10^9 bequerels (0.0335 curies) of technetium-99. Transuranic radionuclides (americium-241, neptunium-237, plutonium-238, and plutonium-239/240) were not detected in any of the samples collected from USEC NPDES outfalls in 2003. (DOE, 2004c)

In 2003, an estimated 4.3 kilograms (9.5 pounds) of uranium were discharged from DOE National Pollution Discharge Elimination System outfalls and 21 kilograms (46 pounds) were discharged from United States Enrichment Corporation outfalls, for a total of 25.3 kilograms (55.5 pounds). (DOE, 2004c)

The analytical results were compared to the standards included in DOE Order 5400.5, Radiation Protection of the Public and the Environment. DOE Order 5400.5 provides guidance and establishes radiation protection standards and control practices designed to protect the public and the environment from undue radiological risk from operations of DOE and DOE contractors. The order requires that off-site radiation doses do not exceed 100 millirem/year above background for all exposure pathways.

The derived concentration guide for each radionuclide as defined in DOE Order 5400.5 includes the following concentrations (in picocuries per liter):

- Americium-241 = 30
- Neptunium-237 = 30
- Plutonium-238 = 40
- Plutonium-239/240 = 30
- Technetium-99 = 100,000
- Uranium-233/234 = 500
- Uranium-235 = 600
- Uranium-236 = 500

- Uranium-238 = 600
- No derived concentration guide is available for total uranium.

All analytical results from the external NPDES outfalls are well below these DOE standards.

In addition to the external NPDES outfalls, the surface waters are monitored for radioactive contamination at 14 locations, including locations upstream and downstream from the DOE reservation. The surface water monitoring results for 2001 indicated that the measured radioactive contamination was consistently less than the applicable drinking water standards (DOE, 2002b and 2002c). Uranium concentrations were detected at levels similar to those that occurred naturally in the Scioto River. Technetium-99 was detected at 1,591 becquerels per cubic meter (43 picocuries per liter) in a sample collected downstream of Little Beaver Creek; this level is well below the DOE-derived concentration guide of 3.7×10^6 becquerels per cubic meter (100,000 picocuries per liter) (DOE, 2002c). The DOE derived concentration guide values given in DOE Order 5400.5 are reference values for radiological protection programs at operational DOE facilities (DOE, 1993b). In addition, in 2001, surface water samples were collected monthly from five locations at the DOE cylinder storage yards and analyzed for total uranium, uranium isotopes, transuranics, and technetium-99. The maximum detected concentration of uranium in these samples was 14 micrograms per liter, which is less than the drinking water Maximum Contaminant Level of 30 micrograms per liter; the maximum technetium-99 concentration was 370 becquerels per cubic meter (10 picocuries per liter), well below the DOE-derived concentration guide of 3.7×10^6 becquerels per cubic meter (100,000 picocuries per liter).

Sediment samples are also collected at the locations where surface water samples are collected by the United States Enrichment Corporation, and at the permitted outfalls on the east and west sides of the DOE reservation (DOE, 2002c). In 2001, the maximum uranium concentration in sediment was 5.6 micrograms per gram, at background sampling location (RM-10W). The maximum technetium-99 concentration was 592 becquerels per kilogram (16 picocuries per gram), at location RM-7 downstream on Little Beaver Creek. Several inorganic substances and polychlorinated biphenyls are also monitored; results of the monitoring indicate no major difference between upstream and downstream concentrations. Polychlorinated biphenyls were not detected in sediments.

3.7.2 Floodplains

Floodplains are land areas adjacent to streams or rivers susceptible to being inundated by stream-derived waters. The Federal Emergency Management Agency Flood Insurance Rate Map indicates that the 100-year floodplain for Little Beaver Creek extends from the confluence with the Big Beaver Creek upstream to the rail spur near environmental sampling point X-230J9. This is within the northwestern portion of the DOE reservation. No portion of the floodplain for Big Beaver Creek is located within the reservation boundary, as shown in Figure 3-12.

The DOE reservation has not been affected by flooding of the Scioto River. The highest recorded flood elevation of the Scioto River in the vicinity of the site was 174 meters (570 feet) above mean sea level in January 1913. The reservation occupies an upland area at an elevation of 200 meters (670 feet) above mean sea level.

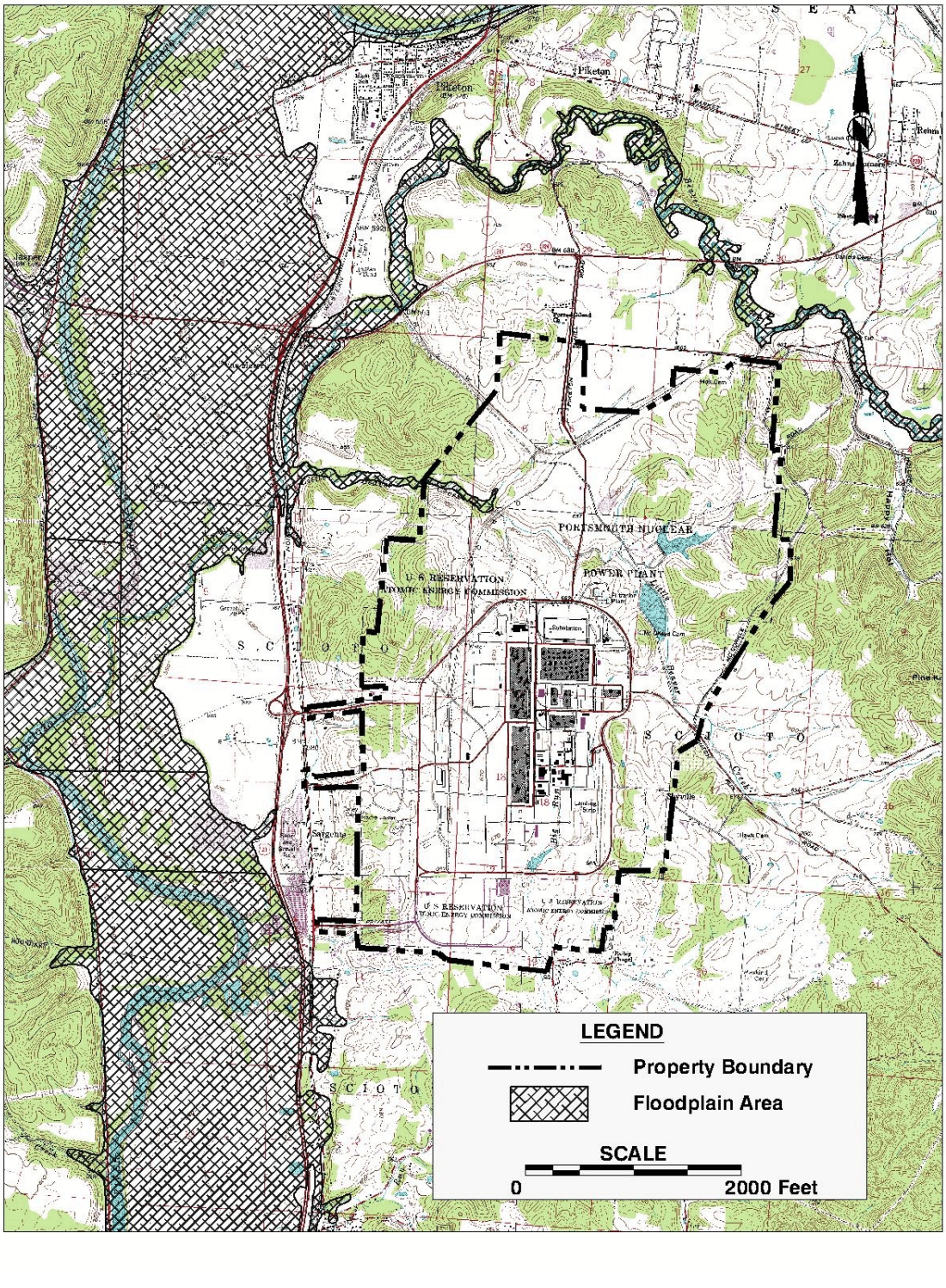

Figure 3-12 100-Year Floodplains at the DOE Reservation at Piketon (ODNR, 2005)

3.7.3 Groundwater

Five hydrogeological units are important for groundwater flow and contaminant migration beneath the DOE reservation. These units are: Minford Clay, Gallia Sand, Sunbury Shale, Berea Sandstone, and Bedford Shale. The upper two units form an aquifer in unconsolidated Quaternary aged deposits; the lower three units form a Mississippian-aged bedrock aquifer. At the site, the hydraulic conductivities of all of the units are very low (Geraghty & Miller, Inc., 1989). The most conductive unit is Gallia Sand with a mean hydraulic conductivity of 1 meter per day (3.4 feet per day) and a range of 0.03 to 46 meters per day (0.11 to 150 feet per day); the Gallia Sand acts as the principal conduit for contaminant transport. The next most permeable unit is the Berea Sandstone with a mean hydraulic conductivity of 0.05 meter per day (0.16 foot per day) and a range of 0.0013 to 4.6 meters per day (0.0045 to 15 feet per day). The average conductivity of Minford Clay, the shallowest unit, is estimated to be 7.0×10^{-5} meter per day (0.00023 foot per day) in the upper zone, while the conductivity of the lower zone is about 0.0013 meter per day (0.0042 foot per day). Average groundwater elevation is 196 meters (646 feet) above mean sea level, which is approximately 7.3 meters (24 feet) below ground surface.

Within the upper portion of the bedrock aquifer, permeability is primarily produced by fractures. As depth increases, the presence of fractures decreases, and permeability depends more on porosity, grain size and shape, and packing arrangement (MMES, 1993). At greater depth, the Berea Sandstone is probably more permeable than the shale units, which act as confining layers. The direction of groundwater flow beneath the site is controlled by a complex interaction between the Gallia and Berea units (Geraghty & Miller, Inc., 1989). The flow patterns are also affected by the presence of storm sewer drains and by the reduction in recharge caused by the presence of buildings and paved areas. Groundwater flow patterns in both the Gallia and Berea units are characterized by an east-west-trending groundwater divide. The direction of groundwater flow is generally to the south in the southern sections of the DOE reservation and to the north in the northern sections.

Vertical groundwater flow is generally downward from the Gallia to the Berea. In places where the Sunbury Shale is absent, upward vertical gradients are observed. The extent of the gradient is influenced by the thickness of the Sunbury Shale. Where the Sunbury Shale is thick, the gradient is large. Three main discharge areas exist for the groundwater system beneath the DOE: Little Beaver Creek to the north and east, Big Run Creek to the south, and two unnamed drainages to the west (Geraghty & Miller, Inc., 1989).

The DOE reservation draws its water from three well fields located along the Scioto River (see Figure 3-13). The well fields draw groundwater from the Scioto River buried aquifer and are located in the Scioto River alluvium within the Scioto River floodplain. Recharge of the aquifer occurs from river and stream flow as well as precipitation (annual average rainfall is 103 centimeters [40.7 inches]). The maximum potential production associated with the well fields is 49,000 cubic meters per day (13 million gallons per day). The current production is approximately 19,000 cubic meters per day (5 million gallons per day).

Groundwater quality has been studied extensively as part of DOE's environmental restoration activities. Groundwater quality is monitored for radioactive and nonradioactive constituents in 11 areas at and near the facility using more than 400 wells. For monitoring and treatment purposes, the site was divided into four quadrants roughly corresponding to groundwater flow patterns. The primary facilities for the proposed ACP site are located in Quadrant I; two of the cylinder storage yards are in Quadrant IV. In Quadrant I, groundwater discharges to Big Run Creek and to an unnamed Southwest drainage ditch. In Quadrant IV, groundwater discharges to the Little Beaver Creek and to the East and North drainage ditches.

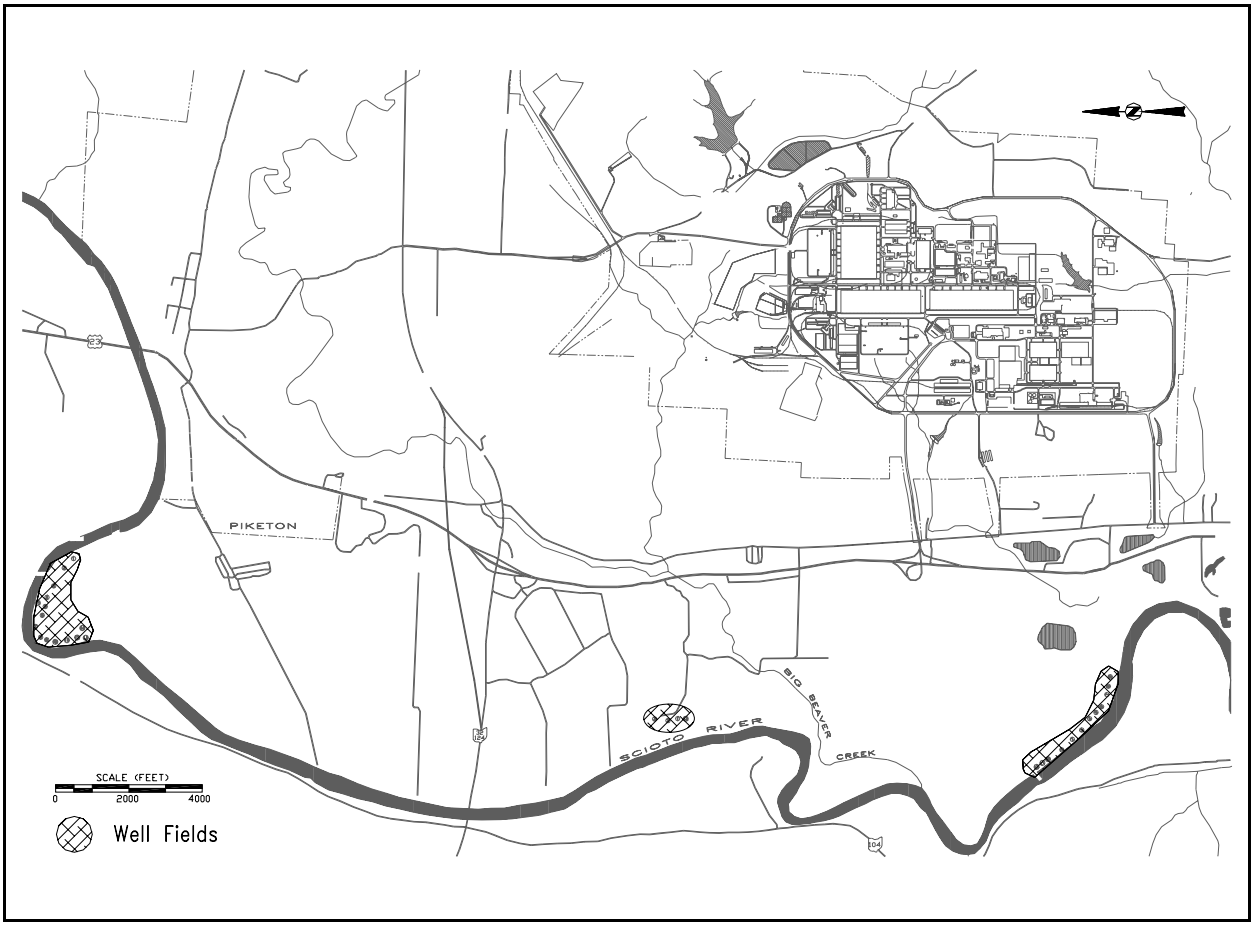

Figure 3-13 Well Fields at the DOE Reservation at Piketon (USEC, 2005)

Onsite, several areas of groundwater contamination have been identified. The main contaminants are volatile organic compounds (mostly trichloroethylene) and radionuclides (e.g., uranium, technetium-99) (DOE, 2002c). Data from the 2000 annual groundwater monitoring showed that five contaminants exceeded primary drinking water standards at the DOE reservation: beryllium, chloroethane, americium, trichloroethylene, and uranium. Alpha and beta activity also exceeded the standards (DOE, 2001a, b). The concentration of contaminants and the lateral extent of the plume did not significantly increase in 2001 (DOE, 2002c).

