

## EXECUTIVE SUMMARY

### PURPOSE

This Annual Environmental Report is prepared to summarize environmental activities, primarily environmental monitoring, at the Portsmouth Gaseous Diffusion Plant (PORTS) for calendar year 2005. The report fulfills a requirement of the U.S. Department of Energy (DOE) Order 231.1A, *Environment, Safety and Health Reporting*, for preparation of an annual summary of environmental data to characterize environmental management performance.

### SITE AND OPERATIONS OVERVIEW

PORTS, which began operation in 1954, is one of three uranium enrichment facilities originally built in the United States; the other two were constructed in Oak Ridge, Tennessee and Paducah, Kentucky. PORTS is located on 5.8 square miles in Pike County, Ohio. The county has approximately 27,700 residents.

In 1993, the DOE began leasing the uranium enrichment production and operations facilities at PORTS to the United States Enrichment Corporation (USEC). The DOE is responsible for certain environmental restoration and waste management activities, uranium programs, and long-term stewardship of nonleased facilities at PORTS.

Bechtel Jacobs Company, LLC managed the DOE programs at PORTS from April 1, 1998 until June 26, 2005. Two new contractors, LATA/Parallax Portsmouth, LLC (LPP) and Theta Pro2Serve Management Company, LLC (TPMC) began management of DOE PORTS programs on June 27, 2005.

A third DOE contractor, Uranium Disposition Services, LLC (UDS), began construction associated with the Depleted Uranium Hexafluoride Conversion Facility in 2004 and assumed responsibility for surveillance and maintenance of depleted uranium cylinders on June 27, 2005. Depleted uranium hexafluoride, which is a product of the gaseous diffusion process, is stored in cylinders on site. The Depleted Uranium Hexafluoride Conversion Facility will convert depleted uranium hexafluoride into uranium oxide, which will be shipped off site.

PORTS production facilities that are used for the separation of uranium isotopes by the gaseous diffusion process are currently leased to USEC; however, most activities associated with the gaseous diffusion process of uranium enrichment ceased in 2001. USEC is responsible for cold shutdown operations, removal of uranium deposits from process equipment, and the proposed gas centrifuge operations. USEC, Inc. (the parent company of USEC) is currently constructing the American Centrifuge uranium enrichment plant at PORTS. The plant is expected to begin uranium enrichment operations in 2009 and create hundreds of jobs.

With the exception of Chapter 2, Compliance Summary; Chapter 4, Environmental Radiological Program Information; and Chapter 5, Environmental Non-Radiological Program Information, this report does not cover USEC operations at PORTS. USEC data are included in these chapters to provide a more complete picture of the programs in place at PORTS to detect and assess potential impacts to human health and the environment resulting from PORTS activities.

## **ENVIRONMENTAL COMPLIANCE**

DOE PORTS has been issued a permit for discharge of water to surface streams, several air emission permits, and a permit for the storage of hazardous waste. The DOE is also responsible for preparing a number of reports for compliance with environmental regulations. These reports include an annual groundwater monitoring report, an annual hazardous waste report, an annual polychlorinated biphenyl (PCB) document log, an annual summary of radionuclide air emissions and the associated dose to the public from these emissions, a monthly summary of National Pollutant Discharge Elimination System (NPDES) monitoring, a quarterly radiological discharge monitoring report, an annual hazardous chemical inventory, and an annual toxic chemical release inventory.

USEC is responsible for compliance activities directly associated with its operations, including air emission permits for uranium enrichment facilities, water discharge permits for several holding ponds and water treatment facilities, and management of wastes generated by USEC operations.

In 2005, DOE PORTS received Notices of Violation from the U.S. Environmental Protection Agency (EPA) and Ohio EPA for alleged violations of hazardous waste regulations pertaining to paperwork and labeling deficiencies. The DOE submitted responses to the alleged deficiencies identified in the Notices of Violation. The Notices of Violation and DOE's responses are summarized in Section 2.4.2.

## **ENVIRONMENTAL PROGRAMS**

Environmental Restoration, Waste Management, and Public Awareness Programs are conducted at PORTS to protect and inform the local population, improve the quality of the environment, and comply with federal and state regulations.

### **Environmental Restoration Program**

Environmental restoration is the process of cleaning up waste sites and facilities to demonstrate that risks to human health and the environment are either eliminated or reduced to safe levels. The DOE established the Environmental Restoration Program to find, analyze, and correct site contamination problems.

The Ohio Consent Decree and the U.S. EPA Administrative Consent Order require investigation and cleanup of PORTS in accordance with the Resource Conservation and Recovery Act (RCRA) Corrective Action Program. The site is divided into quadrants to facilitate the investigation and cleanup. Corrective actions are underway in each quadrant.

A project to remediate volatile organics in Quadrant I at the southern edge of the X-749/X-120 groundwater plume in the area of the X-749 South Barrier Wall and the DOE property boundary continued during 2005. Hydrogen release compounds, which act as an accelerant to the natural microbial process thereby breaking down volatile organics into nontoxic compounds, were injected into the soil at over 150 locations during March and April 2004. Based on data collected during 2005, the hydrogen release compounds are causing decreases in volatile organics in at least one of the monitoring wells in this area.

