LA-2605-0002

Environmental Report

American Centrifuge Lead Cascade Facility

at USEC's Facilities in Piketon, Ohio

February 2003

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ENVIRONMENTAL REPORT FOR THE AMERICAN CENTRIFUGE LEAD CASCADE FACILITY at USEC's Facilities in Piketon, Ohio

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EXECUTIVE SUMMARY

This Environmental Report (ER) is submitted by USEC Inc. (USEC), the applicant for a license to possess and use special nuclear, source, and by-product material in the American Centrifuge Lead Cascade Facility at the Portsmouth Gaseous Diffusion Plant (PORTS) located in Piketon, Ohio under the *Atomic Energy Act* of 1954, as amended, 10 *Code of Federal Regulations* (CFR) Part 70, and other applicable laws and regulations. USEC is the parent company of the United States Enrichment Corporation (Corporation), which is the current holder of a U. S. Nuclear Regulatory Commission (NRC) Certificate of Compliance for PORTS issued under 10 CFR Part 76.

This ER is organized in accordance with the guidance in NUREG-1748, *Environmental Review Guidance for Licensing Actions Associated with NMSS Programs.*

Introduction

The American Centrifuge Lead Cascade Facility (hereafter referred to as the Lead Cascade) is a test and demonstration facility designed to provide information on American Centrifuge technology. The Lead Cascade is an important step toward advancing the national energy security goals of maintaining a reliable and economical domestic source of enriched uranium. Through amendments to the *Atomic Energy Act*, Congress created the Corporation, wholly owned by the U.S. Government until its privatization, to, among other things, conduct research and development, as required, to evaluate alternative technologies for uranium enrichment, and to help maintain a reliable and economical domestic source of enriched uranium. The goals of the Lead Cascade are consistent with the purposes for which the Corporation was created.

To support this and other statutory objectives, on June 17, 2002, USEC and the U.S. Government, represented by the U.S. Department of Energy (DOE), entered into an agreement (DOE-USEC Agreement), which has as one of its fundamental objectives to facilitate the deployment of new, cost effective centrifuge enrichment technology in the U.S. Assuming the successful demonstration of the technology, the DOE-USEC Agreement requires that USEC begin operation of a commercial centrifuge enrichment plant with an annual capacity of 1 million separative work units in accordance with certain milestones.

The DOE-USEC Agreement contemplates three steps towards the deployment of a commercial centrifuge enrichment plant, as discussed below.

The first step, which is already underway, is to research, develop, and demonstrate an economically attractive gas centrifuge machine and enrichment process using American Centrifuge technology. This is being accomplished through a Cooperative Research and Development Agreement between USEC and UT-Battelle through which USEC's demonstration activities in Oak Ridge and Lead Cascade activities in Ohio are supported. DOE regulates centrifuge activities in Oak Ridge, Tennessee. DOE prepared an Environmental Assessment regarding USEC's work in Oak Ridge in October 2002 and determined that it would not result in a significant environmental impact.[1]

The Proposed Action

The Proposed Action evaluated in this ER is the second step contemplated in the DOE-USEC Agreement. The Proposed Action is to install and operate a gas centrifuge Lead Cascade inside existing buildings at PORTS based on up to 240 full-scale gas centrifuge machines and components. In order to operate the Lead Cascade, a 10 CFR Part 70 license is required for USEC to possess and use small quantities of enriched uranium. USEC may possess up to 250 kilograms of uranium hexafluoride.

While the purpose of the testing in Oak Ridge is focused on the centrifuge machine only, the purpose of the Lead Cascade is to provide reliability, performance, cost, and other vital data of the enrichment process as a full-scale system. The Lead Cascade will not produce enriched uranium for sale to customers. The cascade will operate in a recycling "closed loop" mode where the enriched product stream is recombined with the depleted uranium stream prior to being re-fed to the cascade. No enriched material will be withdrawn, with the exception of laboratory samples that will be used to assess the performance of the cascade. The information provided during system testing is the principal benefit of the Lead Cascade.

Following machine and system testing and demonstration in the Lead Cascade, the final but independent step under the DOE-USEC Agreement would be to construct and operate a Commercial Plant using that technology. The Commercial Plant will require a separate NRC license. At the time USEC would submit a license application for the Commercial Plant, USEC would also submit an ER to discuss that plant's environmental impacts. The NRC is expected to prepare an Environmental Impact Statement for the Commercial Plant.

Accordingly, the Proposed Action that is the subject of this ER is limited to licensing of the Lead Cascade at PORTS. In this ER, the Proposed Action is compared to reasonable alternatives. These alternatives include: the No Action Alternative (i.e., not licensing the Lead Cascade) and the siting alternative of Paducah, Kentucky. Since the DOE-USEC Agreement requires that the Lead Cascade be sited either at PORTS or the Paducah Gaseous Diffusion Plant (PGDP) in Paducah, Kentucky, the only siting alternative considered was PGDP.

Results of Analyses

The results of the analyses in this ER can be summarized as follows. The Proposed Action will satisfy the informational needs in support of national energy security goals by demonstrating the reliability, performance, and economy of the gas centrifuge technology as a system. In fact, the information provided during system testing is the principal benefit of the Lead Cascade. The No Action Alternative will not satisfy the need.

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1 DOE, Environmental Assessment for the United States Enrichment Corporation Centrifuge Research and Development Project at the East Tennessee Technology Park (October 2002).

Consideration of reasonable alternatives demonstrates that no alternate enrichment technology test facility, and no other site, is obviously superior to a Lead Cascade at PORTS. USEC considered alternate technologies—Atomic Vapor Laser Isotopic Separation (AVLIS) and Separation of Isotopes by Laser Excitation (SILEX)—that utilize lasers to enrich uranium. USEC determined in 1999 that AVLIS was not an economically viable technology, and suspended its development. USEC continues to evaluate the SILEX technology, but its stage of development does not permit its demonstration and deployment in a timely manner. For siting, DOE is requiring that the Lead Cascade be located at either PORTS or PGDP. Regardless, no other sites other than PORTS or PGDP offer the unique combination of existing skilled work force, environmental data, regulatory programs, and infrastructure relevant to uranium enrichment. Both PORTS and PGDP sites are environmentally suitable. However, the Lead Cascade can be located at PORTS within existing buildings. PGDP could only accommodate the Lead Cascade with the construction of a new, 3,900 square meter (42,000 square foot) building and associated infrastructure. This construction would add cost and increase schedule risk, compared to siting the Lead Cascade at PORTS. Accordingly, PORTS was chosen as the site for the Lead Cascade.

No Significant Impacts

The following discussion summarizes the analyses leading to a finding of no significant environmental impact from the Proposed Action. The Lead Cascade will be located within several existing buildings at PORTS. The uranium enrichment production and operations facilities that comprise PORTS are leased to the Corporation by the DOE, and comprise about 260 hectares (ha) (640 acres) within an approximate 1,501 ha (3,708 acre) DOE reservation. Although uranium enrichment operations at PORTS ceased in May 2001, the area remains highly industrialized as it has been since enrichment operations began in the 1950s. Uranium enrichment equipment and facilities are being maintained in a Cold Standby status. The area is largely devoid of trees, with grass and paved roadways dominating the open space.

The Lead Cascade would be deployed within several existing buildings, which were designed to be used for a DOE gas centrifuge enrichment program that was halted in the mid-1980s. Site utility usage would increase slightly but would still be within existing capacities and historic usages. Increases above 1 percent are expected to be limited to electricity (6 percent), compressed air (3 percent), and sanitary sewer (2 percent). No new facilities will be constructed because the infrastructure needed to operate a Lead Cascade is already in place. The existing facilities will be refurbished to accommodate the Lead Cascade. In addition, the Lead Cascade will use other existing site-wide services such as laboratory analysis, fire protection, security, medical, emergency management, waste management, and environmental monitoring.

There are no significant environmental impacts resulting from the Proposed Action. There are no wetlands, critical habitat, or cultural or visual resources that will be adversely affected by the refurbishment or operation of the Lead Cascade inside existing buildings at PORTS. Air emissions of non-radiological constituents were determined to be small since refurbishment would occur within existing buildings, and operations are not expected to generate significant emissions. Computer modeling shows that the maximum exposure to a member of the public from radiological constituents is more than three orders of magnitude lower than the U.S. Environmental Protection Agency standard of 10 millirem per year.

Wastes generated during construction include typical construction wastes, which, with few exceptions, can be sent to a sanitary or industrial landfill. Wastes generated during operation include refrigerant, classified and unclassified low-level radioactive wastes, and non-regulated wastes. The volumes generated during construction and operation are small and, therefore, will not burden existing PORTS waste management services.

Liquid discharges to surface water or groundwater are not part of the design for the Lead Cascade. Accordingly, there will be no adverse impact to water resources from normal operations. Surface water or groundwater could potentially be affected from a fuel or waste spill, or a sewer line leak. Precautions will be taken in accordance with applicable laws and best management practices to avoid such accidental releases.

Refurbishment and operation of the Lead Cascade would generate small, but significant socioeconomic benefit to the region. Construction would create $1.12 million in direct income to the 25 construction workers who would be needed for approximately one year, with the indirect creation of 17 other jobs. Operation would create $5.45 million in direct income to the 45 full-time employees who would be needed for a little over two years, with the indirect creation of 22 other jobs.

For on-site accidents, accident analyses prepared as part of USEC's Integrated Safety Analysis concluded that there would be no off-site radiological impact from any of the postulated accidents. No radiological transportation accidents are expected since all radioactive materials expected to be used during operations are already located at PORTS. Another transportation issue evaluated involves 160 truck shipments of centrifuge components from Oak Ridge to PORTS. Total vehicular fatalities associated with accidents during these 160 shipments are expected to be 0.00677 over a period of about two years.

There are no environmental justice issues associated with the Lead Cascade because there are no significant environmental impacts to any segment of the population.

Connected to the Proposed Action is the component manufacture and testing being conducted in Oak Ridge, Tennessee. These activities are being conducted within existing buildings. The DOE determined through an Environmental Assessment that these activities present no significant environmental impacts. This ER incorporates by reference the DOE's Environmental Assessment. A Commercial Plant may be constructed if the information provided by the component and system testing demonstrates that the centrifuge enrichment technology is economical. This is independent of, and is not automatically triggered by, the studies that will be conducted in Oak Ridge and the Lead Cascade. In fact, the information obtained from the Lead Cascade will be used in making determinations on the construction of a Commercial Plant using American Centrifuge technology.

Conclusion

In conclusion, the Proposed Action does not have any significant environmental impacts. The insignificant environmental impacts are clearly outweighed by the information that the Proposed Action will provide towards supporting the national energy security goals of maintaining a reliable and economical domestic source of enriched uranium. The No Action Alternative is denial of a license to possess and use special nuclear material in a Lead Cascade at PORTS. The consequence of the No Action Alternative is that the informational needs of the DOE-USEC Agreement will not be met. The primary benefit of the No Action Alternative is the avoidance of the few insignificant impacts associated with the Proposed Action. This avoidance is greatest, albeit not significant, in the area of electricity, compressed air, and sewer usage, and waste generation. The alternative of siting the Lead Cascade at PGDP would also meet the need and would result in slightly greater environmental impacts due the need to construct a building and some supporting infrastructure. The PORTS site was chosen for cost and schedule reasons.

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1.0 INTRODUCTION

USEC Inc. (USEC) is the applicant for a license to possess and use special nuclear, source, and by-product material in the American Centrifuge Lead Cascade Facility (hereafter referred to as the Lead Cascade). As required by 10 *Code of Federal Regulations* (CFR) Part 51, this Environmental Report (ER) is being submitted to the U.S. Nuclear Regulatory Commission (NRC) by USEC to support licensing of the facility. The Lead Cascade is a test facility to obtain information on American Centrifuge enrichment technology. The Lead Cascade is an important step toward advancing the national energy security goals of maintaining a reliable and secure domestic source of enriched uranium. USEC proposes—as the Proposed Action—to locate the Lead Cascade at the Portsmouth Gaseous Diffusion Plant (PORTS) in Piketon, Ohio under the *Atomic Energy Act* of 1954, as amended, 10 CFR Part 70, and other applicable laws and regulations. USEC is the parent company of the United States Enrichment Corporation (Corporation), which is the current holder of a NRC Certificate of Compliance for PORTS issued under 10 CFR Part 76.

This ER is organized in accordance with the guidance contained in NUREG-1748, *Environmental Review Guidance for Licensing Actions Associated with NMSS Programs*, dated September 2001 (Draft Report – For Interim Use and Comment) and contains the level of detail appropriate for the Lead Cascade. Chapter 1.0 provides an introduction and background on the history of USEC and PORTS, and discusses why USEC is requesting from the NRC a license to possess and use special nuclear, source, and by-product material in a Lead Cascade. Chapter 2.0 discusses the Proposed Action and alternatives including the No Action Alternative and siting alternatives. Chapter 3.0 discusses the existing environmental conditions at PORTS, and Chapter 4.0 discusses how those conditions would be modified, if at all, by the Lead Cascade. Chapter 5.0 discusses any mitigation measures employed by the Lead Cascade. Chapter 6.0 discusses the environmental measurement and monitoring program utilized for the Lead Cascade. Chapter 7.0 discusses the Cost Benefit Analysis. Chapter 8.0 provides the summary of any environmental consequences from deployment of the Lead Cascade. Chapters 9.0 and 10.0 contain a list of references and preparers, respectively. Chapter 11.0 contains a Glossary of terms used in this ER. Appendices contain Acronyms and Abbreviations, Chemicals and Units of Measure, Metric/English Conversion Chart, Metric Prefixes; Consultation Letters; Environmental Impact of Decommissioning; Proprietary Cost Benefit Analysis; and ER Figures.

1.1 Background of USEC and PORTS

PORTS is one of only two federally owned, privately operated uranium enrichment facilities in the U.S., whose environmental characteristics have been amply studied, evaluated, reviewed, and are well understood. PORTS is a fully developed industrial site. The uranium enrichment production and operations facilities on the reservation are owned by U.S. Department of Energy (DOE) and leased to USEC through its subsidiary, the Corporation. PORTS is located in a rural area of Pike County in south central Ohio, on a 15 square kilometer (km^2) (5.8 square mile [mi^2]) reservation (Figure 1.1-1). The nearest residential center in this area is Piketon, which is about 6 kilometers (km) (4 miles [mi]) north of the reservation on U.S. Route 23. The county's largest community, Waverly, is about 13 km (8 mi) north of the reservation. Additional population centers within 80 km (50 mi) of the reservation are Portsmouth, 43 km (27 mi) south; Chillicothe, 43 km (27 mi) north; and Jackson, 42 km (26 mi) east.

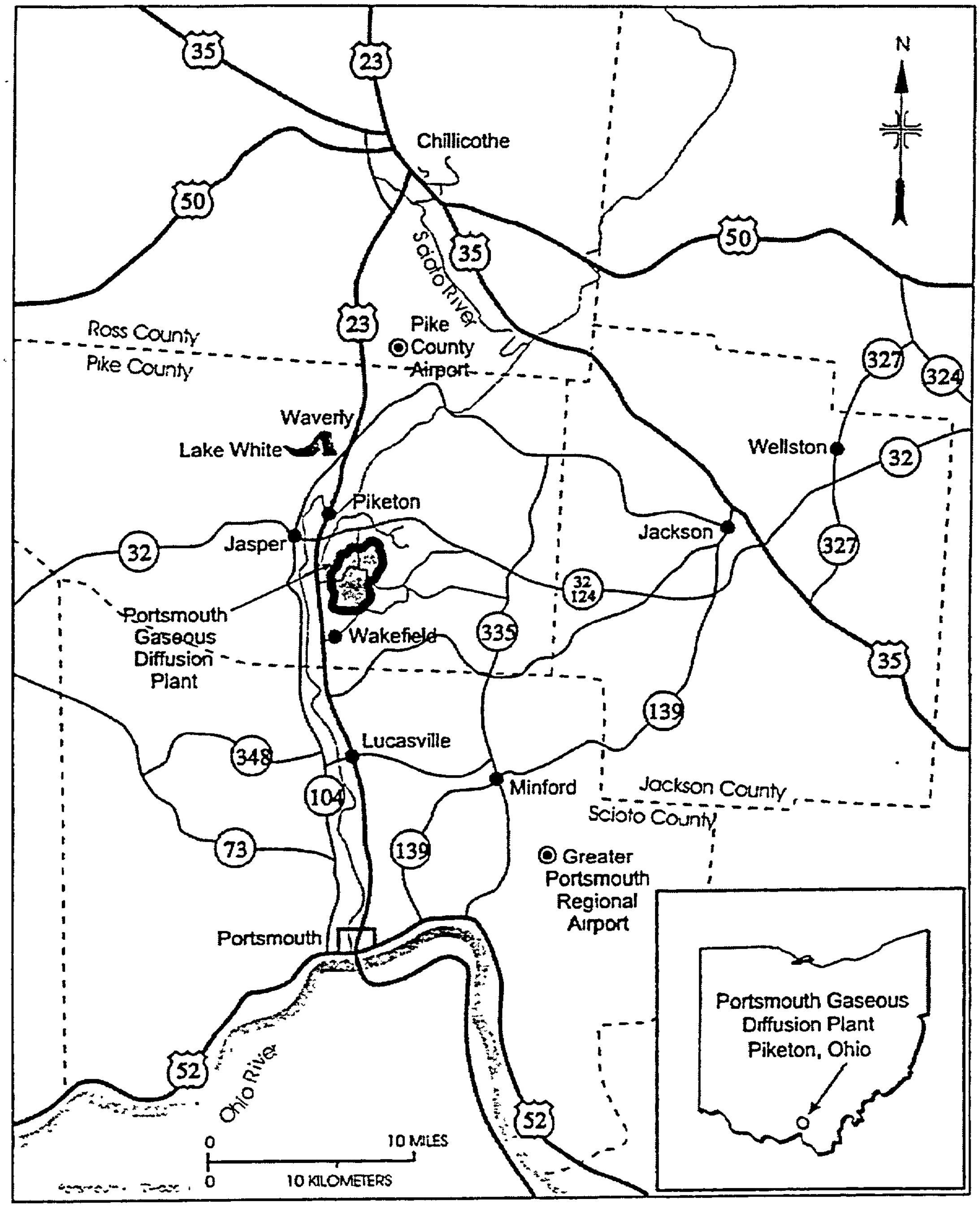
PORTS has been in operation since the mid-1950s as an active uranium enrichment facility supplying enriched uranium for government and commercial use. The PORTS process buildings were constructed from 1952 to 1954, as gaseous diffusion facilities for the isotopic enrichment of uranium. The gaseous diffusion plant (GDP) process buildings contain approximately 763,000 square meters (m^2) (8,210,000 gross square feet [ft^2]). Each of the three process buildings (X-326, X-330, and X-333) is approximately one-half mile in length and contain approximately 12 ha (30 acres) and two floors each. In the late 1970s, PORTS was chosen as the site for a new enrichment facility using gas centrifuge technology. Construction of the Gas Centrifuge Enrichment Plant (GCEP) began in 1979, but was halted in 1985 because the projected demand for enriched uranium decreased.

In 1991, DOE suspended production of highly enriched uranium (HEU) at PORTS. The plant continued to produce low enriched uranium (LEU) for use by commercial nuclear power plants until May 2001.

In accordance with the *Energy Policy Act* of 1992, the predecessor to the Corporation, a newly created government corporation, assumed full responsibility for uranium enrichment operations at PORTS on July 1, 1993. DOE retains certain responsibilities for decontamination and decommissioning, waste management, depleted uranium hexafluoride cylinders, and environmental remediation. The NRC granted the predecessor to the Corporation a Certificate of Compliance for operation of the GDP pursuant to 10 CFR Part 76 on November 26, 1996 and was officially transferred to NRC oversight on March 3, 1997. USEC subsequently became a publicly held private corporation on July 28, 1998 and, with NRC's approval, the Certificate of Compliance was transferred to the Corporation.

The uranium enrichment production and operations facilities at PORTS are leased to the Corporation by the DOE, and comprise about 260 ha (640 acres) within an approximate 1,501 ha (3,708 acre) DOE reservation. In addition to the GDP buildings, extensive support facilities are required to maintain the diffusion process. The support facilities include administration buildings, a steam plant, electrical switchyards, cooling towers, cleaning and decontamination facilities, water and wastewater treatment plants, fire and security headquarters, maintenance shops, warehouses, and laboratory facilities. The Corporation maintains a list of leased facilities on-site.

In May 2001, USEC ceased uranium enrichment operations at PORTS and consolidated enrichment operations at its Paducah Gaseous Diffusion Plant (PGDP). USEC continued to operate its transfer and shipping activities at PORTS until July 2002 in support of its enrichment business. At the request of DOE, the PORTS cascade was placed in cold standby, a condition under which the plant could be returned to a portion of its previous production in about two years if DOE determines that additional domestic enrichment capacity was necessary.



Source. DOE 2001b

Figure 1.1-1 Location of Portsmouth Gaseous Diffusion Plant

1.2 Lead Cascade Overview

Following the suspension of development of the Atomic Vapor Laser Isotopic Separation (AVLIS) enrichment technology, in June 1999, USEC began an evaluation of centrifuge and other technologies to replace its gaseous diffusion technology. The use of foreign centrifuge technology and other third generation technologies including the Separation of Isotopes by Laser Excitation (SILEX), a laser-based technology under development in Australia, were investigated. As part of the evaluation, USEC, in partnership with University of Tennessee-Battelle, the operator of DOE's Oak Ridge National Laboratory, undertook to refine gas centrifuge technology under a DOE-approved Cooperative Research and Develop Agreement (CRADA).

During this private sector and government partnership, USEC began design of an improved centrifuge machine by taking advantage of commercial advances in materials of construction and manufacturing methods. The improved centrifuge technology is intended to achieve performance levels approximately equivalent to those demonstrated in DOE's earlier testing programs, but at a substantially reduced cost.

On June 17, 2002, USEC and the U.S. Government, represented by the DOE, entered into an agreement, which has as one of its fundamental objectives to facilitate the deployment of new, cost effective centrifuge enrichment technology in the U.S. (DOE-USEC Agreement). Assuming successful demonstration of the technology, the DOE-USEC Agreement requires that USEC begin operation of a commercial enrichment plant with annual capacity of 1 million separative work units (SWU) in accordance with certain milestones.

The DOE-USEC Agreement contemplates three steps towards the development of a Commercial Plant, as discussed below. The environmental impacts of the first step—research and development of the centrifuge components (Demonstration Project) in Oak Ridge—were covered in a DOE Environmental Assessment (DOE 2002b) and are incorporated by reference in this ER; the environmental impacts of the second step—deployment and system testing through a Lead Cascade—are the subject of this ER; and the environmental impacts of an independent third step—a Commercial Plant—will be addressed through a separate and future licensing action which will be accompanied by an ER and subsequent NRC Environmental Impact Statement.

Demonstration Project

The Demonstration Project will demonstrate centrifuge performance in Oak Ridge, Tennessee under DOE regulatory oversight. The standard measure of enrichment in the uranium enrichment industry is the SWU. The Demonstration Project will demonstrate that the centrifuge machine design is capable of economically producing 300+ SWU per year. Work is presently on schedule for the completion of the demonstration machine design and USEC plans to begin procurement of long lead items, such as specialty equipment and materials in support of having a demonstration machine built and ready for testing in 2005. USEC will also verify the integrated machine design while maintaining 300+ SWU per year performance, provide a solid basis for the centrifuge machine cost estimate, and obtain initial reliability data from operation of up to 30 machines. The demonstration machines will be operated in highly instrumented test stands in DOE's East Tennessee Technology Park (ETTP) in Oak Ridge, Tennessee, where SWU performance is optimized. Additional machines will be operated in other test stands to evaluate initial reliability of an integrated machine design.

Lead Cascade

For the Lead Cascade, a NRC 10 CFR Part 70 license is required to possess and use special nuclear material in a Lead Cascade consisting of up to 240 operating centrifuge machines at PORTS. The Lead Cascade will be a real time demonstration of the basic building block for a gas centrifuge enrichment process that will provide data that is vital to reducing the financial risks associated with reliability, performance, licensability, and cost. This project provides the opportunity to minimize or eliminate financial risks associated with Commercial Plant deployment.

Rotors for the Lead Cascade Project will be manufactured and balanced in Oak Ridge, Tennessee. The rotors and other centrifuge components will be shipped to the Lead Cascade for assembly, installation, checkout, and start-up. Locating the Lead Cascade at PORTS will require refurbishment of existing equipment and buildings of the former GCEP shown in Figure 1.2-1 (located in Appendix E of this ER). The refurbishment requires approximately 13 months to complete and is currently scheduled to occur between August 2004 and August 2005. The refurbishment would employ an average of 25 workers for a 13-month period. Operation of the Lead Cascade will be initiated in October 2005 and will continue through December 2007, employing 45 workers. Operation will demonstrate the reliability of the centrifuge machines; assist in the design and optimization of the cascade and balance of the plant; and it also will provide information important to determining the cost, design, and licensability of the Commercial Plant. The Lead Cascade will operate on recycle with no withdrawal of enriched product, except for laboratory samples.

Commercial Plant

The centrifuge technology is highly modular, with the basic building block of enrichment capacity being a cascade of centrifuges. Information and work performed during the Demonstration and Lead Cascade Projects will be used to determine the design of the Commercial Plant and will provide vital information on performance, reliability, and economics that will be used in making a decision on the construction of a Commercial Plant. The determination of size and schedule for the construction of a Commercial Plant will be based on a number of factors including, but not limited to, the quantity of production needed, the centrifuge manufacturing rate, the economics of a gas centrifuge Commercial Plant, the state of development and economics of other technologies, and USEC's commitments in the DOE-USEC Agreement.

This figure is withheld pursuant to 10 CFR 2.790 and is located in Appendix E of this ER

Figure 1.2-1 Location of Proposed Lead Cascade Facility

1.3 Purpose and Need for the Proposed Action

The purpose of the Lead Cascade is to provide information to assist in determining whether to move forward with the advanced uranium enrichment technology being developed at the ETTP in Oak Ridge, Tennessee. In fact, the information provided during system testing at the Lead Cascade is the principal benefit of the facility.

The Lead Cascade s an important step toward advancing the national energy security goal of maintaining a reliable and secure domestic source of enriched uranium. The Lead Cascade will use American Centrifuge enrichment technology that supports the national energy security goals. These goals—which include providing a reliable and secure domestic source of enriched uranium—are consistent with the purposes for which the Corporation was created. Through amendments to the *Atomic Energy Act*, Congress created the Corporation to, among other things, conduct research and development as required to evaluate alternative technologies for uranium enrichment, and to help maintain a reliable and economical domestic source of enriched uranium.

To support this and other statutory objectives, on June 17, 2002, USEC and the U.S. Government, represented by the DOE, entered into the DOE-USEC Agreement. Assuming successful demonstration of the technology, the DOE-USEC Agreement requires that USEC begin operations of an enrichment facility at PORTS or PGDP using advanced technology with annual capacity of 1 million SWU (expandable to 3.5 million SWU) in accordance with certain milestones. The milestone schedule contains target dates for various steps including milestones requiring the deployment of the Lead Cascade at either PORTS or PGDP, culminating in deployment of an advanced enrichment technology facility, including testing, NRC licensing, financing, and construction. The milestones require, among other things, that a centrifuge facility (1) begin commercial operations in PORTS by January 2009 and achieve an annual capacity of 1 million SWU by March 2010 or (2) begin commercial operations at PGDP by January 2010 and achieve an annual capacity of 1 million SWU by March 2011.

However, before proceeding with the design, licensing, construction, and operation of a Commercial Plant, USEC needs to demonstrate acceptable reliability, performance, and economy of the gas centrifuge machines. This demonstration is the purpose of the Lead Cascade. Milestones in the DOE-USEC Agreement related to the Lead Cascade include the following:

Date	Milestone
April 2003	Submit License Application for Lead Cascade to NRC
June 2003	NRC dockets Lead Cascade Application
January 2005	Centrifuge testing begins
June 2005	Begin Lead Cascade centrifuge manufacturing
October 2006	Satisfactory reliability and performance data obtained from Lead Cascade operations

In addition to advancing national energy security goals, the Lead Cascade supports USEC's corporate goal of remaining a competitive and reliable domestic provider of enriched uranium to the nuclear industry. The corporation currently produces about 5 million SWU per year using gaseous diffusion technology at PGDP. PGDP is over 50 years old and the power costs to produce SWU are significant. In addition, as Executive Agent for the U.S. Government, the Corporation also introduces into the market about 5 million SWU per year of LEU that is derived from down blending of HEU from Russian warheads. The agreement under which the Corporation supplies LEU from this source expires in 2013. Global LEU suppliers compete primarily in terms of price, and secondarily on reliability of supply and customer service. USEC is committed to being competitive on price and delivering superior customer service. Hence, because of the age of PGDP, the cost of power, and the currently scheduled expiration of the HEU agreement, USEC needs to deploy a lower cost and domestic advanced technology towards the end of this decade.

1.4 Proposed Action

The Proposed Action is to install and operate a gas centrifuge Lead Cascade at PORTS located in Piketon, Ohio, in accordance with the DOE-USEC Agreement. Existing facilities formerly used for GCEP will be leased from the DOE and utilized for the Lead Cascade. The Proposed Action includes refurbishment of facilities, and start-up and operation of up to 240 full-scale gas centrifuge machines and components.

The Lead Cascade operates up to 240 centrifuge machines in the recycle mode as a "closed loop" system. Additional centrifuges may be available for other uses (e.g., spares), but are not installed for operation. The facility may enrich uranium up to 10 weight (wt.) percent uranium-235 (^{235}U). The cascade is operated on recycle where the enriched product stream is recombined with the depleted stream prior to being re-fed to the cascade. Samples of uranium are taken for laboratory analysis to assess the performance of the cascade. The Lead Cascade may possess up to 250 kilograms (kg) uranium hexafluoride (UF_6).

Other operations that are performed to support the primary process include equipment and machinery repair and fabrication of specialized equipment. These activities may be conducted with equipment contaminated with uranium bearing material. The uranium bearing material could be UF_6, uranium tetrafluoride (UF_4), uranyl fluoride (UO_2F_2), or an intermediate oxy-fluoride.

1.5 Applicable Regulatory Requirements, Permits, and Required Consultations

Informal consultations have been made with the cognizant agencies in compliance with the following:

- Section 7 of the *Endangered Species Act*
- *Fish and Wildlife Coordination Act*

- *National Historic Preservation Act* (NHPA), Section 106
- *Farmland Protection Policy Act* (FPPA)/*Farmland Conservation Impact Rating*

Consultation letters and responses are included in Appendix B.

New air pollutant sources or modifications of existing sources in the State of Ohio are required by Ohio Administrative Code 3745-31 to have a Permit to Install (PTI) from the Ohio EPA prior to installation of the source. The Lead Cascade will require one PTI for the process vent.

Sources of airborne radionuclides at DOE-owned facilities are covered by an EPA Permit-By-Rule issued under 40 CFR Part 61 (National Emission Standards for Hazardous Air Pollutants [NESHAP]) Subpart H. Under the NESHAP rule, new or modified sources of airborne radionuclides at DOE-owned facilities are required to have prior Permission to Construct from U.S. Environmental Protection Agency (EPA) unless the change has a projected maximum public Total Effective Dose Equivalent of less than 0.1 millirem per year (mrem/yr). The Lead Cascade is under the 0.1 mrem/yr threshold.

Consequently, the EPA will only require a timely notification from USEC of the intent to install and operate the Lead Cascade to comply with this requirement.

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2.0 ALTERNATIVES

This section describes the alternatives discussed in detail in this ER, as well as those alternatives that were not considered to be reasonable and, thus, were eliminated from further study. This section also includes a discussion of cumulative effects, as well as a table comparing predicted environmental impacts of the Proposed Action, the PDGP Siting Alternative, and the No Action Alternative.

2.1 Detailed Description of the Alternatives

2.1.1 No Action Alternative

This alternative involves not deploying a Lead Cascade. This alternative does not meet the need. Without the Lead Cascade it is doubtful that American Centrifuge technology would be deployed by USEC on a commercial scale (see first alternative considered and eliminated below). Further, this alternative would be inconsistent with the DOE-USEC Agreement. The DOE-USEC Agreement requires USEC to deploy an advanced technology enrichment facility. The milestones require, among other things, that a centrifuge uranium enrichment facility (1) begin commercial operations at PORTS by January 2009 and achieve an annual capacity of 1 million SWU by March 2010 or (2) begin commercial operation at PGDP by January 2010 and achieve an annual capacity of 1 million SWU by March 2011.

2.1.2 Proposed Action

The Proposed Action is to construct and operate a Lead Cascade at PORTS. The purpose of the Lead Cascade is to demonstrate the reliability, performance, and economy of the gas centrifuge machines developed and designed by USEC during the Demonstration Project. Data from the Lead Cascade will be used to support decisions regarding deployment of a Commercial Plant in accordance with the DOE-USEC Agreement described in Section 1.3.

2.1.3 Reasonable Alternatives

A reasonable alternative to the proposed action was to construct and operate a Lead Cascade at PGDP.

This alternative involves constructing and operating a Lead Cascade at PGDP. This alternative was eliminated after a detailed quantitative and qualitative comparison of factors that included the following:

- Cost to construct and operate the Lead Cascade
- Schedule to deploy the Lead Cascade
- Community support and socioeconomic factors
- Environmental, safety, and health factors

- Factors that will facilitate future deployment of the Commercial Plant
- Factors that will lower the costs of USEC's current operations

While this alternative would meet the needs, after a review of these factors, it was determined that siting the Lead Cascade at PORTS would be advantageous from a cost and schedule perspective. The environmental impact of this alternative would be essentially the same as the Proposed Action except for the impacts of constructing a new, 3,900 m^2 (42,000 ft^2) building and associated infrastructure.