The primary facilities for the proposed ACP site are located approximately 60 to 90 meters (200 to 300 feet) north of the northern edge of the X-749 trichloroethylene plume. The proposed location for the new cylinder storage yards north of Perimeter Road is between three groundwater monitoring areas: X-533 switchyard, X-734 landfills, and X-735 landfills. Based on 2002 monitoring results, the proposed ACP facilities do not overlie contaminated groundwater. Various monitoring wells are located in the vicinity of the proposed ACP facilities; however, no groundwater extraction wells, phytoremediation areas, or groundwater treatment facilities are located within the footprint of the proposed ACP facilities.

3.8 Ecological Resources

This section describes the ecological resources, including terrestrial resources (flora and fauna); rare, threatened, and endangered species; wetlands; and other environmentally sensitive areas within the DOE reservation at Piketon.

3.8.1 Flora

The vegetative cover in surrounding Pike County consists mostly of hardwood forests and field crops (USEC, 2005). The terrestrial habitat types at the DOE reservation include (DOE, 1997a):

- Old field areas: Early successional stage of disturbed areas dominated by tall weeds, shade-intolerant trees, and shrubs.
- Scrub thicket: Later successional stage covering old field areas dominated by dense thickets of small trees.
- Managed grassland: Open areas actively maintained and dominated by grasses.
- Upland mixed hardwood forest: Mesic to dry upland areas dominated by black walnut, black locust, honey locust, black cherry, and persimmon.
- Pine forest: Advanced successional stage following scrub thicket. The overstory is dominated by Virginia pine.
- Pine plantation: Nearly pure stands of Virginia pines.
- Oak-hickory forest: Well-drained upland soils. White oak and shagbark hickory are the most dominant of the oaks and hickories.
- Riparian forest: Periodically flooded, low areas associated with streams. Dominated by cottonwood, sycamore, willows, silver maple, and black walnut.
- Beech-maple forest: Undisturbed areas dominated by American beech and sugar maple.
- Maple forest: Dominated by sugar maple and other shade-tolerant species.

The habitat types covering the largest area on the reservation are managed grassland (30 percent of total area), oak-hickory forest (17 percent), and upland mixed hardwood forest (11 percent). The areas covered by each habitat type are listed in Table 3-11 and shown in Figure 3-14 . Several species of animals have been observed within the DOE reservation property boundary.

Table 3-11 Terrestrial Habitat Types at the DOE Reservation at Piketon

Habitat Type	Approximate Total Area (hectares)	Approximate No. of Communities	Percent of Total Area [a]
Managed grassland	446	Numerous [b]	30
Oak-hickory forest	256	14	17.2
Old field	170	10	11.4
Upland mixed hardwood forest	162	20	10.9
Riparian forest	62	10	4.2
Maple forest	52	7	3.5
Scrub thicket	32	10	2.2
Pine forest	28	10	1.9
Beech-maple forest	2	1	0.1
Old white pine plantation with mixed hardwoods	2	1	0.1

Notes:
[a] Total site area is 1,497 hectares (3,700 acres). Approximately 252 hectares (629 acres, 16.9 percent) of the total area are covered by buildings, parking lots, and roads. The remainder of the total site area contains aquatic habitat.
[b] This habitat is present in many areas interspersed between buildings and paved areas across the plant site.
To convert hectares to acres multiply by 2.47.
Source: DOE, 1997b.

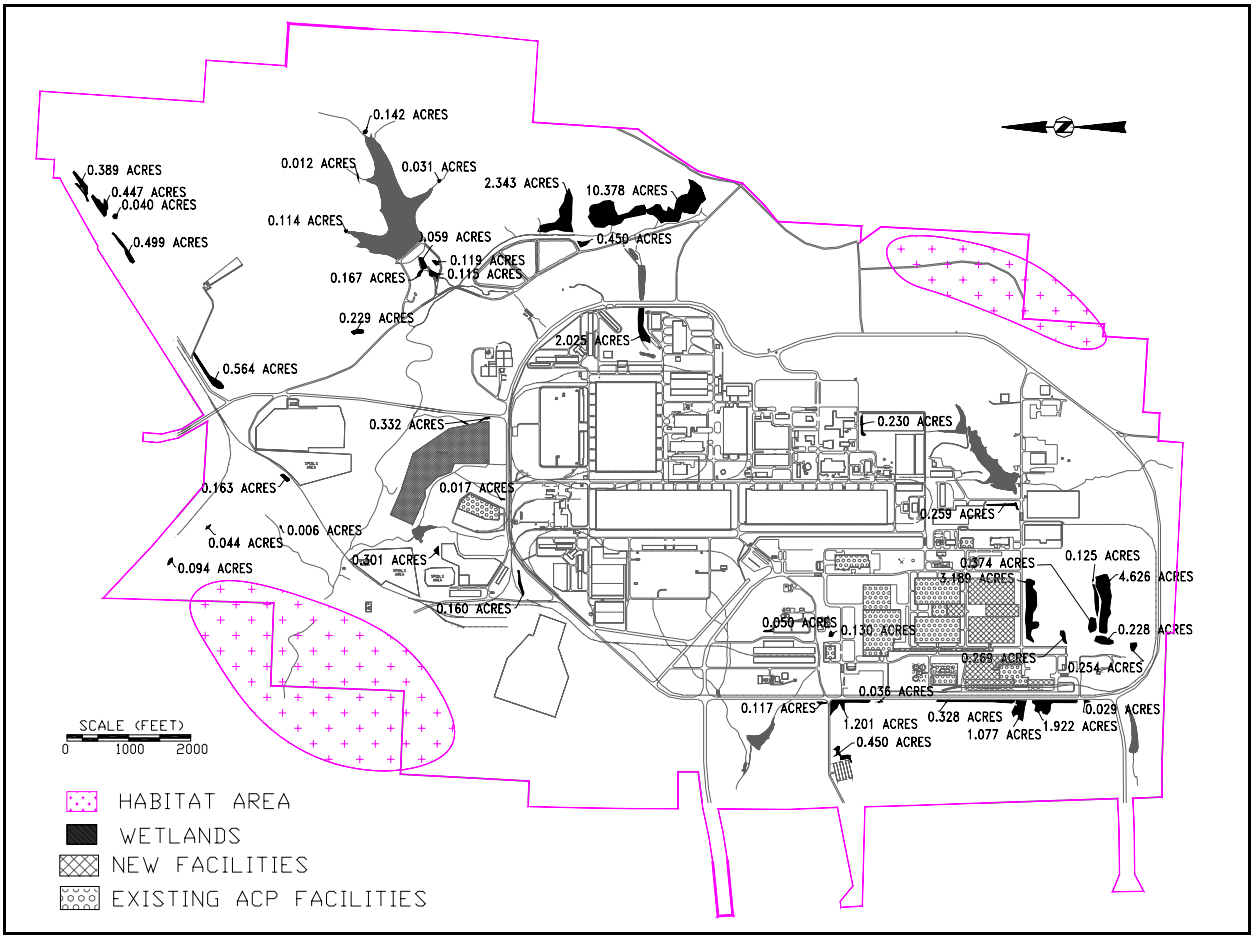

Figure 3-14 Habitat Areas and Wetlands on and Near the Proposed ACP Site (USEC, 2005)

The most common types of vegetation on the DOE reservation include managed grassland, followed by oak-hickory forests, old field communities, and upland mixed hardwood forest, the sum of which make up more than 69 percent of the total area of the reservation. The area in the southwest quadrant of the central area, where the majority of the proposed ACP facilities would be located, is dominated by existing infrastructure (buildings, structures, roads, and parking lots) and managed grasslands. Several wetland communities are also present in the southwest quadrant (see Section 3.8.4). The area where the 745-H Cylinder Storage Yard would be constructed contains managed grasslands, old fields, upland mixed hardwood forest, and riparian forest. Wetlands are also located around the proposed 745-H Cylinder Storage Yard and are associated with the tributaries of Little Beaver Creek.

The flora associated with the wetlands adjacent to the activities associated with the proposed action includes emergent vegetation including sedges, rushes, cat-tails, and various woody species (trees and shrubs) tolerant of the saturated conditions of wetlands.

3.8.2 Fauna

A relatively high diversity of fauna (terrestrial and aquatic species) utilize the various terrestrial and aquatic habitats at the DOE reservation. The reservation is within the home range of approximately 49 mammals, 114 bird species (year-round residents, winter residents, and migratory species), 11 reptile species, and six amphibian species (USEC, 2005). The most abundant mammals include the white-footed

mouse (*Peromyscus leucopus*), short-tailed shrew (*Blarina brevicauda*), opossum (*Didelphis virginiania*), eastern cotton tail rabbit (*Sylvilagus floridanus*), and white-tailed deer (*Odocoileus virginianus*). Common birds found at the reservation include year-round residents, winter residents, and migratory species. The species include red-tailed hawk (*Buteo jamaicensis*); water birds such as the mallard (*Anas platrynchos*) and wood duck (*Aix sponsa*); game birds such as wild turkey (*Meleagris gallopavo*); and non-game birds such as nuthatches (*Sitta* sp.) and wrens *(Troglodytes* sp.). The most common of the 11 reptile species and six species of amphibians observed on the site include the eastern box turtle (*Terrapene carolina*), black rat snake (*Elaphe obsolete*), northern black racer (*Coluber constrictor constrictor*), American toad (*Bufo americanus*) and northern dusky salamander *(Desmognathus fuscus*) (DOE, 1996a).

Common species occurring in open grassland areas like those at the proposed ACP site include eastern cottontail (*Lagomorpha Leporidae*), meadow vole (*Rodentia muridae*), and eastern meadowlark (*Sturnella magna*). Small wooded areas, such as those in the vicinity of the proposed ACP site, support numerous woodland and forest edge species such as raccoon (*Procyon lotor*), gray squirrel (Sciurus carolinensis), red-headed woodpecker (*Melanerpes erythrocephalus*), cardinal (*Cardinalis cardinalis*), white-breasted nuthatch (*Sitta carolinensis*), and yellow-rumped warbler (*Dendroica coronata*). Species that occur in the open grasslands and forest edges that are either actively managed (mowed) or adjacent to developed areas are tolerant of human activities and disturbances.

The aquatic habitats on the DOE reservation include the various holding ponds, intermittent streams, and streams that flow from or through the reservation. The aquatic habitats downgradient of the activities associated with the proposed action include Little Beaver Creek, the West Ditch, and the DOE Piketon Tributary, all of which discharge into the Scioto River. Little Beaver Creek and the West Ditch are designated warm water habitats. Warm water habitats are capable of supporting and maintaining a balanced, integrated, adaptive community of warm water aquatic organisms having a diverse species composition and functional organization. The aquatic habitat associated with Little Beaver Creek supports good to exceptional fish communities downstream of the X-230-J7 discharge from the DOE reservation, and fair fish communities upstream due to intermittent stream flow (OEPA, 1998). The most common of the 34 total fish species and four hybrids found in Little Beaver Creek are the Bluntnose Minnow (*Pimephales notatus*), Central Stoneroller (*Campostoma anomalum*), Creek Chub (*Semotilus atromaculatus*), Rainbow Darter (*Etheostoma caeruleum*), Spotfin Shiner (*Cyprinella spiloptera*), and Striped Shiner (*Luxilus chrysocephalus*). The aquatic habitat associated with the DOE Piketon Tributary is a limited resource water, which does not meet one or more of the warm water habitat characteristics. and provides limited aquatic habitat.

3.8.3 Rare, Threatened, and Endangered Species

The potential existence of Federal and State rare, threatened, and endangered species as well as candidate species in the vicinity of the DOE reservation was determined through a review of previously prepared *National Environmental Policy Act* documents, reviewing the results of previous site-specific studies, and through consultation with the Ohio Department of Natural Resources, Division of Wildlife and Division of Natural Areas and Preserves, and the U.S. Fish and Wildlife Service.

The review of the previous documents and site-specific studies, as well as the consultations indicated that the Indiana bat (*Myotis sodalis*) a Federally listed endangered species; the Carolina yellow-eyed grass (*Xyris difformis*) and the sharp-shinned hawk (*Accipiter striatus*), both Ohio State-listed endangered species; the Virginia meadow-beauty (*Rhexia virginica*), an Ohio State-listed potentially threatened plant; and the rough green snake (*Opheodrys aestivus*), an Ohio State-listed special interest species may occur or have been found on the DOE reservation. Other species that have been identified in the region, but not on the DOE reservation include the Timber rattlesnake (*Crotalus horridus*), and the long-beaked

arrowhead (*Sagittaria australis*). Table 3-12 lists the threatened, endangered, rare, and species of concern in the vicinity of the DOE reservation.

Table 3-12 Federal and State Listed Endangered, Potentially Threatened, and Special Concern Species near the DOE Reservation at Piketon

Category and Scientific Name	Common Name	Status [a]	
		Federal	State
Mammals			
Myotis sodalis	Indiana bat	E	E
Birds			
Accipiter striatus	Sharp-shinned hawk	NL	E
Reptiles			
Crotalus horridus horridus [b]	Timber rattlesnake	NL	E
Opheodrys aestivus	Rough green snake	NL	S
Plants			
Rhexia virginica	Virginia meadow-beauty	NL	P
Xyris difformis	Carolina yellow-eyed grass	NL	E
Sagittaria australis [b]	Long-beaked arrowhead	NL	T

Notes:
[a] E = endangered; P = potentially threatened; S = special concern; T = threatened, NL = not listed.
[b] Not located on the DOE reservation; located in the region.
Source: DOE, 1993a; DOE, 1996b.

Past and current consultations with the U.S. Fish and Wildlife Service indicate that some of the riparian areas on the DOE reservation may be suitable summer habitat for the Indiana bat. In 1994 and 1996, DOE conducted an onsite surveys to identify suitable habitat and then conducted mist netting in those areas to determine if Indiana bats were present. The surveys identified two potential riparian areas for Indiana bats and the mist netting results documented four different species of bats in the two riparian areas, but no Indiana bats were identified.

Past isolated sightings of State-listed species on the DOE reservation include the sharp-shinned hawk and the rough green snake, but no recent sightings have been reported (DOE, 1993a; DOE, 1996b).

The Virginia meadow-beauty has been found near X-611A, a former sludge lagoon, and the Carolina yellow-eyed grass has been tentatively identified at the X-611B sludge lagoon. The Virginia meadow-beauty is associated with the wetlands of the former sludge lagoon and its preferred habitat is on wet, sandy soils, particularly in sandy swamps. The Carolina yellow-eyed grass was observed in 1994; however, formal documentation of the species could not be performed as the grass was not in fruit or flower. Carolina yellow-eyed grass prefers wet peaty or sandy soils typically found in marshes or bogs.

The Ohio EPA determined that two State endangered fish species and four State threatened fish species exist near the DOE reservation, but are restricted to the Scioto River. Little Beaver Creek, the main body of water running through the site, does not provide sufficient habitat to support threatened or endangered species of fish. (OEPA, 1997)

3.8.4 Wetlands

Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (U.S. ACE, 1987). Wetlands generally include swamps, marshes, bogs, and similar areas. The DOE reservation contains 45 wetlands (41 jurisdictional and 4 non-jurisdictional wetlands) totaling 14 hectares (34 acres), excluding retention ponds and streams (DOE, 2003b). Jurisdictional wetlands fall under the protection of Section 404 of the *Clean Water Act*, while non-jurisdictional wetlands do not fall under Federal protection. The locations of these onsite wetlands are shown in Figure 3-14. The majority of the wetlands are associated with wet fields, areas of previous disturbance, drainage ditches, or wet areas along roads and railway tracks. Wetlands on the proposed site primarily support emergent vegetation like cattail, great bulrush, and rush. Palustrine forested wetlands occur along Little Beaver Creek (DOE, 1996c). Table 3-12 lists the jurisdictional wetlands, their size, current status and location in relation to the activities associated with the proposed action.

Table 3-13 Wetlands on the DOE Reservation Associated with the Proposed Action

Hectares	Location	Associated With
Wetlands in proximity to proposed primary facilities		
0.13	West Perimeter Road	Drainage swale
0.44	West Perimeter Road	Drainage swale
0.78	West Perimeter Road	Drainage swale
0.11	X-2207 Parking	Drainage ditch
1.3	Former Gas Centrifuge Enrichment Process site	Wet field
0.11	Former Gas Centrifuge Enrichment Process site	Wet field
0.15	Former Gas Centrifuge Enrichment Process site	Wet field
0.05	Former Gas Centrifuge Enrichment Process site	Wet field
1.9	Former Gas Centrifuge Enrichment Process site	Wet field
0.10	Former Gas Centrifuge Enrichment Process site	Wet field
0.10	Former Gas Centrifuge Enrichment Process site	Wet field
Wetlands in proximity to the two proposed cylinder storage yards		
0.13	North Access Road	Drainage ditch
0.01	X-7456 Cylinder Yard	Drainage ditch
0.07	X-752 Warehouse	Man-made ditch
0.08	X-747H landfill	Radioactive area

Notes:

To convert hectares to acres multiply by 2.47.

Although there are wetlands directly south and west of the proposed ACP site, as shown in Figure 3-14, there are no wetlands directly on the proposed ACP site where there would be new construction and operations. The wetlands near the proposed ACP site have poorly drained soils from previous grading activities and receive the surface runoff from the surrounding landscape. Along the southern border of the proposed ACP site is a large palustrine emergent wetland (1.3 hectares [3.2 acres]), composed primarily of cattails, and one small wetland (0.12 hectare (0.3 acre)). To the west of the proposed ACP site, across the Perimeter Road are six additional wetland areas, each with an area of approximately 0.5

hectare (1 acre) or less. One extremely small wetland (0.05 hectare [0.13 acre]) is located farther to the north of the proposed ACP site. As discussed above, drainage from the proposed site would exit via the southwest drainage ditch via the Southwest Holding Pond in the vicinity of the wetlands to the south of the proposed ACP.

The proposed ACP site in the southwest quadrant of the reservation includes five of the seven proposed cylinder storage yards that would support the ACP. The remaining two proposed cylinder storage yards, X-745G-2 and X-745H, would be located just north of the Perimeter Road. X-745G-2 is an existing yard, while X-745H would require new construction prior to its use. Three isolated wetlands, each less than 0.5 hectare (1 acre) and a number of small tributaries to Little Beaver Creek are located in the vicinity of these two proposed cylinder storage yards. Drainage from these yards would exit via the X-230L North Holding Pond, which discharges into Little Beaver Creek.

3.8.5 Environmentally Sensitive Areas

There are no State or national parks, conservation areas, wild and scenic rivers, or other areas of recreational, ecological, scenic, or aesthetic importance at the proposed ACP site or within a 1.6-kilometer (1-mile) radius of the DOE reservation (ODNR, 2003)

3.9 Socioeconomic Conditions and Local Community Services

This section describes current socioeconomic conditions and local community services within the region of influence of the proposed action. The region of influence is defined as a four-county area in southern Ohio comprising Jackson, Pike, Ross, and Scioto counties. This region encompasses the area in which workers are expected to spend most of their salary, and in which a significant portion of site purchase and non-payroll expenditures from the construction, manufacturing, operation, and decontamination and decommissioning phases of the proposed ACP are expected to take place. The counties included in the region of influence were selected primarily on the basis of the current residential locations of United States Enrichment Corporation and USEC workers at the DOE reservation in Pike County, where the proposed ACP would be located. Currently, approximately 92 percent of these workers reside in the four selected counties (USEC, 2005). Geographically, Ross, Jackson, and Scioto counties bound Pike County to the North, East and South, respectively (see Figure 3-1).

3.9.1 Population Characteristics

The population in the region of influence is characterized in terms of the major population centers around the proposed site, population growth trends, residential locations of current workers on the DOE reservation, and significant transient and special populations. The extent to which surrounding populations qualify as minority or low-income is discussed in the environmental justice evaluation in Section 3.10.

3.9.1.1 Major Population Centers

The major population centers in the region of influence are as follows (see Figure 3-15):

- **Piketon** is the nearest residential center to the DOE reservation. Located in Pike County, this town is approximately 6.4 kilometers (4 miles) north of the DOE reservation on U.S. Route 23. In 2000, the population of Piketon was 1,907 (ODOD, 2003).

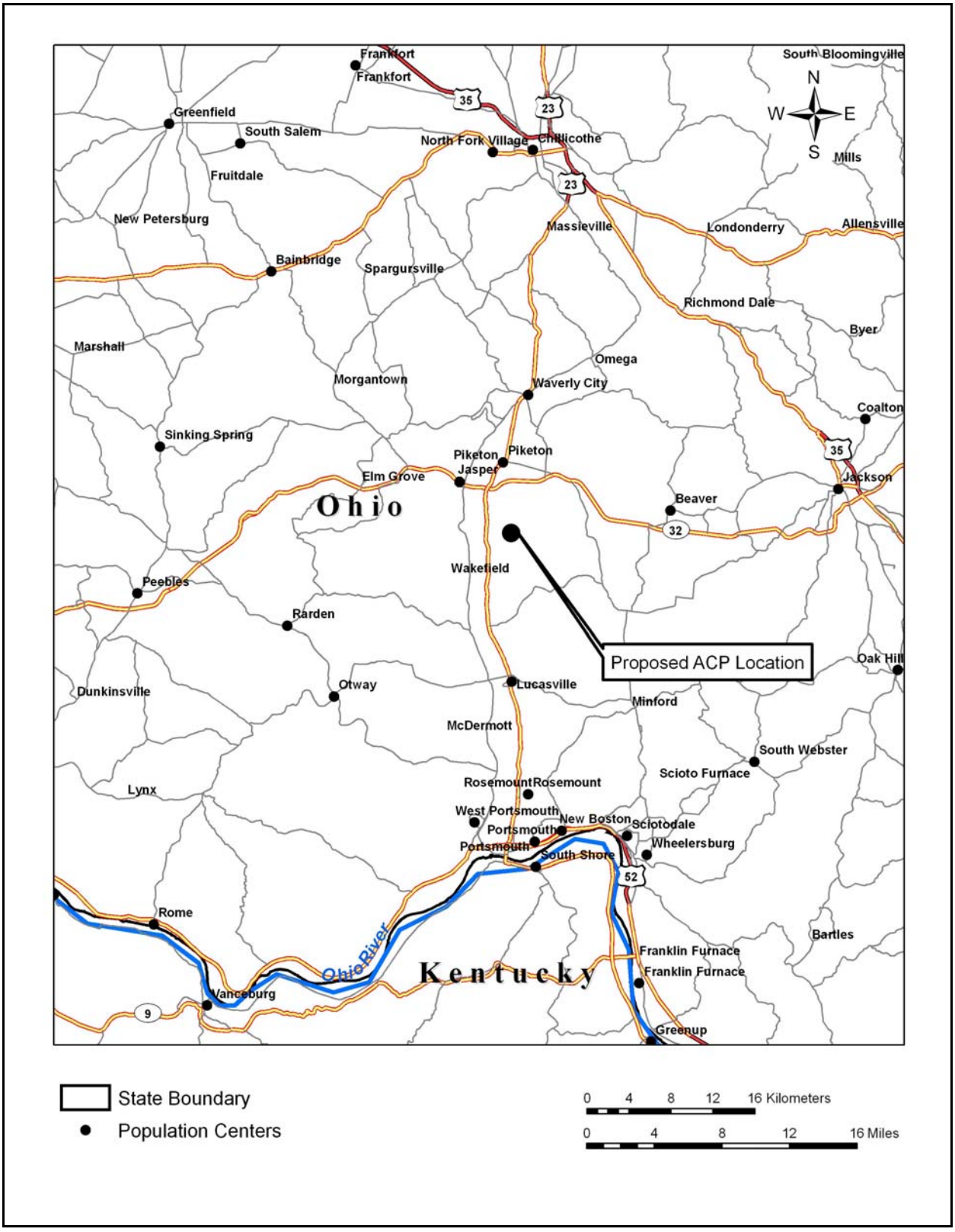

Figure 3-15 Population Centers in the Vicinity of the DOE Reservation

- Waverly is the largest town in Pike County. Located 13 kilometers (8 miles) north of the DOE reservation, the population of Waverly was 4,433 in 2000 (ODOD, 2003).

- The largest population center in the region of influence is Chillicothe, which is located in Ross County. Chillicothe is 43 kilometers (27 miles) north of the DOE reservation, and had a population of 21,796 in 2000 (ODOD, 2003).

- Other surrounding population centers include Portsmouth, which is in Scioto County and is 43 kilometers (27 miles) south of the DOE reservation. The population of Portsmouth was 20,909 in 2000 (ODOD, 2003).

- The town of Jackson is located in Jackson County and is 42 kilometers (26 miles) east of the DOE reservation. In 2000, Jackson's population was 6,184 (ODOD, 2003).

Figure 3-16 shows the population density surrounding the DOE reservation.

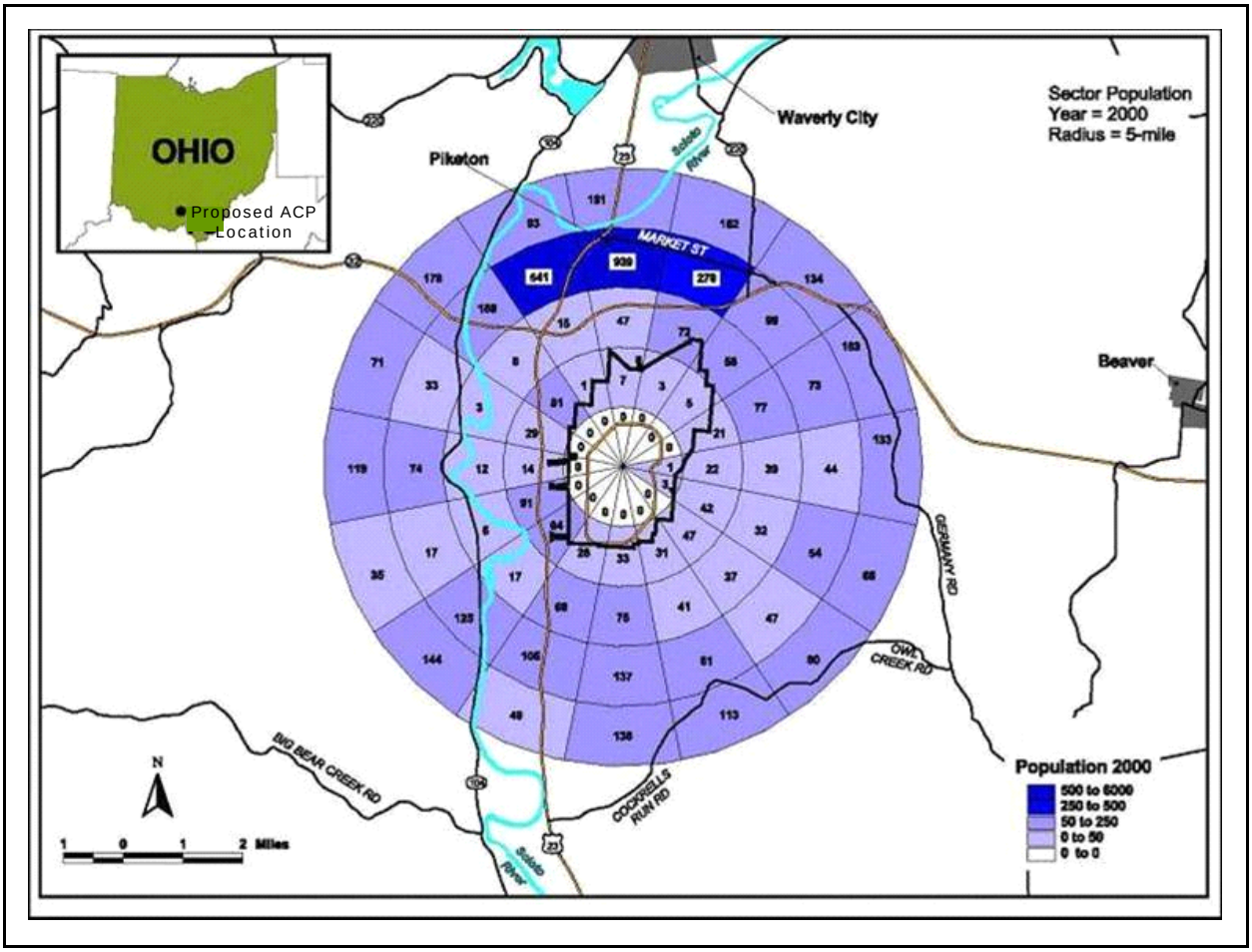

Figure 3-16 Population Density Surrounding the DOE Reservation at Piketon (USEC, 2004a)

3.9.1.2 Population Growth Trends

Table 3-14 presents historic and projected populations in the region of influence and State as a whole. As shown, the population of the region of influence was 212,876 people in 2000, having grown 4.3 percent since 1990 (ODOD, 2003). This growth was marginally lower than the Ohio population growth rate of 4.7 percent in the same decade.

Table 3-14 Population in the Proposed ACP Region of Influence and Ohio in 1990, 2000, and 2010

Location	1990	2000	Average Annual Percent Growth Rate 1990-2000	2010 (Projected)	Percent Growth 1990-2000	Percent Growth 2000-2010 (projected)
Pike County	24,249	27,695	1.3	29,766	14.2	7.5
Scioto County	80,327	79,195	-0.1	78,823	-1.4	-0.5
Jackson County	30,230	32,641	0.8	34,022	8	4.2
Ross County	69,330	73,345	0.6	78,380	5.8	6.9
Region of Influence	204,136	212,876	0.4	220,991	4.3	3.8
Ohio	10,847,120	11,353,140	0.5	11,666,850	4.7	2.8

Source: ODOD, 2003.

During the 1990s, each of the counties in the region of influence, with the exception of Scioto County, experienced a growth in population. Pike County recorded a population growth rate of 14.2 percent between 1990 and 2000, while Jackson and Ross counties grew by 8 percent and 5.8 percent, respectively, in the same decade. The growth rates for these three counties exceeded Ohio's overall growth rates in that period. In contrast, Scioto County registered a marginal decline (-1.4 percent) in population between 1990 and 2000.

The area population is expected to increase by 3.8 percent by the year 2010, compared to a projected overall Ohio growth rate of 2.8 percent in the same period. All counties in the region of influence, except for Scioto County, are projected to experience positive population growth between 2000 and 2010.

3.9.1.3 Residential Locations of Workers

In January 2004, there were 1,223 United States Enrichment Corporation and USEC workers employed at the DOE reservation (reflecting the current cold standby status) (USEC, 2005). Of these workers, 49 percent live in Scioto County, 22 percent live in Pike County, 12 percent live in Ross County, and 10 percent live in Jackson County (USEC, 2005). The remaining eight percent of United States Enrichment Corporation and USEC workers live outside the region of influence (USEC, 2005).