2.2 Alternatives Considered but Eliminated

Alternatives to the proposed action that were considered and eliminated include the following:

- Construct and operate a Commercial Plant without a Lead Cascade
- Construct and operate a non-centrifuge alternate enrichment technology test facility
- Construct and operate a Lead Cascade test facility at a non-GDP location

A discussion of the reasons the above alternatives were eliminated is provided below:

Construct and operate a Commercial Plant without a Lead Cascade

This alternative would involve USEC deploying a Uranium Enrichment Facility on a commercial scale without the benefits of a Lead Cascade. This alternative was eliminated because it involves significant technical, financial, and regulatory risks. The centrifuge design developed in the Demonstration Project in Oak Ridge incorporates changes from DOE designed centrifuges that operated in the 1980s. The technical performance and reliability of these changes must be confirmed before committing to a commercial scale deployment. In addition, there is a need to more accurately define the cost for manufacture and operation of centrifuges prior to a commitment to commercial scale deployment to more accurately forecast the expected investment rate-of-return for the Commercial Plant and reduce financial risk. The experience gained from constructing, operations, and licensing the Lead Cascade will provide data that will add confidence and improve predictability of the schedule cast and licensing process for the Commercial Plant that would facilitate a commitment to commercial scale deployment. This Alternative does not meet the need. Vital data and experience would not be available to USEC to enable it to make its decision on the commercial deployment of gas centrifuge and it would not enable USEC to meet its commitments to the U.S. Government in the DOE-USEC Agreement. The environmental impact of this alternative are larger than the Proposed Action since a Commercial Plant would involve the manufacture and operation of significantly more centrifuge machines.

Construct and operate a non-centrifuge alternate enrichment technology test facility

Non-centrifuge alternate enrichment technologies have been and continue to be evaluated by USEC. For example, as a private corporation, USEC continued development work on the AVLIS enrichment process that utilizes lasers to enrich uranium. In 1999, USEC evaluations concluded that the return on investment was not sufficient to outweigh the risks and ongoing capital expenditures necessary to continue work on AVLIS. So in 1999, USEC suspended development of AVLIS. Today, USEC continues to evaluate the SILEX enrichment process, which also utilizes lasers to enrich uranium. SILEX offers a number of important advantages over the AVLIS process. However, because SILEX is still in an early stage of development, and could not be deployed within the time frames required by the DOE-USEC Agreement. Constructing and operating a SILEX test facility was eliminated as an alternative for current demonstration and deployment because it does not meet the need. USEC continues to evaluate SILEX for demonstration and deployment after centrifuge technology. The environmental impact of this alternative would be to delay the demonstration and deployment of advanced enrichment technology, resulting in the continued emission and effluents from the operation of the PGDP.

Construct and operate a Lead Cascade test facility at a non-GDP location

This alternative involves constructing and operating the Lead Cascade at a "green field" or a disturbed site other than the GDPs. This alternative was eliminated because it is inconsistent with the DOE-USEC Agreement and because only the GDP sites provide schedule, regulatory, and cost advantages over other sites. The DOE-USEC Agreement stipulates that USEC deploy the Lead Cascade at either PORTS or PGDP. Also, no other sites offered the unique combination of (1) readily accessible environmental data, (2) relevant and existing regulatory programs related to uranium enrichment that have been reviewed and approved by NRC, and (3) the availability of skilled labor with uranium enrichment industry experience. Without readily accessible environmental data (as in a green field situation) there would be a delay in assembling and evaluating environmental factors. Without existing regulatory programs, the Lead Cascade would have to develop and solely staff all programs and plans required by the 10 CFR Part 70 regulations. Without available skilled labor with uranium enrichment experience, USEC would have to either provide training or relocate trained personnel at added expense. The environmental impact of this alternative would be either to disturb a "green field" site or to possibly introduce emission and effluents associated with uranium enrichment to an existing industrial site.

2.3 Cumulative Effects

Cumulative impacts are those effects that result from the incremental impacts of an action considered additively with the impacts of other past, present, and reasonably foreseeable future actions. Cumulative impacts are considered regardless of the agency or person undertaking the other actions (40 CFR 1508.7, CEQ 1997) and can result from the combined or synergistic effects of individually minor actions over a period of time. This section describes actions that are considered pertinent to the analysis of cumulative impacts for the proposed refurbishment of facilities for the Lead Cascade at PORTS. The No Action Alternative is typically included as a baseline against which cumulative effects are evaluated.

The cumulative impacts analysis quantitatively presented in this document is based on the potential effects of the Lead Cascade when added to impacts from past, present, and reasonably foreseeable actions. On-going operations on the PORTS reservation include the Corporation's Cold Standby, deposit removal, and removal of technetium from potentially contaminated feed projects and the DOE's environmental restoration activities. These activities will continue with or without the Lead Cascade.

2.3.1 No Action Alternative

As discussed in Chapter 4.0, Environmental Impacts, neither the Proposed Action nor the No Action Alternative will have any significant environmental impacts. Under the No Action Alternative, the Lead Cascade would not be sited at PORTS.

2.3.2 Proposed Action

Under the Proposed Action refurbishment and operations activities will occur within existing facilities. As discussed in Chapter 4.0, the Proposed Action would not cause an appreciable increase or damage to any of the environmental resources.

Connected to the Proposed Action is the on-going Demonstration Project that is being conducted in Oak Ridge, Tennessee. The DOE determined through an Environmental Assessment that these activities present no significant environmental impacts. The Commercial Plant may be constructed at either PORTS or PGDP if the information provided by the component and system testing demonstrate that the centrifuge enrichment technology is economical. This action is independent of, and is not automatically triggered by, the studies that will be conducted at the ETTP and the Lead Cascade. Information from the Demonstration Project and the Lead Cascade will be used in making any future decisions on the deployment of a Commercial Plant. Moreover, the Commercial Plant will require a separate NRC license once the site is selected. At the time USEC would submit a license application for the Commercial Plant, USEC would also submit an ER to discuss that plant's environmental impacts. Accordingly, the cumulative effects that are the subject of this ER include the effects of the Lead Cascade, the Demonstration Project, and the on-going cold standby and environmental operations at PORTS that will continue with or without the Lead Cascade.

2.4 Comparison of the Predicted Environmental Impacts

A comparison of the predicted environmental impacts was conducted for the Lead Cascade. The No Action Alternative and the reasonable alternatives for each of the environmental areas of interest is provided in Table 2.4-1.

Table 2.4-1 Comparison of the Predicted Environmental Impacts

Environmental Area Assessed	Proposed Action	PGDP Siting Alternative	No Action Alternative
Infrastructure	No significant impact; slight increase in electrical (5.76 percent), compressed air (2.91 percent), and sewage (1.69 percent) usage	No significant impact; slight increase in utility usage	No impact
Land Use	No significant impact; utilize existing facilities	No significant impact; new facility would be constructed that is consistent with historical uranium enrichment operations	No impact
Transportation	No significant impact; slight increase in routine shipment (6.77×10^{-4}) and accident shipment (6.77×10^{-3}) risk	No significant impact; slight increase in shipment risk	No impact
Geology, Soils, and Seismicity	No significant impact; utilize existing facilities	No significant impact; possible temporary increase in erosion would occur during construction of new facility	No impact
Water Resources	No significant impact; precautions taken to avoid accidental discharges	No significant impact; precautions would be taken to avoid accidental discharges	No impact
Ecological Resources	No significant impact; utilize existing facilities	No significant impact; construction of new facility would not impact natural habitat for any rare, threatened, or endangered species	No impact
Air Quality			
Non-Radiological	No significant impact; slight increase in HF concentrations (1.2×10^{-4} µg/m^3); slight increase in emissions from standby electrical generator	No significant impact; slight increase in HF concentrations (3.1×10^{-5} µg/m^3); slight increase in emissions from standby electrical generator	No impact
Radiological	No significant impact; slight increase in dose to the MEI (0.023 mrem/yr)	No significant impact; slight increase in dose to the MEI (0.0066 mrem/yr)	No impact
Noise	No significant impact; no increase in noise level outside facility	No significant impact; no increase in noise level outside facility	No impact

Table 2.4-1 Comparison of the Predicted Environmental Impacts (Continued)

Environmental Area Assessed	Proposed Action	PGDP Siting Alternative	No Action Alternative
Historic and Cultural Resources	No significant impact; utilize existing facilities	No significant impact; new facility would be constructed in previously disturbed area	No impact
Visual/Scenic Resources	No significant impact; utilize existing facilities	No significant impact; new facility would be constructed architecturally consistent with existing strategic structures	No impact
Socioeconomic	No significant impact; no impact to housing nor increase in population; slight increase in tax revenue	No significant impact; no impact to housing nor increase in population; slight increase in tax revenue	No impact
Environmental Justice	No impact	No impact	No impact
Public and Occupational Health	No significant impact; slight increase in HF emissions ($1.2x10^{-4}$ $\mu g/m^3$); slight increase in dose to the MEI (0.023 mrem/yr); no significant increase in recordable injury/illness rates	No significant impact; slight increase in HF emissions ($3.1x10^{-5}$ $\mu g/m^3$); slight increase in dose to the MEI (0.0066 mrem/yr)); no significant increase in recordable injury/illness rates	No impact
Waste Management	No significant impact; slight increase in waste generation	No significant impact; slight increase in waste generation	No impact

2.5 Decommissioning of the Lead Cascade

At the end of the useful life of the Lead Cascade, the facility will be decommissioned, with the land and facilities being de-leased and turned over to DOE, consistent with the Lease Agreement. Alternatively, if the Commercial Plant is sited at PORTS and the Lead Cascade facilities are incorporated into the license for the Commercial Plant, decommissioning would take place at the time of Commercial Plant decommissioning. Details regarding decommissioning plans and funding are contained in Chapter 10.0 of the License Application for the American Centrifuge Lead Cascade Facility. The environmental impact of decommissioning is described in Appendix C of this ER.

3.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT

This section describes the various resources present on and around the PORTS reservation as a baseline for the incremental impacts of the Proposed Action and analyzed alternatives. It also provides a general description of the physical, biological, aesthetic, and cultural features of the site and adjacent areas. Chapter 3.0 summarizes information gathered from site surveys, literature, and other publicly available sources for each resource area pertinent to the proposed project. The scope of the discussion varies by resource to ensure that relevant issues are included. Descriptions of the existing environment provide a basis for understanding the direct, indirect, and cumulative effects of the Proposed Action on the PORTS site.

3.1 Site and/or Facility Description

PORTS is located at 39° 00' 30" north latitude and 83° 00' 00" west longitude measured at the center of the plant, on an approximately 1,501 ha (3,708 acre) parcel of DOE-owned land. PORTS is located in a rural area of Pike County in south central Ohio. The nearest residential center in this area is Piketon, which is about 6 km (4 mi) north of the reservation on U.S. Route 23. The county's largest community, Waverly, is about 13 km (8 mi) north of the reservation. Additional population centers within 80 km (50 mi) of the reservation are Portsmouth, 43 km (27 mi) south; Chillicothe, 43 km (27 mi) north; and Jackson, 42 km (26 mi) east.

Additional details are located in Chapter 1.0 of the License Application for the American Centrifuge Lead Cascade Facility.

3.1.1 PORTS Site

Electricity

The Ohio Valley Electric Corporation (OVEC) currently provides electricity for the PORTS reservation over 345 kilovolts (kV) transmission lines. For distribution within the site, power transformers reduce the voltage to 13.8 kV. The current typical electricity consumption rate for the site is approximately 36.5 megawatts (MW). During the timeframe from 1992 through 2000, the electricity consumption rate for the site was approximately 1,166 MW to 1,927 MW.

Water Resources

Raw water is taken from three sources: the primary (groundwater) source is four ground water well fields, X-605H, X-608A/B, and X-6609; the secondary source is the Scioto River through the X-608 pump house; the tertiary source is supernatant that is recycled from the X-611B lagoon. Raw water is treated in the X-611 Water Treatment Facility and fed to the RCW, Tower Cooling Water and high-pressure fire water systems. Water fed to the sanitary and sanitary-fire water system receives further treatment before distribution. The maximum potential water production for the PORTS water system is 13 million gallons per day (MGD). Current water usage is less than 5 MGD.

3.1.2 Gas Centrifuge Enrichment Plant Facility

The X-3001 is a large open bay process facility. It was constructed in the early 1980s to approved building and seismic codes and standards and has been well maintained. Currently, the northeastern section of the X-3001 Process Building contains existing gas centrifuge equipment.

The X-7725 Recycle/Assembly Building is a large, five-story structure with a wide variety of open bay areas, support areas, shipping capability, and special use areas. The building was designed to house equipment for the assembly and disassembly of GCEP production machinery. The X-7725 building is connected to the large open bay process building by an enclosed transfer corridor (X-7727H). This capability allows for easy transfer of centrifuge supplies and personnel between the process area and the X-7725 building.

An integral part of the X-7725 building is the X-7726 Centrifuge Test and Training Facility (CTTF). This facility was designed for assembling centrifuge machines.

3.1.3 Other USEC Facilities

PORTS resources provide fire, security, medical, emergency and waste management, and environmental monitoring support. The X-710 Analytical Laboratory provides sampling support.

Emergency Response

The X-1007 Fire Station has four double drive-through bays with a minimum of one 1,000 gallons per minute pumper, one truck with hazardous materials, radiological, and rescue equipment, and one ambulance. The building also houses facilities for fire extinguisher refilling, training, alarm/radio monitoring, change out, and fire protection engineering (USEC-02).

Emergency Response Operations

Located adjacent to the fire station is the X-1020 Emergency Operations Center (EOC). The EOC is a fully equipped facility, with monitoring and communications capabilities. On-line information analysis systems allow response, management, and advisory teams to rapidly assess, mitigate, and resolve situations. Communication links with the NRC, State, Federal, and local agencies can be established from the EOC.

Telecommunications

The site currently has two telephone switches capable of up to 2,500 connections. One switch is in the X-3000 building. The site telephone feed lines are copper and fiber optic, capable of handling analog or digital signals through Piketon, Ohio Public Telephone Exchange. Plantsite buildings are interconnected by copper and fiber optic cabling.

Steam

The existing coal fired steam plant has three boilers each capable of generating 56,700 kilograms per hour (kg/h) (125,000 pounds per hour [lbs/h]) of steam for the entire site.

Sanitary Wastewater

Sewage treatment is provided by the X-6619 Sewage Treatment Plant (STP), which has a design capacity of 2,275,032 L/d (601,000 GPD).

3.2 Land Use

This section discusses the existing land use and visual resources of the proposed project at the PORTS reservation. The PORTS reservation is an industrial site. The Perimeter Road surrounds a 486 ha (1,200 acre) centrally developed area. The terrain surrounding the reservation, except for the Scioto River floodplain, consists of marginal farmland and densely forested hills. The Scioto River floodplain is farmed extensively, particularly with grain crops.

The reservation land outside Perimeter Road is used for a variety of purposes, including a water treatment plant, holding ponds, sanitary and inert landfill, and open and forested buffer areas. The majority of the site improvements associated with the GDP are located within the 202 ha (500 acre) fenced area. Within this area are three large process buildings and auxiliary facilities that are currently leased to the Corporation. A second, large developed and fenced area covering about 121 ha (300 acres) contains the facilities built for the GCEP. These areas are largely devoid of trees, with grass and paved roadways dominating the open space. The remaining area within Perimeter Road has been cleared and is essentially level. Controlled access to the reservation is maintained by a security force.

Approximately 190 facilities are located within the PORTS reservation as well as the utility structures on the site. In general, the X-100 through X-700 series of buildings are directly related to the GDP. Most of the buildings in this series are located within the 202 ha (500 acre) fenced area. The X-200 and X-300 series are the production buildings and related infrastructure facilities. Most of the buildings and infrastructure included in the X-1000 through X-7000 series of buildings are located within the 121 ha (300 acre) GCEP expansion area. The facilities containing the administrative activities include the facilities numbered in the X-100 series for the GDP and X-1000 series for the more recent construction. The facilities house such activities as administrative offices, engineering, cafeteria, medical services, security, and fire station (DOE 2001b).

3.3 Transportation

The distance between Oak Ridge, Tennessee and Piketon, Ohio is approximately 555 km (345 mi) by road. Major transportation routes to and from Oak Ridge, Tennessee are via two interstate highways, I-40 and I-75, and U.S. highways 11, 25W, and 70. State highways that service the area includes Tennessee SR 58, 61, 62, 95, and 162 (Pellissippi Parkway). These highways lead to Boeing Road where the centrifuges are manufactured.

The PORTS reservation is served by southern Ohio's two major highways: U.S. Route 23 and Ohio SR 32. These highways are one and one half miles west of the site and two miles north of the site, respectively. Access is by the Main Access Road, a four-lane interchange with U.S. Route 23. This access route accommodates the site traffic flow.

The site is 5.6 km (3.5 mi) from 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 (DOE 2001c). Approximately 113 km (70 mi) north of the site, U.S. Route 23 intersects I-270, I-70, and I-71. Trucks also may access I-64 approximately 32.2 km (20 mi) 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-74, and I-75. To the east, SR 32 is linked with I-77.

Prior to September 2001, the North Access Road had a daily traffic load of approximately 2,383 vehicles; the East Access Road had a daily traffic load of 802 vehicles; and the South Access Road had a daily traffic load of 1,579 vehicles. The Main Access Road had a daily traffic load of 592 vehicles. (Traffic in both directions is included in these values.) These roads were congested during shift change; however, traffic flowed at posted speed limits and a projected 40 percent increase in vehicles was feasible without staggering shifts or upgrades to roads. These data were provided by the Pike County Engineer's office from a 1999 traffic study. Load limits on these routes are controlled by the Ohio Revised Code at 38,556 kg (85,000 lbs) gross vehicle weight (gvw). Special overload permitting is available. Since September 2001, all site traffic utilizes the Main Access Road from U.S. Route 23. All the other access roads are currently closed and the reservation is closed to general public access. Access to the reservation is controlled by the security force. This has reduced the amount of traffic on Perimeter Road.

U.S. Route 23 has an average daily traffic volume of 13,990 vehicles. 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 (ODOT) supplied this data from a 1999 traffic study. Load limits on these routes is controlled by the Ohio Revised Code at 38,556 kg (85,000 lbs) gvw. Special overload permitting is available.

The PORTS 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.

The site has excellent rail access, and several track configurations are possible within the site. 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 on-site system is currently used infrequently. The GCEP area is also connected to the existing rail configuration. Track in the vicinity of Piketon, Ohio, allows a maximum speed of 96.6 kilometers per hour (km/h) (60 miles per hour [mph]). The CSX Transportation Inc. line also provides access to other rail carriers.

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, 7 to 9 days; and to Pittsburgh, 3 to 4 days. The U.S. Army Corps of Engineers maintains the Ohio River at a minimum channel width of 243.8 meters (m) (800 feet [ft]) and a depth of 2.74 m (9 ft).

The nearest airport to the site is the Greater Portsmouth Regional Airport, located approximately 24 km (15 mi) to the south. The airport has dual runways, T-hangars and is served by Chasteen Aviation; Inc. Also, nearby is the Ross County Airport, approximately 40 km (25 mi) north of Piketon. This facility is similar in size and makeup to the Greater Portsmouth Regional Airport. Three international airports are within a two-hour drive of the site as well: Cincinnati/Northern Kentucky International Airport, Dayton International Airport, and Port Columbus International.

3.4 Geology and Soils

Physical characteristics of the PORTS reservation have been characterized in several previous investigations. This section discusses the geology and soils found on the PORTS reservation and areas in the vicinity based on these investigations.

The site is not on the National Priority List under the *Comprehensive Environmental Response, Compensation and Liability Act.* In 1989, the Ohio Attorney General's Office issued a Consent Decree and the EPA issued an Administrative Consent Order to direct investigation and cleanup of the site. Under the two enforcement actions, a *Resource Conservation and Recovery Act* (RCRA) of 1976 Facility Investigation was conducted to identify the extent of environmental contamination. The reservation was divided into quadrants based on groundwater flow patterns in order to expedite cleanup of contaminated sites in accordance with the RCRA Corrective Action and Closure process. The RCRA Facility Investigations reports have been completed and approved by Ohio Environmental Protection Agency (OEPA) and EPA for each quadrant. In addition, the Baseline Ecological Risk Assessment and Baseline Human Health Risk Assessment have been approved. At the present time, the OEPA has day-to-day oversight of the clean-up work.

3.4.1 Site Geology

The near-surface geologic materials that influence the hydrologic system of the site consist of several bedrock formations and unconsolidated deposits. The bedrock formations include (from oldest to youngest) Bedford Shale, Berea Sandstone, Sunbury Shale, and Cuyahoga Shale. The unconsolidated deposits of clay, silt, sand, and gravel compose the Minford Clay and Silt (Minford) member and the Gallia Sand and Gravel (Gallia) member of the Teays formation (DOE 1996a). Prior to the Pleistocene glaciation, the Teays River and its tributaries were the dominant drainage system in Ohio.

The preglacial Portsmouth River, a tributary of the Teays, flowed north across the plant site, cutting down through the Cuyahoga Shale and into the Sunbury Shale and Berea Sandstone, and deposited fluvial silt, sand, and gravel of the Gallia member of the Teays Formation. Each formation or unit beneath the site is discussed below.

3.4.1.1 Bedrock Geology

Bedrock consisting of clastic sedimentary rocks underlies the unconsolidated sediments beneath the site. The geologic structure of the area is simple, with the bedrock (Cuyahoga Shale, Sunbury Shale, Berea Sandstone, and Bedford Shale) dipping gently to the east-southeast. No known geologic faults are located in the area; however, joints and fractures are present in the bedrock formations.

Bedford Shale is the lowest stratigraphic unit encountered during environmental investigative activities at the site. Bedford Shale is composed of thinly bedded shale with interbeds and laminations of grey, fine-grained sandstone and siltstone. The typical depth to the top of this formation at the site is 21 to 30 m (70 to 100 ft) below ground surface (bgs). However, Bedford Shale outcrops are present in deeply incised streams and valleys within the reservation. The Bedford Shale averages 31 m (100 ft) in thickness.

Berea Sandstone is a light grey, thickly bedded, fine-grained sandstone with thin shale laminations. The top 3 to 5 m (10 to 15 ft) consists of a massive sandstone bed with few joints or shale laminae. The Berea Sandstone averages 11 m (35 ft) in thickness; however, the lower 3 m (10 ft) has numerous shale laminations and is similar to the underlying Bedford Shale. This gradational contact does not allow for a precise determination of the thickness of the Berea Sandstone. Regionally, Berea Sandstone contains naturally occurring hydrocarbons (oil and gas) in quantities sufficient for commercial production. Generally, within Perimeter Road, the Berea Sandstone is the uppermost bedrock unit beneath the western portion of the site but is overlain by the Sunbury Shale to the east.

Sunbury Shale is a black, very carbonaceous shale. The Sunbury Shale is 6 m (20 ft) thick beneath much of the site, but thins westward as a result of erosion by the ancient Portsmouth River, and is absent on the western half of the site. The Sunbury Shale also is absent in the drainage of Little Beaver Creek downstream of the X-611A Lime Sludge Lagoons and the southern portion of Big Run Creek, where it has been removed by erosion. The Sunbury Shale underlies the unconsolidated Gallia beneath the most industrialized eastern portion of the site and underlies the Cuyahoga Shale outside of the Portsmouth River Valley.

Cuyahoga Shale, the youngest and uppermost bedrock unit at the site, forms the hills surrounding the site. The Cuyahoga Shale has been eroded from most of the active portion of the site. It consists of grey, thinly bedded shale with scattered lenses of fine-grained sandstone and regionally reaches a thickness of approximately 49 m (160 ft).

3.4.1.2 Unconsolidated Deposits

Unconsolidated deposits in the vicinity of the site fill the ancient Portsmouth River Valley to depths of approximately 9 to 12 m (30 to 40 ft). The unconsolidated deposits are divided into two members of the Teays Formation, the Minford Clay and Silt and the Gallia Sand and Gravel.

Minford is the uppermost stratigraphic unit beneath the site. The Minford averages 6 to 9 m (20 to 30 ft) in thickness and grades from predominantly silt and very fine sand at its base to clay near the surface. The upper clay unit averages 5 m (16 ft) in thickness, is reddish-brown, plastic, and silty, and contains traces of sand and fine gravel in some locations. These thicknesses vary greatly as a result of construction cutting and filling operations, as discussed in the next paragraph. The lower silt unit averages 2 m (7 ft) in thickness, is yellow-brown and semiplastic, and contains varying amounts of clay and very fine sand.

During the initial grading of the site, the deposits within the Perimeter Road were reworked to a depth as great as 6 m (20 ft) by preconstruction cut and fill activity. In most cases, the fill is indistinguishable from the undisturbed Minford. The combination of construction activities, bedrock topography, and erosion by modern streams has influenced the areal extent and thickness of the Minford on the PORTS reservation.

Gallia Sand and Gravel were deposited prior to Pleistocene glaciation when the Portsmouth River meandered north through the valley currently occupied by the site. The Gallia averages 0.9 to 1 m (3 to 4 ft) in thickness at the site and is characterized by poorly sorted sand and gravel with silt and clay. Channel migration and variation in depositional environments that occurred during deposition of the Gallia resulted in the variable thickness of the Gallia. The areas of thickest accumulation of Gallia may represent the former channel location and include areas under the southern end of the X-330 building and near the X-701B. Gallia deposits beneath the site are generally absent above an approximate elevation of 198 m (650 ft) above mean sea level (amsl).

As a result of similar depositional environments and source material, deposits from modern streams at the site often are visually indistinguishable from Gallia deposits. The modern surface-water drainage also has eroded the unconsolidated sediments and resulted in locally thin or absent Gallia and Minford.

3.4.2 Soils

According to the Soil Survey of Pike County, Ohio, 22 soil types occur within the PORTS reservation property boundary with the predominant soil type being Omulga Silt Loam (USDA 1990). Most of the area within the active portion of the site is classified as Urban land-Omulga complex with a 0 to 6 percent slope, which consists of Urban land and a deep, nearly level, gently sloping, moderately well-drained Omulga soil in preglacial valleys. The Urban land is covered by roads, parking lots, buildings, and railroads that are so obscure or alter the soil that identification of the soil series is not feasible.

The surface layer of Omulga Silt Loam is dark grayish-brown, friable (easily crumbled), and approximately 25 cm (10 in) thick. The subsoil is approximately 137 cm (54 in) thick and is composed of three portions: (1) a yellowish-brown, friable silt loam; (2) a fragipan (brittle, compacted subsurface soil) of yellowish-brown, mottled, firm, and brittle silty clay loam middle; and (3) a yellowish-brown, mottled, friable silt loam approximately 51 cm (20 in) thick. The root zone generally is restricted to the zone above the fragipan and contains none of the Urban land soils. Well-developed soil horizons may not be present in all areas inside Perimeter Road because of cut-and-fill operations related to construction.

Prime farmland is land that has the best combination of physical and chemical characteristics for producing crops of statewide or local importance. Seven of the soils that occur within the PORTS reservation property are listed in the Pike County Soil Survey as prime farmland soils. Prime farmland is protected by the FPPA of 1981 which seeks "... to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmlands to nonagricultural uses..." (7 USC 4201[b]).

USEC has consulted with the U.S. Department of Agriculture (DOA), Natural Resources Conservation Service (NRCS) who have determined that the project site is mapped as Urban Land-Omulga Complex and is a non-prime soils; therefore, the FPPA does not apply. A copy of the letter is provided in Appendix B.

3.4.3 Seismicity

Geological studies conducted to determine the potential seismic hazard for the PORTS reservation have determined that only one fault is located within 40 km (25 mi) of the site, and no seismicity has been recorded on it and no recorded seismic events have occurred within 40 km (25 mi) of the site. The Kentucky River fault zone and the Bryant Station-Hickman Creek fault are located farther away from PORTS, the latter fault being roughly 97 km (60 mi) to the southwest. These faults bound the southern part of a north-to-northeast-trending area of seismicity in central and eastern Ohio. Soil testing for the GCEP facility indicated that the potential for earthquake-induced soil liquefaction is relatively low. The potential for soil-structure interaction (ground motion magnification) is also slight. Also, Pike County is not one of the potential jurisdictions listed in Appendix VI of 40 CFR Part 264 for which compliance with seismic standards must be demonstrated (MMES 1994).

3.5 Water Resources

This section discusses surface water and groundwater resources present in the vicinity of the Lead Cascade.

3.5.1 Surface Water

Additional information regarding regional data on the physical and hydrological characteristics of ground and surface water is located in Section 1.3.4 of the License Application for the American Centrifuge Lead Cascade Facility.

The site is drained by several small tributaries of the Scioto River, which flows south to the Ohio River. Sources of surface water drainage include storm water runoff, groundwater discharge, and effluent from plant processes.

The largest stream on the site is Little Beaver Creek, which drains the northern and northwestern portions of the site before discharging into Big Beaver Creek. Little Beaver Creek is a small, high-gradient, unmodified stream that receives the majority of its flow from the X-230J7 East Holding Pond discharge through the East Drainage Ditch. Little Beaver Creek also receives effluent via the Northeast Drainage Ditch through the outfall from the X-230J6 Northeast Holding Pond and the North Drainage Ditch through the X-230L North Holding Pond Outfall. Substrates are predominantly slab boulders and bedrock at the upper reach to gravel and sand near the mouth. During parts of the year, intermittent flow conditions exist upstream from the X-230J7 discharge. During these times the upstream section is composed of isolated pools with no observable flow (OEPA 1998).

Big Run Creek, located in the southeastern portion of the site, receives outfall effluent from the X-230K South Holding Pond at the headwaters of the stream. Big Run Creek continues southwest from the DOE property boundary until it discharges into the Scioto River, approximately 6.4 km (4 mi) from the site. The substrates are predominated by gravel and cobble, and the channel has remained unmodified. Because of the small stream size and high gradient, deep pools are absent. Big Run Creek often has intermittent flow during parts of the year (OEPA 1993).

Two ditches drain the western and southwestern portions of the site; flow is low to intermittent. The West Drainage Ditch receives water from surface water runoff, storm sewers, and plant effluent from X-230J5. The unnamed southwest drainage ditch receives water mainly from storm sewers and groundwater discharge. These two drainage ditches continue west and ultimately discharge into the Scioto River.

The quality of surface waters at the site is affected by wastewater discharges and groundwater transport of contaminants from legacy DOE land disposal of waste. Although bedrock characteristics differ somewhat among the watersheds of these surface waters, the observed differences in water chemistry are attributed to different contaminant loadings rather than to geologic variation (DOE 1999a). Water quality, radioactivity, and flow measurements are made at a number of stations operated by DOE (DOE 1999a).

Stormwater discharges from the proposed Lead Cascade exit via the unnamed southwest drainage ditch and the West Ditch to the Scioto River, nearly two miles away. The unnamed southwest drainage ditch is a limited resource water, a use designation that indicates a lower-quality habitat. The fauna in a limited resource water has been substantially degraded and recovery is realistically precluded due to natural background conditions or irretrievable human-induced conditions. The unnamed southwest drainage ditch has been determined by the Ohio Administrative Code to be a "small drainage way maintenance," a highly modified surface water drainageway that does not possess the stream morphology and habitat characteristics necessary to support any other aquatic life habitat use. Additional use designations assigned include water supply and recreation use. The unnamed southwest drainage ditch is considered suitable for irrigation and livestock watering without treatment, commercial and industrial uses, with or without treatment, and partial body contact recreational activities such as wading with minimal threat to public health as a result of water quality. The West Ditch is located on the southwest side of the PORTS site and receives a minimal amount of stormwater runoff from the proposed site for the Lead Cascade. The West Ditch is a warm water habitat, capable of supporting and maintaining a balanced, integrated, adaptive community of warm water organisms. The stream has been determined suitable for irrigation and livestock watering without treatment, commercial and industrial uses, with or without treatment, and partial body contact recreational activities such as wading with minimal threat to public health as a result of water quality. The unnamed southwest drainage ditch and the West Ditch eventually drain into the Scioto River, a warm water habitat capable of supporting and maintaining a balanced, integrated, adaptive community of warm water organisms. The water is considered suitable for irrigation and livestock watering without treatment, commercial and industrial uses, with or without treatment, and recreational activities such as swimming, canoeing, and scuba diving with minimal threat to public health as a result of water quality (OEPA 1993).

DOE has six discharge points, or outfalls, through which water is discharged from the site. Three outfalls discharge directly to surface water (unnamed streams that flow to the Scioto River and Little Beaver Creek), and three discharge to the USEC X-6619 STP before leaving the site through USEC Outfall 003 to the Scioto River. USEC is responsible for 11 National Pollutant Discharge Elimination System (NPDES) outfalls at PORTS. Eight outfalls discharge directly to surface water (West Drainage Ditch to Scioto River, Little Beaver Creek, Big Run Creek, and the Scioto River). Two discharge to the X-6619 STP (Outfall 003) and one discharges to the X-230K South Holding Pond (Outfall 002).

The domestic wastewater generated by the offices and change houses is treated locally at the PORTS STP, which is currently operating within its NPDES permit. As per the USEC NPDES permit, the design capacity of the PORTS STP is 2,275,032 L/d (601,000 GPD). As per NPDES monitoring over the previous year, it is currently operating at 27 percent of that capacity.

3.5.2 Groundwater

The groundwater flow system at the site includes two water-bearing units (the bedrock Berea Sandstone and the unconsolidated Gallia) and two aquitards (the Sunbury Shale and the unconsolidated Minford). The basal portion of the Minford is generally grouped with the Gallia to form the uppermost and primary aquifer at the facility. The hydraulic properties of these units and groundwater flow at the site also have been well defined.