3.9.1.4 Significant Transient and Special Populations

In addition to the residential population, there are institutional, transient, and seasonal populations in the area. Institutional populations include school and hospital populations and are described in Sections 3.9.3.2 and 3.9.3.3.

The transient population consists of visitors participating in various seasonal, social, and recreation activities within the local area. Seasonal populations are also present. For example, usage of Lake White State Park, located approximately 9.7 kilometers (6 miles) north of the DOE reservation, is occasionally heavy and concentrated on the 37 hectares (92 acres) of land closest to the lake. Most of the land surrounding the lake is privately owned. The 136-hectare (337-acre) Lake White offers recreation (i.e., boating, fishing, water skiing, and swimming). There are 10 non-electric campsites for primitive overnight camping (USEC, 2005). These populations are likely to be unaffected by the proposed action due to the distance from the proposed ACP.

3.9.2 Economic Trends and Characteristics

This section describes employment in the region of influence, and at the DOE reservation in particular. It also describes per capita income in the region.

3.9.2.1 Employment in the Region of Influence

The past decade has seen a slight employment shift from the government, construction, and farm sectors towards the service, wholesale and retail trade, and manufacturing sectors within the region of influence. The service sector provides the highest percentage of employment in the region, at 24.7 percent, followed closely by the wholesale and retail trade with 21.7 percent, manufacturing with 17.9 percent, and government enterprises with 16.6 percent (BEA, 2002a).

Tables 3-15 through 3-18 summarize county-specific trends in employment in the region of influence. Pike County shows a substantially higher rate of manufacturing employment than other counties; and Scioto County shows the highest rate of services employment.

Table 3-15 Employment in Pike County by Industry in 1990 and 2000

Sector	No. of People Employed in 1990	Percentage of County Total	No. of People Employed in 2000	Percentage of County Total	Growth Rate 1990-2000
Services	1,666	16.5	2,410	16.1	44.7
Wholesale and Retail Trade	1,498	15.6	2,450	16.4	55.3
Government and Government Enterprises	1,556	15.4	1,859	12.4	19.5
Manufacturing	3,567	35.3	5,748	38.5	61.1
Construction	483	4.8	869	5.8	79.9
Finance, Insurance, and Real Estate	244	2.4	556	3.7	127.9
Transportation and Public Utilities	365	3.6	501	3.4	37.3
Farm Employment	548	5.4	551	3.7	0.5
Mining	32	0.3	Not Available	Not Available	Not Available
Other Sectors	52	0.5	Not Available	Not Available	Not Available
Total	10,091	100	14,944	100	48.1

Source: BEA, 2002a.

Table 3-16 Employment in Scioto County by Industry in 1990 and 2000

Sector	No. of People Employed in 1990	Percentage of County Total	No. of People Employed in 2000	Percentage of County Total	Percent Growth Rate 1990-2000
Services	7,810	28.2	10,134	31.1	29.8
Wholesale and Retail Trade	6,739	24.3	7,816	24	16
Government and Government Enterprises	5,370	19.4	6,120	18.8	14
Manufacturing	2,299	8.3	2,714	8.3	18.1
Construction	1,640	5.9	1,861	5.7	13.5
Finance, Insurance, and Real Estate	1,333	4.8	1,367	4.2	2.6
Transportation and Public Utilities	1,443	5.2	1,390	4.3	-3.7
Farm Employment	844	3	823	2.5	-2.5
Mining	43	0.2	23	0.1	-46.5
Other Sectors	189	0.7	289	0.9	52.9
Total	27,710	100	32,537	100	17.4

Source: BEA, 2002a.

Table 3-17 Employment in Jackson County by Industry in 1990 and 2000

Sector	No. of People Employed in 1990	Percentage of County Total	No. of People Employed in 2000	Percentage of County Total	Percent Growth Rate 1990-2000
Services	2,481	21.6	2,867	20.4	15.6
Wholesale and Retail Trade	2,472	21.5	3,196	22.7	29.3
Government and Government Enterprises	1,455	12.7	1,585	11.3	8.9
Manufacturing	2,661	23.2	4,027	28.6	51.3
Construction	556	4.8	Not Available	Not Available	Not Available
Finance, Insurance, and Real Estate	467	4.1	714	5.1	52.9
Transportation and Public Utilities	500	4.4	570	4.1	14
Farm Employment	694	6	736	5.2	6.1
Mining	149	1.3	362	2.6	143
Other Sectors	48	0.4	Not Available	Not Available	Not Available
Total	11,483	100	14,057	100	22.4

Source: BEA, 2002a.

Table 3-18 Employment in Ross County by Industry in 1990 and 2000

Sector	No. of People Employed in 1990	Percentage of County Total	No. of People Employed in 2000	Percentage of County Total	Percent Growth Rate 1990-2000
Services	6,191	21.7	8,763	25.2	41.5
Wholesale and Retail Trade	5,998	21	7,855	22.6	31
Government and Government Enterprises	6,052	21.2	6,762	19.4	11.7
Manufacturing	5,395	18.9	5,119	14.7	-5.1
Construction	1,401	4.9	1,728	5	23.3
Finance, Insurance, and Real Estate	1,001	3.5	1,378	4	37.7
Transportation and Public Utilities	1,055	3.7	1,978	5.7	87.5
Farm Employment	1,218	4.3	1,226	3.5	0.7
Mining	40	0.1	Not Available	Not Available	Not Available
Other Sectors	170	0.6	Not Available	Not Available	Not Available
Total	28,521	100	34,809	100	22.1

Source: BEA, 2002a.

The unemployment rate in the region of influence is higher than for the State as a whole. The regional unemployment rate, which was 7.8 percent in 1998, was 7.7 percent as of 2002, as shown in Table 3-19. The average unemployment rate for the State of Ohio was 5.7 percent in 2002, up from 4.3 percent in 1998 (ODOD, 2003).

Table 3-19 Unemployment Rates (percent)

Area	1998	2002
Jackson County	7	7.9
Pike County	8.8	8.9
Ross County	5.8	6.2
Scioto County	9.5	7.8
Region of Influence Total	7.8	7.7
Ohio	4.3	5.7

Source: ODOD, 2003.

The region of influence experienced stable growth in employment levels in recent years. Employment growth outpaced labor force growth, increasing from 86,900 in 1998 to 88,500 in 2002, for a growth rate of 1.8 percent for that period (ODOD, 2003). The labor force grew from 94,100 in 1998 to 95,500 in 2002, for a growth rate of 1.5 percent for that period (ODOD, 2003).

Although the overall region of influence unemployment rate decreased between 1998 and 2002, there are cross-county differences in employment trends within the region. Only Scioto County experienced a decline in unemployment levels between 1998 and 2002. Jackson, Pike, and Ross counties registered increases in unemployment rates in the same period.

3.9.2.2 Reservation Employment

As reported in Section 3.9.1.3, United States Enrichment Corporation and USEC employed a total of 1,223 workers at the site, as of January 2004. This number is approximately 11 percent of the total individuals working within Pike County. In addition, the DOE Bechtel Jacobs Company, LLC, subcontractors, and the Ohio Army National Guard employ an additional 374 workers at the DOE reservation (USEC, 2005).

3.9.2.3 Income

Table 3-20 summarizes personal income data for the region of influence for the years 1990, 2000, and 2002.

Table 3-20 Personal Income in the Region of Influence 1990, 2000, and 2002

Location and Type of Income	1990	2000	Percent Nominal Income Growth Rate 1990-2000	2002
Jackson County				
Total Personal Income (thousands of 2002$)	385,323	632,003	64	663,557
Personal per Capita Income (2002$)	12,743	19,362	52	20,112
Pike County				
Total Personal Income (thousands of 2002$)	300,851	547,173	82	574,226
Personal per Capita Income (2002$)	12,355	19,714	60	20,491
Ross County				
Total Personal Income (thousands of 2002$)	977,594	1,631,847	67	1,711,909
Personal per Capita Income (2002$)	14,086	22,219	58	23,015
Scioto County				
Total Personal Income (thousands of 2002$)	1,030,961	1,558,985	51	1,631,353
Personal per Capita Income (2002$)	12,827	19,716	54	20,890
Total Region of Influence				
Total Personal Income (thousands of 2002$)	2,694,729	4,370,008	62	4,581,045
Average Personal per Capita Income (2002$)	13,003	20,252	56	21,127

Source: BEA, 2002b.

Key conclusions that can be drawn from these data include:

- Per capita income in the region was $20,255 in 2000. This is 28.2 percent lower than the State of Ohio's average per capita income of $28,208 in the same year (BEA, 2002b).

- Per capita income in 2000 in the region of influence recorded a 56 percent nominal increase (not adjusted for inflation) from the 1990 level of $13,003 (BEA, 2002b). After adjusting for inflation, this equates to a 26.6 percent increase in real income in the region over that period.

- Per capita incomes in the region of influence vary significantly from one county to the next, ranging from a low of $20,449 in Jackson County to a high of $23,123 in Ross County in 2002 (BEA, 2002b).

For the purposes of quantifying socioeconomic impacts in Section 4.2.10, the analysis uses an average per capita income estimate of $25,317 (2004$) (USEC, 2005).

3.9.3 Housing Resources and Community and Social Services

This section describes housing and social services in the region, including: schools; hospitals and nursing homes; law enforcement, fire fighting, and other public services; and infrastructure and utilities. The social service centers located within 8 kilometers (5 miles) of the DOE reservation are shown in Figure 3-17.

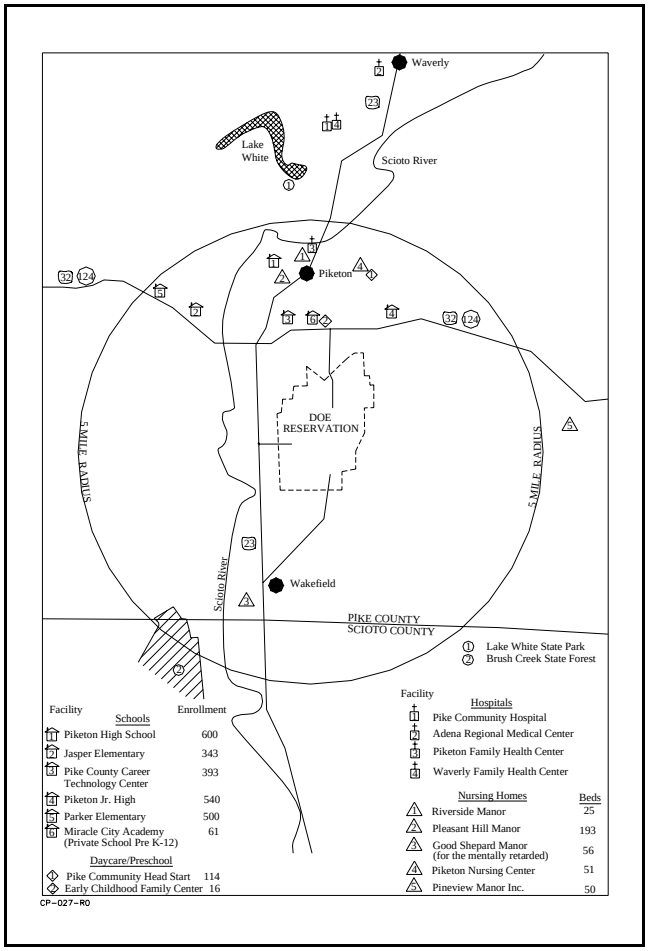

Figure 3-17 Social Service Centers within 8 Kilometers (5 Miles) of the DOE Reservation at Piketon (USEC, 2005)

3.9.3.1 Housing

Detailed housing characteristics for the region of influence are presented in Table 3-21. Between 1990 and 2000, all four counties registered an increase in the total number of owner-occupied and rental housing units (ODOD, 2003). Vacancy rates among rental units rose in each county during this period. As of 2000, there was an 8.6 percent vacancy rate among rental units (amounting to 1,963 vacant rental units) and an 1.8 percent vacancy rate among owner occupied units (amounting to 1,048 vacant owner-occupied units) in the region (U.S. Bureau of the Census, 2000). Housing density in the region of influence averages 106.7 units per square kilometer (41.2 units per square mile), and the median value is $74,550 (ODOD, 2003). In contrast, the Ohio State average housing density is 302.5 units per square kilometer (116.8 units per square mile), and the median value is $103,700 for the State (ODOD, 2003).

Table 3-21 Region of Influence Housing Characteristics, 2000

Location	Number of Owner-Occupied Units	Percent Vacancy Rate Owner-Occupied Units	Number of Rental Units	Percent Vacancy Rate Rental Units	Housing Density (units per square kilometer/units per square mile)	Median Value (2000$)
Jackson County	9,328	1.7	3,291	8.6	85.7/33.1	$70,400
Pike County	7,314	2	3,130	8.5	68.1/26.3	$77,400
Ross County	19,958	1.8	7,178	7.5	109.6/42.3	$87,000
Scioto County	21,646	1.9	9,225	9.5	144.0/55.6	$63,400
Region of Influence Total	58,246	1.8	22,824	8.6	106.7/41.2	$74,550

Source: U.S. Bureau of the Census, 2000 and ODOD, 2003.

3.9.3.2 Schools

The two school systems in the area are the Pike County Schools and the Scioto County Schools. However, only Pike County has school facilities within 8 kilometers (5 miles) of the DOE reservation: one private school that includes preschool through grade 12; two elementary schools, both of which include a preschool program; one junior high school; and one high school. The combined enrollment for the school year 2003-2004 is approximately 2,437 (USEC, 2004b). The total school population within 8 kilometers (5 miles), including faculty and staff, is 2,718 (USEC, 2005). The proximity of these schools to the DOE reservation and their enrollments are shown in Figure 3-17.

Four facilities within 8 kilometers (5 miles) of the DOE reservation provide daycare or schooling for preschool-aged children and after-school care for school-aged children. One facility has 114 registered children and is located in Piketon. The children in the remaining three facilities are consolidated in the numbers provided in the above paragraph (USEC, 2004b). The locations of these facilities are shown in Figure 3-17.

Table 3-22 presents school district data for the region of influence (ODOD, 2003). It is apparent that the student-to-teacher ratio in Jackson, Ross, and Pike counties is higher than the Ohio average.

Table 3-22 School District Data for the Region of Influence in 2000

Location	Number of Teachers	Student-to-Teacher Ratio
Jackson County	330	17.1
Pike County	364	15
Ross County	828	15.1
Scioto County	895	14.8
State of Ohio	117,955	14.8

Source: ODOD, 2003.

3.9.3.3 Hospitals and Nursing Homes

Pike Community Hospital is the hospital closest to the DOE reservation, and is located approximately 12 kilometers (7.5 miles) north of the DOE reservation on State Route 104 south of Waverly. USEC's onsite health protection program provides services for individuals to meet regulatory requirements and to maintain a high level of employee health. The X-1007 Fire Station maintains a first aid room and provides ambulance service for emergency conditions. Pike Community Hospital will provide healthcare services to ACP workers (USEC, 2005). The facility has 66 licensed beds. No other acute care facilities are located in Pike County. Adena Health Center operates as an urgent care facility, located approximately 12 kilometers (7.5 miles) north of the DOE reservation. Piketon and Waverly Family Health Centers, both located north of the DOE reservation, are also available during working hours for minor emergencies. The locations of these facilities are shown in Figure 3-17.

Three licensed nursing homes are located in the Piketon area, an additional one is in Wakefield, and another in Beaver. Four of these five nursing homes are located within 8 kilometers (5 miles) of the DOE reservation. The largest of these facilities is a 193-bed facility in Piketon. The combined licensed capacity of the facilities neighboring the DOE reservation is approximately 375. Figure 3-17 depicts these facilities and shows the number of beds per facility.