Groundwater recharge and discharge areas include both natural and man-made recharge and discharge areas. Natural recharge to the groundwater flow system at the site comes from precipitation. Land use and the presence of thick upper Minford clay and the Sunbury Shale effectively reduce recharge to underlying units. Recharge to the Minford and Gallia is reduced because a large percentage of the land is paved or covered by buildings. However, recharge to the Berea Sandstone from the overlying Gallia is increased as a result of the absence of the Sunbury Shale.

Groundwater flow can generally be divided into four separate flow regions. Groundwater divides provide the basis for separation of the reservation into quadrants. The groundwater divides generally coincide with topographic highs along the center of the industrial complex (from south to north) and topographic highs radiating outward and separating the predominant surface water features draining the facility. The locations of the groundwater flow divides may migrate small distances in response to seasonal changes in precipitation and groundwater recharge. The rates of pumping the X-700/X-705 sumps and remediation wells can also influence the location of the groundwater divides in some areas.

Groundwater at the site discharges primarily to surface streams. Groundwater in the eastern and northern portions of the facility discharges to the East and North Drainage Ditches and to the Little Beaver Creek. In the southern portion of the facility, groundwater discharges to the Big Run Creek and to the unnamed Southwest drainage ditch. Along the western boundary of the site, the West Drainage Ditch serves as a local discharge area for all geologic units.

Groundwater recharge and discharge areas at the site also are affected by man-made features including the storm sewer system, the sanitary sewer system, the RCW system, water lines, and building sumps. The storm sewer system consists of numerous large-diameter culverts and pipes that drain surface water from discrete segments of the site. Groundwater collected by these drains is transported to the discharge point for each storm drain. Discharge points for the storm drains generally coincide with site NPDES outfalls that eventually discharge to the surface water units described previously. The RCW and fire hydrant supply systems are pressurized to ensure proper transport of water. If these systems have leaks, they may locally act as sources of recharge to groundwater. Although recharge from these lines to groundwater is difficult to measure, overall groundwater directions are not affected. These systems are generally located within 1.8 to 3.7 m (6 to 12 ft) of the ground surface. The depth to groundwater generally is more than 3.7 m (12 ft) bgs. Consequently, these systems and their associated backfills are usually located above the local water table. On the basis of these factors, none of these systems appears to act as a major discharge conduit for groundwater. Man-made features that do have a major effect on groundwater flow at the site include a set of sumps located in the X-700 and the

X-705 buildings, extraction wells in the vicinity of X-231B, X-701B, and groundwater interceptor trenches at X-749 and X-701B.

Groundwater is used as a domestic, municipal, and industrial water supply in the vicinity of the PORTS reservation. Most municipal and industrial water supplies in Pike County are developed from the Scioto River Valley buried aquifer. Groundwater in the Berea sandstone and Gallia sand formations that underlie PORTS is not used as domestic, municipal, or industrial water supplies. Domestic water supplies are obtained from either unconsolidated deposits in preglacial valleys, major tributaries to the Scioto River Valley, or from fractured bedrock encountered during drilling.

The PORTS reservation is the largest industrial user of water in the vicinity and obtains its water from the X-608A/B, X-605G, and X-6609 water supply well fields, which are next to the Scioto River south of Piketon. The wells tap the Scioto River Valley buried aquifer. Total groundwater production averages 49.4 million L/d (13 MGD) for the entire site, including USEC activities (DOE 1999b).

In 2000, a combined total of approximately 78 million liters per year (L/yr) (20.7 million gallons per year [Gal/yr]) of contaminated groundwater was treated at the X-622, X-622T, X-623, X-624, and X-625 Groundwater Treatment Facilities. Approximately 488 liters (L) (129 gallons [Gal]) of TCE were removed from the groundwater. All processed water is discharged through NPDES outfalls before exiting the site.

- X-622 – TCE-contaminated groundwater from the X-231B southwest oil biodegradation plot, the X-749 contaminated materials disposal facility, and the Peter Kiewit groundwater collection system is processed at the X-622 treatment unit using activated carbon and green sand filtration.

- X-622T – At this treatment facility, activated carbon is used to treat contaminated groundwater from the X-700 chemical cleaning facility and the X-705 decontamination building. The contaminated groundwater is extracted from sumps located in the basement of each building.

- X-623 – This groundwater treatment facility consists of an air stripper with off-gas activated carbon filtration and aqueous-phase activated carbon filtration. X-623 provides treatment for contaminated groundwater from the X-701B holding pond and three groundwater extraction wells in the X-701B plume area.

- X-624 – TCE-contaminated groundwater from the X-237 interceptor trench associated with the X-701B plume is treated via an air stripper with off-gas activated carbon filtration, plus carbon filtration of the effluent water.

- X-625 – Groundwater that is gravity fed to this facility (from a horizontal well associated with the X-749/X-120 groundwater plume and as part of an ongoing technology demonstration) is treated with various passive media such as iron fillings.

3.5.3 Floodplains

Floodplains consist of mostly level land along rivers and streams that may be submerged by floodwaters. The Flood Insurance Rate Map provided by the Federal Emergency Management Agency indicates that the 100-year floodplain extends on both sides of Little Beaver Creek upstream from the confluence with Big Beaver Creek to the rail spur located near the X-230J9 North Environmental Sampling Station. The 100-yr floodplain ranges on either side of Little Beaver Creek from 15 to 61 m (50 to 200 ft) roughly following the 175 m (575 ft) topographic contour. Flooding is not a problem for the majority of the site. The highest recorded flood level of the Scioto River in the vicinity of the site was 174 m (570 ft) amsl (January 1913), which is approximately 30 m (100 ft) below the level of most site facilities. No portion of the floodplain for Big Beaver Creek is located within the PORTS reservation boundary.

The average annual discharge at the Higby station for the period of record (1930-1991) is 4,654 cubic feet per second (cfs), while the maximum discharge of record is 177,000 cfs observed on January 23, 1937. The stage of the 1937 flood was 593.7 ft amsl. The historical flood stage of the Scioto River next to the site was estimated to be 556.7 ft by using the estimate that the Scioto River drops approximately 37 ft between the Higby gauging station (river mile [RM] 55.5) and the mouth of Big Beaver Creek (RM 27.5). Elevations for floods (with three recurrence intervals) at the confluence of the Scioto River and Big Beaver Creek (RM 27.5), estimated by the U. S. Army Corps of Engineers, are compared with the site nominal grade elevation in Table 1.3-3 of the License Application for the American Centrifuge Lead Cascade Facility.

Since the site has a nominal elevation of about 670 ft amsl (Figure 1.3-7 of the License Application for the American Centrifuge Lead Cascade Facility) and about 113 ft above the historical flood level for the Scioto River in the area, the site has not been affected by flooding of the Scioto River.

3.6 Ecological Resources

This section describes the ecological resources, including terrestrial resources, wetlands, environmentally sensitive areas, and rare, threatened, and endangered species within the PORTS reservation. The area selected for the Lead Cascade includes existing facilities formerly used for GCEP, and located in a fully developed industrial area. As such, the grounds are maintained as lawns and support various species of grasses and herbaceous divots.

3.6.1 Terrestrial Resources

Vegetation

Much of the PORTS reservation and the area in the vicinity of the site has experienced extensive disturbance. There is very little in terms of vegetative communities within the Perimeter Road on the site. The area of the Proposed Action is either inside existing concrete floor buildings or paved, consequently there is no vegetation within the immediate project area.

The vegetation of surrounding Pike County consists primarily of hardwood forests. Field crops constitute the other major category of vegetative cover in the surrounding area.

The 10 terrestrial habitat types identified at the site are as follows (DOE 1997):

- 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 pine.
- 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, oak hickory forest, and upland mixed hardwood forest.

Wildlife

The area of the Proposed Action is either inside existing concrete floor buildings or paved, consequently there is no animal habitat within the immediate project area. Forty-nine mammals have ranges that include the site. The most abundant mammals include the white-footed mouse (*Peromyscus leucopus*), short-tailed shrew (*Blarina brevicauda*), and opossum (*Didelphis virginiania*) (DOE 1996c).

One hundred and fourteen bird species including year-round residents, winter residents, and migratory species have been observed onsite (DOE 1996c). 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*), non-game birds such as nuthatches (*Sitta* sp.), and wrens (*Troglodytes* sp.).

Eleven species of reptiles and six species of amphibians have been observed on the site. The most common reptiles include the eastern box turtle (*Terrapene Carolina*), black rat snake (*Elaphe obsolete*), and northern black racer (*Coluber constrictor constrictor*). The most common species of amphibians are the American toad (*Bufo americanus*) and northern dusky salamander (*Desmognathus fuscus*) (DOE 1996c)..

Common insects include cicades, aphids, bees wasps, ants, flies, beetles, and grasshoppers (Battelle 1976).

3.6.2 Aquatic Resources

Wetlands

Wetlands are areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil condition. Wetlands generally include swamps, marshes, bogs, and similar areas. The area of the proposed action is either inside existing concrete floor buildings or paved, consequently there are no environmentally sensitive areas within the immediate project area.

The PORTS reservation contains 41 jurisdictional and 4 non-jurisdictional wetlands totaling 14 ha (34 acres) (DOE 1996b). For the purposes of DOE environmental restoration activities previously performed at PORTS, the site was divided into four quadrants based on groundwater flow patterns. Each quadrant roughly corresponds to a distinct groundwater flow cell within the primary water bearing unit beneath the site.

- Quadrant I - includes the southern portion of the PORTS reservation and contains X-749 and X-120 area

- Quadrant II - includes the eastern portion of the PORTS reservation and contains X-701B Holding Pond

- Quadrant III - includes the western portion of the PORTS reservation and contains X-616 and X-740 area

- Quadrant IV - includes the northern portion of the PORTS reservation and contains X-611A and X-735 area

Quadrant I has 13 jurisdictional wetlands totaling 5 ha (13 acres). Quadrant II contains three jurisdictional wetlands with a total area of 5 ha (13 acres). Quadrant III has 6 jurisdictional wetlands totaling 1 ha (2 acres), and Quadrant IV has 19 jurisdictional wetlands and 4 non-jurisdictional wetlands totaling 3 ha (7 acres). The majority of the wetlands are associated with wet fields, areas of previous disturbance, drainage ditches, or wet areas along roads and railway tracks.

3.6.3 Environmentally Sensitive Areas

The area of the Proposed Action is either inside existing concrete floor buildings or paved, consequently there are no environmentally sensitive areas within the immediate project area. However, there are several environmentally sensitive areas within the PORTS reservation. These include areas where Ohio endangered or threatened species have been observed, and wetland areas and the floodplain of the Little Beaver Creek. There are no exceptional water streams within the facility.

Northwest Tributary. This area is a stream corridor considered a sensitive area because it represents the best habitat for bats at the site.

X-611A Former Lime Sludge Lagoons. The area near the sludge lagoon is sensitive because of the presence of Virginia meadow-beauty (*Rhexia virginica*) adjacent to the base of the dike. Wetlands also are present in this area.

X-611B Sludge Lagoon. The area near the sludge lagoon should be considered a sensitive area due to the possible presence of Carolina yellow-eyed grass (*Xyris difformis*), which was observed at the site in 1994 (DOE 1996b). Confirmation of this species is necessary, however, as the original identification occurred while the plant was not flowering.

There are no state or national parks, conservation areas, wild and scenic rivers, or other areas of recreational, ecological, scenic, or aesthetic importance within the immediate vicinity of the site (DOE 2001c).

3.6.4 Rare, Threatened, and Endangered Species

The potential occurrence of Federal and State rare, threatened, and endangered species in the project vicinity was determined by consulting with the Ohio Department of Natural Resources (ODNR), Division of Natural Areas and Preserves, and previously prepared environmental assessments. A comprehensive evaluation of the site for the presence of Federal and State listed rare, threatened, and endangered species was conducted in 1996 (DOE 1997). USEC has contacted the U.S. Fish and Wildlife Service (USFWS) in order to comply with Section 7 of the *Endangered Species Act*. In their letter dated August 30, 2002, the USFWS has indicated that the Indiana bat (*Myotis sodalis*) is the only Federally listed endangered animal species whose home range includes the site. USEC has also contacted the ODNR. ODNR's letter, dated August 8, 2002, indicates that there are no records of rare or endangered species in the project area. Copies of the letters are provided in Appendix B.

Surveys were conducted for the presence of the Indiana bat in 1994 and 1996. As part of the 1996 survey, potential summer habitat for the Indiana bat was identified in the Northwest Tributary stream corridor, the Little Beaver Creek stream corridor, and along a logging road in a wooded area to the east of the X-100 facility. Most netting was conducted in those areas in June and again in August. Although 14 bats representing four common species were captured during the August survey, no Indiana bats were collected. The survey also indicated that most of the site has poor summer habitat for Indiana bats. The few woodlands that occur on the property are small, isolated, and not of sufficient maturity to provide good habitat. The exception is an area of deciduous sugar maple forest along the Northwest Tributary stream corridor, where several of the bats were collected (DOE 1997). The Northwest Tributary begins just southwest of the Don Marquis substation and flows approximately 3,200 ft before leaving the DOE property prior to its confluence with Little Beaver Creek.

Historically, isolated sightings and observations of threatened, endangered, or special interest species have occurred at the facility. An Ohio endangered raptor, sharp-shinned hawk *(Accipiter striatus*), has been observed at the site in the past (DOE 1993). One Ohio endangered plant species, Carolina yellow-eyed grass *(Xyris difformis*), and a potentially threatened species, Virginia meadow beauty *(Rhexia virginica*), have been found at the site (DOE 1993; DOE 1996c). The rough green snake *(Opheodrys aestivus*), listed as an Ohio special interest species, has been observed at the site (DOE 1996c).

The OEPA determined that two State endangered fish species and four State threatened fish species near the site are restricted to the Scioto River. In support of this determination, the *Biological and Water Quality Study of Little Beaver Creek and Big Beaver Creek-1997*, an OEPA study, indicated that Little Beaver Creek and Big Beaver Creek do not provide sufficient habitat to support threatened or endangered species. Little Beaver Creek runs through the eastern end of the site and is a tributary to Big Beaver Creek, which flows into the Scioto River (OEPA 1998).

3.7 Meteorology, Climatology, and Air Quality

This section describes the meteorology, climate, and air quality on the PORTS reservation and the vicinity and also addresses radiological and non-radiological air quality in the PORTS region.

3.7.1 Meteorology

Discussion related to the meteorology of the site is located in Section 1.3.3 of the License Application for the American Centrifuge Lead Cascade Facility.

3.7.2 Climate

PORTS is located in the humid continental climate zone of North America and has weather conditions that vary greatly throughout the year. The mean annual temperature is about 12.7° Celsius (C) (55° Fahrenheit [F]). Average summer and winter temperatures are 22.2°C (72°F) and 0°C (32°F), respectively. Record high and low temperatures are 39.4°C (103°F) and -32°C (-25°F), respectively.

Prevailing winds are out of the south-southwest and average 8 km/h (5 mph). The highest monthly average wind speed, 18 km/h (11 mph), typically occurs in the spring. Total precipitation averages approximately 102 centimeter (cm) (40 inches [in.]) annually and is usually well distributed throughout the year. Fall is the driest season. Snowfall averages approximately 52 cm/yr (20 in./yr). Although snow amounts and frequencies vary greatly from year to year, an average 8 days/yr have greater than 3 cm (1 in.) of snowfall (DOE 2001b).

3.7.3 Air Quality

The facilities at PORTS have permits for non-radiological and radiological air emissions. Non-radiological emissions are regulated under NAAQS and the standards adopted by the State of Ohio. Radioactive emissions are regulated by the EPA under National Emission Standard for Hazardous Air Pollutants (NESHAP) regulations (40 CFR Part 61, Subpart H). This emission standard limits emissions of radionuclides to the ambient air from the DOE reservation not to exceed amounts that would cause any member of the public to receive in any year an effective dose equivalent (EDE) of 10 mrem/yr.

3.7.3.1 Non-Radiological Air Quality

As directed by the *Clean Air Act* (CAA) of 1970 (42 U.S.C. §7401), the EPA has set the NAAQS for several criteria pollutants to protect human health and welfare (40 CFR Part 50). These pollutants include particulate matter less than 10 microns in diameter (PM_{10}), sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), lead, and ozone (O_3).

Non-radiological air quality is defined by the concentration of various pollutants in the atmosphere expressed in units of parts per million (ppm) or in $\mu g/m^3$. The standards and limits set by State and Federal regulations are provided in concentrations averaged over incremental time limits (e.g., 30 minutes, 1 hour, 3 hours). The averaging times shown in the tables of this section correspond to the regulatory averaging times for the individual pollutants.

An area is designated by the EPA as being in attainment for a pollutant if ambient concentrations of that pollutant are below the NAAQS or in non-attainment if violations of the NAAQS occur. In areas where insufficient data are available to determine attainment status, designations are listed as unclassified. Unclassified areas are treated as attainment areas for regulatory purposes.

The PORTS region is classified as an attainment area for the pollutants listed in the NAAQS (DOE 2001c). These standards are shown in Table 3.7-1. Primary standards protect against adverse health effects, while secondary standards protect against welfare effects such as damage to crops, vegetation, and buildings. The State of Ohio has adopted the NAAQS and regulations to guide the evaluation of hazardous air pollutants and toxins to specify permissible short- and long-term concentrations. Existing air quality on the site is in attainment with National Ambient Air Quality Standards (NAAQS) for all the criteria pollutants.

Table 3.7-1
National Ambient Air Quality Standards and Allowable PSD Increments

Pollutant	Averaging Time	NAAQS Standard (μg/m³)		Allowable PSD increment (μg/m³)	
		Primary	Secondary	Class I	Class II
Sulfur dioxide	3 h[a]	—	1,300	25	512
	24 h[a]	365	—	5	91
	Annual	80	—	2	20
Nitrogen dioxide	Annual	100	100	2.5	25
Ozone	1 h[b]	235	235	—	—
	8 h	157	157	—	—
Carbon monoxide	1 h[a]	10,000	—	—	—
	8 h[a]	40,000	—	—	—
PM-10[d]	24 h[b]	150	150	8	30
	Annual	50	50	4	17
PM-2.5[c,e]	24 h	65	65	—	—
	Annual	15	15	—	—
Lead	3 months[e]	1.5	1.5	—	—

Source. DOE 2001a
a Not to be exceeded more than once per year
b Not to be exceeded more than one day per year on average over three years
c Particulate matter less than 10 μm in diameter
d Particulate matter less than 25 μm in diameter
e Calendar quarter
Note PSD—Prevention of Significant Deterioration

The PORTS reservation is located in a Class II prevention of significant deterioration (PSD) area. PSD regulations were established to prevent significant deterioration of air quality in areas that already meet the NAAQS. Specific details of PSD are found in 40 CFR 51.166. Among other provisions, cumulative increases in SO_2, NO_2, and PM_{10} levels after specified baseline dates must not exceed specified maximum allowable amounts. These allowable increases, also known as increments, are especially stringent in areas designated as Class I areas (e.g., national parks and wilderness areas) where the preservation of clean air is particularly important. All areas not designated as Class I currently are designated as Class II. The nearest Class I PSD area is the Dolly Sods Wilderness Area, which is approximately 280 km (174 mi) east of the PORTS reservation in West Virginia.

Prior to the Title V regulations, the Corporation had four permits-to-operate and 96 registered sources subject to the state permit-to-operate requirements under Ohio Administrative Code (OAC) 3745-35. Ohio Title V regulations, OAC 3745-77, came into effect on October 1, 1995. The Title V application for the Corporation was submitted on September 27, 1996 with the most recent revision submittal on November 1, 2002. Under the Title V regulations, the Corporation has 66 non-insignificant sources and 151 insignificant sources. The application is still pending with the OEPA. The DOE has four permitted, two PTI's, and nine registered air emission sources (DOE 2002a).

The largest non-radiological airborne emissions from PORTS are from the coal-fired boilers at the X-600 Steam Plant. These emissions are shown in Table 3.7-2. The boilers are permitted by OEPA with opacity, particulate, and SO_2 limits. Electrostatic precipitators on each of the boilers control opacity and particulate emissions. In addition, the boilers emit NO_2 and CO. 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 PORTS include gaseous fluorides, water treatment chemicals, cleaning solvent vapors, and process coolants.

Table 3.7-2 PORTS Non-Radiological Airborne Emissions

Total Particulate Matter	Air Permit Limit	Stack Test Results
Boiler Number 1	0.19 lbs/million british thermal unit (mmbtu)	0.059 lbs/mmbtu
Boiler Number 2	0.19 lbs/mmbtu	0.098 lbs/mmbtu
Boiler Number 3	0.19 lbs/mmbtu	0.1106 lbs/mmbtu

Sulfur Dioxide	Air Permit Limit	Analytical Results
Boiler Number 1	6.16 lbs/mmbtu	4.13 lbs/mmbtu
Boiler Number 2	6.16 lbs/mmbtu	4.13 lbs/mmbtu
Boiler Number 3	6.16 lbs/mmbtu	4.13 lbs/mmbtu

3.7.3.2 Radiological Air Quality

Atmospheric emissions of radionuclides from the DOE reservation are regulated under EPA regulations found under NESHAP, 40 CFR Part 61, Subpart H. The EPA EDE limit of 10 mrem/yr to members of the public for the atmospheric pathway is also incorporated in DOE Order 5400.5, Radiation Protection of the Public and the Environment. The pertinent NRC regulations related to the radiation dose limits TEDE to individual members to the public are also listed in 10 CFR Part 20. Additional EPA dose limits are listed at 40 CFR Part 190.

At PORTS, unrestricted areas are not exposed to any significant direct radiation sources, and the public dose is dominated by gaseous effluents. Consequently, the public TEDE is equal to the public EDE calculated under the NESHAP regulations. The NRC has recognized this and accepted demonstrations of NESHAP compliance as demonstrating compliance with the TEDE limit as well (USEC-02).

DOE and the Corporation annually calculate MEI and collective doses and a percentage of dose contribution from each radionuclide emitted using the CAP88 computer code. Since, the Corporation is responsible for the principal site process and support operations and DOE is responsible for operations such as the X-326 L-Cage and its Glovebox, the X-345 High Assay Sampling Area, the X-744 Glovebox, and site remediation activities, separate annual NESHAP reports are submitted due to the separation of responsibilities. Results of PORTS compliance modeling are discussed below. Details of the annual compliance modeling are also reported in the Portsmouth Annual Environmental Report 2000 (DOE 2001d) and the NESHAP 2000 Annual Report (NESHAP 2001a, NESHAP 2001b).

Description of Dose Model

CAP88-PC Version 2, a computer program approved by EPA for compliance with 40 CFR Subpart H, was used to calculate the dose due to radionuclide emissions to air from DOE operations and CAP88 mainframe model was used to calculate the dose due to radionuclide emissions to air from PORTS operations. The programs are identical except for the operating system and use a modified Gaussian plume equation to estimate the dispersion of radionuclides released from up to six sources. The program computes radionuclide concentrations in air, rates of deposition on ground surfaces, concentrations in food, and intake rates to people from ingestion of food produced in the assessment area.

Summary of Input Parameters

Input parameters for the CAP88 model include physical parameters for each radionuclide emission source, radionuclide emissions, meteorological data, and agricultural data. DOE has four unmonitored minor emission sources regulated by the EPA. USEC has thirteen monitored and several unmonitored sources at the PORTS regulated by EPA. The radionuclide emissions for each source are presented in the NESHAP reports (NESHAP 2001a, NESHAP 2001b). For modeling purposes, the physical emission sources are grouped into three emission release points for DOE and ten emission release points for USEC as shown in Tables 3.7-3 and 3.7-4. Default values were used for the size and class of each radioisotope. Tables 3.7-3 and 3.7-4 provide the physical parameters for each source modeled from DOE and the Corporation's operations, respectively.

Table 3.7-3
Physical Parameters for DOE Air Emissions Sources

Source	Stack height (m)	Stack diameter (m)	Exit velocity (m/s)
X-326 L-Cage Glovebox	22	0.36	6.35
X-623 Groundwater Treatment Facility	7 6	0.2	15.5
X-624 Groundwater Treatment Facility	6.1	0.2	20.6

Source NESHAP 2001a

Table 3.7-4
Physical Parameters for USEC Air Emission Sources

Source	Stack height (m)	Stack diameter (m)	Exit velocity (m/s)
X-326 (purge cascades)	50	0.25	18
X-326 (all other vents)	20	0.97	24
X-330	20	0.20	61
X-333	20	0.62	29
X-344	20	0.36	0.3
X-700	16	0.30	14
X-705	14	1.5	12.3
X-710	9	1.0	10.2
X-720	18	1.19	9
XT-847	11	0.406	5.5

Source: NESHAP 2001b

Site-specific meteorological data is collected at the 30 m (98 ft) height from the on-site meteorological tower. Data collected for calendar year 2000 includes:

Annual precipitation: 100.4 cm/yr (40 in./yr)

Average air temperature: 11.6°C (53°F)

Average mixing layer height: 1,000 m (3,280 ft)

The wind file used in the CAP88 model is also generated from data collected at the on-site meteorological tower.

Note that the default values provided with the CAP88-PC model can be very conservative. The rural food array used to estimate the DOE dose assumes that the public obtains all foodstuffs within 80 km (50 mi) of the plant (see Table 3.7-5). In reality, the majority of the foodstuffs consumed are purchased at supermarkets that receive foodstuffs from all over the world.

Table 3.7-5
Agricultural Data: Rural Default Food Array Values

Fraction of foodstuffs from:	Local area	Within 50 miles	Beyond 50 miles
Vegetables and Produce	0.700	0.300	0.000
Meat	0.442	0.558	0.000
Milk	0.399	0.601	0.000

Source NESHAP 2001a, NESHAP 2001b.

Results

The effect of radionuclides released to the atmosphere was characterized by calculating EDEs to the MEI (a hypothetical individual who is assumed to reside at the most exposed point on the plant boundary). The CAP88 model calculated the 2000 maximum EDE for the MEI near the PORTS reservation based on emissions from DOE operation sources to be 0.01 mrem/yr. The MEI is located 914 m (0.6 mi) east of the X-623 Groundwater Treatment Facility, 579 m

(0.4 mi) east-southeast of the X-624 Groundwater Treatment Facility, and 2,362 m (1.5 mi) east-northeast of the X-326 L-Cage Glovebox (NESHAP 2001a).

In 2000, the maximum EDE for PORTS sources was 0.039 mrem/yr. The Corporation's MEI is located 1,372 m (0.9 mi) east-northeast of the X-623 Groundwater Treatment Facility, 914 m (0.6 mi) east-northeast of the X-624 Groundwater Treatment Facility, and 2,667 m (2 mi) northeast of the X-326 L-Cage Glovebox. The MEI was located 2,620 m northeast of the Corporation's predominant emission source (X-326 Tall Stack) (NESHAP 2001b).

In accordance with 40 CFR 61.92, EDEs to individuals based on PORTS emissions should be combined with the DOE EDEs. The maximum EDE for the entire facility is calculated by adding the DOE and USEC EDEs for each individual. When the two EDEs are combined, the EDE to the MEI in 2000 is 0.047 mrem/yr, which is substantially below the 10 mrem/yr NESHAP limit applicable to PORTS and the 300 mrem/yr (approximate) dose that the average individual in the United States receives from natural sources of radiation. The MEI for the combined USEC and DOE EDEs is located at two different locations: the first at the same location as the Corporation's MEI and the second 1,067 m (0.7 mi) east-northeast of the X-623 Groundwater Treatment Facility, 640 m (0.4 mi) east of the X-624 Groundwater Treatment Facility, and 2,286 m (1.4 mi) northeast of the X-326 L-Cage Glovebox. This total dose is less than the sum of the maximum EDEs calculated separately by DOE and the Corporation because the MEI for DOE is not calculated at all the same locations as the MEI for the Corporation. The total combined EDE for the DOE MEI is 0.042 mrem/yr and the total combined for the Corporation's individual is 0.047 mrem/yr (NESHAP 2001a).

The collective EDE to the entire population within 80 km (50 mi) of the PORTS reservation in 2000 was 0.18 person-roentgen equivalent man (rem)/yr, based on PORTS calculations of 0.15 person-rem/yr from USEC sources (NESHAP 2001b) and 0.03 person-rem/yr from DOE sources (DOE 2001d).

3.8 Noise

Noise on the PORTS reservation is intermittent and intensity levels vary. Noise levels associated with construction and processing activities and local traffic are comparable to those of any other industrial site. No sensitive receptor sites, such as picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, or hotels, are in the immediate vicinity of the site (DOE 2001c).

Because actual noise estimates are not available, measured noise levels around an automobile assembly plant were used to estimate, and conservatively bound, any potential noise impacts. These noise levels are 55 to 60 decibel A-weighted (dBA) at about 60 m (200 ft) from the plant property (Cantor 1996). These noise levels would be inaudible 500 m (1,640 ft) from the site, even with low background noise levels. EPA has identified 55 dBA as a yearly average outdoor noise level that, if not exceeded, would prevent activity interferences and annoyance (EPA 1978).

Various standards that regulate the noise levels are given below:

- The National Institute for Occupational Safety and Health (NIOSH) recommended exposure limit (REL) for occupational noise exposure is 85 dBA as an 8-hr Time-Weighted Average (TWA) (NIOSH 1998). Exposures at or above these levels are considered hazardous.

- The *Noise Control Act* of 1972 (23 CFR Part 722) regulates maximum per truck noise levels of 80-83 dBA depending on the truck type measured 15 m from traffic centerline.

- *Federal-Aid Highway Act* of 1970 has set the noise abatement criteria (NAC) by land use type and human activities (23 CFR Part 722). The following NAC are the unacceptable levels which are used to determine impacts.

    1. NAC for the outdoors range from 57 dBA to 75 dBA

    2. NAC for parks (most similar to National Resources and Environmental Research Program [NRERP]) is 67 dBA

    3. NAC for developed areas is 72 dBA

Typical noise levels of familiar noise sources are provided in Figure 3.8-1.

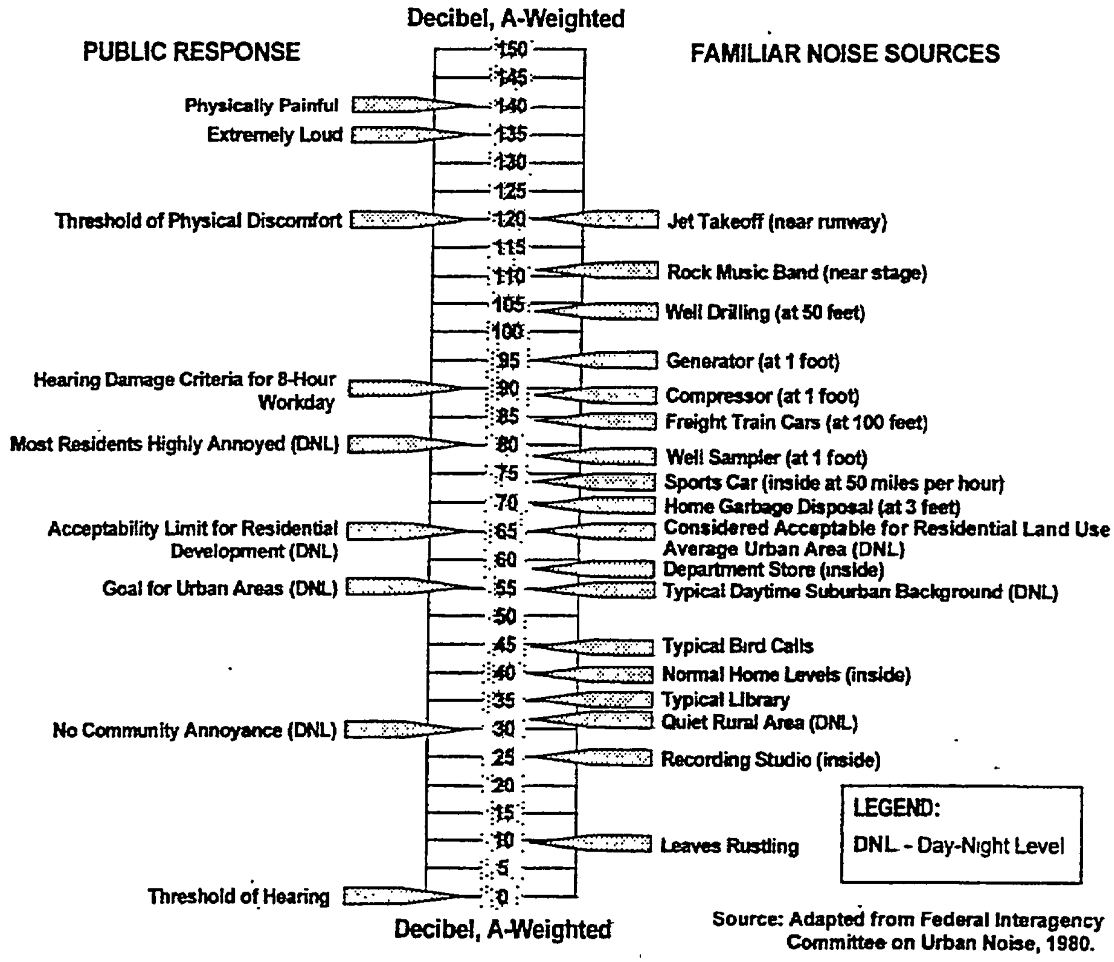


Figure 3.8-1 Typical Noise Levels of Familiar Noise Sources and Public Responses

3.9 Historic and Cultural Resources

3.9.1 Cultural Resources

Cultural resources are defined as any prehistoric or historic district, site, building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious, or any other reason. When these resources meet any one of the National Register Criteria for Evaluation (NRCE) (36 CFR 60.4), they may be termed historic properties and thereby are potentially eligible for inclusion on the National Register of Historic Places (NRHP).

USEC has contacted the Ohio State Historic Preservation Office (SHPO) to inform them of the Proposed Action. In a letter dated October 15, 2002, the SHPO concurred with a finding of No Adverse Effect. A copy of this letter is provided in Appendix B. The SHPO also made a determination in a previously prepared Environmental Assessment, that the PORTS reservation met the NRCE under Criterion A, Criteria Consideration G, because of its exceptional significance in the development of nuclear energy potential in post-World War II U.S. history (DOE 2001c). The boundary of the historic property that met the NRCE was not addressed by SHPO.

The site is located within a region where Adena and Hopewell Indian mounds have existed. Additionally, several historic Native American Indian tribes are known to have had villages nearby.

Two preliminary Phase I archaeological surveys have been completed at PORTS and were used in the preparation of the *Environmental Assessment Reindustrialization Program at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio* (DOE 2001c). The combined surveys covered 836 ha (2,066 acres) in Quadrants I through IV. There are few prehistoric archaeological resources at the site. Whether this is indicative of the local prehistoric upland settlement pattern or is a consequence of the extensive land disturbance associated with development of the site is not known. In contrast, historic archaeological resources at the site are relatively abundant, conspicuous, and undisturbed due to the nature and development of the facility.

Dobson-Brown et al. (1996) developed a predictive model of archaeological resource locations at the site based on variations in modern plant communities, topography, and soils, and on the location of previously identified archaeological resources in a 6.5 km (4 mi) literature review study area radius around the facility (DOE 2001c).

Survey methods in Quadrants I and II included visual inspection, surface collection, and hand excavation of shallow, less than 13 cm (less than 5 in.), shovel test pits. Similar shovel test pits inside the Perimeter Road area did not identify archaeological resources and indicated that this area has been highly disturbed.

Survey methods in Quadrants III and IV consisted of visual inspection, surface collection, hand-excavated shovel tests to 30 cm (12 in.) in depth in high-probability areas lacking significant disturbance and less than 15 percent slope. Additionally, hand-excavated deep shovel tests (greater than 30 cm or 12 in.) were accompanied by 2 cm (0.75-in.)-diameter hand-coring in three areas in Quadrant IV along Little Beaver Creek. Portions of Quadrants I and II that were not investigated during the preliminary Phase I archaeological survey were also investigated by shallow shovel tests.

The combined Phase I archaeological surveys identified 38 archaeological resources. Nine of the resources contain prehistoric components. Five are identified as prehistoric isolated finds. Two are identified as prehistoric lithic scatters. Two contain prehistoric and historic components: a prehistoric isolated find in an historic cemetery and a prehistoric lithic scatter and historic farmstead. These sites are located in Quadrants I, II, and IV. No archaeological resources have been identified in Quadrant III. Thirty of the archaeological resources are associated with historic-era properties located within the site. Fifteen are remnants of historic farmsteads. Seven are scatters of historic artifacts or open refuse dumps. Two are isolated finds of historic artifacts. Four are remnants of PORTS structures. Two are historic cemeteries. One of the historic cemeteries has an associated chapel and remnant of an observation tower.

The draft cultural resource report (Schweikart et al. 1997) determined that 22 of the archaeological resources do not meet the NRCE. Insufficient data were collected at the remaining 14 archaeological components and two historic-era cemeteries, one of which (33 Pk 189; PIK-206-9) includes an associated historic archaeological component, to determine whether they meet the NRCE (DOE 2001c).

3.9.2 Architectural Historic Resources

Two architectural historic surveys have also been completed at the site (Dobson-Brown et al. 1996; Coleman et al. 1997). The combined surveys covered an approximate 1,501 ha (3,708 acre) area and identified several structures that may have historical significance.

A draft historic context for the PORTS reservation has also been prepared. This historic context is broken into four development periods for the site: Development Period 1 (1900–51), Development Period 2 (1952–56), Development Period 3 (1957–78), and Development Period 4 (1979–85). In the draft architectural survey report (Coleman et. al. 1997), recommendations were made concerning which buildings and structures were considered contributing and noncontributing resources to the historic property. DOE will evaluate these recommendations in conjunction with the SHPO to determine which buildings and structures are considered historic properties under the NHPA and whether any of the properties are eligible for inclusion in the NRHP.

3.10 Visual/Scenic Resources

The dominant viewshed in the vicinity of the PORTS reservation consists of support facilities, transmission lines, open and forested buffer areas, marginal farmland, limited residential areas, and densely forested hills.

The PORTS reservation consists mainly of a 486 ha (1,200 acre) fully developed industrial area. The majority of the industrial area is centrally located within a fenced 202 ha (500 acre) Controlled Access Area. Within this area is approximately 190 facilities as well as utility structures, water towers, and auxiliary facilities that support site activities. A second, large developed and fenced area covering about 121 ha (300 acres) contain the facilities built in the early 1980s for the GCEP. The grounds are maintained as lawns, and support various species of grasses and herbaceous divots. These facilities are generally not visible offsite because views are limited by rolling terrain and heavy forests and vegetation. Photographs of the GCEP facilities utilized for the Lead Cascade are shown in Figures 3.10-1 through 3.10-5.

The developed areas and utility corridors (i.e. transmission lines and support facilities) of the PORTS reservation are consistent with a Visual Resources Management (VRM) Class IV designation. The remainder of the PORTS reservation is consistent with VRM Class III or IV.

There are no existing state nature preserves or scenic rivers in the area.

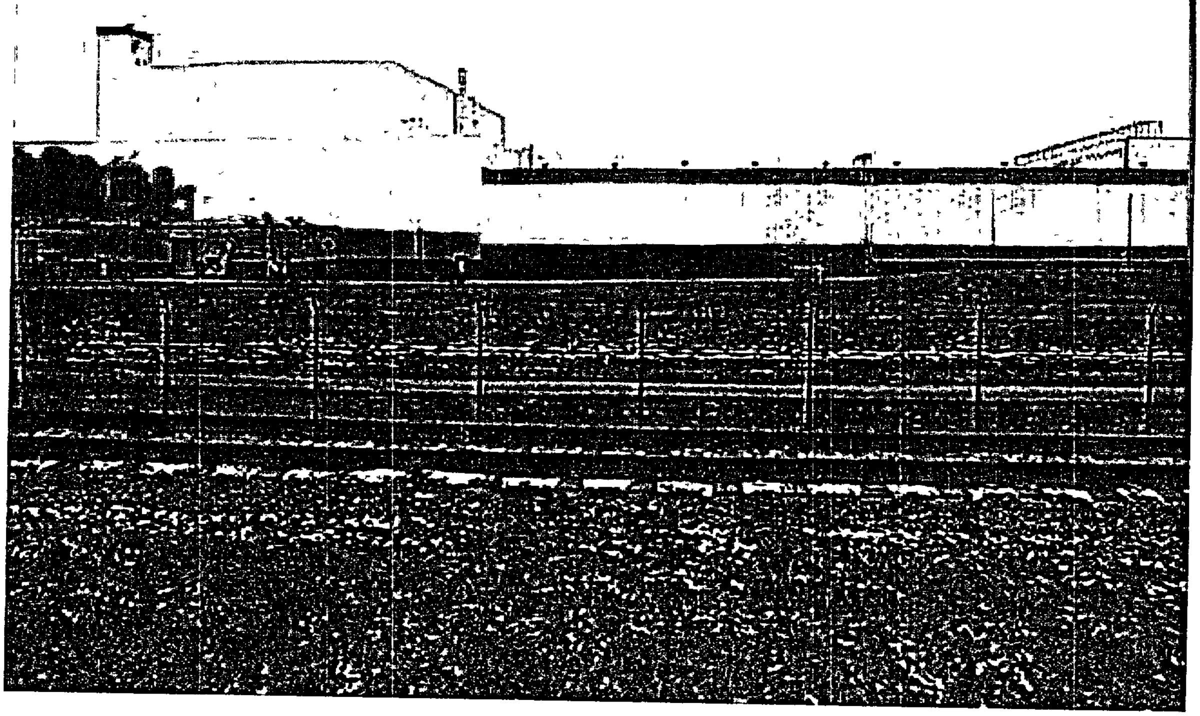


Figure 3.10-1 View of the X-7725 and X-7727H Buildings [Looking East]

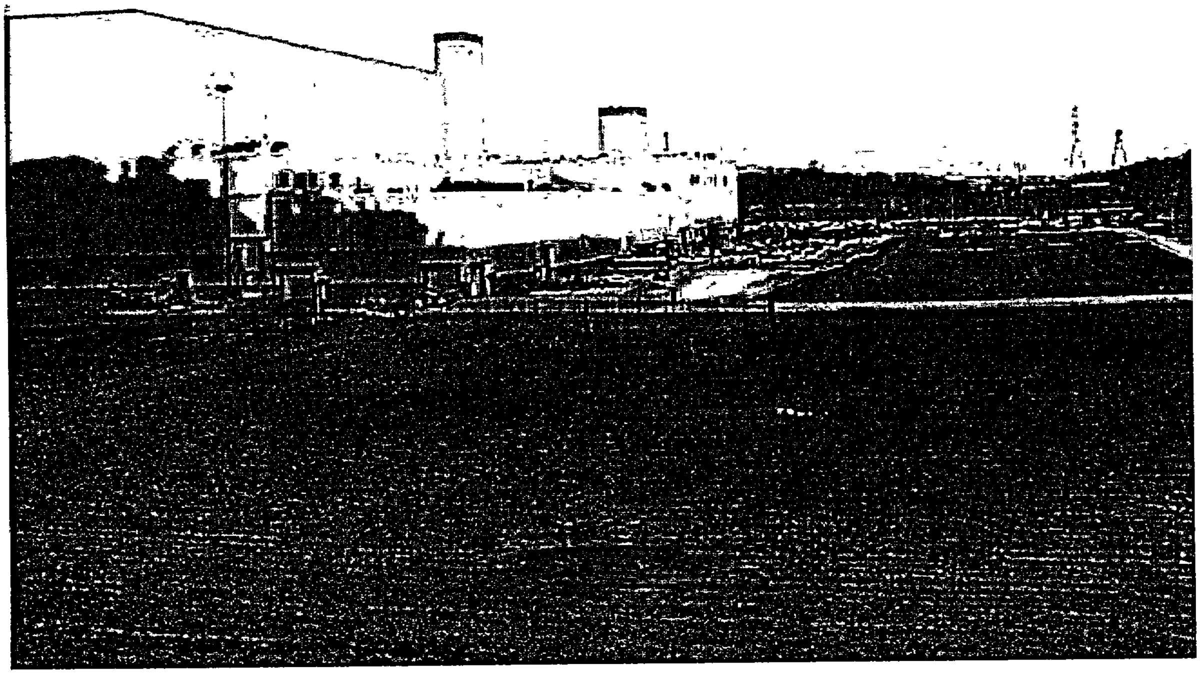


Figure 3.10-2 View of the X-7725 Building
[Looking Southwest]

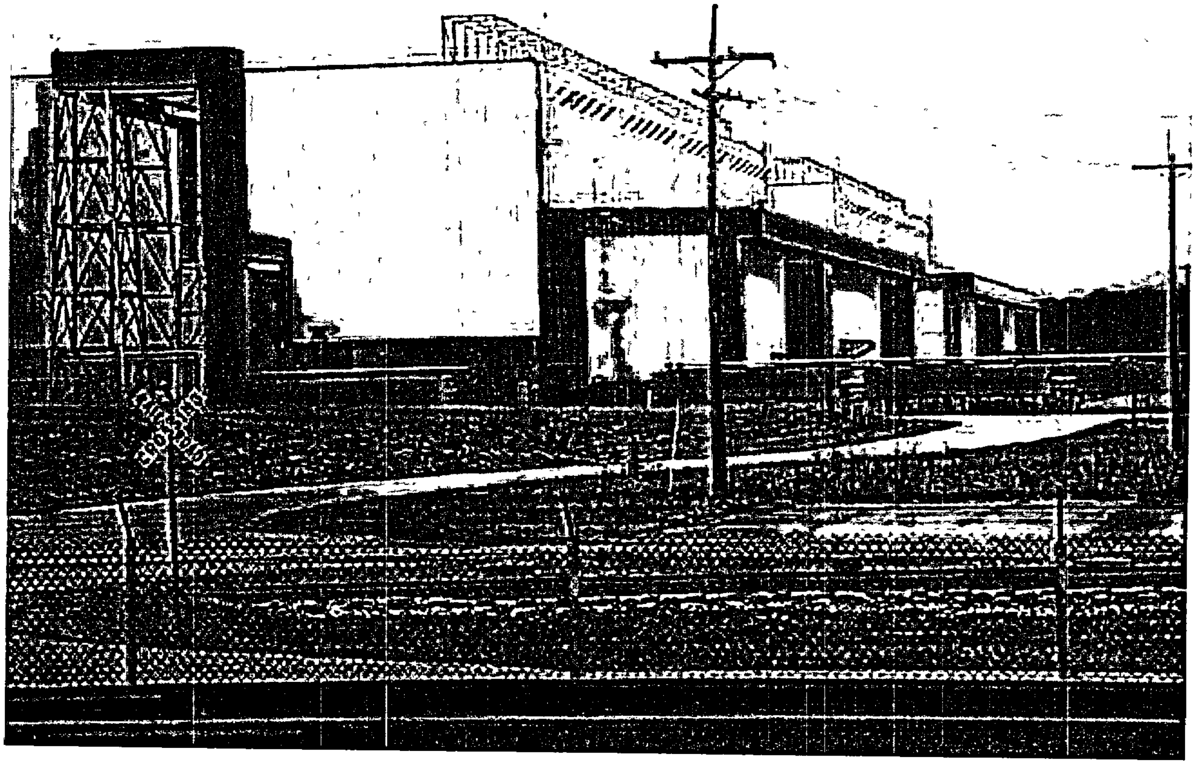


Figure 3.10-3 View of the X-3001 Building [Looking Northeast]

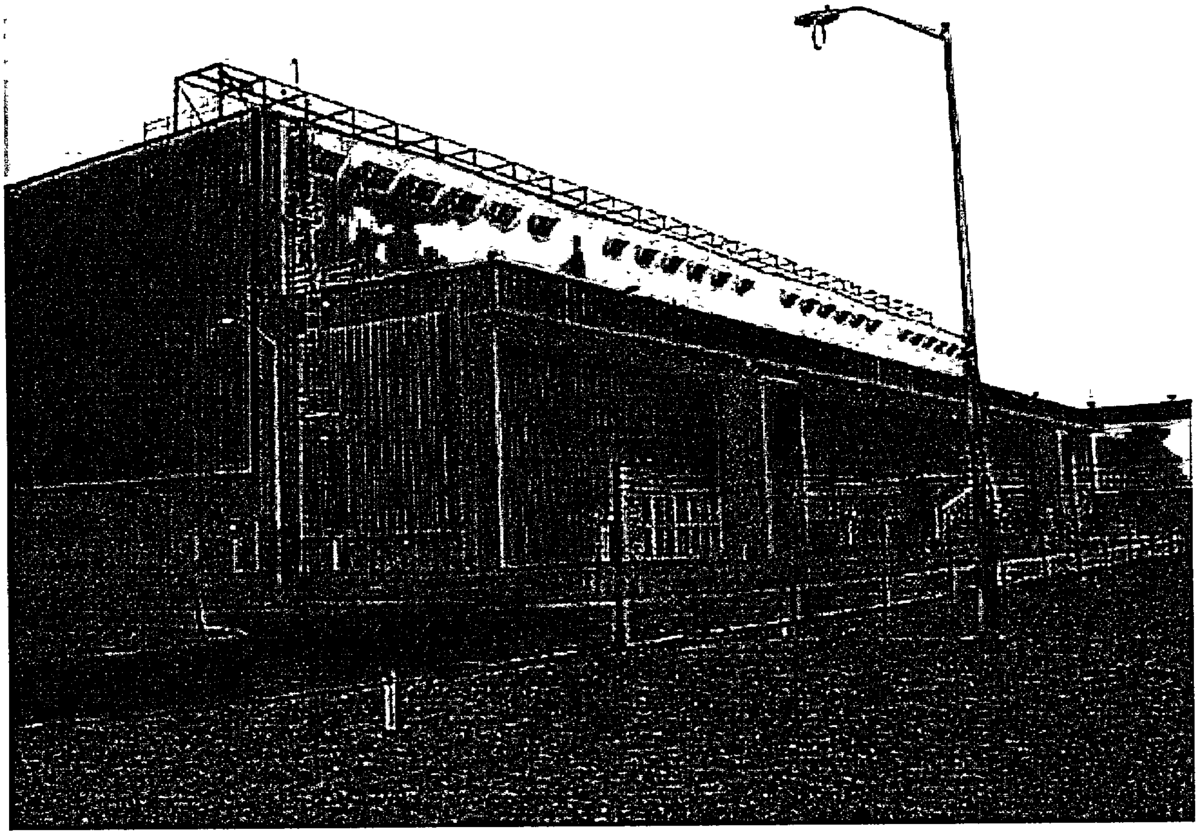


Figure 3.10-4 View of the X-3001 Building [Looking Southwest]

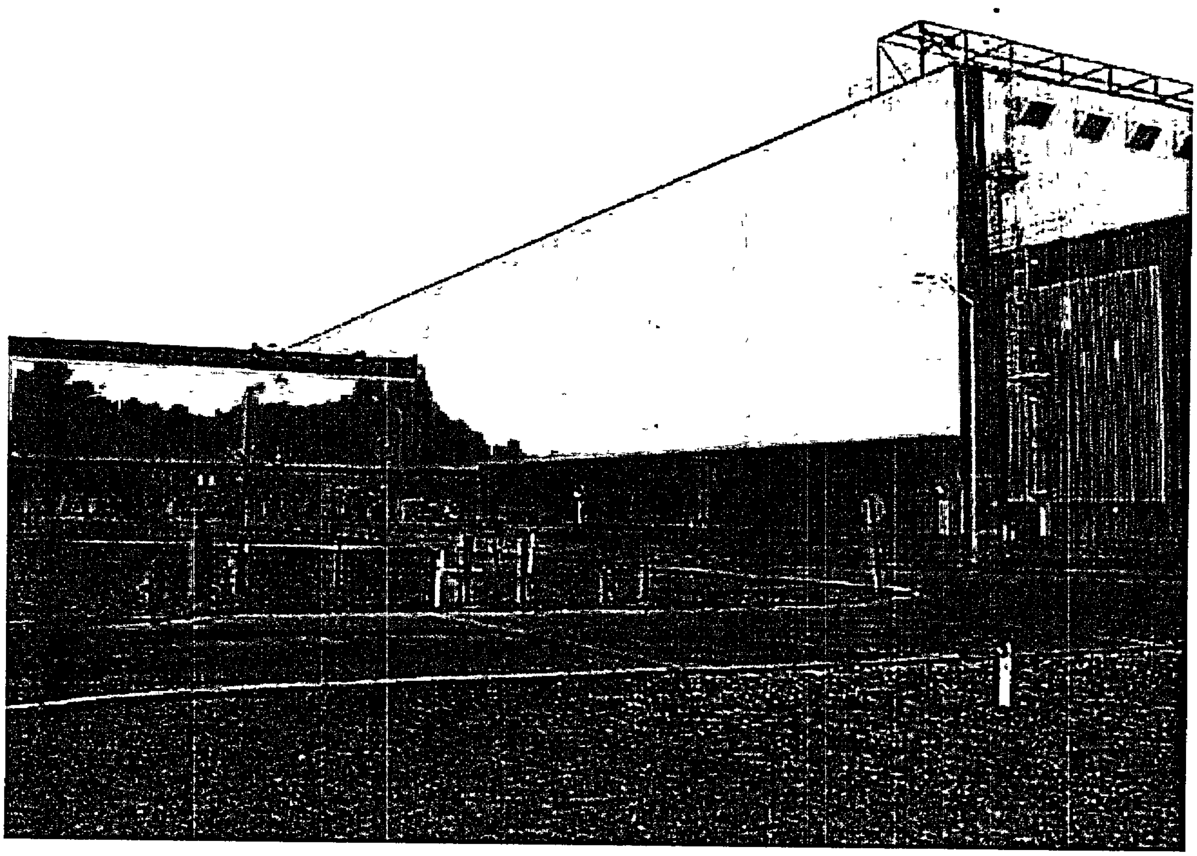


Figure 3.10-5 View of the X-3001 and X-3012 Buildings [Looking Southwest]

3.11 Socioeconomic

This section describes current socioeconomic conditions within a ROI where almost 95 percent of the PORTS workforce currently resides. The ROI is a four-county area in Southern Ohio comprised of Jackson, Pike, Ross, and Scioto Counties.

Employment and Income

Employment by sector over the last decade has changed slightly, as shown in Table 3.11-1. The service sector provides the highest percentage of the employment in the ROI, almost 25 percent, followed closely by the wholesale and retail trade, manufacturing, and government sectors, with 21.7 percent, 17.9 percent, and 16.6 percent, respectively. 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 ROI.

Table 3.11-1
Employment By Sector (Percent)

Sector	Jackson 1990	Jackson 2000	Pike 1990	Pike 2000	Ross 1990	Ross 2000	Scioto 1990	Scioto 2000	ROI 1990	ROI 2000
Services	21.6	18.9	16 7	16.0	21.8	25.0	28.3	31.1	23 4	24.7
Wholesale and Retail Trade	21.5	21.5	14.9	16.0	21.0	22.1	24.2	24.0	21.4	21.7
Government and government enterprises	12.7	10.7	15.6	12.3	21.2	19.0	19.4	18.6	18.6	16.6
Manufacturing	23.1	27.0	35.5	38.2	18.8	14.4	8.3	8.3	17.8	17.9
Construction	4.9	0.0	4.8	5.9	4.9	5.1	5.9	5.8	5.2	4.7
Finance, insurance, and real estate	4.1	5.1	2.4	3.9	3.5	3.9	4.8	4.2	3.9	4.2
Transportation and public utilities	4.4	3.8	3 6	3.4	3.7	5.7	5.2	4.5	4.3	4.6
Farm employment	6.1	4.8	5.5	3.6	4.3	3.6	3.1	2.5	4.3	3.4
Mining	1.3	2.4	0.3	0.0	0.1	0.0	0.2	0.1	0.3	0.4
Other Sectors	0 4	0.0	0.5	0.0	0.6	0.0	0.7	0.9	0.6	0.3

Source BEA 2002a

The ROI experienced stable growth over the last 10 years. The labor force grew from 86,670 in 1992 to 95,030 in 2001, for a growth rate of 9.6 percent for that period. Employment growth outpaced labor force growth, increasing from 77,721 in 1992 to 88,980 in 2001, for a growth rate of 14.5 percent for that period. The ROI unemployment rate, which was 10.3 percent in 1992, is 6.4 percent as of 2001, as shown in Table 3.11-2. The average unemployment rate for the State of Ohio was 4.3 percent in 2001, down from 7.3 percent in 1992 (BLS 2002a, 2002b). The unemployment rate in the ROI is higher than for the state.

Per capita income in the ROI was $20,272 in 2000, a 54 percent increase from the 1990 level of $13,142. Per capita income in 2000 in the ROI ranged from a low of $19,158 in Pike County to a high of $21,849 in Ross County. The per capita income in Ohio was $27,977 in 2000 (BEA 2002b).

Table 3.11-2
Region of Influence Unemployment Rates (Percent)

	1992	2001
Jackson County	9.2	7.1
Pike County	11.7	7.9
Ross County	9.2	5.0
Scioto County	11.5	6.9
ROI Total	10.3	6.4
Ohio	7.3	4.3

Source: BLS 2002a

Current PORTS Employment

PORTS presently employs 1,272 workers at the site, which is approximately 13.2 percent of the total individuals working within Pike County. Of the total number employed at the site, 1,237, or 97.2 percent are residents of Ohio. Table 3.11-3 lists the number of PORTS workers by their county of residence within Ohio.

Table 3.11-3
PORTS Workers by County of Residence

County	Number of Workers	Percent of Total Employment
Jackson	117	9.2
Pike	285	22.4
Ross	147	11.6
Scioto	621	48.8
Outside the ROI	102	8.0

Source: USEC 2002b

Tax Structure

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 $0.06950 per $1,000 for all three classifications; for Portsmouth, in Scioto County, the rate is $0.06013 per $1,000 for all three classifications; for Wellston, in Jackson County, the rate is $0.05500 per $1,000 for all three classifications; and in Chillicothe, in Ross County, the Class I rate is $0.05412, the Class II rate is $0.05398, and the Class III rate is $0.05405 per $1,000 (ODT 2002a).

The State of Ohio personal income tax rate for incomes ranging from $20,000 to $40,000 is $445.80 plus 4.5 percent of excess over $20,000 and for incomes ranging from $40,000 to $80,000 is $1,337.20 plus 5.2 percent of excess over $40,000 (ODT 2002b). Ohio also has a 5.0 percent sales tax rate. 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 (ODT 2002c).

Population and Housing

Pike County is the home of the PORTS reservation and is primarily rural in nature. The remaining counties in the ROI are also largely rural in character except near the cities of Portsmouth in Scioto County and Chillicothe in Ross County. Over the last 20 years, population within the ROI has grown at a slightly lower rate compared to the State of Ohio. ROI population is projected to grow faster than the state during the current decade, increasing 6.2 percent between 2000 and 2010, compared to the state rate of 4.0 percent. Table 3.11-4 presents historic and projected population in the ROI and the state.

Table 3.11-4
Historic and Projected Population

	1980	1990	2000	2010
Jackson County	30,592	30,230	32,641	34,724
Pike County	22,802	24,249	27,695	29,981
Ross County	65,004	69,330	73,345	80,111
Scioto County	84,545	80,327	79,195	81,307
ROI	202,943	204,136	212,876	226,123
Ohio	10,797,630	10,847,115	11,353,140	11,805,877

Source: Census 2002, OOSR 2001.
Year 2010 projections based on established rates applied to 2000 census counts

Chillicothe, in Ross County, is the largest population center in the ROI with a population of 21,796 in 2000. Other population centers include Portsmouth in Scioto County and Jackson in Jackson County, with populations of 20,909 and 6,184 in 2000, respectively. The largest town in Pike County is Waverly and the closest town to PORTS is Piketon. The population of these towns was 4,433 and 1,907 in 2000, respectively (Census 2001).

Housing characteristics for the ROI are presented in Table 3.11-5. Owner-occupied housing units account for 71.8 percent of the total occupied housing units while renter-occupied units accounted for 28.2 percent. The vacancy rate in the ROI was 3.6 percent in 2000, indicating that over 3,200 units are available for occupancy (Census 2002c).

Table 3.11-5
Region of Influence Housing Characteristics

	Housing Units	Owner-Occupied Units	Owner-Occupied Vacancy Rate (Percent)	Rental Units	Rental Vacancy Rate (Percent)
Jackson County	13,909	9,328	1.7	3,291	8.6
Pike County	11,602	7,314	2.0	3,130	8.5
Ross County	29,461	19,958	1.8	7,178	7.5
Scioto County	34,054	21,646	1.9	9,225	9.5
ROI	89,026	58,246	1.8	22,824	8.6

Source Census 2002a

Community Services

Twenty-four public school districts with a total of 94 schools provide education for approximately 37,700 students in the ROI (NCES 2002). Scioto County, where the majority of the site workers live, includes twelve separate school districts. The largest is the Portsmouth City School District with almost 2,900 students in 8 schools.

Pike Community Hospital is the hospital closest to the site, located approximately 7.5 miles north of the facility on State Route104 south of Waverly. Adena Health Systems, also located north of the site on SR 104, south of Waverly, serves the area as an urgent care facility. No other acute care facilities are located in Pike County. There are also two licensed nursing homes near Piketon and one in Wakefield; all are located within 8 km (5 mi) of the site.

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

Environmental Justice

This section details the racial composition and income status of the county where the PORTS reservation is located. Data is provided on the county and census tract level where available. Census 2000 data is the primary source for this section and it is supplemented as necessary in areas where it was found to be deficient.

The site is located in central Pike County just south of the town of Piketon. The site lies near the eastern edge of Census Tract 9522, near the border with Census Tracts 9523 and 9527. Tables 3.11-6 and 3.11-7 present the individuals of each category of race within the local areas by number and percent respectively. The state levels are presented for comparison.

Low-income populations are identified using statistical poverty thresholds from the Bureau of Census (defined in 2000 as 1999 income of less than $17,463 for a family of four). Poverty status data from the 2000 Census is beginning to be issued. Presently, data is available at the county level, not the tract level. To supplement this deficiency, data from the 1990 Census is used at the tract level. The data has been adjusted based on changes at the county level data over the last ten years. The estimated number of persons below the poverty level and the rates for each of the geographical areas are presented in Table 3.11-8.

Table 3.11-6
Racial Composition

	Total Population	One Race						Two or More Races	Ethnicity	
		White	African American	American Indian	Asian	Pacific Islander	Other		Hispanic	Non-Hispanic
Census Tract 9522	5,592	5,311	110	55	2	0	4	110	29	5,563
Census Tract 9523	5,067	4,884	41	26	14	4	2	96	19	5,048
Census Tract 9527	4,342	4,266	14	21	4	0	1	36	26	4,316
Pike County	27,695	26,786	246	204	51	10	20	378	155	27,540

Note: Persons of Hispanic ethnicity may be of any race.
Source: Census 2002b

Table 3.11-7
Racial Compositions (Percent)

	One Race						Two or More Races	Ethnicity	
	White	African American	American Indian	Asian	Pacific Islander	Other		Hispanic	Non-Hispanic
Census Tract 9522	95.0	2 0	1.0	0.0	0.0	0.1	2.0	0.5	99.5
Census Tract 9523	96.4	0.8	0.5	0.3	0.1	0.0	1.9	0.4	99.6
Census Tract 9527	98.2	0.3	0.5	0.1	0.0	0.0	0.8	0.6	99.4
Pike County	96.7	0.9	0.7	0.2	0 0	0.1	1.4	0.6	99.4
Ohio	85.0	11.5	0.2	1.2	0.0	0.8	1.4	1.9	98.1

Note: Persons of Hispanic ethnicity may be of any race.
Source. Census 2002b

Table 3.11-8
Low-Income Populations

Region	Population	Population for Determination of Poverty Status	Population Below Poverty Level	Percent
Census Tract 9522	5,592	5,592	1,185	21.2
Census Tract 9523	5,067	5,067	1,159	22.9
Census Tract 9527	4,342	4,342	1,029	23.7
Pike County	27,695	27,226	5,061	18.6
Ohio	11,353,140	11,046,987	1,170,698	10.6

Source Census 1990a, b, 2002c.

3.12 Public and Occupational Health

Air releases of radionuclides from the operations at the site result in radiation exposures to people in the vicinity well within regulatory limits. Based on the year 2000 total radionuclide releases, the radiation dose calculated to the MEI is 0.047 mrem/yr. The collective dose to population within 80 km (50 mi) of the site is 0.18 person-rem (NESHAP 2001b). This calculated MEI dose of 0.047 mrem/yr is much lower than the EPA standard of 10 mrem/yr and the NRC TEDE limit of 100 mrem/yr.

The NIOSH conducted an epidemiologic study to examine the causes of death among all PORTS 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 NIOSH investigation at PORTS, deaths from cancers of the stomach, lung, and the lymphatic and the hematopoietic systems including leukemia, were evaluated in more detail.

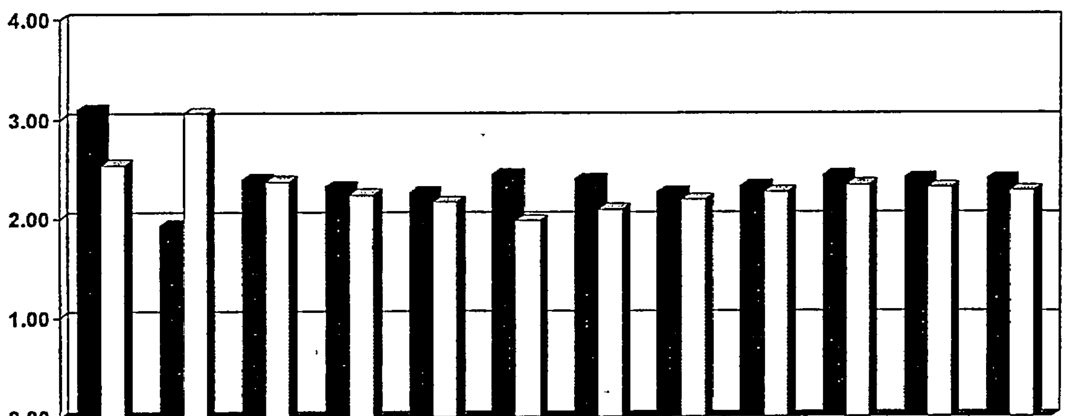
The final report, Mortality Patterns Among Uranium Enrichment Workers at the Portsmouth Gaseous Diffusion Plant, was published July 2001. The Announcement of Findings by NIOSH, published October 2001 states: "Overall cohort mortality was significantly less than expected, when compared to the United States population, as was mortality from all cancers. 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. 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 NIOSH study of PORTS" (NIOSH 2002).

The United States Department of Labor, Bureau of Labor Statistics (BLS), compiles annual injury and illness data including the incidence rates by industry. USEC's standard industrial classification (SIC) is 2819, "Industrial Inorganic Chemicals, not elsewhere classified. The BLS average incidence rate of nonfatal occupational injuries and illnesses for SIC 2819 for calendar year 2001 is 4.8.

The Corporation maintains a log and summary of recordable occupational injuries and illnesses at PORTS under the guidance of OSHA 29 CFR Part 1910, Part 1904, *Recording & Reporting Occupational Injuries & Illnesses.*

Table 3.12-1 summarizes a comparison of year-to-date monthly Recordable Injury/Illness rates (RIIs) for fiscal years 2001 and 2002.