Table 3-23 provides data on the number of physicians, level of service (number of physicians per 1,000 persons), and hospitals in the region of influence counties in the year 2000. These data indicate that all counties in the region had a lower level of service than the Ohio average, which is 3.3 physicians per 1,000 persons (ODOD, 2003).

Table 3-23 Physicians and Hospitals in the Region of Influence in 2000

County	Physicians		Hospitals	
	Number of Physicians	Level of Service [a]	Number of Registered Hospitals	Number of Beds
Jackson	27	0.83	1	24
Pike	28	0.99	1	66
Ross	135	1.84	1	262
Scioto	139	1.76	1	421

Notes:
[a] Level of service denotes the number of physicians per 1,000 persons.
Source: ODOD, 2003.

3.9.3.4 Law Enforcement, Fire Fighting, and Other Public Services

Several State, county, and local police departments provide law enforcement in the region of influence. Pike County, which is where the DOE reservation is located, has 19 officers and will provide law enforcement services to the site. Other counties in the region have a total of 101 full-time officers, 16 in Jackson, 32 in Ross, and 53 in Scioto (FBI, 2000).

According to the U.S. Fire Administration's National Fire Department Census Database, there are 43 career and volunteer fire departments in the region of influence (USFA, 2005). The career fire departments include Portsmouth Fire Department, which has three engine houses comprising four engines, two ladders, and one rescue vehicle (PFD, 2005). In addition, the Chillicothe Fire Department consists of three units, each with 13 firefighters; three emergency medical service vehicles; and one 100-foot platform (CFD, 2005).

3.9.3.5 Infrastructure and Utilities

Historically, there has been very little overlap between utilities providing services to communities in the region of influence and those supporting the Portsmouth Gaseous Diffusion Plant. With the exception of natural gas and landfill services, dedicated utilities were developed to support the needs of the Portsmouth Gaseous Diffusion Plant. These dedicated utilities are expected to have more than adequate capacity to continue serving the ACP under the proposed action. Currently, there is a 5-centimeter (2-inch) diameter natural gas supply line to the Portsmouth Gaseous Diffusion Plant; the proposed action will not require augmentation of this supply line. For most utilities, therefore, the communities in the region of influence and the proposed action draw on a mutually exclusive set of suppliers. For this reason, no further details are provided on the capacity and structure of utility markets in the region of influence.

The proposed action is likely to share landfill facilities with the communities in the region of influence. The Pike County landfill is expected to be the primary endpoint for sanitary/industrial waste disposal and the Rumpke Beach Hollow landfill will be an alternative destination for these wastes. The project capacities and use of each are presented in Table 3-24.

Table 3-24 Capacity of Landfills in the Region of Influence

Landfill	Capacity	Space	Municipalities Using Landfill
Pike County Landfill	1,800 metric tons/day	34 more years	Jackson, Scioto, Pike, Lawrence, Adams, Brown, Highland and Ross
Rumpke Beach Hollow Landfill	240 metric tons/day	82 more years	Jackson, Wellston and Oak Hill

Notes:
To convert metric tons to tons multiply by 1.1.
Source: USEC, 2005.

3.9.4 Tax Structure and Distribution

The average property tax rates for Ohio cities are divided into three separate classifications: Class I Real (residential and agricultural), Class II Real (commercial, industrial, mineral, and public utility), and Class III Tangible Personal (general and public utility). For Waverly, in Pike County, the rate is $0.07412 per $1,000 for all three classifications; for Portsmouth, in Scioto County, the rate is $0.06663 per $1,000 for all three classifications; for Jackson, in Jackson County, the rate is $0.04864 per $1,000 for all three

classifications; and in Chillicothe, in Ross County, the Class I rate is $0.05401, the Class II rate is $0.05386, and the Class III rate is $0.05405 per $1,000 (Ohio Department of Taxation, 2003).

The State of Ohio has a graduated personal income tax. For example, the tax rate for incomes ranging from $20,000 to $40,000 is $445.80 plus 4.5 percent of excess over $20,000. For incomes ranging from $40,000 to $80,000, the tax rate is $1,337.20 plus 5.2 percent of excess over $40,000. And for incomes ranging from 80,000 to 100,000, the tax rate is $3,417.60 plus 5.943 percent of excess over $80,000. Ohio also has a 6.0 percent sales tax rate that was raised temporarily from 5.0 percent on July 1, 2003, with the present rate authorized until June 30, 2005 (Ohio Department of Taxation, 2003). In addition to the State sales tax, each county in Ohio has a county sales tax. Jackson, Ross, and Scioto Counties have a county sales tax rate of 1.5 percent and Pike County has a county sales tax rate of 1.0 percent (Ohio Department of Taxation, 2003).

3.10 Environmental Justice

On February 11, 1994, the President signed Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," which directs all Federal agencies to develop strategies for considering environmental justice in their programs, policies, and activities. Environmental justice is described in the Executive Order as "identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." On December 10, 1997, the Council on Environmental Quality issued "Environmental Justice Guidance Under the National Environmental Policy Act" (CEQ, 1997). The Council developed this guidance to "...further assist Federal agencies with their *National Environmental Policy Act* procedures." As an independent agency, the Council's guidance is not binding on the NRC; however, the NRC has committed to evaluate environmental justice issues as part of its *National Environmental Policy Act* reviews. To guide such evaluations, the NRC has issued a final policy statement on the "Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions" (69 FR 52040; August 24, 2004) and environmental justice procedures to be followed in NEPA documents prepared by the NRC's Office of Nuclear Material Safety and Safeguards (NRC, 2003).

This section summarizes data from the 2000 U.S. Census (specifically the 2000 decennial U.S. Census Summary File 3) on minority and low-income populations within an 80-kilometer (50-mile) radius of the proposed ACP site. This area includes a total of 191 census tracts, including 139 in Ohio, 38 in Kentucky, and 14 in West Virginia.

To determine if environmental justice will have to be considered in greater detail, the NRC staff compared the percentage of minority and low-income populations in Census tracts in the area being assessed to the State and county percentages. If the minority or low-income population in a given tract exceeds 50 percent or is significantly greater than the State or county percentage, environmental justice will have to be considered in greater detail. Generally, the NRC staff considers differences greater than 20 percentage points to be significant. The following sections summarize the results of this analysis within 80 kilometers (50 miles) of the proposed ACP, first for minority populations, and then for low-income populations. This summary is supported by detailed tables that provide the results for each Census tract in Appendix F.

3.10.1 Minority Populations

The Council on Environmental Quality guidelines on environmental justice recommend "minority" being defined as members of American Indian or Alaska Native, Asian or Pacific Islander, Black non-Hispanic, and Hispanic populations (CEQ, 1997). The 2000 Census includes the data necessary to identify minority populations, according to both race and Hispanic origin (U.S. Census Bureau, 2002), and identifies

individuals claiming multiple racial identities, up to six races. To remain consistent with the Council's guidelines and NUREG-1748, the phrase "minority population" in this EIS refers to persons who identified themselves in the 2000 Census as follows:

- Partially or totally Black (including Black or Negro, African American, Afro-American, Black Puerto Rican, Jamaican, Nigerian, West Indian, or Haitian);
- American Indian or Alaska Native;
- Asian;
- Native Hawaiian or other Pacific Islander;
- Multiple Races; or
- Other Race.

In accordance with NUREG-1748, individuals identifying themselves as White and a minority were counted as that particular minority group. In addition, for the purpose of this EIS, minority populations were taken to include White individuals of Hispanic origin. To avoid double counting, tabulations include only White Hispanics since the above racial groups already account for non-White Hispanics. Therefore, the minority population considered in this environmental justice evaluation consists of all non-White persons (including those of multiple racial affiliations) plus White persons of Hispanic origin.

Figure 3-18 identifies Census tracts within a 80-kilometer (50-mile) radius of the proposed ACP site that contain minority populations in excess of the criteria outlined above. As shown in the figure, there are two Census tracts in which minority populations either exceed 50 percent and/or are significantly greater

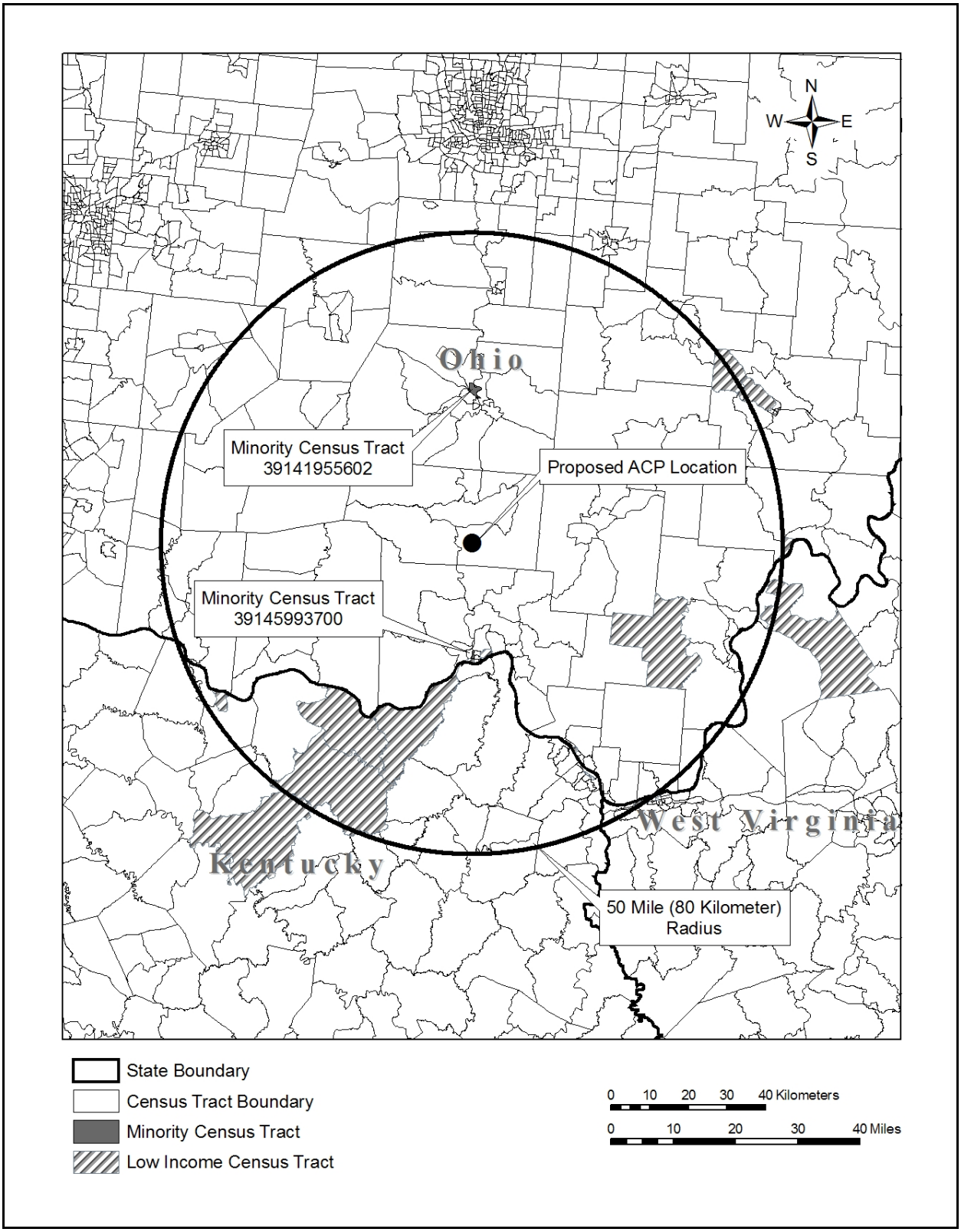

Figure 3-18 Census Tracts with Minority and Low-Income Populations within an 80-Kilometer (50-Mile) Radius of the Proposed ACP Site

than the State or county percentage. These tracts and their locations relative to the proposed ACP site are detailed in Table 3-25.

3.10.2 Low-Income Populations

In accordance with the Council on Environmental Guidelines and NUREG-1748, this environmental justice analysis identifies low-income populations as those falling below the statistical poverty level identified annually by the U.S. Census Bureau in its Series P-60 reports on income and poverty (NUREG-1748, Appendix C, p. C-4). Following the Office of Management and Budget's Statistical Policy Directive 14 (OMB, 1978), the U.S. Census Bureau uses a set of income thresholds that vary by family size and composition to define who falls below the poverty threshold. If the total income for a family or unrelated individual falls below the relevant poverty threshold, then the family or unrelated individual is classified as being "below the poverty level."

Table 3-26 shows the Poverty Thresholds in 2004 by family size and number of related children under 18. For example, in 2004, the poverty threshold for a family of three with one related child younger than 18 was an annual income of $15,205, while the poverty threshold for a family of five with one related child younger than 18 was an annual income of $23,838.

Table 3-25 Census Tracts Exceeding Minority Criteria [a]

Census Tract	County, State	Approximate Distance and Direction from the DOE Reservation
39141955602	Ross, Ohio	40 kilometers to the north
39145993700	Scioto, Ohio	28 kilometers to the south

Notes:
[a] See Appendix F for more detail.
km = kilometer
To convert kilometers to miles multiply by 0.62.

Table 3-26 Poverty Thresholds in 2004 (Annual Income in $)

Size of Family Unit	Weighted Average Threshold	Related Children Under 18 years								
		None	One	Two	Three	Four	Five	Six	Seven	Eight or More
One person	9,643									
Under 65 years	9,827	9,827								
65 years and over	9,060	9,060								
Two people	12,335									
Householder under 65 years	12,714	12,649	13,020							
Householder 65 years and over	11,429	11,418	12,971							
Three people	15,071	14,776	15,205	15,219						
Four people	19,311	19,484	19,803	19,157	19,223					
Five people	22,837	23,497	23,838	23,108	22,543	22,199				
Six people	25,791	27,025	27,133	26,573	26,037	25,241	24,768			
Seven people	29,304	31,096	31,290	30,621	30,154	29,285	28,271	27,159		
Eight people	32,430	34,778	35,086	34,454	33,901	33,115	32,119	31,082	30,818	
Nine or more people	38,659	41,836	42,039	41,480	41,010	40,240	39,179	38,220	37,983	36,520

Source: U.S. Census Bureau, 2005a, b.

Figure 3-18 identifies Census tracts within an 80-kilometer (50-mile) radius of the proposed ACP site that contain low-income populations in excess of the threshold criteria. There are 18 Census tracts in which low-income populations either exceed 50 percent and/or are significantly greater than the State or county percentage. These 16 tracts and their locations relative to the proposed ACP site are detailed in Table 3-27.

Table 3-27 Census Tracts Exceeding Low-Income Criteria [a]

Census Tract	County, State	Approximate Distance and Direction from the DOE Reservation
21019030300	Boyd, Kentucky	66 km to the southeast
21069980400	Fleming, Kentucky	78 km to the southwest
21135990100	Lewis, Kentucky	32 km to the southwest
21135990200	Lewis, Kentucky	50 km to the southwest
21135990400	Lewis, Kentucky	62 km to the southwest
21161960200	Mason, Kentucky	75 km to the southwest
39009972800	Athens, Ohio	75 km to the northeast
39009972900	Athens, Ohio	80 km to the northeast
39053953700	Gallia, Ohio	40 km to the southeast
39087050300	Lawrence, Ohio	60 km to the southeast
39105964400	Meigs, Ohio	80 km to the east
39145993200	Scioto, Ohio	28 km to the south
39145993600	Scioto, Ohio	34 km to the south
54011000600	Cabell, West Virginia	80 km to the southeast
54011000900	Cabell, West Virginia	80 km to the southeast
54011001000	Cabell, West Virginia	80 km to the southeast
54011001100	Cabell, West Virginia	80 km to the southeast
54053954900	Mason, West Virginia	77 km to the east

Notes:
[a] See Appendix F for more detail.
km = kilometer; mi = mile .
To convert km to mi multiply by 0.62.