Table 3.12-1 Recordable Injuries/Illnesses Comparison by Fiscal Year



	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
■ FY-2001	3.10	1.93	2.39	2.31	2.25	2.44	2.39	2.26	2.32	2.43	2.40	2.39
□ FY-2002	2.54	3.06	2.36	2.23	2.16	1.97	2.09	2.18	2.26	2.33	2.30	2.27

Note: The rates are calculated based on the number of injuries and illnesses ÷ Number of hours worked by employees X 200,000 hours.

Over the years, the major sources of significant chemical exposures at PORTS have been to the following agents:

- Acids (Hydrochloric, Hydrofluoric, Nitric, Sulfuric) - Nitric acid levels ranged up to 8.14 milligrams per cubic meter (mg/m^3)
- Arsenic - Levels ranged up to 2.1 mg/m^3
- Asbestos - Levels ranged up to 1.4 fibers/cubic centimeter (cc)
- Chlorine, Chlorine Trifluoride - Chlorine levels ranged up to 1.8 mg/m^3
- Chlorinated Solvents (TCE, Methyl chloroform, etc.) - TCE levels ranged up to 145 mg/m^3
- Chromium (Total) - Levels ranged up to 1.6 mg/m^3
- Fluoride, Fluorine, and HF – HF levels ranged up to 4.2 mg/m^3
- Lead, Copper (weapons qualification) - Lead levels ranged up to 19.5 mg/m^3
- Mercury - Levels ranged up to 0.19 mg/m^3
- Nickel - Levels ranged up to 0.45 mg/m^3

Exposures to the above chemical agents are controlled by administrative and engineering methods and/or personal protective equipment. Exposure results are reported as an 8-hour TWA as specified in 29 CFR 1910.1000, Table Z-1.

PORTS has the following Extremely Hazardous Substances stored and used on site as identified by *Ohio Revised Code* Section 3750.02(B)(1)(a), *Superfund Amendment and Reauthorization Act* of 1986, Title III, Community Right-To-Know:

- Chlorine
- Fluorine
- HF
- Nitric Acid
- SO_2
- Sulfuric Acid

There have been no industrial fatalities at the site.

3.13 Waste Management

The DOE and Corporation's Waste Management Programs direct the safe storage, treatment, and disposal of waste generated by past and present operations and from current environmental restoration projects. DOE also stores Corporation-generated waste in the *Resource Conservation and Recovery Act* (RCRA) Part B permitted storage areas in agreement with the OEPA Director's Final Findings and Orders, issued to the Corporation on October 5, 1995.

Waste management requirements are varied and are sometimes complex because of the variety of waste streams generated by the Corporation and DOE activities. DOE Orders and NRC, EPA, OEPA, and Ohio Department of Health (ODH) regulations must be satisfied to demonstrate compliance for waste management activities. Additional policies have been implemented for management of radioactive, hazardous, and mixed wastes.

3.13.1 Waste Segregation and Collection

PORTS generated wastes are collected and packaged, where feasible, by the waste generator. Wastes known to be suitable for release to unrestricted areas based on the point and process of generation are segregated at the source, when possible, from wastes not suitable for release to unrestricted areas. Wastes from areas controlled for loose radioactive contamination are considered to be potentially contaminated until characterized. Wastes requiring characterization to determine whether they may be released to unrestricted areas are segregated upon completion of such characterization.

3.13.2 Waste Packaging and Labeling

Containers known to contain radioactive waste, including packaging, are labeled in accordance with the Radioactive Waste Management Program (USEC-02).

Waste is packaged in appropriate containers to meet Department of Transportation (DOT) and 10 CFR Part 71 requirements. Some general types of waste packaging include, but are not limited to:

- Solid Waste 5-, 30-, 55-, or 110-Gal drums
- Liquid Waste 5-, 30-, or 55-Gal drums
- Corrosives, Acids polybottles or polydrums
- Scrap Metal B-25 boxes or other similar boxes or various drums

In addition, 85- and 110-Gal overpacks may be used for appropriate wastes and damaged containers.

3.13.3 Waste Storage

Those PORTS wastes that are regulated for radiological content only are removed from the generating facility and stored at a corporation radioactive waste storage facility prior to final disposal. PORTS-generated mixed wastes are stored locally for up to 90 days pending treatment, disposal, or transfer to a DOE-owned storage facility. The XT-847 is the Corporation's radioactive waste management facility and is described in the Radioactive Waste Management Program (USEC-02). Other areas may be utilized as waste storage facilities as required by facility operations. If outdoor storage is necessary, radioactive wastes with removable contamination are packaged in containers, wrapped or covered to prevent the release of radioactivity. Storage areas are posted appropriately.

Access to waste storage containers is restricted to trained personnel in accordance with 10 CFR 20.1905. Low-level radioactive waste (LLRW) containers are inspected quarterly, at a minimum, to ensure container integrity and to identify and correct any leaks or other problems.

When near-term treatment/disposal of PORTS-generated mixed wastes cannot be completed within 90 days, such wastes are transferred to DOE-owned and operated facilities for storage until treatment and/or disposal can be accomplished. Such transfers are documented through the Request for Disposal System.

3.13.4 General Waste Description

Aqueous waste is comprised primarily of various metal-bearing solutions generated from processes such as equipment cleaning, decontamination, and maintenance. Mixed wastes in this category are hazardous due to the presence of heavy metals, which cause the waste to exhibit the toxicity characteristic.

Petroleum/organic liquid wastes include wastes generated from vehicle and equipment maintenance, degreasing, painting and related activities, and waste generated from maintenance and repair of non-polychlorinated biphenyl (PCB) electrical equipment. Mixed wastes in this group are hazardous because they meet a listed waste description, exhibit the characteristic of ignitability, or exhibit the toxicity characteristic due to the presence of organic compounds.

Hardware/scrap metal/metal-bearing solid wastes in this mixed waste category are hazardous because they exhibit the hazardous characteristic due to the presence of toxic heavy metals. Scrap metal, however, is excluded from hazardous waste management rules. Hardware and scrap metal are generated from a wide variety of plant processes and maintenance activities. Replacement of spent bulbs and batteries, repair and discard of electronic/electrical equipment, metal-working, and repair and discard of equipment are all examples of activities that generate discarded hardware and scrap metal. Processes that generate metal-bearing solids include wastewater treatment, air pollution control, spill cleanup, use of personal protective equipment, painting, metal cleaning, photographic processes, and general equipment maintenance.

Dry active waste (DAW) is generated as a result of day-to-day operations involving facilities throughout the site. Radioactively contaminated wastes consisting primarily of paper, personal protective equipment (used for protection from both chemical and radiological hazards), cardboard, fiberglass, cloth, rubber, and air filters are examples of DAW.

The rubble/aggregates category of waste consists of glass that is generated primarily in the laboratory from analytical processes, and sand, soil, gravel, concrete, and clay adsorbents generated from decontamination and spill cleanup activities.

The treatment residues category consists of residuals from the smelting of radioactive scrap metal, ash from the incineration of DAW, residuals from the treatment of mixed waste, and compacted solids from volume reduced radiological waste.

The mixed wastes that fall within the laboratory waste category are generated from processes such as sample preparation, sample analyses (including samples from off-site sources), cleaning of laboratory equipment, and discard of off-specification chemicals. They are comprised of a variety of listed and characteristic hazardous wastes and may be in solid or liquid form.

The sealed source category of waste consists primarily of radioactive instrument and calibration sources no longer needed for their intended purpose.

The category of other plant wastes is comprised of solids and liquids and is generated in a wide variety of settings on the plant site. Solids are generated from spill cleanup activities, discarded personal protective equipment, metal-working, filtering of process liquids, and trapping of contaminants generated in venting systems. Processes associated with cleaning and decontamination of equipment or buildings, spill cleanup, and uranium recovery generates the various metal-bearing solvent and corrosive liquid wastes in this category. These wastes may exhibit one or more of the hazardous characteristics of ignitability, corrosivity, reactivity, and toxicity as well as meet the descriptions for certain listed hazardous waste.

During 2000, over 8 million lbs of waste from DOE were recycled, treated, or disposed (Table 3.13-1). Future DOE waste management projects include the shipment for disposal of LLRW and mixed waste, and the treatment of mixed and PCB-mixed waste at off-site commercial facilities.

Table 3.13-1
DOE Waste Management Program Treatment, Disposal, and Recycling Accomplishments for 2000

Waste Stream	Quantity	Treated, disposed, or recycled	Treatment, disposal, or recycling facility
Waste streams characterized	10 waste streams (3,317 drums)	NA	NA
Ion exchange resin	1 drum/177 lbs	Disposed	Envirocare
X-701B PCB sludge	125 B-25 boxes/620,818 lbs	Disposed	Envirocare
X-616 waste	1443 B-25 boxes/7,376,993 lbs	Disposed	Envirocare
X-720 Neutralization Pit soils	32 B-25 boxes/191,812 lbs	Disposed	Envirocare
X-749 soils	18 drums/9,175 lbs	Treated and disposed	Safety-Kleen
Wastewater	20,144 lbs	Treated	On-site treatment facilities
PCB mineral oil	2 tankers/48,900 lbs	Trial burn	TSCA Incinerator
PCB mineral oil	16 drums/7,084 lbs	Treated and disposed	Safety-Kleen
Compressed gas cylinders	18 cylinders	Treated and disposed	Safety-Kleen
Lab Packs	13 drums/1,363 lbs	Disposed	Waste Control Specialists LLC
Fluorescent light bulbs	2,050 lbs	Recycled	Superior Special Services, Inc.
Aluminum cans	1,677 lbs	Recycled	Star, Inc.
Cardboard	6,953 lbs	Recycled	Star, Inc.
Mixed office paper	24,670 lbs	Recycled	Rumpke

Source DOE 2001d.

During calendar year 2002 the Corporation disposed of 6,293 cubic feet (ft^3) of LLRW and 1,081 ft^3 of mixed wastes. The Corporation was able to recycle 1,538 ft^3 of batteries, bulbs, and used oil (Table 3.13-2). The generation rates for LLRW and mixed wastes are expected to remain constant for the next few years. The projected annual generation rates by PORTS for waste is 3,500 ft^3 of LLRW and 500 ft^3 of mixed wastes.

Table 3.13-2
PORTS Waste Generation and Shipment Rates
Calendar Year 2002

Waste Category	Generated (ft^3)	Shipped (ft^3)	Treatment/Disposal Facility
Mixed/Hazardous: -Aerosol Cans -Lithium Batteries -Ni-cad Batteries -Metal Bearing Solids -Solvent Laden Solids -Solvent Laden Paint -Laboratory & Off Spec Chemicals -Misc. Lab Solutions -Alumina -Sludges	441	1,081	LWD DSSI Perma-Fix
Low-Level Radioactive: -Dry-Activated Waste -Scrap Metal -Oily 3M Cloth -Used Oil -Alumina -Sludges	3,035	6,293	Envirocare DSSI GTS Duratek
Fluorescent Bulbs Incandescent Bulbs Circuit Boards	746	1,436	AERC
Lead-Acid Batteries	533	788	DOE Run
Used Oil	259	525	Safety Kleen

Source: PORTS Waste Management/Environmental Compliance/Industrial Safety

NOTE: Wastes shipped include working off those in backlog.

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4.0 ENVIRONMENTAL IMPACTS

The proposed Lead Cascade site is located in a highly developed industrial area that has been subject to extensive environmental characterizations. The reservation land outside the Perimeter Road is used for a variety of purposes, including a water treatment plant, holding ponds, sanitary and inert landfill, and open and forested buffer areas. The majority of the site improvements associated with the GDP are located within the 202 ha (500 acre) fenced area. A second, large developed and fenced area, covering about 121 ha (300 acres), contains the facilities built for GCEP, in which the Lead Cascade will be located. Both of these areas are largely devoid of trees, with grass and paved roadways dominating the open space. The remaining area within Perimeter Road has been cleared and is essentially level.

The terrain surrounding the site, except for the Scioto River floodplain, consists of marginal farmland and densely forested hills. The Scioto River floodplain is farmed extensively, particularly with grain crops.

4.1 Infrastructure

Changes to infrastructure were assessed by noting modifications and refurbishment to existing facilities to accommodate Lead Cascade equipment and operations and the projected utility usage rates. Current utility capacities and usage rates at the PORTS site were compared to projected rates to determine the possible impacts to the overall site.

4.1.1 No Action Alternative

Under this alternative, there would be no refurbishment and personnel assignments would not change. Changes to utilities would be limited to normal maintenance activities. There would be no increase in utilities usage and current building space allocation would not be affected. Utility usage under the No Action Alternative would not add to PORTS utility usage.

4.1.2 PGDP Siting Alternative

Under this alternative a new facility would be constructed and used for centrifuge operations at PGDP. Lead Cascade operations would receive support on an as-required basis from the existing infrastructure at PGDP.

The percentage increase in utility usage (i.e., electricity, water, sewer, and natural gas) was estimated to be small when compared to current usage. When compared to system capabilities, the increase in usage for the Lead Cascade would be negligible and thus would not have a negative impact on system operation or reserve capacity.

4.1.3 Proposed Action

Under the Proposed Action the X-3001, X-3012, and X-7726 facility buildings are leased from DOE by USEC, modified and used for centrifuge operations. Lead Cascade operations would receive support on an as-required basis from other existing facilities and resources such as security, medical, emergency response, etc.

Impacts to utility usage at the Lead Cascade were analyzed for electricity, water, and sewer. Facilities to be used are currently heated and supplied with routine utilities, so there would be no impact from Lead Cascade operation. Utilities for other site buildings will not be impacted because Lead Cascade support requirements will not represent a significant change in activity level especially when compared to existing capacities. Utility impacts for the Lead Cascade operations are shown in Table 4.1-1.

Table 4.1-1
Current and Projected Utility Usage Under the Proposed Action

Energy Type	Units	PORTS Capacity	Current Usage	Lead Cascade Usage	Percent of Current
Electrical Power	kW	2,260,000	34,700	2,000	5.76
Potable Water	L/d	15,140,000	9,765,300	10,220	0 10
Cooling Water, Recirculating	L/d	2,333,452,500	310,370,000	1,968,200	0.63
Cooling Water, Makeup	L/d	66,237,500	9,084,000	13,626	0.15
Sewer	L/d	3,406,500	604,086	10,220	1.69
Fire water (avail.)	L/d	130,809,600	-	-	-
Compressed air	m^3/h	81,674	17,489	509	2.91

Source: USEC 2002g

The biggest impact to site utility usage will be electrical power, which is projected to increase by approximately 2,000 kW. This will cause a 5.76 percent increase from the current level of 34,700 kW.

The second largest percentage increase is the rise in compressed air usage of 509 m^3/h (17,975 ft^3/h), or 2.91 percent under this alternative. The use of compressed air is well within system capacity.

There is a 10,220 L/d (2,700 GPD) rise in sewer usage, or 1.69 percent under this alternative. The additional wastewater from this project would not place a burden on the current treatment plant load capacity. During the project, potable and cooling makeup water usage is projected to increase by 23,846 L/d (6,300 GPD). Additional water usage under this alternative represents an increase of 0.15 percent in overall site usage. Use of RCW will increase by 1,968,200 L/d (519,940 GPD); this is well within the system capacity and will have no external effect.

The percentage increase in utility usage is small when compared to current usage. When compared to system capabilities, the increase in usage for the Lead Cascade is negligible and thus would not have a negative impact on system operation or reserve capacity.

4.2 Land Use Impacts

Land use impacts were assessed by reviewing refurbishment and operations activities for the Lead Cascade.

4.2.1 No Action Alternative

Under the No Action Alternative, the Lead Cascade would not be deployed at PORTS; therefore, no impacts to land use would occur.

4.2.2 PGDP Siting Alternative

Under this alternative the Lead Cascade would be constructed in a new 3,900 m^2 (42,000 ft^2) building located on ground leased to USEC on the PGDP reservation.

No changes to existing land use would occur. Operation of the Lead Cascade would be consistent with historical uranium enrichment operations on the PGDP reservation. Accordingly, there would be no impact to land use associated with construction of the Lead Cascade at PGDP.

4.2.3 Proposed Action

PORTS currently and historically has been used for industrial purposes and since the mid 1950s has been used for uranium enrichment and other nuclear activities. Under the Proposed Action, existing facilities used for uranium enrichment would be used for the Lead Cascade and no ground would be disturbed for building construction or changes made to the facility that would alter visual characteristics with its surroundings; therefore, no impacts to land use would occur.

USEC has consulted with the SHPO who has concurred with a finding of No Adverse Effect. USEC has also consulted with the DOA, NRCS who have determined that the project site is mapped as Urban Land-Omulga Complex and is a non-prime soils and therefore the FPPA does not apply.

4.3 Transportation Impacts

Transportation risks were analyzed due to refurbishment and operation of the Lead Cascade at PORTS.

4.3.1 No Action Alternative

Under the No Action Alternative, USEC would not conduct nor support further development of gas centrifuge technologies for uranium enrichment at PORTS. Therefore, there would be no increase in transportation risk as compared to the current conditions under this alternative.

4.3.2 PGDP Siting Alternative

Chemicals and materials would be transported to PGDP for assembly and installation of centrifuges in the Lead Cascade. The shipping of chemicals and materials would meet the DOT Hazardous Materials Regulations (49 CFR Parts 171-180) governing packaging and shipping of hazardous materials. There would also be non-hazardous and non-contaminated shipments from Oak Ridge, Tennessee to PGDP of rotors and parts to support the operation of up to 240 machines. It is assumed that the shipments would be made by trucks. The distance between Oak Ridge, Tennessee and Paducah, Kentucky is approximately 507 km (315 mi) by road. It is estimated that there would be no significant increase in risk associated with the shipments.

Impacts on transportation due to construction and decommissioning activities would be negligible. Although there would be minimal increases in traffic, the construction and decommissioning activities would be temporary and would not result in long-term effects.

4.3.3 Proposed Action

Chemicals and Materials

Different chemicals and materials that would be transported for assembly and installation of centrifuges for the Lead Cascade are shown in Table 4.3-1.

Table 4.3-1
Chemicals and Materials Transported for the Lead Cascade

Materials Available in CTTF	Estimated Maximum Quantity
Isopropyl Alcohol	4 L/month
Vacuum Grease	5 Kg
Helium	3 each gas cylinders
Liquid Nitrogen	2 each (80 L dewars)
Acetone	4 L
Cleaning Solvents	15 L
Oils used in Centrifuge	1,500 L
Oils Used in the Vacuum Pumps	200 L

Source: USEC 2002e

The shipping of chemicals and materials would meet the DOT Hazardous Materials Regulations (49 CFR Parts 171-180) governing packaging and shipping of hazardous materials.

There will be non-hazardous and non-contaminated shipments from Oak Ridge, Tennessee to PORTS of rotors and parts to support the operation of up to 240 machines. It is assumed that the shipments will be made by trucks.

Table 4.3-2 summarizes the total routine and accident shipment risks (i.e., the total risk to all workers and members of the general public potentially exposed for shipments) associated with the rotors and parts transportation from Oak Ridge, Tennessee to PORTS. The vehicular risk associated with routine transportation would result from the potential exposure to increased levels of airborne particulates from vehicular exhaust emissions and from fugitive dusts raised from the roadbed by the transport vehicles. The vehicular risks are associated with the road accidents and are not related to the shipment's cargo. The detailed analysis and assumptions for the transportation are presented in Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride (PEIS 1999).

The distance between Oak Ridge, Tennessee and Piketon, Ohio is approximately 555 km (345 mi) by road. The total risks presented in Table 4.3-2 are for a distance of 1,000 km (620 mi). Therefore, the risks associated with the transportation of rotors and parts will be less than given in Table 4.3-2.

Table 4.3-2
Total Routine and Accident Shipment Risks for the Transportation of Rotors and Parts

		Risk Over 1,000 km (620 mi)			
		Routine Shipments Risks		Accident Shipments Risks	
Facility	Total Shipments (Truck)	Vehicular Lead Cascade/ shipment	Total Vehicular Lead Cascade*	Vehicular Fatalities/ shipment	Total Vehicular Fatalities*
Oak Ridge, TN to Piketon, OH	160	4.23×10^{-6}	6.77×10^{-4}	4.23×10^{-5}	6.77×10^{-3}

Source. PEIS 1999
* 160 shipments

Impacts on transportation due to refurbishment and decommissioning activities would be negligible. Although there would be minimal increases in traffic, the refurbishment and decommissioning activities would be temporary and would not result in long-term effects.

4.4 Geology, Soils, and Seismicity Impacts

Geology and soils analysis considers a ROI that includes the proposed Lead Cascade, as well as the rest of the PORTS reservation. Impacts to these resource areas were determined by assessing potential changes in existing geology and soils that could result from refurbishment activities and operations under each of the alternatives.

4.4.1 No Action Alternative

Under the No Action Alternative, the Lead Cascade would not be deployed at PORTS; therefore, no impacts to geological resources would occur.

4.4.2 PGDP Siting Alternative

Under this alternative a new facility would be constructed and used for centrifuge operations at PGDP. Soil disturbance from project activities would occur at construction laydown areas, destroying soil profile, and leading to a possible temporary increase in erosion as a result of storm water runoff and wind action. Engineering controls, best management, and construction practices will be implemented that will minimize the extent of excavation. Disturbed areas will be controlled to minimize erosion and sediment runoff to the extent practicable and would not adversely effect the safe operation of the facility.

4.4.3 Proposed Action

Under the Proposed Action, no new construction of facilities will take place for deployment of the Lead Cascade at PORTS. The Lead Cascade will utilize existing buildings in the former GCEP that have been refurbished to accommodate the Lead Cascade. There will be no impact on soil compaction, soil erosion, subsidence, landslides, or disruption of natural drainage patterns.

USEC has consulted with the DOA, NRCS who have determined that the project site is mapped as Urban Land-Omulga Complex and is a non-prime soils; therefore, the FPPA does not apply.

4.5 Water Resources Impacts

Potential impacts to surface and groundwater quality would be insignificant during refurbishment activities and operations of the Lead Cascade.

4.5.1 No Action Alternative

Under the No Action Alternative, the Lead Cascade would not be constructed at PORTS; therefore, no impacts to surface or groundwater resources would occur.

4.5.2 PGDP Siting Alternative

During construction of the Lead Cascade at PGDP, there would be a potential for an increase in the amount of sediment carried in surface water runoff. Precaution would be taken in order to minimize surface water impacts. The use of physical barriers, such as silt fences, would minimize the amount of silt reaching the surface water and reduce direct effects on water quality.

Precautions would also be taken during construction to avoid impacts from accidental discharges of fuel, waste, and sewage. Precautions include the use of safety procedures, spill prevention plans, and spill response plans in accordance with Federal and State laws that would minimize the likelihood and severity of potential impacts from accidental discharges. The possibility of migration of contaminants to soils, surface water, and ground water would be reduced by limiting construction to dry periods. Consequently, adverse impacts to surface water and ground water would not result.

4.5.3 Proposed Action

There would be no impacts from refurbishment or normal operations to surface or groundwater. The greatest potential impact to groundwater quality could occur as a result of a fuel or waste spill, or a sewer line leak and subsequent migration of contaminants through the soil profile during refurbishment activities. Precautions will be taken to avoid impacts from accidental discharges, such as, the use of safety procedures, spill prevention plans, and spill response plans in accordance with Federal and State laws which would minimize the likelihood and severity of potential impacts from accidental discharges.

An above ground storage tank (AST) will be installed north of and adjacent to the X-3001 Process Building. The AST will be an equivalent replacement for the 1,500-Gal under ground storage tank (UST) that was removed to meet the December 1998 regulatory requirements for UST upgrade/removal. The fuel tank will be constructed from materials that are compatible with the product to be stored and the conditions of storage (i.e., pressure and temperature) and meet all operational regulatory requirements. A secondary means of containment as required by 40 CFR 112.8 will provide for the entire capacity of the AST with sufficient freeboard to contain precipitation.

Fuel will be transferred from the AST to a 100-Gal day tank inside the X-3001 to supply a standby generator. The fuel will be fed via aboveground and underground piping. The piping system will conform to standards for fuel distribution pressure piping, will be designed to minimize abrasion and corrosion, and will allow for expansion and contraction.

Fuel lines and tanks will be labeled to meet regulatory standards. Absorbent pads and/or spill pallets will be placed at hose connections. Fuel oil delivery procedures will be utilized and followed by truck drivers and receiving personnel during unloading operations at the tank.

The refurbishment of the existing facilities in the former GCEP would not cause impacts to surface and groundwater resources.

4.6 Ecological Resources Impacts

Impacts to ecological resources were determined by assessing Lead Cascade refurbishment and operations activities and projected disturbances to threatened and endangered species, wildlife habitat, wetlands, and vegetation.

4.6.1 No Action Alternative

Under the No Action Alternative, the Lead Cascade would not be deployed at PORTS; therefore, no impacts to ecological resources would occur.

4.6.2 PGDP Siting Alternative

The area of the Lead Cascade at PGDP does not provide a natural habitat for any rare, threatened, or endangered species and there are no wetlands present in the immediate vicinity of the location where the Lead Cascade would be located. Therefore, no significant impacts would be anticipated from constructing the Lead Cascade at PGDP.

4.6.3 Proposed Action

No new development will take place for the Lead Cascade at PORTS. Refurbishment of existing facilities and operation would not have impacts on the terrestrial habitats, plants, animals, and wetlands present within the PORTS reservation. The USFWS and the ODNR were contacted requesting recommendations and comments regarding potential effects of this action. The USFWS has identified the presence of the Indiana Bat (*Myotis sadalis*) and the timber rattlesnake (*crotalus horridus horridus*) to be in the range of the Proposed Action. Copies of the letters are provided in Appendix B.

The area for the Proposed Action is in an already developed industrial area and does not provide a favorable habitat for the Indiana Bat or timber rattlesnake. Therefore, these species would not be impacted by the Proposed Action.

4.7 Air Quality Impacts

Potential impacts to air quality were assessed for refurbishment and operation of the Lead Cascade. Air quality impacts were determined using the CAP88-PC computer model to monitor chemical gaseous emissions. Non-radiological and radiological impacts were also analyzed.

4.7.1 No Action Alternative

Under the No Action Alternative, the Lead Cascade would not conduct or support further development of gas centrifuge technologies for uranium enrichment at PORTS. Therefore, there would be no change in air quality under this alternative.

4.7.2 PGDP Siting Alternative

4.7.2.1 Non-Radiological Air Quality

Existing air quality on the PGDP site is in attainment with NAAQS for all the criteria pollutants. However, McCracken County (which includes PGDP and the City of Paducah) was recently identified by the Kentucky Department of Air Quality as a potential non-attainment area for ozone based on the 8 hr-standard. Principal non-radiological NAAQS "criteria" pollutants would be limited to exhaust from a large (greater than 600 horsepower) stationary diesel engine which would be used in the unlikely event of power failure. Based on AP-42 emission factors and 500 hours of operation, emissions from this generator would be well below the PSD increments; therefore, no PSD review would be required by the EPA or Kentucky Department of Environmental Protection.

The construction activities would not be expected to produce any fugitive dust. Best construction management practices would be used for construction activities to mitigate any airborne releases.

4.7.2.2 Radiological Air Quality

Projected annual emissions were estimated for this alternative. The results indicate that the annual EDE to the MEI would be approximately 0.0066 mrem/yr. The calculated MEI dose is much lower than the EPA standard of 10 mrem/yr and the NRC TEDE limit of 100 mrem/yr. Converting the activity concentrations of the uranium isotopes to mass concentrations and summing gives a total uranium concentration of 9.2×10^{-5} $\mu g/m^3$ at the point of maximum dose. Stoichiometric calculations give an associated HF concentration of $3.1 \times 10^{-5} \mu g/m^3$.

4.7.3 Proposed Action

The impact of the projected radioactive and chemical gaseous emissions from the Lead Cascade was modeled using the CAP88-PC computer model distributed by the EPA. The receptor points considered were hypothetical neighbors living on a farm at the boundary of the PORTS reservation in each of the sixteen major compass directions and the two tenant organizations currently onsite (the Ohio National Guard at X-751 Mobile Equipment Maintenance Shop and the OVEC office building on the Main Access Road). The Lead Cascade is located in the X-3001 Process Building and uses the existing building vent. Actual onsite weather data from calendar year 2001 was used to model atmospheric dispersion (USEC 2002b).

4.7.3.1 Non-Radiological Air Quality

Existing air quality on the site is in attainment with NAAQS for all the criteria pollutants. A 850 horsepower electrical generator will be utilized for standby power in the X-3001 Process Building in the event of system power failure. The electrical generator will be exempt from permitting requirements as stipulated in the Permit-by-rule exemptions in Ohio Administrative Code 3745-31-03(A)(4)(a).

Principal non-radiological NAAQS "criteria" pollutants are limited to exhaust from a large (greater than 600 horsepower) stationary diesel engine which will be used in the unlikely event of power failure. Based on AP-42 emission factors and 500 hours of operation, emissions from this generator would be well below the PSD increments; therefore, no PSD review would be required by the EPA or OEPA.

Since the refurbishment and operations activities will principally take place inside of existing GCEP buildings, the activities are not expected to produce any fugitive dust. Best construction management practices will be used for refurbishment activities to mitigate any airborne releases.

4.7.3.2 Radiological Air Quality

The scenario modeled was the projected annual emissions from the Lead Cascade located in the X-3001 Process Building. Actual site wind data from calendar year 2001 was used in the modeling. Annual average radionuclide concentrations and associated public doses were directly calculated by the model used. Annual average concentrations of airborne uranium and HF at the point of maximum public impact were manually estimated by means of published specific activities and stoichiometry.

EPA CAP88-PC Model

The dispersion model used was Version 1 of the EPA's CAP88-PC. CAP88-PC is a PC-based version of the original mainframe-based CAP88 suite of computer models published by EPA for demonstration of compliance with the 40 CFR Part 61 Subpart H standards for atmospheric releases of radionuclides from the DOE reservation. The generic CAP88 suite includes:

- A Gaussian plume dispersion module (AIRDOS) with algorithms to account for deposition, environmental scavenging, and radioactive decay of radionuclides;
- A dose conversion module (DARTAB) to convert environmental concentrations into annual external and internal exposures and impacts (50-year EDE) and Total Lifetime Fatal Cancer Risks) in accordance with Regulatory Guide 1.109, *Calculation of Annual Dose to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I*;
- A database (RADRISK) of dose and risk conversion factors; and
- A preprocessor to convert STAR format wind data into a format used by AIRDOS.

Version 1 of CAP88-PC runs interactively on MS-DOS and is approved for demonstration of compliance by EPA.

Model Input

The projected activity emission rate for the Lead Cascade consisted of 0.1 millicuries (mCi) per week, or 0.0052 curie per year (Ci/yr), of total uranium. No irradiated material is to be fed to the Lead Cascade. Technetium, transuranics and uranium-236 (^{236}U) should not be present in the emissions. Historical experience with short-lived uranium daughters (uranium-Y [^{231}Th], uranium-XY [^{234}Th] and protactinium-234 [^{234m}Pa]) shows that they contribute much less than 0.1 percent of the public radiation dose, so they were omitted from the source term to simplify the results.

One percent ^{235}U assay was selected as being realistically conservative in regard to the uranium emissions of the Lead Cascade. This was based on the fact that the Lead Cascade will feed normal uranium and will include both a stripping section and an enrichment section. The most analogous existing vents to this are the X-333 Cold Recovery and X-330 Cold Recovery vents, which normally run at one to two percent assay and three to five percent assay, respectively. Since a lower assay results in a larger mass emission, the lowest assay in these two ranges will yield the most conservative public exposure to chemical emissions from the Lead Cascade.

The vent characteristics were based on the existing process vent in X-3001. Vent height is 23 m (75 ft) above grade and vent diameter was entered as 0.05 m (2 in.). Zero plume rise was used, so the vent diameter is not actually used in the model calculations.

The wind data used was taken from the onsite 30-m meteorological station during calendar year 2001. The PORTS reservation sits in an ancient river valley that runs roughly from southwest to northeast and the bulk of the low level winds either blow up this valley (to the northeast) or down the valley (to the southwest). Historically, the site sees a preponderance of winds going up the valley, offset for dispersion purposes by the fact that the DOE reservation "bulges" in the northeast corner. Consequently, the historic point of maximum impact by the existing emission sources is along the southern edge of the bulge. The X-3001 is located in the extreme southwest corner of the active plant site however, and is further from the eastern side of the reservation than any of the existing vents.

The distances between the X-3001 vent and the nearest member of the public were assumed to be equal to the distance from the center of the X-3001 Building to the current DOE reservation boundary in each of the sixteen compass directions. A second model run was made using the two onsite tenant organizations (the Ohio National Guard at the X-751 Mobile Equipment Maintenance Shop and the OVEC office building on the Main Access Road) as the nearest members of the public. All distances were scaled from a blueprint-size site map with the universal transverse mercator (UTM) grid (100 m or 328 ft increments) overlaid.

For the initial model run, a rural food consumption pattern was used according to EPA recommendations. This assumes a certain percentage of all foodstuffs are produced at home and the rest is produced locally. The specific percentages are listed in the model output. For the onsite tenants, it was assumed that all foodstuffs were brought in from offsite. This should still be conservative since the tenant employees do not actually reside at the workplace.

Results

The results show that the MEI at a publicly accessible location would be located along the southern DOE boundary near the southwest corner of the reservation. The annual EDE in this location would be 0.023 mrem/yr. The calculated MEI dose of 0.023 mrem/yr is much lower than the EPA standard of 10 mrem/yr and the NRC TEDE limit of 100 mrem/yr.

One of the options available on CAP88-PC is a table of calculated airborne concentrations of each nuclide at each location in pCi/m^3. Converting the activity concentrations of the uranium isotopes to mass concentrations and summing gives a total uranium concentration of 3.6×10^{-4} µg/m^3 at the point of maximum dose. Stoichiometric calculations give an associated HF concentration of 1.2×10^{-4} µg/m^3. The Threshold Limiting Values (TLV) published by the American Conference of Governmental Industrial Hygienists (ACGIH) are 200 µg/m^3 for uranium and 2,300 µg/m^3 for HF. OSHA has published a Permissible Exposure Limit (PEL) for uranium of only 50 μg/m^3. The projected concentrations are a minimum of five orders of magnitude below these standards.

The maximum annual radiation dose for the current onsite tenant organizations would be 0.0077 mrem per year at the X-751 Mobil Equipment Maintenance Shop. This is less than the annual dose to any of the plant neighbors, which is consistent with historical experience with the existing emission sources. The associated airborne concentrations would be 1.2×10^{-4} μg/m^3 of total uranium and 4.0×10^{-5} μg/m^3 of HF. Again, the chemical concentrations are several orders of magnitude below the applicable standards cited above. The detailed analysis and assumptions are presented in Dispersion Modeling of Projected Lead Cascade Emissions at PORTS (USEC 2002a).

4.8 Noise Impacts

Noise impacts were determined by comparing current noise levels with projected levels during refurbishment of the facilities and operation of the Lead Cascade.

4.8.1 No Action Alternative

Under the No Action Alternative, the Lead Cascade would not conduct or support further development of gas centrifuge technologies for uranium enrichment at PORTS. Therefore, there would be no change in the noise levels under this alternative.

4.8.2 PGDP Siting Alternative

Noise associated with the construction phase would be temporary and would not be expected to increase the noise level outside of the facility. It is anticipated that there will be slightly elevated noise level within the cascade area created by the centrifuge machines when being operated at normal operating speed. However, appropriate hearing protection measures (e.g., postings and earplugs) will be incorporated, if necessary, to protect personnel within the elevated noise areas. The operation of the centrifuge system is not expected to increase the noise levels outside of the facility.

4.8.3 Proposed Action

Noise associated with the refurbishment phase will be temporary and is not expected to increase the noise level outside of the facility. It is anticipated that there will be slightly elevated noise level within the cascade area created by the centrifuge machines when being operated at normal operating speed. However, appropriate hearing protection measures (e.g., postings and earplugs) will be incorporated, if necessary, to protect personnel within the elevated noise areas. The operation of the centrifuge system is not expected to increase the noise levels outside of the facility.

Because actual noise estimates for operation of the Lead Cascade are not available, measured noise levels around an automobile assembly plant were used to estimate, and conservatively bound, any potential noise impacts. These noise levels are 55 to 60 dBA at about

60 m (200 ft) from the plant property (Cantor 1996). These noise levels would be inaudible 500 m (1,640 ft) from the site, even with low background noise levels. EPA has identified 55 dBA as a yearly average outdoor noise level that, if not exceeded, would prevent activity interferences and annoyance (EPA 1978).

4.9 Historic and Cultural Resources Impacts

Impacts to cultural resources were determined by consultations with the SHPO and previously conducted cultural surveys to identify the existence of cultural resources and assessing construction impacts.

4.9.1 No Action Alternative

Under the No Action Alternative, the Lead Cascade would not be deployed at PORTS; therefore, no impacts to cultural resources would occur.

4.9.2 PGDP Siting Alternative

Under this alternative a new facility would be constructed and used for centrifuge operations at PGDP. The construction would take place within a previously disturbed area of the PGDP reservation. Therefore, this alternative would not result in any impact to cultural or historic resources.

4.9.3 Proposed Action

The siting of the Lead Cascade at PORTS would not require construction of new facilities; therefore, no areas of cultural resources would be impacted as a result of the Lead Cascade Project. The consultation letter to the NRHP is included in Appendix B.

4.10 Visual/Scenic Resources Impacts

Visual/scenic resource impacts were assessed by reviewing refurbishment activities for the Lead Cascade.

4.10.1 No Action Alternative

Under the No Action Alternative, the Lead Cascade would not be deployed at PORTS; therefore, no impacts to visual characteristics would occur.

4.10.2 PGDP Siting Alternative

Under this alternative the Lead Cascade would be constructed in a new 3,900 m^2 (42,000 ft^2) building located on ground leased to USEC on the PGDP reservation. Architectural consistency would be provided to ensure blending of the Lead Cascade construction with the existing strategic structures while allowing for improvements in building sustainability designs.

Long-term effects to visual resources would be limited to the view of the constructed facility and would be limited to land-based vantage points within the PGDP reservation.

4.10.3 Proposed Action

Under the Proposed Action, existing facilities used for uranium enrichment would be used for the Lead Cascade and no ground would be disturbed or exterior changes made to the facility that would alter visual characteristics with its surroundings; therefore, no impacts to visual/scenic resources would occur.

There are no existing state nature preserves or scenic rivers in the area. The developed areas and utility corridors (i.e. transmission lines and support facilities) of the PORTS reservation are consistent with a VRM Class IV designation. The remainder of the PORTS reservation is consistent with VRM Class III or IV.

USEC has consulted with the SHPO who has concurred with a finding of No Adverse Effect. USEC has also consulted with the DOA, NRCS who have determined that the project site is mapped as Urban Land-Omulga Complex and is a non-prime soils and therefore the FPPA does not apply.

4.11 Socioeconomic and Environmental Justice Impacts

Any sudden influx of capital or employment to a region will impact the existing socioeconomic environment to some degree. Socioeconomic factors, such as employment, income, and population, are interrelated in their response to the implementation of an action. The construction and operation of the Lead Cascade at PORTS would impact the existing socioeconomic environment of the ROI comprised of Jackson, Pike, Ross, and Scioto Counties in Ohio. Other counties within Ohio would derive minor socioeconomic impacts from locating the Lead Cascade at PORTS aside from the benefits to the four counties discussed below.

4.11.1 Socioeconomic Impact Methodology

Socioeconomic impacts are addressed in terms of both direct and indirect impacts. Direct impacts are those changes that can be directly attributed to the Proposed Action, such as changes in employment and expenditures from the construction and operation of the proposed plant. Indirect impacts to the ROI occur in response to the direct impacts from the Proposed Action. Two factors indirectly lead to changes in employment levels and income in other sectors throughout the ROI:

1. The changes in site purchase and non-payroll expenditures from the refurbishment and operation phases of the facility; and

2. The changes in payroll spending by new employees.

The total economic impact is the sum of the direct and indirect impacts. The direct impacts estimated in the socioeconomic analysis are based on project summary data developed by USEC in conjunction with their contractors and representatives. Total employment and earnings impacts were estimated using Regional Input-Output Modeling System multipliers developed specifically for the Portsmouth ROI, comprised of Jackson, Pike, Ross and Scioto Counties in Ohio, by the U.S. Bureau of Economic Analysis (BEA). These multipliers are developed from national input-output tables maintained by the BEA and adjusted to reflect regional trading patterns and industrial structure. The tables show the distribution of the inputs purchased and the outputs sold for each industry for every county in the United States. The multipliers for this analysis were developed from the input-output tables for the four counties comprising the ROI. The multipliers are applied to data on initial changes in employment levels and earnings associated with the proposed project to estimate the total (direct and indirect) impact of the project on regional earnings and employment levels. For this analysis, the term "direct jobs" refers to the employment created by the project and "direct income" refers to project workers' salaries. The term "indirect jobs" refers to the jobs created in other employment sectors as an indirect result of new employment at the construction site and "indirect income" refers to the income generated by the new indirect jobs.

The importance of the actions and their impacts is determined relative to the context of the affected environment, or project baseline, established in the following section. The baseline conditions provide the framework for analyzing the importance of potential economic impacts that could result from the project. Impacts would be determined to be significant if the change resulting from the action analyzed would exceed historical fluctuations in the regional economy.

4.11.1.1 No Action Alternative

Under the No Action Alternative, the Lead Cascade would not be deployed at PORTS. None of the socioeconomic benefits associated with the project, including employment, income, and tax revenues, would be generated and the local economy would receive no ancillary benefits from the project.

4.11.1.2 PGDP Siting Alternative

Under this alternative, the creation of both direct and indirect jobs would result from constructing and operating the Lead Cascade at PGDP. There would also be an increase in revenue to the local economy. Because all jobs created both directly and indirectly by the Lead Cascade are expected to be filled within the ROI, no impacts to population or housing are expected. Community services would also not experience any significant impacts, as no significant increase in population would be expected to occur as a result of this alternative.

4.11.1.3 Proposed Action

Refurbishment

The refurbishment of the Lead Cascade at PORTS would only require the refurbishment of existing structures. The staff required to install the project equipment would be minimal. Approximately 25 full time employees for 13 months would be needed to complete the refurbishment of facilities for the project. The refurbishment activities would occur between August 2004 and August 2005.

The average salary for a construction worker employed in Pike County, Ohio was $34,997 in 1999 (CBP 2002). Assuming an average cost of living adjustment of 3.0 percent per year, the average salary would be $40,571 in 2004 and $41,788 in 2005. At these salary levels, the construction of the Lead Cascade would generate $1,119,081 in direct income during the 13-month period. This would lead to the indirect creation of 17 jobs in other sectors throughout the ROI. The indirect income created by these jobs would be $526,080 over the 13-month period, assuming an average annual salary of $28,565. The total change in employment during construction would be 42 jobs and the total change in income would be $1,645,161. Since the state income tax rate for Ohio is $445.80 plus 4.5 percent of excess over $20,000 and $1,337.20 plus 5.2 percent of excess over $40,000 this extra income would generate an additional $53,383 in revenue for the state during the period of 2004 to 2005. Assuming that new employees would spend 75 percent of their remaining income, the state would also receive approximately an additional $59,692 in revenue from the sales tax, which is 5.0 percent. Pike County would also benefit from their county sales tax of 1.0 percent. Assuming that half of all transactions occur within Pike County, the county would receive approximately $5,969 in additional revenue.

Though it is difficult to analyze which sectors would benefit from the creation of the indirect jobs due to the small number, they would most likely be created in the following sectors: two in the services sector; two in the wholesale and retail trade sector; one in the manufacturing sector; and one in the government and government services sector. These jobs would be created within the four-county ROI. Other counties not considered a part of the ROI would also derive some economic benefit from the refurbishment of the facility; however, the amount would be relatively minor as the population of the ROI is sufficient to fill any jobs created during the refurbishment of facilities for the Lead Cascade.

Operation

The Lead Cascade is currently scheduled to transition from construction to operation in September 2005 and begin operation in October 2005 continuing through December 2007. The Lead Cascade requires 45 full-time employees during operation.

The Lead Cascade would be staffed as detailed in Table 4.11-1. The average salaries for each category and the 3.0 percent annual cost of living adjusted salaries for the years the facility operates are presented in Table 4.11-2. Table 4.11-3 shows the total income generated for each year of operation, broken down by the labor categories.

Table 4.11-1
Categorical Staffing Breakdown for Operation of Lead Cascade

	2005	2006	2007
Management	8	9	9
Engineers	6	4	2
Support	8	8	8
Hourly	23	24	26
Total	**45**	**45**	**45**

Source USEC 2002a.

Table 4.11-2
Average Salary by Staffing Category at PORTS

	1998	2005	2006	2007
Management	66,985	82,383	84,855	87,400
Engineers	51,773	63,675	65,585	67,552
Support	28,743	35,351	36,411	37,504
Hourly	36,148	44,458	45,791	47,165
Average	**45,912**	**56,467**	**58,161**	**59,906**

Note: 1998 values are estimated from data in USEC 1998 Other year values are calculated by a 3.0 percent increase per year.

Table 4.11-3
Total Salary by Staffing Category at PORTS

	2005	2006	2007
Management	164,766	763,695	786,600
Engineers	95,511	262,340	135,104
Support	70,701	291,288	300,032
Hourly	255,633	1,098,984	1,226,290
Total	**586,611**	**2,416,307**	**2,448,026**

Note: Year 2005 total only reflects the months the project would be in operation. The project would operate from October 2005 through December 2007.

At these salary levels, the operation of the Lead Cascade would generate $5,450,944 in direct income during the 27-month operational period. This would lead to the indirect creation of 22 jobs in other sectors throughout the ROI. The indirect income created by these jobs would be $1,865,858 over the 27-month period based on an average annual salary of $37,694. The total change in employment during operation would be 67 jobs and the total change in income would be $7,316,802. Since the state income tax rate for Ohio is $445.80 plus 4.5 percent of excess over $20,000 and $1,337.20 plus 5.2 percent of excess over $40,000 this extra income would generate an additional $295,582 in revenue for the state during the period of 2005 to 2007. Assuming that new employees would spend 75 percent of their remaining income, the state would also receive approximately an additional $263,296 in revenue from their sales tax, which is 5.0 percent. Pike County would also benefit from their county sales tax of 1.0 percent. Assuming that half of all transactions occur within Pike County, the county would receive approximately $26,330 in additional revenue from income created by the Lead Cascade.

Again, the small number of indirect jobs created makes a sectoral analysis difficult. The indirect jobs would most likely be created in the following sectors: six in the services sector; six in the wholesale and retail trade sector; four in the manufacturing sector; three in the government and government services sector; and the other five spread through the remaining sectors. These jobs would be created within the four-county ROI. Other counties not considered a part of the ROI would also derive some economic benefit from the operation of the project; however, the amount would be relatively minor as the population of the ROI is sufficient to fill any jobs created during operation of the Lead Cascade.

Since all jobs created both directly and indirectly by the Lead Cascade are expected to be filled within the ROI, no impacts to population or housing are expected. Community services would also not experience any significant impacts, as no significant increase in population would be expected to occur as a result of the project.

4.11.2 Environmental Justice

The NRC's NUREG-1748, *Environmental Review Guidance for Licensing Actions Associated with NMSS Programs,* Appendix B, states that "[I]f it is determined that a particular action will have no significant environmental impact, then there is no need to consider whether the action will have disproportionally high and adverse impacts on certain populations." As discussed in the various subsections of Chapter 4.0 of this ER, neither the No Action Alternative nor siting of the Lead Cascade at PORTS or PGDP generate significant environmental impacts. Therefore, further environmental justice analysis is not required.

4.11.2.1 No Action Alternative

Under the No Action Alternative, the Lead Cascade would not be deployed and operated at PORTS. None of the environmental impacts associated with the project, including socioeconomic benefits, would be generated and the affected environment would remain the same. Therefore, no environmental justice impacts would occur.

4.11.2.2 PGDP Siting Alternative

Under this alternative the Lead Cascade would be constructed and operated at PGDP and the environmental impacts would be as described in earlier sections. No significant environmental or human health impacts have been identified that would disproportionately affect certain population sectors. Therefore, no environmental justice impacts have been identified as a result of this alternative.

4.11.2.3 Proposed Action

Under the Proposed Action, the Lead Cascade would be refurbished and operated at PORTS and the environmental impacts would be as described in earlier sections. Minority populations as defined by the Council of Environmental Quality have been identified within the surrounding area, particularly African American, American Indian and individuals of two or more races within Census Tract 9522. A minority population of individuals of two or more races also exists within neighboring Census Tract 9523. All of these populations are meaningfully greater than the minority population percentage in the general population in the surrounding area. The percentage of low-income population within each of the three tracts is larger than surrounding geographical areas. However, no significant environmental or human health impacts have been identified that would disproportionately affect any minority or low-income segment of the population. Therefore, no environmental justice impacts have been identified as a result of the Proposed Action.

4.12 Public and Occupational Health Impacts

4.12.1 No Action Alternative

Under the No Action Alternative, the ongoing activities at the site would continue and the potential human health impacts would be approximately the same as those calculated for the year 2000 and presented in Section 3.10.

4.12.2 PGDP Siting Alternative

The potential human health impacts due to construction and operation of the Lead Cascade at PGDP were estimated based on radioactive and chemical gaseous emissions. The calculated MEI dose of 0.0066 mrem/yr is much lower than the EPA standard of 10 mrem/yr and the NRC TEDE limit of 100 mrem/yr. Air emissions of non-radiological constituents would not be significant.

OSHA recordable injury/illness rates would not be expected to be significantly impacted by construction and operation of the Lead Cascade.

4.12.3 Proposed Action

The potential human health impacts due to the proposed Lead Cascade at the PORTS facility were estimated based on radioactive and chemical gaseous emissions. The calculated MEI dose of 0.023 mrem/yr, is much lower than the EPA standard of 10 mrem/yr and the NRC TEDE limit of 100 mrem/yr.

Air emissions of non-radiological constituents were determined to be small since construction would occur within existing buildings, and operations are not expected to generate significant emissions.

USEC's OSHA recordable injury/illness rates are not expected to be significantly impacted by refurbishment or operation of the Lead Cascade. The number of employees involved contributes a relatively insignificant number of total hours worked per month to the overall calculation of the rate. Assuming no changes to present PORTS employment levels, the refurbishment activities with 25 employees would account for approximately 2 percent of the total hours worked. The Lead Cascade operation with 45 employees would account for approximately 4 percent of the total hours worked. An average of the recordable injury/illness rates for PORTS for the past three fiscal years is approximately 2.56. The high was 3.01, and the low was 2.27. Since the additional activities of refurbishment and operation of the Lead Cascade are not expected to significantly impact the rate, it is reasonable to expect the recordable injury/illness rate to continue to be in the same range.

Accident Analysis

The potential impacts of accidents from Lead Cascade operations are addressed in the Integrated Safety Analysis (ISA) (USEC 2002f). An ISA identifies potential accident sequences in the facility's operations, designates items relied on for safety (IROFS) to either prevent such accidents or mitigate their consequences to an acceptable level, and describes management measures to provide reasonable assurance of the availability and reliability of IROFS.

The most frequent potential occurrence for the accidents analyzed was an expected frequency of 10^{-2} to 1 per year for the lowest consequence events. The ISA analyses concluded that there would be no off-site radiological impact from any of the potential accidents. The analyses also determined that the off-site chemical impact of any of the potential accidents would be intermediate, which is defined as an acute exposure greater than the Emergency Response Planning Guideline (ERPG)-1 HF limits set in the ERPG, but less than ERPG-2 level. UF_6 would be expected to completely react before the site boundary would be reached, but there would be a potential for UO_2F_2 exposure leading to about an 8 mg uranium uptake. These events are in the unlikely or highly unlikely frequency range. The chemical impact from hypothesized accidents for the Lead Cascade operation was determined to be low because of the small amount of inventory used during Lead Cascade operation, the distance between any accident and the reservation boundary and the design features and management measures that will be in effect.

4.12.3.1 Non-Radiological Impacts

Direct exposure to chemicals from PORTS does not represent a likely pathway of exposure for the public. For airborne releases, concentrations off-site are too small to present problems through dermal exposure or inhalation pathways. Water discharge outfalls are located within areas of the site that are not readily accessible to the general public. Public exposure to water from the outfalls on a daily basis is highly unlikely, and ingestion of water directly from the outfalls is even less likely (DOE 2001c).

Non-radiological environmental monitoring at PORTS includes air, water, sediment and biota (fish and vegetation). Monitoring of non-radiological parameters is required by State and Federal regulations and/or permits, but is also completed to reduce public concerns about plant operations. In 2001, non-radiological environmental monitoring information was collected by both DOE and the Corporation (DOE 2002a).

The chemical airborne concentrations of total uranium and HF were calculated to be 3.6 x 10^{-4} $\mu g/m^3$ and 1.2 x 10^{-4} $\mu g/m^3$ respectively. The TLVs published by the ACGIH are 200 $\mu g/m^3$ for uranium and 2300 $\mu g/m^3$ for HF. OSHA has published a PEL for uranium of only 50 $\mu g/m^3$. The projected concentrations are a minimum of five orders of magnitude below these standards. Consequently, no adverse health effects are expected from the exposure of airborne chemical releases at these low concentrations.

4.12.3.2 Radiological Impacts

Radiological environmental monitoring at PORTS includes air, water, sediment and biota (animals, vegetation, and crops) as well as measurement of both radiological and chemical parameters. Environmental monitoring are required by State and Federal regulations and/or permits, but is also completed to reduce public concerns about plant operations. In 2001, non-radiological environmental monitoring information was collected by both DOE and the Corporation (DOE 2002a).

The potential human health impacts due to the proposed Lead Cascade at the PORTS facility were estimated based on routine radioactive and chemical gaseous emissions. The calculated MEI dose of 0.023 mrem/yr, is much lower than the EPA standard of 10 mrem/yr an the NRC TEDE limit of 100 mrem/yr.

4.12.4 Pathway Assessment

Airborne chemical and/or uranium released after potential accidents or operations may be deposited downwind onto soil and surface water or as an effluent into the environment. Human and ecological receptors would be exposed to the chemical toxicity of the uranium or chemical exposure and to the effects from contact, inhalation, and ingestion of contaminated soil, water, sediment, and food.

The Lead Cascade radioactive and chemical emissions are expected to be much less than the historical operating experience of the GDP and current Corporation/DOE operations.

The monitoring programs described in the DOE, *Portsmouth Annual Environmental Report for 2001* (DOE 2002a) and Chapter 9.0 of the License Application for the American Centrifuge Lead Cascade Facility detail the DOE/Corporation and USEC monitoring activities and locations for exit pathway, baseline, and compliance monitoring. Figures 4.12-1 through 4.12-4 (located in Appendix E of this ER) depict the locations of various sampling points.

4.12.5 Public and Occupational Exposure

Direct exposure to chemicals from the Lead Cascade does not represent a likely pathway of exposure for the public. For airborne releases, concentrations off-site are too small to present problems through dermal exposure or inhalation pathways. Water discharge outfalls are located within areas of the site that are not readily accessible to the general public. Public exposure to water from the outfalls on a daily basis is highly unlikely, and ingestion of water directly from the outfalls is even less likely (DOE 2001c).

Exposures to chemical agents are controlled by administrative and engineering methods and/or personal protective equipment. All exposure results are reported as an 8-hour TWA as listed in 29 CFR 1910.1000, Table Z-1.

Environmental monitoring is required by State and Federal regulations and/or permits, but is also completed to reduce public concerns about plant operations. In 2001, non-radiological environmental monitoring information was collected by both DOE and the Corporation (DOE 2002a).

For on-site accidents, accident analyses prepared as part of USEC's ISA concluded that there would be no off-site radiological impact from any of the postulated accidents.

This figure is withheld pursuant to 10 CFR 2.790 and is located in Appendix E of this ER

Figure 4.12-1 Locations of Routine Surface Water Sampling Points

This figure is withheld pursuant to 10 CFR 2.790 and is located in Appendix E of this ER

Figure 4.12-2 Locations of Soil and Vegetation Sampling Points

This figure is withheld pursuant to 10 CFR 2.790 and is located in Appendix E of this ER

Figure 4.12-3 Locations of Internal Soil Sampling Points

This figure is withheld pursuant to 10 CFR 2.790 and is located in Appendix E of this ER

Figure 4.12-4 Locations of Stream Sediment Sampling Points

4.13 Waste Management Impacts

4.13.1 No Action Alternative

Under the No Action Alternative, the Lead Cascade would not conduct or support further development of gas centrifuge technologies for uranium enrichment at PORTS. No activities would occur at the site; therefore, no impacts over current operations would result.

4.13.2 PGDP Siting Alternative

Wastes generated during the various phases of the project at PGDP would be handled in accordance with procedures that encompass NRC, State, and Federal requirements. The quantity of LLRW generated would be expected to be insignificant compared to the site's LLRW generation.

4.13.3 Proposed Action

The Proposed Action is the refurbishment of existing GCEP facilities and operation of the Lead Cascade and support operations.

The processes defined for each building in the scope including the anticipated work to be performed in each facility during the facility's refurbishment, assembly, and operation phases and the associated potential impact are detailed below.

4.13.3.1 Refurbishment Phase

Waste generated during the facility refurbishment phase will consist of sanitary/industrial waste. This will include normal building construction materials such as steel beams, plywood, concrete, etc.

Support equipment will undergo maintenance servicing and checkout. Examples of this activity are lubrication and oil changes in the cranes and pumps. Waste from these activities will be non-regulated lubricants and cleaning materials, and general maintenance debris, which will be sanitary/industrial waste. General sanitary/industrial waste from paper and packing products, wood, and general building trash will be generated.

Both incandescent and fluorescent light bulbs and lead acid and non-lead acid batteries will be generated throughout the project and will be handled in accordance with established recycling and disposal programs.

In addition, LLRW and or RCRA wastes could be generated during the refurbishment phase and would be handled according to procedures that encompass, NRC, State, and Federal requirements.

Buildings X-7725, X-7726, and X-3012

The current offices, change out, and training areas of Buildings X-7725, X-7726, and X-3012 are planned as offices, change out, and training areas for this project. Minimal changes will be necessary for these areas since they are already serving these purposes. Thus, only a small portion of the wastes generated during the refurbishment phase will be attributed to these facilities.

Process Facilities

Assembly, test, and operations activities will be conducted in Buildings X-7726, X-7727H, X-3001, and X-3012. The majority of the wastes generated during the refurbishment phase will be attributed to the X-3001 Building.

4.13.3.2 Assembly Phase

Building X-7725 will operate as an office building and a completed machine transport area. The X-3012 will operate as an office building, a control room and maintenance shop. Neither is expected to generate any office/sanitary waste in excess of its present level.

Process Facilities

The assembly phase will consist of assembly and testing of the completed machines in the X-7726 CTTF facility. The manufacture of the machines will occur at Oak Ridge, Tennessee, as was addressed in the DOE Environmental Assessment for the United States Enrichment Corporation Centrifuge Research and Development Project at the East Tennessee Technology Park (DOE 2002b).

Some of the smaller parts or sub-assemblies will undergo mechanical testing which will include, in some cases, planned failure test. A fully assembled machine may also fail during operational test. If the operational machine contains UF_6 gas, LLRW may be generated. The quantity of LLRW generated is expected to be insignificant compared to the site's LLRW generation.

Prior to final assembly or even for sub-assembly, final cleaning of all parts is performed. This will generate a small quantity of sanitary waste (e.g., dry wipes, rags, etc.) and listed RCRA wastes when a solvent is used for cleaning.

4.13.3.3 Operations Phase

Building X-3001

In Building X-3001 where the machines will be installed and operated, the machine operations area will require the use of heating and ventilation only. However, the Lead Cascade will use RCW in the process building where it will interface with a heat exchanger and a closed loop machine cooling water system. A non-halogenated refrigerant bath will be used in the sampling system. Although some make-up of refrigerant will be required, no routine liquid waste discharges are projected for the project.

There will be limited quantities of waste generated from miscellaneous activities during the project. An alcohol and dry ice bath will be used to solidify UF_6 during some sampling activities. The alcohol will be reused and replenished as required due to evaporation. The quantity of alcohol involved is approximately 1 Gal/month.

Alumina traps will be used on the pumping systems and trapping systems. The useful life of the alumina may be for the entire project but may have to be changed during the project. If the alumina has been exposed to process gas, it would be LLRW and non-radioactive waste if it has not been exposed to process gas.

Some excess reacted hard resin-hardener mixtures will result in a small quantity of sanitary solid waste.

X-710 Laboratory

Hydrochloric acid and other laboratory chemicals will be used as an acid digestion test and other tests in X-710 Laboratory. This is a small quantity use and will result in a RCRA characteristic waste. However, this is within the present scope of this facility and will not create a significant increase in laboratory waste.

General Wastes

No asbestos containing material is projected to be generated by this project. Additionally, no *Toxic Substances Control Act* (TSCA) PCB waste is projected for the project. If either of these materials is found, appropriate control, preventative and waste management measures will be implemented in accordance with established site procedures. There are no projected uses of reactive or explosive materials on the project.

A quantity of operational and maintenance chemicals, supplies, and materials required to maintain project continuity will be stored within the Lead Cascade facilities in appropriate storage containers, cabinets, or areas, (i.e., in flammable storage cabinets, carcinogen storage cabinets, etc). Appropriate chemical inventory list will be maintained and Material Safety Data Sheets will be available.

There will be a minimal impact to the potable water supply system and to the sanitary sewer system. During construction, there may be as many as 25 people creating a demand for drinking, potable, and shower water and a projected 36 people showering during operation with another 9 people who do not use the shower facilities. It is not expected that this would create a noticeable impact either on the water supply plant or STP, based on the existing available capacity.

The Corporation will perform the handling and storing of waste within the Lead Cascade Facilities. The Corporation will follow appropriate procedures that encompass, NRC, State and Federal requirements when performing these activities. Appropriate facility RCRA accumulation areas will be maintained. The Corporation will get all permits required for construction and operation of the Lead Cascade facilities. The Corporation will fully characterize waste per the requirements of the receiving Treatment, Storage, or Disposal (TSD) facility.

When handling and storing project waste, appropriate RCRA satellite accumulation areas and 90-day storage areas will be utilized. Waste may also be transferred to the appropriate permitted TSD facility. The Lead Cascade will be designed to operate in compliance with all applicable waste management laws and regulations. LLRW will be stored/disposed in a manner consistent with NRC regulatory requirements. USEC will manage hazardous waste Low-Level Mixed Waste (LLMW) in compliance with 40 CFR Part 266 Subpart N, subject to, the Ohio rule making process of adopting consistent and equivalent rules into the Ohio Administrative Code Chapter 3745-266. The LLMW regulations are expected to be effective in Ohio during the Fall of 2003. Sanitary and industrial waste will be transferred or transported to the USEC approved sanitary/industrial landfill. Classified wastes will be stored in accordance with the appropriate security and regulatory requirements and will be disposed at an appropriate site in accordance with regulatory requirements.

The amount of UF_6 in the facility at any given time is limited to 250 kg (551 lbs). There will be no enrichment performed in the facility that will exceed 10 percent ^{235}U assay.

There will be only consumer-use type pesticide/herbicide used for localized insect control (Winebarger 2000a).

Table 4.13–1 shows waste projections for the Lead Cascade with information available at this time.

Table 4.13-1
Projections of Waste Quantities for Major Waste Types

Material/Activity	Type of Waste Generated	Activity Phase	Projected Annual Rate
Paper, construction debris, wood, concrete	Sanitary/industrial	Modification	100-150 yd^3
Paper, office waste, bathroom supplies	Sanitary/industrial	Modification	50-100 yd^3
Lubricants, maintenance debris	Non-regulated	Modification and operations phases	400-450 ft^3
Light bulbs and batteries	RCRA recycle	Modification and operations phases	100-150 ft^3
Paper, office waste, bathroom supplies	Sanitary/industrial	Operational	100-150 yd^3
Refrigerant from withdrawal system	LLRW	Operational	800-1,200 Gal
Classified Waste	Non-regulated	Operational	2,000-3,000 ft^3
Classified Waste	LLRW	Operational	2,000-3,000 ft^3
General maintenance and facility materials	Mixed RCRA/LLRW	Operational	200-400 ft^3
General maintenance and facility materials	RCRA	Operational	600-1,000 ft^3
General maintenance and facility materials	LLRW	Operational	600-1,000 ft^3
General maintenance and facility materials	Non-regulated	Operational	1,000-1,800 ft^3
PCB waste	TSCA		None projected
Asbestos waste	TSCA		None projected

Source. Winebarger 2000a
Note: Scaled by 20 since there are 20X machines

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5.0 MITIGATION MEASURES

Under the Proposed Action activities will occur within existing facilities. As discussed in Chapter 4.0, the Proposed Action would not cause an appreciable increase or damage to any of the environmental resources. Mitigation measures, other than those identified in the ISA and ISA Summary, are not necessary. The ISA identifies potential accident sequences in the facility's operations, designates IROFS to either prevent such accidents or mitigate their consequences to an acceptable level, and describes management measures to provide reasonable assurance of the availability and reliability of IROFS. Management measures are utilized to maintain the IROFS so that they are available and reliable. Management measures are the principal mechanism by which the reliability and availability of each IROFS is ensured. They are described in Chapter 11.0 of the License Application for the American Centrifuge Lead Cascade Facility.

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6.0 ENVIRONMENTAL MEASUREMENT AND MONITORING PROGRAMS

The Lead Cascade is located within an existing nuclear facility with an established Environmental Monitoring Program in place. The Lead Cascade uses only chemicals and radionuclides already in use at PORTS and has no direct discharges to unrestricted areas except for its process vents. The Lead Cascade Environmental Monitoring Program is based on the PORTS Program. Lead Cascade monitoring is conducted consistent with the scope of the existing PORTS Program. Details on the Environmental Measurements and Monitoring Programs are found in Section 9.2 of the License Application for the American Centrifuge Lead Cascade Facility.

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7.0 COST BENEFIT ANALYSIS

In this ER, USEC has evaluated the environmental and other impacts and costs associated with the Preferred Alternative of siting the Lead Cascade at PORTS, as well as the impacts and costs associated with the No Action Alternative and the Reasonable Alternative of siting the Lead Cascade at PGDP. This Chapter provides a costs and benefits analysis for the Proposed Action of siting the Lead Cascade at PORTS site in the existing Gas Centrifuge Enrichment Plant (GCEP) complex in Piketon, Ohio, the No Action Alternative, and PGDP Siting Alternative. The analysis includes both qualitative and quantitative discussions of costs and environmental impact. As discussed below, the decision to locate the Lead Cascade at PORTS is justified on environmental, cost, and schedule grounds, and there is no obviously superior alternative.

7.1 Qualitative Analysis of Alternatives

7.1.1 Construct and Operate a Lead Cascade Test Facility at PGDP

As discussed throughout Chapter 4.0, both the Preferred Alternative and the alternative of siting the Lead Cascade at PGDP are acceptable alternatives on environmental grounds. Neither alternative would result in any significant adverse environmental impacts. However, siting of the facility at PGDP would entail somewhat larger impacts associated with the need to construct a new 3,900 m^2 (42,000 ft^2) building that is not required at PORTS.

As with PORTS, the PGDP alternative meets the need and provides the following benefits: (1) readily accessible environmental data; (2) relevant and existing regulatory programs related to uranium enrichment that have been reviewed and approved by the NRC; and (3) the availability of skilled labor with uranium enrichment industry experience.