3.11 Noise

As described earlier, the proposed ACP site is located in an industrial area within the DOE reservation in Piketon. The nearest actual resident that may hear noise from the site is currently 914 meters (3,000 feet) away to the southwest.

The DOE EIS (DOE, 2004a) for the depleted UF_6 conversion facility being constructed on the reservation just north of the proposed ACP site determined that ambient noise levels in this area would be approximately 40 day-night average noise level. However, construction of the conversion facility is now underway, so the existing noise environment at the proposed ACP would include this construction noise. The same EIS estimates noise levels from the construction of the depleted UF_6 conversion facility to be 91.5 decibels at 15 meters (50 feet). Because noise from a point source, such as a single piece of construction equipment, drops off at 6 decibels per doubling of distance, construction noise would be approximately 50 decibels at the closest residence. This assumes distance attenuation from the conversion facility to the residence closest to the proposed ACP. The distance from the conversion facility to this residence is approximately 1,829 meters (6,000 feet). The noise level would be 45 day-night average noise level if construction activities were limited to an eight-hour daytime shift. Consequently, the existing ambient noise level at the nearest residence would be 45 day-night average noise level during the conversion facility construction period and would drop back to 40 day-night average noise level after completion of construction. This noise level estimate is probably an upper bound since it does not account for other types of attenuation, such as air absorption and ground effects due to terrain and vegetation.

The U.S. Department of Housing and Urban Development has standards for community noise levels. It also has developed land use compatibility guidelines (HUD, 2002) for acceptable noise levels versus the specific land use. Table 3-28 shows these guidelines. The estimated ambient noise level of 45 day-night average noise level at the site is below these guidelines.

Table 3-28 U.S. Department of Housing and Urban Development Land Use Compatibility Guidelines for Noise

	Sound Pressure Level (dBA) [a]			
Land Use Category	**Clearly Acceptable**	**Normally Acceptable**	**Normally Unacceptable**	**Clearly Unacceptable**
Residential	<60	60-65	65-75	>75
Livestock Farming	<60	60-65	75-80	>80
Office Buildings	<65	65-75	75-80	>80
Wholesale, Industrial, Manufacturing & Utilities	<70	70-80	80-85	>85

Notes:
[a] dBA = decibels, A-weighted**;** DNL = day-night average noise level**.**
DNL is a 24 hour average with a 10 dBA nighttime penalty. DNL is measured in dBA, which is A-weighted decibels.
Source: HUD, 2002.

3.12 Transportation

The DOE reservation is served directly by road and rail. Nearby air and water transportation routes also serve the site area. Figure 3-19 shows the various transportation routes for roads, rail, water, and air.

3.12.1 Roads

The site is 5.6 kilometers (3.5 miles) south of the intersection of the U.S. Route 23 and Ohio SR 32 interchange. Both routes are four lanes with U.S. Route 23 traversing north-south and Ohio SR 32 traversing east-west (USEC, 2005). Principal access to the proposed ACP site area is by the Main Access Road (also called the West Access Road), a security-controlled access, four-lane road connecting with U.S. Route 23. The Main Access Road is closed to general public access and connects to the Perimeter Road that encircles the fenced portion of the DOE facility. Employees of the proposed ACP would utilize the Main Access Road for access from and traveling to U.S. Route 23. USEC anticipates that construction workers and delivery of construction material will use the Southwest Access Road to U.S. Route 23 or the North Access Road to Ohio SR 32.

U.S. Route 23 intersects I-270, I-70, and I-71 approximately 113 kilometers (70 miles) north of the site. Trucks also may access I-64 approximately 32.2 kilometers (20 miles) southeast of Portsmouth. SR 32 runs east-west from Cincinnati and through Piketon to Parkersburg, West Virginia. To the west, SR 32 provides access to Cincinnati's three interstate highways, I-71, I-4, and I-75. To the east, SR 32 is linked with I-77. (USEC, 2005)

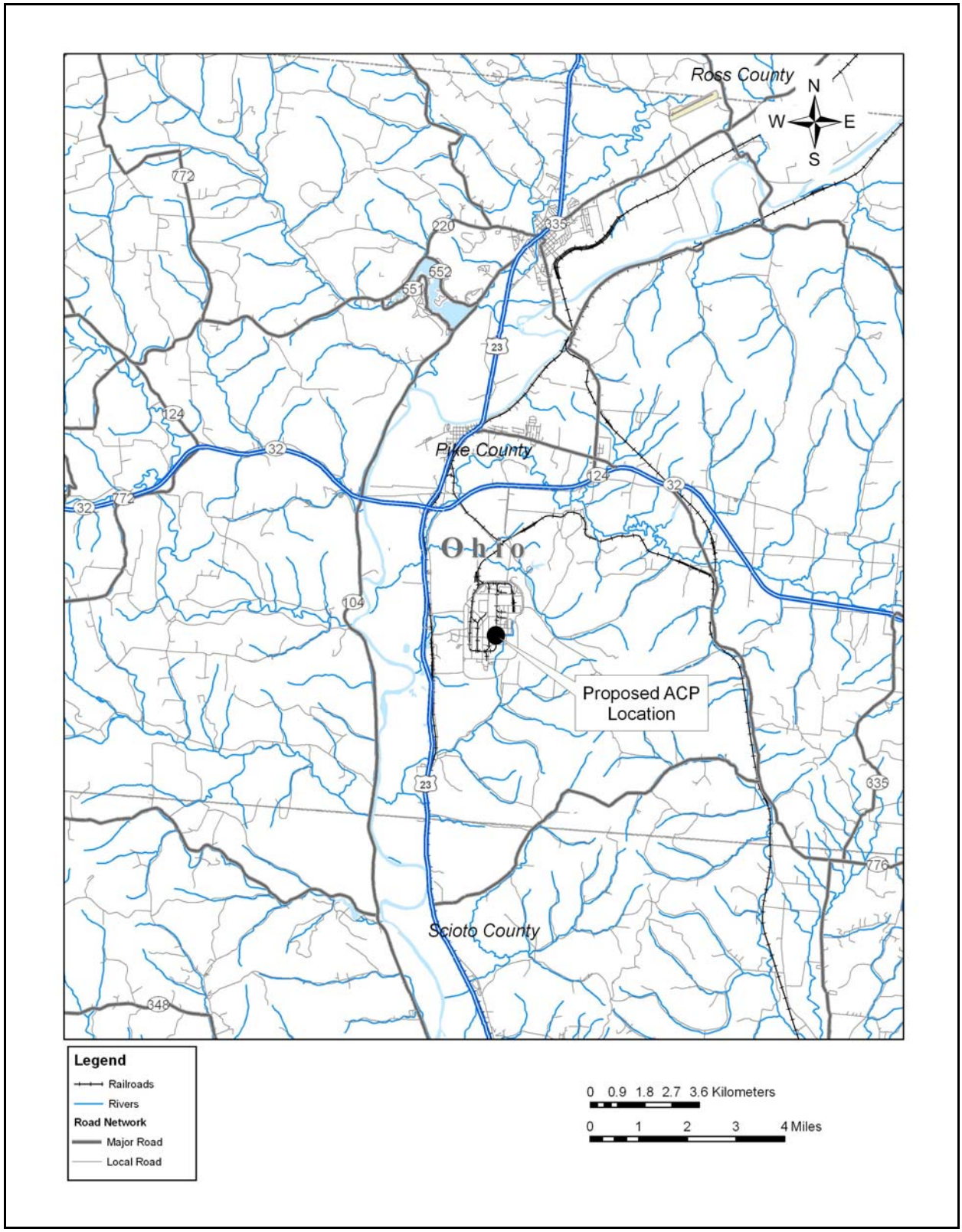

Figure 3-19 Transportation Routes In and Out of the DOE Reservation

U.S. Route 23 has an average daily traffic volume of 13,990 vehicles, while Ohio SR 32 has an average daily volume of 7,420 vehicles (traffic in both directions is included in these values). U.S. Route 23 is at 60 percent of design capacity with Ohio SR 32 at 40 percent of design capacity. The Ohio Department of Transportation supplied these data from a 1999 traffic study. Load limits on these routes are controlled by the Ohio Revised Code (38,556 kilograms [85,000 pounds]) gross vehicle weight. Special overload permitting is available. (USEC, 2005)

The DOE reservation road system is in generally good condition due to road repaving projects. Except during shift changes, traffic levels on the site access roads and Perimeter Road are low. Peak traffic flows occur at shift changes, and the principal traffic problem areas during peak morning/afternoon traffic are at locations where parking lot access roads meet the Perimeter Road. The site has 12 parking lots varying in capacity from approximately 50 to 800 vehicles. Total parking capacity is for approximately 4,400 vehicles. (USEC, 2005)

3.12.2 Rail

A rail system is located on the site with several track configurations possible. Two rail carriers, CSX and Norfolk Southern, service Pike County. The Norfolk Southern rail line is connected to the CSX Transportation Inc. line via a rail spur entering the northern portion of the site. The onsite system is used infrequently. The primary facilities for the proposed ACP site are connected to the existing rail configuration. Rail access is also available near the cylinder storage areas that would be located to the north, just outside the Perimeter Road. Track in the vicinity of Piketon allows a maximum speed of 96.6 kilometers per hour (60 miles per hour). The CSX Transportation Inc. line also provides access to other rail carriers. (USEC, 2005)

3.12.3 Water

The site can be served by barge transportation via the Ohio River at the ports of Wheelersburg, Portsmouth, and New Boston. The Portsmouth barge terminal bulk-materials-handling facility is available for bulk materials and heavy unit loads. All heavy unit loading is by mobile crane or barge-mounted crane at an open-air terminal. The Ohio River provides barge access to the Gulf of Mexico via the Mississippi River or the Tennessee-Tombigbee Waterway. Travel time to New Orleans is 14 to 16 days; to St. Louis, seven to nine days; and to Pittsburgh, three to four days. The U.S. Army Corps of Engineers maintains the Ohio River at a minimum channel width of 243.8 meters (800 feet) and a depth of 2.74 meters (9 feet). (USEC, 2005)

3.12.4 Air

The nearest airport is the Greater Portsmouth Regional Airport located approximately 24 kilometers (15 miles) south of the site. The airport has dual runways and T-hangars, and is operated by Chasteen Aviation, Inc. The airport serves mostly private aircraft owners and business travelers. There are no regularly scheduled commercial flights; however, charter service is available. (Scioto County Government, 2005) Another nearby airport, the Pike County Airport, is located just north of Waverly. This facility is similar in size and makeup to the Greater Portsmouth Regional Airport. In addition, three international airports are within a two-hour drive of the site: Cincinnati/Northern Kentucky International Airport, Dayton International Airport, and Port Columbus International Airport. (USEC, 2004a)

3.13 Public and Occupational Health

As described in Sections 3.5 through 3.7, several different media in and around the DOE reservation contain radionuclides and chemicals that are both naturally occurring and anthropogenic (i.e., human made) from historical and current operations at the site. These media include soil, surface water,

sediment, groundwater, and air. This section describes these radiological and chemical background and anthropogenic levels in terms of public and occupational exposure and health, as well as historical exposure levels for activities similar to the proposed action. It also summarizes public health studies performed in the region which were sufficient to establish baseline information for the Chapter 4 analysis of impacts to public and worker health that may be due to the proposed action.

3.13.1 Background Radiological Exposure

Humans are exposed to ionizing radiation from many naturally occurring and anthropogenic sources in the environment. Radioactivity from naturally occurring elements in the environment is present in soil, rocks, and living organisms. A major proportion of natural background radiation comes from naturally occurring airborne sources such as radon. Such natural radiation sources contribute approximately 3 millisieverts per year (300 millirem per year) to the radiation dose that a member of the U.S. population receives annually. The majority of this exposure - approximately 2 millisieverts per year (200 millirem per year) - is from naturally occurring radon gas from soil, rock, and water. Anthropogenic sources not attributable to the DOE reservation also contribute to the average amount of dose a member of the U.S. population receives. These sources include X-rays for medical purposes (0.39 millisieverts per year (39 millirems per year)), nuclear medicine (0.14 millisieverts per year [14 millirems per year]), and consumer products (0.05 to 0.13 millisieverts per year [5 to 13 millirems per year]) (e.g., smoke detectors). A person living in the U.S. receives a current average dose of about 3.6 millisieverts per year (360 millirems per year) (NRC, 2004b).

Air releases of radionuclides from current operations at the DOE reservation result in radiation exposures to people in the vicinity of the site. Both air monitoring and modeling data have been examined in detail. In terms of air monitoring, DOE collected data from a network of 15 air samplers in 2002 (DOE, 2003b). Data were collected both onsite and in the area surrounding the reservation. The monitoring network is intended to assess whether air emissions from the reservation affect air quality in the surrounding area. A background ambient air monitoring station is located approximately 21 kilometers (13 miles) southwest of the site. The analytical results from air sampling stations closer to the plant are compared to background measurements. Uranium-233/234 and uranium-238 were routinely detected at the stations and in most of the samples collected from each station. Uranium-235 was detected in slightly less than half of the samples collected in 2002. Uranium-236 was detected in one or two samples at eight of the 15 stations. Americium-241, neptunium-237, and plutonium-238 were detected once each at stations A28, A36, and A24, respectively. Technetium-99 was detected once at three sampling stations in 2002. Detections of the transuranic radionuclides, technetium-99 and uranium-236 were usually near the detection limit for the analytical method.

To confirm that air emissions are within regulatory requirements and are not harmful to human health, ambient air monitoring data were used in a separate study to calculate a dose to a hypothetical person living at the monitoring station. The highest net dose calculation is 1.9×10^{-5} millisieverts per year (0.0019 millirem per year) (Station A9), which is well below the U.S. EPA National Emissions Standards for Hazardous Air Pollutants limit of 0.1 millisieverts per year (10 millirem per year), and the NRC total effective dose equivalent limit of 1 millisievert per year (100 millirem per year) (DOE, 2003b).

Based on modeling of total radionuclide releases to the air for the year 2002 from United States Enrichment Corporation operations at the site, the estimated radiation dose to the maximum exposed individual—a hypothetical individual who is assumed to reside at the most exposed point on the plant boundary—is 2.60×10^{-4} millisieverts per year (0.026 millirem per year) (USEC, 2005). DOE operations contributed an additional 4.20×10^{-5} millisieverts per year (0.0042 millirem per year) to the maximum exposed individual, resulting in a combined dose of 3.10×10^{-4} millisieverts per year (0.031 millirem per year). These estimated maximum exposed individual doses are well below the U.S. EPA limit of 0.1 millisieverts per year (10 millirem per year) and the NRC limit of 1 millisievert per year (100 millirem

per year). These results also are comparable to those estimated in an EIS for the affected environment of a separate, depleted uranium conversion facility proposed on the DOE reservation (DOE, 2004a). That EIS reports a combined dose (USEC and DOE sources) of 6×10^{-4} millisieverts per year (0.060 millirem per year) for air, which also is well below the U.S. EPA limit of 0.1 millisieverts per year (10 millirem per year) and the NRC limit of 1 millisievert per year (100 millirem per year). Note that while this conversion facility dose estimate is approximately double the dose estimated for the proposed ACP's affected environment, this can be explained by the different location that was evaluated on the DOE reservation.