On June 28, 2002, USEC issued Requests For Proposals to the states of Kentucky and Ohio to site the Lead Cascade in PGDP and PORTS, respectively. Both states were offered an opportunity to provide financial or other incentives to reduce the cost of the Lead Cascade Project. USEC performed a detailed qualitative and quantitative evaluation of siting the Lead Cascade at PGDP versus PORTS after the state proposals were received. As stated in the Section 2.2.1 of this ER, the evaluation included the following:

- Cost to construct and operate the Lead Cascade
- Schedule to deploy the Lead Cascade
- Community support and socioeconomic factors
- Environmental, safety, and health factors
- Factors that will facilitate future deployment of the Commercial Plant
- Factors that will lower the costs of USEC's current operations

Based on USEC's evaluation of state proposals, PORTS is the Preferred Alternative on the basis of comparative economic costs and schedule. PGDP has a higher schedule risk; making the achievement of DOE-USEC Agreement milestones more difficult. Some additional schedule risk is also created by the seismic considerations associated with the PGDP site. A summary of the detailed analysis of PGDP versus PORTS is provided in Section 7.2.

7.1.2 No Action Alternative

The No Action alternative involves not deploying a Lead Cascade. As discussed throughout Chapter 4.0, the No Action Alternative would result in no additional or incremental adverse environmental or other impacts at the PORTS site. It would obviate, however, the modest socioeconomic benefits (additional jobs) created by refurbishment and operating activities at the Lead Cascade. The No Action Alternative, however, fails to meet the informational needs (as discussed in Section 1.3) for a facility to test the reliability, performance and economics of a gas centrifuge enrichment plant before proceeding to deploy a full-scale Commercial Plant. As a result, the No Action Alternative is clearly not the Preferred Alternative.

7.2 Detailed Analysis of PGDP versus PORTS

7.2.1 Cost to Construct and Operate the Lead Cascade

The total capital, operating and maintenance costs of siting the Lead Cascade at PGDP are higher than those for PORTS. As detailed in Appendix D, the additional costs associated with constructing an entirely new facility to house the Lead Cascade at PGDP are substantial, particularly when compared to the overall Lead Cascade Project costs. USEC has compared the project costs (net of financial incentives offered by both Ohio and Kentucky) and has concluded that siting the Lead Cascade at PORTS will cost less than siting the Lead Cascade at PGDP. The costs to construct and operate the Lead Casade at either site contain privileged or confidential commercial or financial information. Therefore, the information is being submitted to the NRC under separate cover in accordance with the requirements of 10 CFR 2.790 and has been designated Appendix D to the ER.

7.2.2 Schedule to Deploy Lead Cascade

Siting the Lead Cascade at PGDP would require the construction of a new building and some associated infrastructure. Work necessary to have facilities ready to receive centrifuge machines when manufactured (June 2005 in the DOE-USEC Agreement) would be considerably more than the work needed at PORTS by this date, making the PGDP schedule higher in risk. In addition, PGDP is located in close proximity to the New Madrid fault. While the Lead Cascade could be safely deployed at PGDP, the need to design a facility for the greater seismic activity introduces a factor that could impact the schedule. The combination of the requisite construction activity and the seismic activity add schedule risk to the Lead Cascade deployment.

7.2.3 Community Support and Socioeconomic Factors

Federal and State political leadership and local residents of both Ohio and Kentucky have expressed strong support for the Lead Cascade. Both States have benefited from the gaseous diffusion plant operations and both are interested in continuing to meet the Nation's energy needs, utilizing advanced enrichment technology. Siting the Lead Cascade at either site would produce increased employment opportunities for personnel living in these regions. Construction staffing would be greater at PGDP, while staffing for operations at either location would be essentially equivalent. At either location there would be relatively modest increases in employment and correspondingly modest potential impacts on local property values, and community and emergency services such as schools and police.

7.3 Conclusion

In conclusion, USEC has evaluated the No Action Alternative, and has performed a qualitative and quantitative cost benefit analysis of the reasonable alternative of siting the Lead Cascade at PGDP. Based on this evaluation, USEC concludes that the no action alternative fails to meet the need and the environmental impacts, costs, and schedule risks are lower at PORTS than at PGDP. USEC has concluded that there is no obviously superior alternative to PORTS, and that the cost-benefit balance weighs in favor of siting the Lead Cascade at PORTS as the Preferred Alternative.

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8.0 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

8.1 Unavoidable Adverse Environmental Impacts

Radiation and chemical releases from operations, in general, may cause adverse impacts. However, the releases and corresponding exposures from the Lead Cascade would be well below regulatory limits and proportionally very small. In addition, USEC would use safety procedures, spill prevention plans, and spill response plans in accordance with State and Federal laws to avoid and investigate accidental spills or leaks.

The potential for injuries and fatalities of workers exists during project construction and operation. Engineered controls, precautions, training, safety programs, and management measures will reduce the potential for worker injuries or fatalities.

8.2 Irreversible, Irretrievable, and Unavoidable Adverse Impacts

Impacts to utility usage for the Lead Cascade were analyzed for electricity, water, and sewer. Based on existing excess capacities and the small increase in utilization, the impact to the utility usage is negligible.

The proposed site of the Lead Cascade is within the existing industrialized PORTS site boundary, which has been previously disturbed. The area of the Proposed Action is either inside existing concrete floor buildings or paved, consequently, there is no vegetation within the immediate project area. Therefore, the use of this proposed site would not result in a change to existing land use patterns and plans or destruction of wildlife habitat.

8.3 Short-Term and Long-Term Impacts and Relationship Between Short-Term Use of the Environment and the Maintenance and Enhancement of Long-Term Productivity

The proposed facility would be consistent with local, State, and Federal plans and permits. These plans are based on planning efforts that recognize the need for orderly growth and the demands for new technology to produce LEU within the context of past, present, and future development. The short-term impacts and use of resources for the proposed facility also would be consistent with the maintenance and enhancement of long-term productivity for the State of Ohio.

8.3.1 No Action Alternative

Under the No Action Alternative, there would be no short-term uses of resources. The demonstration of acceptable reliability, performance, and economy of the gas centrifuge machines would not occur; therefore, and there would be no effect on long-term productivity.

8.3.2 PGDP Siting Alternative

Under the PGDP Siting Alternative Action, short-term uses of resources would be greater than for the No Action Alternative. Any short-term commitments of resources associated with air emissions and utility usage would be in exchange for the demonstration of acceptable reliability, performance, and economy of the gas centrifuge machines. Though not significant, the environmental impact of this alternative would be greater than the Proposed Action due to the impacts of constructing a new 3,900 m^2 (42,000 ft^2) building and associated infrastructure.

8.3.3 Proposed Action

Under the Proposed Action, short-term uses of resources would be greater than for the No Action Alternative. Any short-term commitments of resources associated with air emissions and utility usage would be in exchange for the demonstration of acceptable reliability, performance, and economy of the gas centrifuge machines.

The refurbishment and operation of the proposed Lead Cascade at PORTS would have an impact on the environment for at least as long as the facility is in operation. While the land has already been developed for the GCEP buildings, the land taken for the project would not be available for other projects and purposes during the period that the land is used for the Lead Cascade.

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11.0 GLOSSARY

Air pollutant: Any substance in air which could, if in high enough concentration, harm man, other animals, vegetation, or material. Pollutants may include almost any natural or artificial composition of matter capable of being airborne.

Air quality standards: The level of pollutants in the air prescribed by regulations that may not be exceeded during a specified time in a defined area.

Ambient air: The surrounding atmosphere as it exists around people, plants, and structures. Air quality standards are used to provide a measure of the health-related and visual characteristics of the air.

Aquifer: A saturated geologic unit through which significant quantities of water can migrate under natural hydraulic gradients.

Baseline: A quantitative expression of conditions, costs, schedule, or technical progress to serve as a base or standard for measurement during the performance of an effort; the established plan against which the status of resources and the progress of a project can be measured.

CAP88: As used in this report, EDE refers to the EDE calculated by the EPA's CAP88 model, which does not include radiation from sources other than airborne radioactive materials.

Committed Effective Dose Equivalent (CEDE): The CEDE of radiation for a population.

***Clean Air Act*:** This Act mandates and enforces air pollutant emissions standards for stationary sources and motor vehicles.

***Code of Federal Regulations* (CFR):** All Federal regulations in force are published in codified form in the *Code of Federal Regulations.*

Criteria pollutants: Six air pollutants for which national ambient air quality standards are established by the Environmental Protection Agency under Title I of the Federal *Clean Air Act*: sulfur dioxide, nitrogen oxides, carbon monoxide, ozone, particulate matter (smaller than 10 microns in diameter), and lead.

Cultural resources: Archaeological sites, architectural features, traditional use areas, and Native American sacred sites or special use areas.

Cumulative impacts: The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal), private industry, or individuals undertake such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

Depleted uranium: Uranium whose content of the isotope ^{235}U is less than 0.7 percent, which is the ^{235}U content of naturally occurring uranium.

Direct economic effects: The initial increases in output from different sectors of the economy resulting from some new activity within a predefined geographic region.

Direct jobs: The number of workers required at a site to implement an alternative.

Dose: The energy imparted to matter by ionizing radiation. The unit of absorbed dose is the rad.

Dose commitment: The dose an organ or tissue would receive during a specified period of time (e.g., 50 to 100 years) as a result of intake (as by ingestion or inhalation) of one or more radionuclides from a defined release, frequently over a year's time.

Dose equivalent: The product of absorbed dose in rad (or gray) and the effect of this type of radiation in tissue, and a quality factor. Dose equivalent is expressed in units of rem or Sievert, where 1 rem equals 0.01 Sievert. The dose equivalent to an organ, tissue, or the whole body will be that received from the direct exposure plus the 50-yr committed dose equivalent received from the radionuclides taken into the body during the year.

Effective dose equivalent (EDE): The summation of the products of the dose equivalent received by specified tissues of the body and a tissue-specific weighting factor. This sum is a risk-equivalent value and can be used to estimate the health effects risk of the exposed individual. The tissue-specific weighting factor represents the fraction of the total health risk resulting from uniform whole-body irradiation that would be contributed by that particular tissue. The EDE includes the CEDE from internal deposition of radionuclides, and the effective dose equivalent due to penetrating radiation from sources external to the body. EDE is expressed in units of rem (or Sievert). As used in this report, EDE refers to the EDE calculated by EPA's

CAP88 model, which does not include radiation from sources other than airborne radioactive materials.

Effluent: A gas or liquid discharged into the environment.

Emission standards: Legally enforceable limits on the quantities and/or kinds of air contaminants that can be emitted into the atmosphere.

Endangered species: Defined in the *Endangered Species Act* of 1973 as "any species which is in danger of extinction throughout all or a significant portion of its range."

***Endangered Species Act* of 1973:** This act requires Federal agencies, with the consultation and assistance of the Secretaries of the Interior and Commerce, to ensure that their actions will not likely jeopardize the continued existence of any endangered or threatened species or adversely affect the habitat of such species.

Environmental justice: The fair treatment of people of all races, cultures, incomes, and educational levels with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment implies that no population of people should be forced to shoulder a disproportionate share of the negative environmental impacts of pollution or environmental hazards due to a lack of political or economic strength.

Exposure limit: The level of exposure to a hazardous chemical (set by law or a standard) at which or below which adverse human health effects are not expected to occur:

Reference dose is the chronic exposure dose (mg or kg per day) for a given hazardous chemical at which or below which adverse human non-cancer health effects are not expected to occur.

Reference concentration is the chronic exposure concentration (mg/m^3) for a given hazardous chemical at which or below which adverse human non-cancer health effects are not expected to occur.

Fault: A fracture or a zone of fractures within a rock formation along which vertical, horizontal, or transverse slippage has occurred. A normal fault occurs when the hanging wall has been depressed in relation to the footwall. A reverse fault occurs when the hanging wall has been raised in relation to the footwall.

Floodplain: The lowlands adjoining inland and coastal waters and relatively flat areas including at a minimum that area inundated by a 1-percent or greater chance flood in any given year. The base floodplain is defined as the 100-yr (1.0 percent) floodplain. The critical action floodplain is defined as the 500-yr (0.2 percent) floodplain.

Formation: In geology, the primary unit of formal stratigraphic mapping or description. Most formations possess certain distinctive features.

Gaussian plume: The distribution of material (a plume) in the atmosphere resulting from the release of pollutants from a stack or other source. The distribution of concentrations about the centerline of the plume, which is assumed to decrease as a function of its distance from the source and centerline (Gaussian distribution), depends on the mean wind speed and atmospheric stability.

Glovebox: An airtight box used to work with hazardous material, vented to a closed filtering system, having gloves attached inside of the box to protect the worker.

Hazardous chemical: Under 29 CFR Part 1910, Subpart Z, "hazardous chemicals" are defined as "any chemical which is a physical hazard or a health hazard." Physical hazards include combustible liquids, compressed gases, explosives, flammables, organic peroxides, oxidizers, pyrophorics, and reactives. A health hazard is any chemical for which there is good evidence that acute or chronic health effects occur in exposed employees. Hazardous chemicals include carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, agents that act on the hematopoietic system, and agents that damage the lungs, skin, eyes or mucous membranes.

Hazardous material: A material, including a hazardous substance, as defined by 49 CFR 171.8 which poses a risk to health, safety, and property when transported or handled.

Hazardous/toxic waste: Any solid waste (can also be semisolid or liquid, or contain gaseous material) having the characteristics of ignitability, corrosivity, toxicity, or reactivity, defined by the *Resource Conservation and Recovery Act* and identified or listed in 40 CFR Part 261 or by the *Toxic Substances Control Act.*

Highly enriched uranium (HEU): Uranium in which the abundance of the isotope ^{235}U is increased well above normal (naturally occurring) levels.

Indirect jobs: Within a regional economic area, jobs generated or lost in related industries as a result of a change in direct employment.

Integrated Safety Analysis (ISA): Identifies potential accident sequences in a facility's operations, designates items relied on for safety to either prevent such accidents or mitigate their consequences to an acceptable level, and describes management measures to provide reasonable assurance of the availability and reliability of items relied on for safety.

Isotope: An atom of a chemical element with a specific atomic number and atomic mass. Isotopes of the same element have the same number of protons but different numbers of neutrons and different atomic masses.

Laser: A device that produces a beam of monochromatic (single-color) "light" in which the waves of light are all in phase. This condition creates a beam that has relatively little scattering and has a high concentration of energy per unit area.

Low-level radioactive waste (LLRW): Waste that contains radioactivity but is not classified as high-level waste, transuranic waste, spent nuclear fuel, or "11e(2) by-product material" as defined by DOE Order 5820.2A, *Radioactive Waste Management*. Test specimens of fissionable material irradiated for research and development only, and not for the production of power or plutonium, may be classified as low-level waste, provided the concentration of transuranic waste is less than 100 nanocuries per gram. Some low-level waste is considered classified because (1) the nature of the generating process and/or constituents, and (2) the waste would reveal too much about the generating process.

Manufacturing: As used in this document, the production of centrifuge components.

Maximally exposed individual (MEI): A hypothetical person who could potentially receive the maximum dose of radiation or hazardous chemicals.

Migration: The natural movement of a material through the air, soil, or groundwater; also, seasonal movement of animals from one area to another.

Millirem (mrem): Measurement of the amount of radiation a person receives.

Mixed waste: Waste that contains both "hazardous waste" and "radioactive waste" as defined in this glossary.

National Ambient Air Quality Standards (NAAQS): Air quality standards established by the *Clean Air Act,* as amended. The primary NAAQS are intended to protect the public health with an adequate margin of safety, and the secondary NAAQS are intended to protect the public welfare from any known or anticipated adverse effects of a pollutant.

National Emission Standards for Hazardous Air Pollutants (NESHAP): A set of NESHAP emitted from specific classes or categories of new and existing sources. These were implemented in the *Clean Air Act* Amendments of 1977.

***National Environmental Policy Act* of 1969 (NEPA):** This Act is the basic national charter for the protection of the environment. It requires the preparation of an environmental impact statement for every major Federal action that may significantly affect the quality of the human or natural environment. Its main purpose is to provide environmental information to decision makers and the public so that actions are based on an understanding of the potential environmental consequences of a proposed action and its reasonable alternatives.

***National Historic Preservation Act* of 1966, as amended (NHPA):** This Act provides that property resources with significant national historic value be placed on the National Register of Historic Places. It does not require any permits but, pursuant to Federal code, if a proposed action might impact an historic property resource, it mandates consultation with the proper agencies.

National Pollutant Discharge Elimination System (NPDES): Federal permitting system required for hazardous effluents regulated through the *Clean Water Act,* as amended.

National Register of Historic Places (NRHP): A list maintained by the Secretary of the Interior of districts, sites, buildings, structures, and objects of prehistoric or historic local, state, or national significance. The list is expanded as authorized by Section 2(b) of the *Historic Sites Act* of 1935 (16 U.S.C. 462) and Section 101(a)(1)(A) of the NHPA of 1966, as amended.

Nitrogen oxides (NOX): Refers to the oxides of nitrogen, primarily NO (nitrogen oxide) and NO_2 (nitrogen dioxide). These are produced in the combustion of fossil fuels and can constitute an air pollution problem. When nitrogen dioxide combines with volatile organic compounds, such as ammonia or carbon monoxide, ozone is produced.

Nonattainment area: An air quality control region (or portion thereof) in which the Environmental Protection Agency has determined that ambient air concentrations exceed NAAQS for one or more criteria pollutants.

Off-site: As used in this ER, the term denotes a location, facility, or activity occurring outside the boundary of the entire PORTS site.

On-site: As used in this ER, the term denotes a location or activity occurring somewhere within the boundary of PORTS.

On-site population: USEC, Department of Energy, and contractor employees who are on duty, and badged on-site visitors.

Ozone: The triatomic form of oxygen; in the stratosphere, ozone protects the Earth from the sun's ultraviolet rays, but in lower levels of the atmosphere ozone is considered an air pollutant.

Plume: The elongated pattern of contaminated air or water originating at a point source, such as a smokestack or a hazardous waste disposal site.

Prehistoric: Predating written history, in North America, also predating contact with Europeans.

Prevention of Significant Deterioration: Regulations established by the 1977 *Clean Air Act* Amendments to limit increases in criteria air pollutant concentrations above baseline.

Prime farmland: Land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor without intolerable soil erosion, as determined by the Secretary of Agriculture (*Farmland Protection Policy Act* of 1981, 7 CFR Part 7, paragraph 658).

Radiation: The particles or electromagnetic energy emitted from the nuclei of radioactive atoms. Some elements are naturally radioactive; others are induced to become radioactive by bombardment in a reactor. Naturally occurring radiation is indistinguishable from induced radiation.

Radioactive waste: Materials from nuclear operations that are radioactive or are contaminated with radioactive materials, and for which use, reuse, or recovery are impractical.

Radioactivity: The spontaneous decay or disintegration of unstable atomic nuclei, accompanied by the emission of radiation.

Radionuclide: A radioactive element characterized according to its atomic mass and atomic number which can be man-made or naturally occurring. Radionuclides can have a long life as soil or water pollutants, and are believed to have potentially mutagenic or carcinogenic effects on the human body.

Recharge: Replenishment of water to an aquifer.

Regional economic area: A geographic area consisting of an economic node and the surrounding counties that are economically related and include the places of work and residences of the labor force. Each regional economic area is defined by the U.S. Bureau of Economic Analysis.

Region of influence (ROI): A site-specific geographic area that includes the counties where approximately 90 percent of the current PORTS workforce resides.

Remediation: The process, or a phase in the process, of rendering radioactive, hazardous, or mixed waste environmentally safe, whether through processing, entombment, or other methods.

Resource Conservation and Recovery Act **(RCRA), as amended:** This Act provides "cradle to grave" regulatory program for hazardous waste which established, among other things, a system for managing hazardous waste from its generation until its ultimate disposal.

Risk: A quantitative or qualitative expression of possible loss that considers both the probability that a hazard will cause harm and the consequences of that event.

Risk assessment (chemical or radiological): The qualitative and quantitative evaluation performed in an effort to define the risk posed to human health and/or the environment by the presence or potential presence and/or use of specific chemical or radiological materials.

Roentgen: A unit of exposure to ionizing X- or gamma radiation equal to or producing 1 electrostatic unit of charge per cubic centimeter of air. It is approximately equal to 1 rad.

Roentgen equivalent man (REM): The unit of radiation dose for biological absorption equal to the product of the absorbed dose, in rads, a quality factor which accounts for the variation in biological effectiveness of different types of radiation. Also known as "rem."

Runoff: The portion of rainfall, melted snow, or irrigation water that flows across the ground surface and eventually enters streams.

Sanitary wastes: Wastes generated by normal housekeeping activities, liquid or solid (includes sludge), which are not hazardous or radioactive.

Scope: In a document prepared pursuant to the NEPA of 1969, the range of actions, alternatives, and impacts to be considered.

Scoping: Involves the solicitation of comments from interested persons, groups, and agencies at public meetings, public workshops, in writing, electronically, or via fax to assist Department of Energy in defining the proposed action, identifying alternatives, and developing preliminary issues to be addressed in an EIS.

Seismic: Pertaining to any earth vibration, especially an earthquake.

Seismicity: The tendency for the occurrence of earthquakes.

Silt: A sedimentary material consisting of fine mineral particles intermediate in size between sand and clay.

Siltstone: A sedimentary rock composed of fine textured minerals.

Source term: The estimated quantities of radionuclides or chemical pollutants released to the environment.

Specific activity: The specific activities used in conversion are:

^{234}U - 6.30 x 10^{-3} Ci/g

^{235}U - 2.18 x 10^{-6} Ci/g

^{238}U - 3.39 x 10^{-7} Ci/g

Surface water: Water on the Earth's surface, as distinguished from water in the ground (groundwater).

Threatened species: Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Total Effective Dose Equivalent (TEDE): The sum of the dose due to external radiation and the CEDE.

***Toxic Substances Control Act* of 1976 (TSCA):** This act authorizes the Environmental Protection Agency to secure information on all new and existing chemical substances and to control any of these substances determined to cause an unreasonable risk to public health or the environment. This law requires that the health and environmental effects of all new chemicals be reviewed by the Environmental Protection Agency before they are manufactured for commercial purposes.

Uranium: A naturally occurring heavy, silvery-white metallic element (atomic number 92) with many radioactive isotopes. ^{235}U is most commonly used as a fuel for nuclear fission. Another isotope, uranium-238, can be transformed into fissionable plutonium-239 following its capture of a neutron in a nuclear reactor.

Wetland: Land or areas exhibiting hydric soil conditions, saturated or inundated soil during some portion of the year, and plant species tolerant of such conditions.

Appendix A
Acronyms and Abbreviations, Chemicals and Units of Measure, Conversion Chart, Metric Prefixes

ACRONYMS AND ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
amsl	above mean sea level
AAQS	Ambient Air Quality Standards
ALARA	as low as reasonably achievable
AST	above ground storage tank
AVLIS	Atomic Vapor Laser Isotopic Separation
bgs	below ground surface
BEA	U.S. Bureau of Economic Analysis
BLS	Bureau of Labor Statistics
CAA	*Clean Air Act* of 1970
CCZ	Contamination Control Zone
CEDE	Committed Effective Dose Equivalent
CFR	Code of Federal Regulations
CRADA	Cooperative Research and Develop Agreement
CTTF	Centrifuge Test and Training Facility
DAW	dry active waste
DOA	U.S. Department of Agriculture
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
ER	environmental report
EDE	effective dose equivalent
EOC	Emergency Operations Center
EPA	U.S. Environmental Protection Agency
ERPG	Emergency Response Planning Guide
ETTP	East Tennessee Technology Park
FPPA	*Farmland Protection Policy Act* of 1981
GCEP	Gas Centrifuge Enrichment Plant
GDP	gaseous diffusion plant
gvw	gross vehicle weight
HEU	highly enriched uranium
IROFS	items relied on for safety
ISA	Integrated Safety Analysis
LEU	low enriched uranium
LLMW	Low-Level Mixed Waste
LLRW	low-level radioactive waste
MEI	maximally exposed individual
NAAQS	National Ambient Air Quality Standards
NAC	Noise Ambient Criteria
NEPA	*National Environmental Protection Act*
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NHPA	*National Historic Preservation Act*
NIOSH	National Institute for Occupational Health and Safety
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission

NRCE	National Register Criteria for Evaluation
NRCS	Natural Resources Conservation Service
NRERP	National Resources and Environmental Research Program
NRHP	National Register of Historic Places
OCA	Ohio Administrative Code
ODH	Ohio Department of Health
ODNR	Ohio Department of Natural Resources
ODOT	Ohio Department of Transportation
OEPA	Ohio Environmental Protection Agency
OSHA	Occupational Safety and Health Administration
OVEC	Ohio Valley Electric Corporation
PCB	polychlorinated biphenyl
PEL	Permissible Exposure Limit
PGDP	Paducah Gaseous Diffusion Plant
PORTS	Portsmouth Gaseous Diffusion Plant
PSD	prevention of significant deterioration
RCRA	*Resource Conservation and Recovery Act* of 1976
RCW	recirculating cooling water
RIIs	Recordable Injury/Illness rates
REL	Recommended Exposure Limit
ROI	region of influence
SAR	Safety Analysis Report
SHPO	State Historic Preservation Office
SIC	standard industrial classification
SILEX	Separation of Isotopes by Laser Excitation
SR	State Route
STP	Sewage Treatment Plant
TEDE	Total Effective Dose Equivalent
TLV	Threshold Limiting Value
TSCA	*Toxic Substances Control Act* of 1976
TSD	Treatment, Storage, or Disposal
TWA	Time Weighted Average
USEC	USEC Inc.
USFWS	U.S. Fish and Wildlife Service
UST.	under ground storage tank
UTM	Universal Transverse Mercator
VRM	Visual Resources Management

CHEMICALS AND UNITS OF MEASURE

C	Celsius
Ci	curie
cc	cubic centimeters
cfs	cubic feet per second
cm	centimeters
CO	carbon monoxide
dBA	decibel A-weighted
F	Fahrenheit
ft	feet
ft^2	square feet
ft^3	cubic feet
ft^3/h	cubic feet per hour
g	grams
Gal	gallons
Gal/yr	gallons per year
GPD	gallons per day
ha	hectares
HF	hydrogen fluoride
h	hour
in.	inches
kg	kilogram
kg/h	kilogram per hour
km	kilometers
km^2	square kilometers
km/h	kilometers per hour
kV	kilovolts
kW	kilowatts
L	liters
lbs	pounds
lbs/h	pounds per hour
L/d	liters per day
L/h	liters per hour
m	meters
m^2	square meters
m^3	cubic meters
m^3/h	cubic meters per hour
m/s	meters per second
mCi	millicuries (one-thousandth of a curie)
mg	milligram (one-thousandth of a gram)
MGD	million gallons per day
mg/m^3	milligrams per cubic meter
mi	miles
mi^2	square miles
mi^3/d	cubic miles per day

mmbtu	million british thermal unit
mph	miles per hour
mrem	millirem (one-thousandth of a rem)
MW	megawatt
NO_2	nitrogen dioxide
NOX	nitrogen oxides
O_3	ozone
^{234m}Pa	protactinium-234
PCB	polychlorinated biphenyl
pCi/m^3	picocurie (one-trillionth of a curie)/cubic meter
PM_{10}	particulate matter (less than 10 microns in diameter)
ppm	parts per million
rem	roentgen equivalent man
RM	river mile
SO_2	sulfur dioxide
SWU	separative work units
TCE	trichloroethylene
^{235}U	uranium-235
^{236}U	uranium-236
^{238}U	uranium-238
UF_6	uranium hexafluoride
UF_4	uranium tetrafluoride
UO_2F_2	uranyl fluoride
^{231}Th	uranium-Y
^{234}Th	uranium-XY
yr	year
μCi	microcurie (one-millionth of a curie)
μCi/g	microcuries per gram
μg	microgram (one-millionth of a gram)
μg/kg	micrograms per kilogram
μg/L	micrograms per liter
$\mu g/m^3$	micrograms per cubic meter
μ	micron or micrometer (one-millionth of a meter)
wt.	weight

CONVERSION CHART					
To Convert Into Metric			**To Convert Into English**		
If You Know	**Multiply By**	**To Get**	**If You Know**	**Multiply By**	**To Get**
Length					
inch	2.54	centimeter	centimeter	0.3937	inch
feet	30.48	centimeter	centimeter	0.0328	feet
feet	0.3048	meter	meter	3.281	feet
yard	0.9144	meter	meter	1.0936	yard
mile	1.60934	kilometer	kilometer	0.62414	mile (Statute)
Area					
square inch	6.4516	square centimeter	square centimeter	0.155	square inch
square feet	0.092903	square meter	square meter	10.7639	square feet
square yard	0.8361	square meter	square meter	1.196	square yard
acre	0.40469	hectare	hectare	2.471	acre
square mile	2.58999	square kilometer	square kilometer	0.3861	square mile
Volume					
fluid ounce	29.574	milliliter	milliliter	0.0338	fluid ounce
gallon	3.7854	liter	liter	0.26417	gallon
cubic feet	0.028317	cubic meter	cubic meter	35.315	cubic feet
cubic yard	0.76455	cubic meter	cubic meter	1.308	cubic yard
Weight					
ounce	28.3495	gram	gram	0.03527	ounce
pound	0.45360	kilogram	kilogram	2.2046	pound
short ton	0.90718	metric ton	metric ton	1.1023	short ton
Force					
dyne	0.00001	newton	newton	100,000	dyne
Radiation					
rem	0.01	Sievert	Sievert	100	rem
rad	0.01	Gray	Gray	100	rad
Temperature					
Fahrenheit	Subtract 32 then multiply by 5/9ths	Celsius	Celsius	Multiply by 9/5ths then add 32	Fahrenheit

METRIC PREFIXES

Prefix	Symbol	Multiplication Factor
exa-	E	1 000 000 000 000 000 000 = 10^{18}
peta-	P	1 000 000 000 000 000 = 10^{15}
tera	T	1 000 000 000 000 = 10^{12}
giga-	G	1 000 000 000 = 10^{9}
mega-	M	1 000 000 = 10^{6}
kilo-	k	1 000 = 10^{3}
hecto-	h	100 = 10^{2}
deka-	da	10 = 10^{1}
deci-	d	0.1 = 10^{-1}
centi-	c	0.01 = 10^{-2}
milli-	m	0.001 = 10^{-3}
micro-	μ	0.000 001 = 10^{-6}
nano-	n	0.000 000 001 = 10^{-9}
pico-	p	0.000 000 000 001 = 10^{-12}
femto-	f	0.000 000 000 000 001 = 10^{-15}
atto-	a	0.000 000 000 000 000 001 = 10^{-18}

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Appendix B
Consultation Letters

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USEC
A Global Energy Company

August 2, 2002

Dr. Mary Knapp
Field Supervisor
U.S. Fish and Wildlife Service
6950-H American Parkway
Reynoldsburg, Ohio 43068-4127

CERTIFIED MAIL
7001 0320 0004 8113 5368

Dear Dr. Knapp:

INFORMAL CONSULTATION UNDER SECTION 7 OF THE ENDANGERED SPECIES ACT FOR THE PROPOSED INSTALLATION AND OPERATION OF A GAS CENTRIFUGE LEAD CASCADE FACILITY AT THE PORTSMOUTH GASEOUS DIFFUSION PLANT (PORTS) IN PIKETON, OHIO

USEC, Inc. is preparing an Environmental Report (ER) in accordance with 10 CFR 51.45 for the proposed use of the X-3001, X-7726, X-7727H, X-3012, X-7725 buildings, associated parking areas and pedestrian/vehicle portals on the Department of Energy's (DOE) Portsmouth Gaseous Diffusion Plant (PORTS) reservation for the installation and operation of a gas centrifuge Lead Cascade (LC) facility. This site is one of two under consideration by USEC, Inc. for the LC facility. A siting decision has not been made, but is expected later this calendar year.

USEC is a non-Federal Corporation regulated by the U.S. Nuclear Regulatory Commission (NRC).

The proposed action would result from locating the LC facility at the site of the former DOE Gas Centrifuge Enrichment Plant (GCEP). The GCEP facilities, located within DOE's PORTS reservation, depicted in attachment 1, were built in the early 1980s. The GCEP program was terminated in 1985. The GCEP facilities are adjacent to the existing gaseous diffusion plant, which ceased uranium enrichment operations in May 2001. The LC facility would assemble, test, repair, and operate centrifuge machines at the existing site in facilities originally designed, constructed and intended for gas centrifuge enrichment. Currently, the primary uses of the GCEP facilities are waste storage, warehouse activities, office and locker areas for support functions for the DOE.

The LC would utilize the X-3001 process building, depicted in attachment 2. Material and machine component receipts, component testing, and assembly of the centrifuge machines would occur in the X-7726 facility. The X-7727H facility serves as a transport corridor from the assembly location to the LC. The X-7725 has offices, lockers, change rooms, break rooms, training rooms and the storage and maintenance areas for the centrifuge transporter. All facilities described here are owned by the DOE and would be leased by USEC.

This letter is intended to serve as informal consultation under Section 7 of the Endangered Species Act. In this regard, USEC requests an updated list of protected species and habitats on the PORTS reservation and solicits your recommendations and comments about the potential effects of this proposed action. Documentation of your Consultation will be included in the USEC ER.

If you need further information on this proposed action, please do not hesitate to call me at (740) 897-2710 or Greg Fout at (740) 897-3823.