The depleted uranium conversion EIS (DOE, 2004a) also states that the maximum radiation dose to an offsite member of the public as a result of current onsite facility operations is estimated to be 2.0 millirem per year. This dose, while still lower than the U.S. EPA and NRC standards, includes several other exposure pathways as part of the assessment: waterborne (drinking, swimming, fishing), at 0.00039 millisieverts per year (0.039 millirem per year); ingestion (sediment, soil, locally produced vegetation and crops), at 0.0088 millisieverts per year (0.88 millirem per year); and direct gamma radiation, at 0.0098 millisieverts per year (0.98 millirem per year). This latter exposure, direct radiation, was estimated for a person driving slowly on the Perimeter Road and passing close to the edge of the cylinder yards two times a day for 185 days per year. This road, however, was closed to the public after September 11, 2001 and thus this exposure is a significant over-estimate of actual doses if the road remains closed.

According to USEC (USEC, 2005), on-reservation worker average whole body dose is less than 0.1 millisieverts per year (10 millirem per year). In the depleted uranium conversion facility EIS cylinder yard worker exposure is estimated (from monitored external radiation) at 0.64 millisieverts per year (64 millirem per year) (DOE, 2004a). Both estimates are significantly less than the NRC and DOE worker dose standards of 50 millisieverts per year (5,000 millirem per year).

3.13.2 Background Chemical Exposure

As discussed in Section 3.5.3, existing air quality on and around the site is in attainment with the criteria pollutants under the National Ambient Air Quality Standards and the standards adopted by the State of Ohio. These pollutants include particulate matter less than 10 microns (3.94×10^{-4} inches) in diameter, sulfur dioxide, carbon monoxide, nitrogen dioxide, lead, and ozone.

For other non-radiological pollutants and other possible exposure pathways, the depleted uranium conversion EIS (DOE, 2004a), specifically Section 3.1.7.2, provides a useful summary of health indicators using estimated hazard quotients (a comparison of estimated maximum potential human intake levels with intake levels below which adverse effects are very unlikely to occur). In all media assessed, air, soil, surface water, sediment, and groundwater, the hazard quotients are less than one, meaning adverse effects are very unlikely to occur as a result of non-radiological chemicals present in the environment around the site. Furthermore, only groundwater has a hazard quotient approaching one (i.e., 0.26), yet the monitoring wells resulting in this value are onsite wells that are not used for drinking water.

Regarding occupational exposure, DOE recently authorized Bechtel Jacobs Company, LLC to initiate characterization of potential beryllium contamination at the Portsmouth Gaseous Diffusion Plant. In December 2003, under contract to Bechtel Jacobs Company, LLC, the United States Enrichment Corporation began performing surface wipes, surface bulk, and destructive analysis sampling in various locations throughout the plant. Low levels of beryllium have been found in aluminum parts machined and used in several facilities, and these levels are significant based on initial surface characterization results in comparison with DOE beryllium contamination limits in 10 CFR Part 850. At least one credible exposure pathway has been identified with machining of aluminum parts, and several more have been suggested by professionals within the beryllium processing industry; these include grinding, buffing, welding, and chemical treatment/cleaning of beryllium-containing materials.

The Occupational Safety and Health Administration has issued permissible exposure limits for chemicals emitted into the air at this site (some of these limits are final, while others have only been proposed). Two of the key chemicals of concern—soluble and insoluble uranium compounds and hydrogen fluoride—are below those limits (DOE, 2004a). Other chemicals have been measured over the years at various levels at the Portsmouth Gaseous Diffusion Plant. Some of these levels have approached or exceeded occupational health benchmarks. For example, arsenic levels ranged up to 2.1 milligrams per cubic meter, which is higher than the permissible exposure limit of 0.01 milligrams per cubic meter, and lead levels ranged up to 19.5 milligrams per cubic meter, which is higher than the permissible exposure limit of 0.050 milligrams per cubic meter. Several other such examples exist. The measured levels were at the upper ends of the relevant ranges and the permissible exposure limits for eight-hour time weighted averages.

Another occupational health issue is the potential risk from exposure to chemicals in the onsite subsurface soil, groundwater, and surface water. Estimates of excess lifetime cancer risks to hypothetical workers range as high as 1.5×10^{-2}, and estimates of hazard quotients for noncarcinogens range as high as eight (DOE, 2004b). Note that these exposures are hypothetical and are based on unmitigated risks.

One final issue regarding occupational health is the potential for large quantities of highly hazardous material to be stored onsite. No threshold quantities, however, are present at the proposed ACP site, based on the Occupational Safety and Health Administration Process Safety Management Standard (29 CFR § 1910.119) and the U.S. EPA Risk Management Program Standard (40 CFR Part 68).

3.13.3 Public Health Studies

In 1992, Pike and Scioto County residents petitioned the Centers for Disease Control and Prevention to conduct an epidemiological health study. Residents expressed their desire for a health study on radiation-related diseases, and they raised questions about excessive cancer rates in Scioto County (which is south of the site), excessive birth defects, and other adverse health effects (such as heavy metal toxicity) believed to be related to environmental releases from the site. The petition was forwarded to the Agency for Toxic Substances and Disease Registry with a request to perform a public health assessment to determine what follow-up health activities, such as a health study (designed to evaluate whether disease in the community could be associated with exposure to site contaminants), were appropriate.

The public health assessment included an analysis of mortality data obtained specifically for the assessment from the Centers for Disease Control and Prevention's National Center for Health Statistics, Office of Analysis and Epidemiology and an analysis of 11 other sets of data or studies (ATSDR, 1996). The National Center for Health Statistics' data that were examined were from the Wide-ranging ONline Data for Epidemiologic Research Database for the years 1979 to 1991. A detailed look at all causes of death for Pike, Ross, and Scioto counties in Ohio shows significantly higher rates of cardiovascular disease for Pike County. The age-adjusted rate for childhood cancer mortality in Pike County was found to be roughly twice the national and State rates, but the number was too small to give a statistically reliable result. For example, this rate is based on only five cancer deaths for the 13-year period from 1979 to 1991, and none of the childhood cancers were of the same type and therefore could not be related to a common cause, both statistically and because different cancers suggest different causes.

The public health assessment also noted that if there were significant uranium exposure in the community surrounding the plant, a measurable increase in the rate of renal failure would be expected. No increase in the renal failure rate was identified in surrounding communities, and no other trends were found for the area for the years 1979 to 1991.

One of the 11 other data sets or studies analyzed in the public health assessment was the National Cancer Institute Report "Cancer in Populations Living Near Nuclear Facilities. Volume 2: Individual Facilities Before and After Startup" (1953-1984). Among the facilities examined in this report was the Portsmouth Gaseous Diffusion Plant. Relative risks (i.e., the ratio of the risk of a disease in an exposed person compared to the risk in an unexposed person) for a number of types of cancer—including bladder and stomach cancer, which were mentioned as cancers of concern by a member of the public during the July 9, 2004 public meeting in Piketon, Ohio, on the proposed ACP—all clustered around one, thus indicating that the populations living near the Portsmouth facility were at approximately the same risk of developing these cancers as populations not living nearby.

The Agency for Toxic Substances and Disease Registry concluded, through its public health assessment process, that exposure data could not be found to support a health study, and furthermore, available information about health outcomes did not suggest any adverse health impact from site operation (ATSDR, 1996). Because the Agency for Toxic Substances and Disease Registry's public assessment was published in 1996, however, more recent data regarding cancer mortality were compiled for this EIS using the Wide-ranging ONline Data for Epidemiologic Research Database (the same database used for the public health assessment).

The new cancer data compiled for this EIS are shown in Table 3-29. These data indicate that Pike County is similar to the rest of Ohio and the U.S. in terms of overall cancer mortality. New data also were sought for three specific cancers of interest—childhood cancer, stomach cancer, and bladder cancer—either because they were of interest in the public health assessment or a subsequent public meeting. The annual mortality counts from these cancers, however, were five or fewer for both Pike County and the nearby Ross and Scioto Counties and thus are not reported due to patient confidentiality concerns. Had they been available, the low rates also would have rendered them statistically unreliable.

New data also were compiled (Table 3-30 for mortality due to renal failure, a health endpoint of interest in the public health assessment because of uranium metal's role as a heavy metal in renal toxicity. The new data cover two date ranges: 1995 to 1998 and 1999 to 2001.[1] As seen by these data, there may have been an increase subsequent to the public health assessment in renal failure rates in the selected counties, particularly Pike County, when compared to all of Ohio or the U.S.; however, it cannot be concluded that this rise was solely due to uranium toxicity. While high levels of uranium can be a risk factor for renal failure, other risk factors, such as diabetes and hypertension, may be even more important. For 1999 to 2001, the Centers for Disease Control and Prevention's Wide-ranging ONline Data for Epidemiologic Research data show that age-adjusted annual mortality per 100,000 from diabetes in Pike County was 51 while in Ohio this rate was only 31 and in the U.S. was 25.

3.13.4 Occupational Injury and Illness Rates

There have been no industrial fatalities on the DOE reservation. Nevertheless, the National Institute for Occupational Safety and Health conducted an epidemiologic study at the reservation to examine the causes of death among workers employed by the facility between September 1, 1954 and December 31, 1991. Deaths among the workers were compared with rates for the general U.S. population. Possible relationships were evaluated for deaths from several types of cancer and exposures to ionizing radiation and certain chemicals (fluoride, uranium metal, and nickel). Based upon previous health studies of nuclear facility workers, including an earlier National Institute for Occupational Safety and Health

[1] The beginning year of the first range, 1995, was selected rather than 1992 (i.e., the year that would have followed the end of the original public health assessment date range of 1979 to 1991) because most of the gross annual mortality counts from 1992 to 1994 were five or fewer and thus not reported due to patient confidentiality concerns. Also, the cutoff between 1998 and 1999 is due to changes in the international classification of diseases codes (see Footnote 3 of Table 3-30).

investigation at the DOE facility, deaths from cancers of the stomach, lung, and the lymphatic and the hematopoietic systems including leukemia, were evaluated in more detail. The announcement of findings by the National Institute for Occupational Safety and Health, published in October 2001, stated that overall cohort mortality was significantly less than that of the U.S. population, as was mortality from all cancers. (USEC, 2005)

Table 3-29 Death Rate/Trend Comparison, All Cancers, Death Years Through 2001

Area	Death Rate Compared to US Rate (1)	Annual Death Rate over rate period	Lower 95% Confidence Interval for Death Rate	Upper 95% Confidence Interval for Death Rate	Rate Period	Rate Ratio (2) County to US	Recent Annual Percent Change (3) in Death Rates	Recent Trend (4)	Recent Trend Period (3,4)
United States	-	199.8	199.6	200	1997-2001	-	-1.1	falling	1993-2001
Ohio	similar	212.4	211.2	213.6	1997-2001	1.1	-1.2	falling	1995-2001
Pike County	similar	200.5	177.9	225.2	1997-2001	1	0.7	stable	1977-2001

Notes:
All rates are per 100,000 persons.
When the population size for a denominator is small, the rates may be unstable. A rate is unstable when a small change in the numerator (e.g., only one or two additional cases) has a dramatic effect on the calculated rate. Suppression is used to avoid misinterpretation when rates are unstable.
(1) Rate Comparison
"above" = when 95% confident the rate is above and Rate Ratio > 1.10.
"similar" = when unable to conclude above or below with confidence.
"below" = when 95% confident the rate is below and Rate Ratio < 0.90.
(2) Rate ratio is the county rate divided by the US rate.
(3) Recent trend in death rates were calculated using the Joinpoint Regression Program and are expressed as the annual percent change over the recent trend period. Recent trend period is the period since last change in trend as determined by Joinpoint.
(4) Trend
"rising" = when 95% confidence interval of annual percent change is above 0.
"stable" = when 95% confidence interval of annual percent change includes 0.
"falling" = when 95% confidence interval of annual percent change is below 0.
Source: Death data provided by the National Vital Statistics System public use data file. Death rates calculated by the National Cancer Institute using SEER*Stat. Death rates are age-adjusted to the 2000 US standard population by 5-year age groups. Population counts for denominators are based on Census populations as modified by NCI.

Table 3-30 Age-Adjusted Mortality Rates for Renal Failure

Year Range	United States	State of Ohio	Pike County	Ross County	Scioto County
1979 to 1991	8.3	8.4	6.4U(1)	8.8U(1)	8.8U(1)
1995 to 1998	8.8	11.2	32.2U	14.3U(2)	14.2U
1999 to 2001(3)	13.2	15.3	43.7U	14.6U(4)	12.9U

Notes:
All Rates are per 100,000 persons.
"U" indicates the data are statistically unreliable because they are based on fewer than 20 deaths.
(1) These rates are from ATSDR (1996), though the original source is as described below. They were not previously applied the "U" designation but they appear to require it based on the definition above. Furthermore, these exact numbers could not be duplicated from the source below and are slightly lower than the recalculated numbers. This discrepancy may be due to factors such as updated data or the year that was selected for the standard population used for the age-adjustment (the year 2000 for the new date range).
(2) The years averaged are 1994, 1997, and 1998 because the data for 1995 and 1996 are suppressed for confidentiality (i.e., deaths are five or fewer).
(3) Beginning in 1999, cause of death in the data source (below) is specified with the International Classification of Diseases 10th Revision rather than 9th revision codes. The two revisions differ substantially, which may account for some or all of the difference seen between the 1999 to 2001 group and the previous groups. This difference should have no effect, however, between the different locations or areas within the same year range group.
(4) The years averaged are 1999 and 2001 because the data for 2000 are suppressed for confidentiality (i.e., deaths are five or fewer).
Source: CDC, 2004.

The lower mortality among these workers is consistent with the "healthy work effect," which is found in most occupational epidemiologic studies. No statistically significant excesses in mortality from any specific cause were identified. Analyses of possible relationships between causes of death and the identified exposures failed to reveal any dose-response trends. For leukemia, no effect of cumulative exposure to either external or internal radiation was identified. Additionally, no dose-response relationships were observed for cancers of the stomach, lung, Hodgkin's disease, lymphoreticulosarcoma, and all cancers combined. Workers deaths from cancers of the lympho-hematopoietic tissue, including leukemia, equaled U. S. rates of matched controls. Stomach cancer deaths were greater than expected, but this difference was not statistically significant. Deaths from these cancers had been found to be slightly elevated in a previous National Institute for Occupational Safety and Health study of the site.

The Department of Labor has documented eight cases of beryllium sensitization and 14 cases of Chronic Beryllium Disease among current and former workers at the Portsmouth Gaseous Diffusion Plant. It has been estimated that about 1,200 of a total of 28,000 personnel (including subcontractors) who have worked at the DOE reservation have received a medical test to determine beryllium sensitivity. Likely exposure pathways are being or recently have been identified by Bechtel Jacobs Company, LLC, as authorized by DOE.

The United States Enrichment Corporation maintains a log and summary of recordable occupational injuries and illnesses under the guidance of the Occupational Safety and Health Administration's 29 CFR Part 1910, Part 1904, Recording & Reporting Occupational Injuries & Illnesses. The proposed ACP Environmental Report summarizes a comparison of year-to-date monthly Recordable Injury/Illness rates per 100 full-time workers for fiscal years 2002 and 2003. Calendar year 2002 and 2003 Recordable Injury/Illness rates are 2.95 and 1.94. For comparison, the U.S. Department of Labor, Bureau of Labor Statistics compiles annual injury and illness data including the incidence rates by industry. United States Enrichment Corporation standard industrial classification is 2819, "Industrial Inorganic Chemicals, not elsewhere classified." Calendar year 2003 Bureau of Labor Statistics' average incidence rate of nonfatal occupational injuries and illnesses are not currently published. The Bureau of Labor Statistics' national average incidence rate of nonfatal occupational injuries and illnesses for standard industrial classification

2819 for calendar year 2002 is 3.4, which is higher than the rates of 2.95 and 1.94 for the United States Enrichment Corporation.

3.14 Waste Management

This section describes the solid, hazardous, radioactive, and mixed (i.e., hazardous plus radioactive) wastes currently generated and managed by the United States Enrichment Corporation at the DOE reservation in Piketon. This reflects the baseline condition and is in contrast to the wastes that USEC would generate and manage under the proposed action, which are described in Chapter 2. This section also describes the existing waste management practices used by the United States Enrichment Corporation at the DOE reservation, most of which would also be used to manage wastes from the proposed ACP.

3.14.1 Current Waste Management Program

The United States Enrichment Corporation's Waste Management Program directs the storage, treatment, and disposal of waste generated by its operations at the DOE reservation at Piketon. The company must satisfy NRC, U.S. EPA, Ohio EPA, and Ohio Department of Health regulations as part of these activities. Waste generated by United States Enrichment Corporation operations at the DOE reservation and then transferred to DOE for storage, treatment, or disposal is subject to DOE Orders. Additional policies have been implemented by the United States Enrichment Corporation for management of radioactive, hazardous, and mixed wastes generated at the site. The United States Enrichment Corporation is currently operating in accordance with an NRC Certificate of Compliance issued under 10 CFR Part 76.

Waste collection and segregation activities are completed in accordance with applicable State and Federal rules and regulations and site procedures (see Table 1-3 in Chapter 1). Wastes are collected and packaged, where feasible, at the location where the waste is generated. Wastes are also segregated into the various waste streams and handled accordingly to minimize the generation of hazardous, low-level mixed waste, and low-level radioactive waste.

3.14.2 Baseline Waste Generation

Table 3-31 summarizes the projected baseline waste generation for the DOE reservation at Piketon, as reported in DOE's EIS supporting the proposed depleted UF_6 conversion facility at the reservation (DOE, 2004a). Volumes include operational and environmental restoration (i.e., cleanup) wastes projected from 2002 to 2025, not including the proposed ACP.

The waste volumes generated and managed by the United States Enrichment Corporation at the DOE reservation are much smaller than those reported above for operational and cleanup activities for the reservation as a whole. During 2003, the United States Enrichment Corporation disposed of approximately 0.1 cubic meter (3.5 cubic feet) of low-level radioactive waste and 15 cubic meters (530 cubic feet) of low-level mixed waste, and recycled approximately 76 cubic meters (2,684 cubic feet) of non-hazardous waste. The projected annual waste generation rates range from 182 to 355 cubic meters (6,420 to 12,520 cubic feet) of low-level radioactive waste and from 8 to 11 cubic meters (300 to 400 cubic feet) of low-level mixed waste (USEC, 2005).

Table 3-31 Projected Waste Generation Volumes for the DOE Reservation at Piketon [a]

Waste Category	Waste Treatment Volume, m^3/yr [b]
Low-level radioactive waste	73,000
Low-level mixed waste	5,600
Transuranic waste	none projected
Hazardous waste	110
Non-hazardous waste [b]	
Solids	3,200
Wastewater	145,000

Notes:
[a] Volumes include operational and environmental restoration wastes projected from FY 2002 to FY 2025.
[b] m^3/yr = cubic meters per year; ft^3/yr = cubic feet per year.
To convert m^3/yr to ft^3/yr multiply by 35.3.
Source: DOE, 2004a.

3.14.3 Current Waste Streams and Management Practices

Wastes generated by existing United States Enrichment Corporation operations at the DOE reservation at Piketon and/or managed onsite at the reservation include:

- Depleted uranium;
- Low-level radioactive waste;
- Non-radioactive hazardous waste;
- Low-level mixed waste;
- Recyclable waste;
- Classified/sensitive waste; and
- Sanitary/industrial waste.

The following sections summarize each of these waste streams from United States Enrichment Corporation activities at the DOE reservation along with the current facilities and procedures for managing these wastes.

3.14.3.1 Depleted Uranium

Regulatory Framework

Approximately 177,600 metric tons (195,800 tons (16,109 containers)) of depleted UF_6 were being stored at the DOE reservation as of June 2004 (DOE, 2004a). All of the depleted uranium is the responsibility of DOE under signed memoranda of agreement between the United States Enrichment Corporation and DOE. The depleted UF_6 stored at the reservation is managed in accordance with 40 CFR Part 266 and Ohio Administrative Code 3745-266. Section 3113(a) of the *USEC Privatization Act* (Public Law 104-134) requires DOE to accept low-level radioactive waste, including depleted uranium that has been determined to be low-level waste, for disposal, upon the request of, and reimbursement of costs by, the United States Enrichment Corporation. To date, this provision has not been invoked, and the form in which the depleted uranium would be transferred to DOE has not been specified. Depleted UF_6 has been classified by the NRC as a Low-Level Radioactive Waste (NRC, 2005). It is assumed that depleted uranium from the proposed ACP that is transferred under this provision of law in the future would be in the form of Depleted UF_6. This would add to the inventory needing conversion at the depleted UF_6 conversion facility, as discussed further in Section 4.2.12.3.

Waste Management Facilities and Practices

The DOE reservation has a total of 16,109 DOE-managed cylinders containing depleted UF_6 equivalent to approximately 177,627 metric tons (195,800 tons) (see Table 3-32). The cylinders are located in two storage yards that have concrete bases. The cylinders are stacked two high to comply with Defense Nuclear Facility Safety Board recommendations. All 9- and 13-metric ton (10- and 14-ton) cylinders stored in these yards have been, or are being, inspected and repositioned. They have been placed on new concrete saddles with sufficient room between cylinders and cylinder rows to permit adequate visual inspection of cylinders. (DOE, 2004a)

Table 3-32 DOE-Managed Depleted Uranium Hexafluoride Cylinders at the DOE Reservation at Piketon

Cylinder Type	Number of Cylinders
Full	16,018
Partially Full	42
Heel	49
Total	16,109

Source: DOE, 2004a.

The cylinder storage yards at the DOE reservation are sources of only a very small amount of waste compared with the volume of waste generated from ongoing plant operations. Cylinder yard waste consists of small amounts of metal, scrapings from cylinder maintenance operations, potentially contaminated soil, and miscellaneous items.

3.14.3.2 Low-Level Radioactive Waste

Waste Characteristics

Low-level radioactive waste is radioactively contaminated waste that is not classified as high-level radioactive waste, transuranic waste, spent nuclear fuel, or byproduct materials as defined in Section 11e(2) of the *Atomic Energy Act*. Low-level radioactive wastes have radionuclide concentrations that typically range from the minimum detectable activity of 0.2 to 0.5 micrograms per gram for total uranium and 37 becquerels per kilogram (1 picoCurie per gram) for technetium up to 0.5 milligram per gram for total uranium and 1,110 becquerels per kilogram (30 picoCuries per gram) for technetium. Higher concentrations do occasionally occur. Low-level radioactive waste includes dry active waste, radioactively contaminated metal, trap material, and used oil. Trap material consists of alumina, magnesium, and sodium fluoride pellets. Activities in trap material will typically range from the minimum detectable activity of 0.2 to 0.5 micrograms per gram for total uranium and 37 becquerels per kilogram (1 picoCurie per gram) for technetium up to 10.0 milligrams per gram for total uranium and 3.7×10^6 becquerels per kilogram (100,000 picoCuries per gram) for technetium. Magnesium trapping material from the feed stock decontamination project at the reservation has had technetium levels of up to 1.77×10^8 becquerels per kilogram (4.78 microCurie per gram). Depleted UF_6 is also considered a category of low-level radioactive waste, but is considered a separate waste stream for the purposes of this EIS, as discussed above.

Waste Management Facilities and Practices

Low-level radioactive wastes generated by United States Enrichment Corporation operations at the DOE reservation are generally transferred to the XT-847 Waste Management Staging Facility for temporary storage pending shipment to offsite treatment and disposal facilities. Such waste is stored onsite until shipment to an offsite treatment, storage, and disposal facility can be scheduled. During 2003, offsite treatment, storage, and disposal facilities that managed low-level radioactive waste generated by United States Enrichment Corporation operations at the DOE reservation included Envirocare, DSSI, and GTS Duratek. During 2003, approximately twice as much low-level radioactive waste was generated (283 cubic meters (10,016 cubic feet)) as was shipped offsite for disposal (155 cubic meters (5,465 cubic feet)).

The XT-847 facility consists of a steel structure with concrete floors and is divided into three storage areas, including a 90-day hazardous waste storage area. The XT-847 Facility is used to accumulate, stage, and prepare hazardous waste, radioactive and hazardous mixed waste, low level radioactive waste, and non-hazardous recyclable material prior to shipment off the reservation. The XT-847 Facility is equipped with truck and rail loading/unloading facilities. The facility also supports nuclear measuring activities.

3.14.3.3 Hazardous Waste

Waste Characteristics

The hazardous waste category is comprised of: (1) *Resource Conservation and Recovery Act* waste listed in 40 CFR Part 261, Subpart D or exhibits any hazardous waste characteristics reported in 40 CFR Part 261, Subpart C; (2) *Toxic Substances Control Act* waste; or (3) any waste defined as hazardous under equivalent State regulations. Hazardous wastes currently generated by the United States Enrichment Corporation at the DOE reservation include aerosol cans, solvents, and laboratory waste.

Waste Management Facilities and Practices

Hazardous wastes generated by the United States Enrichment Corporation at the DOE reservation are stored at the XT-847 Waste Management Staging Facility prior to transfer offsite for treatment and disposal. The company does not store hazardous waste for periods greater than 90 days. All hazardous waste is transferred to a *Resource Conservation and Recovery Act* Part B permitted "greater than-90-day" storage facility operated by DOE at the reservation within 90 days of generation in accordance with the Ohio EPA Director's Final Findings and Orders, issued to the United States Enrichment Corporation on October 5, 1995. The DOE reservation then provides long term onsite storage for hazardous waste at the X-7725 and X-326 hazardous waste storage areas. Several additional 90-day satellite storage areas are available for temporary storage of hazardous waste. Hazardous wastes are stored onsite at the reservation under DOE control until shipment to an offsite treatment, storage, and disposal facility can be scheduled. In 2003, offsite treatment, storage, and disposal facilities used for management of hazardous waste included LWD, DSSI, and Perma-Fix.

3.14.3.4 Low-Level Mixed Waste

Waste Characteristics

Low-level mixed waste is a waste that contains both low-level radioactive waste and *Resource Conservation and Recovery Act* hazardous waste, as defined in Ohio Administrative Code 3745-266-210. Such waste currently generated by the United States Enrichment Corporation at Piketon includes laboratory waste, solvents, and decontamination solutions.

Waste Management Facilities and Practices

Low-level mixed waste generated by the United States Enrichment Corporation at the DOE reservation is generally transferred to the XT-847 facility for temporary storage prior to transfer off site for treatment and disposal. Such waste is exempted from the storage requirements for hazardous waste as defined in Ohio Administrative Code 3745-51-03, since it is a hazardous waste and is generated and managed by the United States Enrichment Corporation, as described in 40 CFR Part 266, Subpart N and Ohio Administrative Code 3745-266.

All low-level mixed waste generated from United States Enrichment Corporation operations at the site is transferred to a *Resource Conservation and Recovery Act* Part B permitted "greater than-90-day" storage facility operated by DOE at the reservation in accordance with the Ohio EPA Director's Final Findings and Orders, issued to the United States Enrichment Corporation on October 5, 1995. The wastes are stored onsite until shipment to an offsite treatment, storage, and disposal facility can be scheduled. In 2003, mixed wastes were shipped offsite to facilities managed by LWD, DSSI, and Perma-Fix.

3.14.3.5 Recyclable Waste

Waste Characteristics

Recyclable waste includes waste that is:

- Not radioactively contaminated;
- Not regulated as hazardous under the *Resource Conservation and Recovery Act*;
- Not regulated under the *Toxic Substances Control Act*;
- Not categorized as classified/sensitive; and
- Is not acceptable for disposal at a sanitary landfill.

Some examples of recyclable waste currently generated by the United States Enrichment Corporation at Piketon include used oil, fluorescent bulbs, incandescent bulbs, High Intensity Discharge bulbs, circuit boards, and scrap metal.

Waste Management Facilities and Practices

Recyclable wastes generated by existing United States Enrichment Corporation operations at the DOE reservation are segregated and stored onsite until off-reservation shipment to a treatment, storage, and disposal facility can be scheduled. In 2003, offsite facilities that were used for recycling such waste included AERC, DOE-Run, and Safety-Kleen.

3.14.3.6 Classified/Sensitive Waste

Waste Characteristics

Classified/sensitive waste is any waste considered as such for security reasons. These materials may be classified due to configuration, composition, contamination, or contained information. Classified waste may be categorized as non-hazardous waste or as low-level radioactive depending upon its point of and method of generation. The classified/sensitive waste is primarily classified machine parts from the American Centrifuge Plant (ACP) process equipment and secondarily documents and electronic or other media containing classified/sensitive information. The machine parts may be radioactively contaminated (i.e., low-level waste), but are not expected to be a hazardous waste. The documents and media are normal office waste except for the classified/sensitive information and will be disposed of as such, following destruction in accordance with the ACP Security Program. (USEC, 2006)

Waste Management Facilities and Practices

Classified waste is stored onsite prior to disposal in classified offsite disposal facilities. There is no regulatory time limit associated with accumulation and disposal of classified/sensitive waste. Classified material that is to be shipped off-site to an approved facility for disposal is placed in, and accumulated within, approved secure storage containers or attended until such time that the shipping off-site is deemed necessary (i.e., until an economically practical amount for a shipment to a disposal facility is available). The current generation rate for classified/sensitive waste is very low, so it is anticipated that a single shipment may require an extended period to accumulate. Consequently, the storage time could range from a month to years before USEC Inc. accumulates enough classified waste to fill a single disposal container.

Classified/Hazardous waste will have a 90-day accumulation time limit. Shipments of low-level mixed waste will occur approximately every 90 days. Any classified/low-level mixed waste will remain on-site and managed in accordance with the low-level mixed waste rules in Ohio Administrative Code 3745-266 until shipments can be scheduled to an approved Treatment, Storage, Disposal, Recycling Facility.

3.14.3.7 Sanitary/Industrial Waste

Waste Characteristics

Sanitary/industrial waste includes non-hazardous solid waste generated by industrial processes and manufacturing and conventional waste material that is no longer usable for plant operations. Some examples of sanitary/industrial waste generated by the United States Enrichment Corporation at the DOE reservation include sludge from wastewater treatment, alkaline batteries, trash, paper, wood, metal, glass, and cafeteria/office refuse.

Waste Management Facilities and Practices

Sanitary/industrial solid wastes generated by existing United States Enrichment Corporation operations at the DOE reservation are disposed at the offsite Pike Sanitary Landfill. Sanitary wastewater (e.g., from showers and toilets) generated at the site are discharged to the plant sanitary sewer system and ultimately to the X-6619 sewage treatment plant. Treated sanitary wastewaters are discharged from X-6619 directly to the Scioto River through an underground pipeline via a permitted outfall. As discussed in Section 3.7, storm water runoff from the proposed ACP area drain to a pair of holding ponds (X-2230N West Holding Pond and X-2230M Southwest Holding Pond) to allow settling of suspended solids, dissipation of chlorine, and oil diversion and containment prior to discharge to unnamed tributaries of the Scioto River.

The only intentional process wastewater discharge resulting from plant operations is blow down from the Tower Cooling Water system.

3.15 References

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