Sincerely,

Peter J. Miner
Regulatory Manager,
Lead Cascade Project

PJM:GEF:sj

Attachments

cc/att:

Greg Fout
T. J. Justice, Governor's Economic Development Office
James Morgan
Carol O'Claire, Ohio Emergency Management Agency
Mario Robles
File – RM-02-26

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
6950 Americana Parkway, Suite H
Reynoldsburg, Ohio 43068-4127

(614) 469-6923/FAX (614) 469-6919
August 30, 2002

Peter J. Miner
United States Enrichment Corporation
Portsmouth Gaseous Diffusion Plant
PO Box 628
Piketon, OH 45661

Dear Mr. Miner:

This is in response to your August 2, 2002, letter requesting information on endangered species in Pike County, Ohio. The proposed project will consist of the installation and operation of a gas centrifuge lead cascade facility at the Portsmouth Gaseous Diffusion Plant, in Piketon, Pike County, Ohio. We understand that this information is sought for completion of an environmental report in accordance with the Department of Energy.

In general, we recommend that any potential projects minimize water quality impacts and impacts to high quality fish and wildlife habitat, such as forests, streams, and wetlands. If streams and/or wetlands are involved, you should contact the Regulatory Branch of the Huntington District of the Corps of Engineers and the Ohio EPA for possible Section 404/401 permit requirements. Note that wetlands may exist on sites that are not designated wetland by the National Wetland Inventory. Best construction techniques should be used to minimize erosion, in particular, on slopes. All disturbed areas should be mulched and revegetated with native plant species.

ENDANGERED SPECIES COMMENTS: The proposed project lies within the range of the **Indiana bat** (*Myotis sodalis*), a Federally listed endangered species. Summer habitat requirements for the species are not well defined, but the following comments are thought to be important:

1. Dead or live trees and snags with peeling or exfoliating bark, split tree trunk and/or branches, or cavities, which may be used as maternity roost areas.

2. Live trees (such as shagbark hickory) which have exfoliating bark.

3. Stream corridors, riparian areas, and upland woodlots which provide forage sites.

Should the proposed site contain trees with any of the characteristics listed above, we recommend that they and surrounding trees be saved wherever possible. If they must be cut, they should not be cut between April 15 and September 15.

If desirable trees are present and if the above time restriction is unacceptable, mist net or other surveys should be conducted to determine if bats are present. The survey should be designed and conducted in coordination with this office. The survey should be conducted in June or July since the bats would only be expected in the project area from approximately April 15 to September 15.

The project also lies within the range of the **timber rattlesnake** (*Crotalus horridus horridus*), a large shy rattlesnake that is declining throughout its national range. No Federal listing status has been assigned to this species. Instead, the U.S. Fish and Wildlife Service has initiated a pre-listing Conservation Action Plan to support state and local conservation efforts. Your proactive efforts to conserve this species now may help avoid the need to list the species under the Endangered Species Act in the future. The timber rattlesnake is protected throughout much of its range and listed as endangered by the State of Ohio. Due to their rarity and reclusive nature, we encourage early project coordination to avoid potential impacts to timber rattlesnakes and their habitat.

In Ohio, the timber rattlesnake is restricted to the un-glaciated Allegheny Plateau and utilizes the specific habitat types, depending upon season. Winters are spent in dens usually associated with high, dry ridges. These dens may face any direction, but southeast to southwest are most common. Such dens usually consist of narrow crevices in the bedrock. Rocks may or may not be present on the surface. From these dens, timber rattlesnakes radiate throughout the surrounding hills and move distances as great as 4.5 miles. In the fall, timber rattlesnakes return to the same den. Intensive efforts to transplant timber rattlesnakes have not been successful. Thus protection of the winter dens is critical to the survival of this species. Some project management ideas include the following:

1) At a minimum, project evaluations should contain delineations of timber rattlesnake habitat within project boundaries. Descriptions should indicate the quality and quantity of timber rattlesnake habitat (den sites, basking sites, and foraging area, etc.) that may be affected by the project.

2) In cases where timber rattlesnakes are known to occur or where potential habitat is rated moderate to high, timber rattlesnake surveys may be necessary. If surveys are to be conducted, it may be helpful to inquire about timber rattlesnake sightings with local resource agency personnel or reliable local residents. In addition, local herpetologists may have knowledge of historical populations as well as precise knowledge of the habits, and especially the specific, local types of habitats that may contain timber rattlesnakes. Surveys should be performed during the periods of spring emergence from dens (usually a narrow window in April or May) and throughout the active season until October. The species is often easiest to locate during the summer months when pregnant females seek open areas in early morning, especially after cool evenings.

3) In portions of projects where timber rattlesnakes will be affected, clearing and construction activities should occur at distances greater than 100 feet from known dens. Most importantly, tops of ridges and areas of exposed rock should be avoided.

4) In areas where timber rattlesnake dens are known or likely to exist, maintenance activities (mowing, cutting, burning, etc.) should be conducted from November 1 to March 1, when timber rattlesnakes are hibernating.

This technical assistance letter is submitted in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the Endangered Species Act, of 1973, as amended, and is consistent with the intent of the National Environmental Policy Act of 1969, the U. S.

Fish and Wildlife Service's Mitigation Policy. .

If you have questions, or if we may be of further assistance in this matter, please contact Ken Lammers at extension 15 in this office.

Sincerely,

Mary Knapp

Mary M. Knapp, Ph.D.
Supervisor

cc: ODNR, Div. of Wildlife, SCEA Unit, Columbus, OH

USEC
A Global Energy Company

August 2, 2002

Mr. Jim Borchelt
District Conservationist
Natural Resources Conservation Service
11752 State Route 104
Waverly, Ohio 45690

CERTIFIED MAIL
7001 0320 0004 8113 5375

Dear Mr. Borchelt:

FARMLAND CONSERVATION IMPACT RATING: INSTALLATION AND OPERATION OF A GAS CENTRIFUGE LEAD CASCADE FACILITY AT THE PORTSMOUTH GASEOUS DIFFUSION PLANT (PORTS) IN PIKETON, OHIO

USEC, Inc. is preparing an Environmental Report (ER) in accordance with 10 CFR 51.45 for the proposed use of the X-3001, X-7726, X-7727H, X-3012, X-7725 buildings, associated parking areas and pedestrian/vehicle portals on the Department of Energy's (DOE) Portsmouth Gaseous Diffusion Plant (PORTS) reservation for the installation and operation of a gas centrifuge Lead Cascade (LC) facility. This site is one of two under consideration by USEC, Inc. for the LC facility. A siting decision has not been made, but is expected later this calendar year.

USEC is a non-Federal Corporation regulated by the U.S. Nuclear Regulatory Commission (NRC).

The proposed action would result from locating the LC facility at the site of the former DOE Gas Centrifuge Enrichment Plant (GCEP). The GCEP facilities, located within DOE's PORTS reservation, depicted in attachment 1, were built in the early 1980s. The GCEP program was terminated in 1985. The GCEP facilities are adjacent to the existing gaseous diffusion plant, which ceased uranium enrichment operations in May 2001. The LC facility would assemble, test, repair, and operate centrifuge machines at the existing site in facilities originally designed, constructed and intended for gas centrifuge enrichment. Currently, the primary uses of the GCEP facilities are waste storage, warehouse activities, office and locker areas for support functions for the DOE.

The LC would utilize the X-3001 process building, depicted in attachment 2. Material and machine component receipts, component testing, and assembly of the centrifuge machines would occur in the X-7726 facility. The X-7727H facility serves as a transport corridor from the assembly location to the LC. The X-7725 has offices, lockers, change rooms, break rooms, training rooms and the storage and maintenance areas for the centrifuge transporter. All facilities described here are owned by the DOE and would be leased by USEC.

In order to comply with the requirements of the Farmland Protection Policy Act and to rate the relative impact of the proposed action, USEC is submitting a Farmland Conversion Impact Rating form (form AD-1006). The affected 5.5 acres are located in existing site facilities originally designed, constructed and intended for gas centrifuge enrichment on land that has been previously converted to industrial use, therefore, should not require any farmland conversion. The results of the a Farmland Conversion Impact Rating will be incorporated into the ER after the process and any further consultation with the Natural Resources Conservation Service is complete.

If you need further information on this proposed action, please do not hesitate to call me at (740) 897-2710 or Greg Fout at (740) 897-3823.

Sincerely,

Peter J. Miner
Regulatory Manager,
Lead Cascade Project

PJM:GEF:smj

Attachments

cc/att:

Greg Fout
T. J. Justice, Governor's Economic Development Office
James Morgan
Carol O'Claire, Ohio Emergency Management Agency
Mario Robles
File – RM-02-27

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request: August 2, 2002
Name Of Project: Lead Cascade	Federal Agency Involved: Nuclear Regulatory Commissio
Proposed Land Use: Continued Commercial/Industrial Use	County And State: Pike County, Ohio
PART II *(To be completed by SCS)*	Date Request Received By SCS

Does the site contain prime, unique, statewide or local important farmland? Yes ☐ No ☐
(If no, the FPPA does not apply — do not complete additional parts of this form).

Acres Irrigated	Average Farm Size

Major Crop(s)	Farmable Land In Govt. Jurisdiction	Amount Of Farmland As Defined in FPPA
	Acres: %	Acres: %

Name Of Land Evaluation System Used	Name Of Local Site Assessment System	Date Land Evaluation Returned By SCS

		Alternative Site Rating			
PART III *(To be completed by Federal Agency)*		Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly		0			
B. Total Acres To Be Converted Indirectly		0			
C. Total Acres In Site		5.5			
PART IV *(To be completed by SCS)* Land Evaluation Information					
A. Total Acres Prime And Unique Farmland					
B. Total Acres Statewide And Local Important Farmland					
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted					
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value					
PART V *(To be completed by SCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*					
PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points				
1. Area In Nonurban Use					
2. Perimeter In Nonurban Use					
3. Percent Of Site Being Farmed					
4. Protection Provided By State And Local Government					
5. Distance From Urban Builtup Area					
6. Distance To Urban Support Services					
7. Size Of Present Farm Unit Compared To Average					
8. Creation Of Nonfarmable Farmland					
9. Availability Of Farm Support Services					
10. On-Farm Investments					
11. Effects Of Conversion On Farm Support Services					
12. Compatibility With Existing Agricultural Use					
TOTAL SITE ASSESSMENT POINTS	160				
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100				
Total Site Assessment *(From Part VI above or a local site assessment)*	160				
TOTAL POINTS *(Total of above 2 lines)*	260				

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection.

(See Instructions on reverse side)

Form AD-1006 (10-83)

STEPS IN THE PROCESSING THE FARMLAND AND CONVERSION IMPACT RATING FORM

Step 1 – Federal agencies involved in proposed projects that may convert farmland, as defined in the Farmland Protection Policy Act (FPPA) to nonagricultural uses, will initially complete Parts I and III of the form.

Step 2 – Originator will send copies A, B and C together with maps indicating locations of site(s), to the Soil Conservation Service (SCS) local field office and retain copy D for their files. (Note. SCS has a field office in most counties in the U.S. The field office is usually located in the county seat. A list of field office locations are available from the SCS State Conservationist in each state).

Step 3 – SCS will, within 45 calendar days after receipt of form, make a determination as to whether the site(s) of the proposed project contains prime, unique, statewide or local important farmland.

Step 4 – In cases where farmland covered by the FPPA will be converted by the proposed project, SCS field offices will complete Parts II, IV and V of the form.

Step 5 – SCS will return copy A and B of the form to the Federal agency involved in the project. (Copy C will be retained for SCS records).

Step 6 – The Federal agency involved in the proposed project will complete Parts VI and VII of the form.

Step 7 – The Federal agency involved in the proposed project will make a determination as to whether the proposed conversion is consistent with the FPPA and the agency's internal policies.

INSTRUCTIONS FOR COMPLETING THE FARMLAND CONVERSION IMPACT RATING FORM

Part I: In completing the "County And State" questions list all the local governments that are responsible for local land controls where site(s) are to be evaluated.

Part III: In completing item B (Total Acres To Be Converted Indirectly), include the following:

1. Acres not being directly converted but that would no longer be capable of being farmed after the conversion, because the conversion would restrict access to them.

2. Acres planned to receive services from an infrastructure project as indicated in the project justification (e.g. highways, utilities) that will cause a direct conversion.

Part VI: Do not complete Part VI if a local site assessment is used.

Assign the maximum points for each site assessment criterion as shown in §658.5(b) of CFR. In cases of corridor-type projects such as transportation, powerline and flood control, criteria #5 and #6 will not apply and will be weighed zero, however, criterion #8 will be weighed a maximum of 25 points, and criterion #11 a maximum of 25 points.

Individual Federal agencies at the national level, may assign relative weights among the 12 site assessment criteria other than those shown in the FPPA rule. In all cases where other weights are assigned, relative adjustments must be made to maintain the maximum total weight points at 160.

In rating alternative sites, Federal agencies shall consider each of the criteria and assign points within the limits established in the FPPA rule. Sites most suitable for protection under these criteria will receive the highest total scores, and sites least suitable, the lowest scores.

Part VII: In computing the "Total Site Assessment Points", where a State or local site assessment is used and the total maximum number of points is other than 160, adjust the site assessment points to a base of 160. Example: if the Site Assessment maximum is 200 points; and alternative Site "A" is rated 180 points:

$$\frac{\text{Total points assigned Site A}}{\text{Maximum points possible}} = \frac{180}{200} \times 160 = 144 \text{ points for Site "A."}$$

United States Department of Agriculture USDA

NRCS Natural Resources Conservation Service

11752 State Route 104
Waverly, Oh 45690

Phone 740-947-5353

August 8, 2002

Peter J. Miner
USEC P. O. Box 628
Piketon, Oh 45661

Dear Mr. Miner,

In response to your 08/02/02 letter regarding the Lead Cascade project and form AD-1006 prime farmland determination, the following applies. The project site is mapped UoA, Urban Land-Omulga Complex, 0-6% slopes, according to the Pike Soil Survey, sheet 48.

This mapping is non-prime soils and therefore the FPPA does not apply. Enclosed are your copies for further processing.

Good luck with the project and thank you for contacting NRCS in Pike County.

Sincerely,

Jim Borchelt

Jim Borchelt
District Conservationist

JB/mws

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request: August 2, 2002
Name Of Project: Lead Cascade	Federal Agency Involved: Nuclear Regulatory Commission
Proposed Land Use: Continued Commercial/Industrial Use	County And State: Pike County, Ohio
PART II *(To be completed by SCS)*	Date Request Received By SCS: 8-6-02
Does the site contain prime, unique, statewide or local important farmland? Yes ☐ No ☒ (If no, the FPPA does not apply — do not complete additional parts of this form)	Acres Irrigated: / Average Farm Size:
Major Crop(s): / Farmable Land In Govt. Jurisdiction: Acres: %	Amount Of Farmland As Defined in FPPA: Acres: %
Name Of Land Evaluation System Used: / Name Of Local Site Assessment System:	Date Land Evaluation Returned By SCS: 8-8-02

PART III *(To be completed by Federal Agency)*	Alternative Site Rating: Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	0			
B. Total Acres To Be Converted Indirectly	0			
C. Total Acres In Site	5.5			
PART IV *(To be completed by SCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland				
B. Total Acres Statewide And Local Important Farmland				
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted				
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value				
PART V *(To be completed by SCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*				

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points	Site A	Site B	Site C	Site D
1. Area In Nonurban Use					
2. Perimeter In Nonurban Use					
3. Percent Of Site Being Farmed					
4. Protection Provided By State And Local Government					
5. Distance From Urban Builtup Area					
6. Distance To Urban Support Services					
7. Size Of Present Farm Unit Compared To Average					
8. Creation Of Nonfarmable Farmland					
9. Availability Of Farm Support Services					
10. On-Farm Investments					
11. Effects Of Conversion On Farm Support Services					
12. Compatibility With Existing Agricultural Use					
TOTAL SITE ASSESSMENT POINTS	160				
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100				
Total Site Assessment *(From Part VI above or a local site assessment)*	160				
TOTAL POINTS *(Total of above 2 lines)*	260				

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection:

USEC
A Global Energy Company

August 2, 2002

Ms. Nancy Strayer
Assistant Chief of Natural Areas & Preserves
Ohio Department of Natural Resources
1889 Fountain Square, Building F-1
Columbus, Ohio 43224

CERTIFIED MAIL
7001 0320 0004 8113 5351

Dear Ms. Strayer:

LETTER OF CONSULTATION FOR THE PROPOSED INSTALLATION AND OPERATION OF A GAS CENTRIFUGE LEAD CASCADE FACILITY AT THE PORTSMOUTH GASEOUS DIFFUSION PLANT (PORTS) IN PIKETON, OHIO

USEC, Inc. is preparing an Environmental Report (ER) in accordance with 10 CFR 51.45 for the proposed use of the X-3001, X-7726, X-7727H, X-3012, X-7725 buildings, associated parking areas and pedestrian/vehicle portals on the Department of Energy's (DOE) Portsmouth Gaseous Diffusion Plant (PORTS) reservation for the installation and operation of a gas centrifuge Lead Cascade (LC) facility. This site is one of two under consideration by USEC, Inc. for the LC facility. A siting decision has not been made, but is expected later this calendar year.

USEC is a non-Federal Corporation regulated by the U.S. Nuclear Regulatory Commission (NRC).

The proposed action would result from locating the LC facility at the site of the former DOE Gas Centrifuge Enrichment Plant (GCEP). The GCEP facilities, located within DOE's PORTS reservation, depicted in attachment 1, were built in the early 1980s. The GCEP program was terminated in 1985. The GCEP facilities are adjacent to the existing gaseous diffusion plant, which ceased uranium enrichment operations in May 2001. The LC facility would assemble, test, repair, and operate centrifuge machines at the existing site in facilities originally designed, constructed and intended for gas centrifuge enrichment. Currently, the primary uses of the GCEP facilities are waste storage, warehouse activities, office and locker areas for support functions for the DOE.

The LC would utilize the X-3001 process building, depicted in attachment 2. Material and machine component receipts, component testing, and assembly of the centrifuge machines would occur in the X-7726 facility. The X-7727H facility serves as a transport corridor from the assembly location to the LC. The X-7725 has offices, lockers, change rooms, break rooms, training rooms and the storage and maintenance areas for the centrifuge transporter. All facilities described here are owned by the DOE and would be leased by USEC.

This letter is intended to serve as informal consultation regarding protected or rare species that may be on or near the site. In this regard, USEC requests an updated list of protected species and habitats on the PORTS reservation and solicits your recommendations and comments about the potential effects of this proposed action. Documentation of your Consultation will be included in the USEC ER.

If you need further information on this proposed action, please do not hesitate to call me at (740) 897-2710 or Greg Fout at (740) 897-3823.

Sincerely,

Peter J. Miner
Regulatory Manager,
Lead Cascade Project

PJM:GEF:smj

Attachments

cc/att:

Greg Fout
T. J. Justice, Governor's Economic Development Office
James Morgan
Carol O'Claire, Ohio Emergency Management Agency
Mario Robles
File – RM-02-25

Ohio Department of Natural Resources

BOB TAFT, GOVERNOR SAMUEL W SPECK, DIRECTOR

Division of Natural Areas and Preserves
Stuart Lewis, Chief
1889 Fountain Square, Bldg. F-1
Columbus, OH 43224-1388
Phone: (614) 265-6453, Fax: (614) 267-3096

August 8, 2002

Peter Miner
USEC, Inc.
PO Box 628, MS 1212
Piketon, OH 45661

Dear Mr. Miner:

After reviewing our Natural Heritage maps and files, I find the Division of Natural Areas and Preserves has no records of rare or endangered species in the Proposed Installation and Operation of a Gas Centrifuge Lead Cascade Facility project area at the Portsmouth Gaseous Diffusion Plant in Piketon, Pike County, Piketon Quad (7001 0320 0004 8113 5351).

There are no existing or proposed state nature preserves or scenic rivers at the project site. We are also unaware of any unique ecological sites, geologic features, breeding or non-breeding animal concentrations, champion trees, or state parks, forests or wildlife areas within the project area.

Our inventory program has not completely surveyed Ohio and relies on information supplied by many individuals and organizations. Therefore, a lack of records for any particular area is not a statement that rare species or unique features are absent from that area. Please note that although we inventory all types of plant communities, we only maintain records on the highest quality areas. Also, we do not have data for all Ohio wetlands. For National Wetlands Inventory maps, please contact Madge Fitak in the Division of Geological Survey at 614-265-6576.

Please contact me at 614-265-6818 if I can be of further assistance.

Sincerely,

Debbie Woischke

Debbie Woischke, Data Specialist
Division of Natural Areas & Preserves

USEC
A Global Energy Company

August 2, 2002

Mr. Mark Epstein
Archeology Reviews Manager
Resource Protection and Review
567 East Hudson Street
Columbus, Ohio 43211-1030

CERTIFIED MAIL
7001 0320 0004 8113 5344

Dear Mr. Epstein:

NATIONAL HISTORIC PRESERVATION ACT, SECTION 106 COMPLIANCE, INSTALLATION AND OPERATION OF A GAS CENTRIFUGE LEAD CASCADE FACILITY AT THE PORTSMOUTH GASEOUS DIFFUSION PLANT (PORTS) IN PIKETON, OHIO

USEC, Inc. is preparing an Environmental Report (ER) in accordance with 10 CFR 51.45 for the proposed use of the X-3001, X-7726, X-7727H, X-3012, X-7725 buildings, associated parking areas and pedestrian/vehicle portals on the Department of Energy's (DOE) Portsmouth Gaseous Diffusion Plant (PORTS) reservation for the installation and operation of a gas centrifuge Lead Cascade (LC) facility. This site is one of two under consideration by USEC, Inc. for the LC facility. A siting decision has not been made, but is expected later this calendar year.

USEC is a non-Federal Corporation regulated by the U.S. Nuclear Regulatory Commission (NRC).

The proposed action would result from locating the LC facility at the site of the former DOE Gas Centrifuge Enrichment Plant (GCEP). The GCEP facilities, located within DOE's PORTS reservation, depicted in attachment 1, were built in the early 1980s. The GCEP program was terminated in 1985. The GCEP facilities are adjacent to the existing gaseous diffusion plant, which ceased uranium enrichment operations in May 2001. The LC facility would assemble, test, repair, and operate centrifuge machines at the existing site in facilities originally designed, constructed and intended for gas centrifuge enrichment. Currently, the primary uses of the GCEP facilities are waste storage, warehouse activities, office and locker areas for support functions for the DOE.

The LC would utilize the X-3001 process building, depicted in attachment 2. Material and machine component receipts, component testing, and assembly of the centrifuge machines would occur in the X-7726 facility. The X-7727H facility serves as a transport corridor from the

United States Enrichment Corporation
Portsmouth Gaseous Diffusion Plant, P.O Box 628, Piketon, OH 45661
Telephone 740-897-2331 Fax 740-897-2909 http://www usec.com

assembly location to the LC. The X-7725 has offices, lockers, change rooms, break rooms, training rooms and the storage and maintenance areas for the centrifuge transporter. All facilities described here are owned by the DOE and would be leased by USEC.

The consulting party recommended by NRC for this action is the Ohio State Historic Preservation Office (SHPO). The proposed action is within the previously disturbed area of the PORTS reservation. In addition, the proposed action is within areas disturbed during construction of the GCEP facility and therefore should not result in any additional impact to Native American Indian tribal, religious, or cultural sites.

An ER of this action is being prepared in accordance with the requirements of 10 CFR 51.45. Documentation of Consultations will be included in the USEC ER.

USEC has determined that the proposed action would not have adverse effects on historical resources included or eligible for inclusion in the National Register of Historic Places (National Register). The proposed action would result in utilizing the X-3001 process building, X-7726, X-7727H, and the X-7725 facilities consistent with the original intent of gas centrifuge enrichment when the GCEP facility was constructed in the early 1980s. The proposed action would not impact on the historical integrity of the PORTS reservation.

If you need further information on this proposed action, please do not hesitate to call me at (740) 897-2710 or Greg Fout at (740) 897-3823.

Sincerely,

Peter J. Miner
Regulatory Manager,
Lead Cascade Project

PJM:GEF:smj

Attachments

cc/att:

Greg Fout
T. J. Justice, Governor's Economic Development Office
James Morgan
Carol O'Claire, Ohio Emergency Management Agency
Mario Robles
File – RM-02-24

Appendix C
Environmental Impact of Decommissioning

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ENVIRONMENTAL IMPACT OF DECOMMISSIONING

Introduction

For conservatism, the Decommissioning Program described in Chapter 10.0 of the license application assumes that the Lead Cascade is decommissioned at the end of its useful life. No credit is given to transfer of equipment and material either to the DOE or to the Centrifuge Commercial Plant.

Centrifuges, service modules, process headers, vacuum pumps, and traps are the typical equipment to be removed by USEC; only the building shells and the facility infrastructure, including equipment that existed at the time of lease (e.g., rigid mast crane, utilities, etc.) will remain. The cascade area floor will be monitored for contamination, and will be decontaminated, if required. The remaining facilities will be decontaminated where needed to comply with the Lease turnover requirements. UF_6 material will be transferred to an authorized facility. Radioactive wastes will be disposed of at licensed low-level waste disposal sites. Hazardous wastes will be treated or disposed of in licensed hazardous waste facilities. Following USEC's decommissioning activities, the facilities will be de-leased and returned to DOE in accordance with Lease Agreement requirements.

As described in Chapter 10.0 of the License Application for the American Centrifuge Lead Cascade Facility, activities required for decommissioning have been identified with decontamination options identified to remove, disassemble, and dispose of the centrifuge machines. Specific elements of the planning may change with the submittal of the decommissioning plan required at the time of license termination. A more detailed Lead Cascade plan for completion of decommissioning will be submitted by USEC in accordance with 10 CFR 70.38 at or about the time of license termination.

Radioactive Contamination Control

10 CFR 20.1101(b) requires that a licensee use, to the extent practicable, procedures and engineering controls based upon sound radiation principles to achieve occupational doses and doses to members of the public that are as low as reasonably achievable (ALARA). Compliance with the ALARA principle is required during Lead Cascade operations and will continue throughout the decommissioning process by minimizing waste volumes and the spread of radioactive contamination.

Personnel doses due to decommissioning activities are anticipated to be less than the Administrative Control Level (500 mrem TEDE) stated in Chapter 4.0 of the license application. The primary concern during decommissioning activities will be the chemical toxicity of soluble uranium due to an inadvertent release of UF_6. This is a major concern for personnel in the immediate vicinity of the release point. However, due to the relatively small source term (less than 0.02 curies of radioactive material) off-site doses will be minimal. USEC anticipates that the majority of the radioactive material (greater than 80 percent) will be removed from the Lead Cascade upon completion of the project during the shutdown and evacuation process. The remaining radioactive material will be dispersed through the Lead Cascade components and piping. The equipment will have to be decontaminated or disposed of as radioactive material.

Decommissioning Program

Decommissioning planning and design features will simplify eventual dismantling and decontamination. The plans are implemented through proper management and Radiation Protection and Industrial Safety programs. Decommissioning policies address radioactive waste management, physical security, and nuclear materials control and accountability.

The plan for decommissioning is to promptly decontaminate or remove all materials from the facilities that are required under the Lease Agreement to return the facilities to DOE. Implementation of decommissioning may begin immediately following facility shutdown, since only low radiation levels exist at this facility. Overall, the decommissioning process is estimated to require slightly greater than one year from facility shutdown to completion of the final radiation survey. This approach avoids long-term storage and monitoring of wastes at the facility. The type and amount of wastes produced at the Lead Cascade do not warrant such delays in waste removal. The intent of decommissioning the Lead Cascade is to remove equipment and materials from the buildings such that only the building shells and facility infrastructure remain thus minimizing the impact and waste volumes. Decommissioning activities would be conducted in compliance with regulatory requirements, reporting, and permit conditions.

Decontamination

Since reprocessed uranium will not be used as feed in the Lead Cascade, no consideration of ^{232}U, transuranic alpha-emitters and fission product residues is necessary for the decontamination process. Only contamination from ^{238}U, ^{235}U, ^{234}U, and their daughter products will require handling by decontamination processes. The primary contaminant throughout the facility will be in the form of small amounts of UO_2F_2, with even smaller amounts of UF_4 and other uranium compounds.

Decontamination of facility components and structures will not require the installation of a new facility dedicated for that purpose since the Lead Cascade Decontamination Service Area will be especially designed to accommodate repetitive equipment decontamination of centrifuges (up to 240 plus a 15 percent contingency) and other components. The Decontamination Service Area will be the primary location for decontamination activities.

Although decontaminated components may be reused in the Commercial Plant, for conservatism this evaluation of environmental impact assumes that components will be decontaminated in accordance with radiation protection requirements and classified parts will be dispositioned in accordance with the Lead Cascade Security Program. Any UF_6 tails remaining at the facility will be transferred to an authorized facility at decommissioning and its ultimate disposition will be accounted by the receiving facility.

Contaminated portions of the buildings will be decontaminated as required. Structural contamination should be limited to the areas indicated as inside the Contamination Control Zone (CCZ) of the facility as described in Chapter 10.0 of the License Application for the American Centrifuge Lead Cascade Facility.. The remainder of the Lead Cascade is not expected to require decontamination. Good housekeeping practices during normal operation will maintain these areas contamination free. When decontamination is complete, all of the Lead Cascade facilities will be surveyed to verify that further decontamination is not required. Decontamination activities will continue until Lead Cascade facilities are demonstrated to be suitable for de-leasing and turnover to DOE in accordance with Lease Agreement requirements.

Contamination of site structures will be limited to specific CCZs, and will be maintained at low levels throughout facility operation by regular cleaning. Due to applied coatings and good housekeeping practices, final decontamination of these areas is not assumed to require significant removal of surface concrete or other structural material.

The centrifuges will be processed and the following operations will be performed:

- Removal of external fittings;
- Removal of bottom flange, motor and bearings, and collection of contaminated oil;
- Removal of top flange, and withdrawal and disassembly of internals; and
- Destruction of classified parts by shredding, crushing, burial, etc.

Air Emissions from Decommissioning

USEC anticipates that the majority of the radioactive material (greater than 80 percent) will be removed from the Lead Cascade upon completion of the project. The remaining radioactive material will be dispersed through the Lead Cascade components and piping. The resulting radiological impacts during decommissioning activities would be far below the EPA standard of 10 mrem/year and the Nuclear Regulatory Commission TEDE limit of 100 mrem/year.

The maximum impact if all of the remaining radioactive material became airborne would be approximately half that of the predicted maximum annual gaseous effluent.

Items for Potential Decontamination at Decommissioning

Category	Description	Estimated Quantity
Centrifuges	Casings, Rotor Assemblies, Motors, Suspensions, Mounts	240
Piping	Up to 1 in. process piping length (ft)	40,000
	Greater than 1 – 4 in. process piping length (ft)	3,000
Pumps	Evacuation vacuum pumps	2
	Purge vacuum pumps	4
Ventilation	Ductwork length (ft)[3x4]	300
Building Surfaces	Floors (ft^2) (Note 1)	45,000
Valves	Process valves	240
	Miscellaneous valves	40
Traps	Chemical traps (2 sets of 4)	8
Other Equipment	UF_6 Portable Carts	4
Decontamination Service Area	Centrifuge transporter	1
	Centrifuge manipulator	2
	Centrifuge dismantling equipment	4
	Cutting machines	2
	Degreasers	2
	Decontamination tanks	3
	Wet blast cabinet	1
	Crusher	1

Note 1: Amount of wall ft^2 not given because it is not anticipated to need decontamination at time of decommissioning. The floor space listed consists of the X-3001 cascade.

Waste Streams from Decommissioning

The plan for decommissioning is to promptly decontaminate or remove all materials from the facility to allow it to be released back to DOE in accordance with Lease Agreement requirements.

Wastes will consist of normal industrial trash, non-hazardous chemicals and fluids, small amounts of hazardous materials, and radioactive wastes. The radioactive waste will primarily be crushed centrifuge rotors, trash, and citric cake. Citric cake consists of uranium and metallic compounds precipitated from citric acid decontamination solutions.

Disposal

Wastes produced during decommissioning will be collected, handled, and disposed of in a manner similar to that described for those wastes produced during normal operation. Radioactive wastes will ultimately be disposed of in licensed low-level radioactive waste disposal facilities. Hazardous wastes will be disposed of in hazardous waste disposal facilities. Non-hazardous and non-radioactive wastes will be disposed of in a manner consistent with good industrial practice and in accordance with applicable regulations.

It is estimated that approximately 1,300 m^3 of radioactive waste will be generated during the decommissioning operation. This waste may be subject to further volume reduction prior to disposal.

A more complete estimate of the wastes and effluent to be produced during decommissioning will be provided in the USEC plan for completion of decommissioning, to be submitted at or about the time of license termination.

Final Radiation Survey

A final radiation survey would be performed to verify proper decontamination to allow the site to be released to DOE in accordance with Lease Agreement requirements. The evaluation of the final radiation survey is based, in part, on an initial radiation survey performed prior to operation. The initial survey determines the natural background radiation of the area; providing a datum for measurements that determine any increase in levels of radioactivity.

The final survey will systematically measure radioactivity over the Lead Cascade facilities. The intensity of the survey will vary depending on the location (i.e., the buildings, the immediate area around the buildings, the controlled fenced area, and the remainder of the site). The survey procedures and results will be documented in a report. The report will include a map of the survey site, measurement results, and the site's relationship to the surrounding area. The results will be analyzed and shown to be below allowable residual radioactivity limits; otherwise, further decontamination will be performed.

Results

Recoverable items will be externally decontaminated and suitable for reuse except for a very small amount of intractable internally contaminated material that severely limits potential customers. Other than centrifuge machines, there is potentially a small amount of salvageable scrap material. Material requiring disposal will primarily be process piping, trash, and residue from the effluent treatment systems. No problems are anticipated which will prevent the Lead Cascade facilities from being released to DOE in accordance with Lease Agreement requirements.

Appendix D
Cost Comparison to Construct and Operate the Lead Cascade at PORTS versus PGDP

The information contained in this appendix is being submitted to the NRC under separate cover in accordance with the requirements of 10 CFR 2.790

Appendix E
ER Figures

The information contained in this appendix is being submitted to the NRC under separate cover in accordance with the requirements of 10 CFR 2.790