In December 2003, the Ohio EPA issued the Decision Document for corrective actions required for the X-701B area in Quadrant II. These corrective actions include construction of landfill caps in the western portion of the area and groundwater treatment through injection of a chemical oxidant followed

by phytoremediation, if necessary. Phase I field activities for groundwater remediation began in September 2005 to determine operating parameters for the oxidant injection system. Phase I field activities were completed in November 2005, and a report was submitted to the Ohio EPA.

As required by the Ohio EPA, corrective actions in Quadrants III and IV were maintained and monitored in 2005.

### **Waste Management Program**

The DOE PORTS Waste Management Program directs the safe storage, treatment, and disposal of waste generated from past plant operations, ongoing plant maintenance, and ongoing environmental restoration projects. In 2005, approximately 8.1 million pounds of waste from PORTS were recycled, treated, or disposed at off-site facilities.

Waste management activities are conducted in compliance with DOE Orders, Ohio EPA regulations, and U.S. EPA regulations. Waste management requirements are varied and often complex because of the variety of wastes generated by DOE PORTS activities. The types of waste managed by DOE PORTS include:

- *Low-level radioactive waste* – radioactive waste not classified as high level or transuranic waste.
- *Hazardous (RCRA) waste* – waste that contains one or more of the wastes listed under RCRA or that exhibits one or more of the four RCRA hazardous characteristics: ignitability, corrosivity, reactivity, and toxicity.
- *PCB wastes* – waste containing PCBs, a class of synthetic organic chemicals. Disposal of PCB materials is regulated under the Toxic Substances Control Act (TSCA).
- *Subtitle D solid wastes* – Waste that includes construction and demolition debris, industrial waste, and sanitary waste, as defined by Ohio regulations.

Many of the wastes generated by DOE PORTS are a combination of these first three waste types; for example, some wastes are both RCRA hazardous waste and low-level radioactive waste.

Supplemental policies also have been implemented for waste management including minimizing waste generation; characterizing and certifying wastes before they are stored, processed, treated, or disposed; pursuing volume reduction (such as blending and bulking); on-site storage in preparation for safe and compliant final treatment and/or disposal; and recycling.

### **Public Awareness Program**

The DOE provides a public Environmental Information Center to allow access to all documents used to make decisions on remedial actions being taken at PORTS. The information center is located just north of PORTS at the Ohio State University Endeavor Center (Room 220), 1862 Shyville Road, Piketon, Ohio 45661. The Information Center is open 9 a.m. to noon Monday and Tuesday, noon to 4 p.m. Wednesday and Thursday, or by appointment (call 740-289-8898 or email [eic@falcon1.net](mailto:eic@falcon1.net)). Additional information is provided by the DOE Site Office (740-897-5010) and the LPP Office of Public Affairs (740-897-2336). The latest Annual Environmental Report and other information can also be obtained from the PORTS web site at [www.lpports.com](http://www.lpports.com).

Public update meetings and public workshops on specific topics are also held to keep the public informed and to receive their comments and questions. Periodically, fact sheets about major projects are written for the public. Additionally, the *Portsmouth Environmental Bulletin* is distributed to more than 4,000 recipients, including those on the community relations mailing list, neighbors within 2 miles of the plant, and plant employees and retirees.

## **ENVIRONMENTAL MONITORING**

Environmental monitoring at PORTS includes air, water, soil, and biota (animals, vegetation, and crops) and includes measurement of both radiological and chemical parameters. Environmental monitoring programs may be required by regulations, permit requirements, and DOE Orders, but also may be developed to address public concerns about plant operations. The DOE *Environmental Monitoring Plan for the Portsmouth Gaseous Diffusion Plant* describes the environmental monitoring programs for DOE PORTS.

In 2005, environmental monitoring information was collected for the following programs:

- Airborne discharges,
- Ambient air,
- Direct radiation,
- Discharges to surface water,
- Local surface water,
- Sediment,
- Soil,
- Vegetation, and
- Biota.

In addition, the Ohio EPA conducted sampling of surface water, sediment, and fish in areas on-site and around PORTS during 2005 for a Biological and Water Quality Study. To the extent possible, the Ohio EPA and DOE split the samples collected for this project. Data for samples analyzed by DOE subcontractors are discussed in this report. The Ohio EPA Biological and Water Quality Study for PORTS will be prepared by the Ohio EPA and available through the Ohio EPA Division of Surface Water.

Data collected for these programs in 2005 are consistent with data collected in previous years and indicate that radionuclides and chemicals released by PORTS operations have a minimal effect on human health and the environment. The DOE also collects extensive environmental monitoring information on groundwater at PORTS. Groundwater monitoring is discussed in the Groundwater Programs chapter.

## **DOSE**

Potential impacts on human health from radionuclides released by PORTS operations are calculated based on environmental monitoring data. This impact, commonly called a dose, can be caused by radionuclides released into the air and/or water, or radiation emanating directly from buildings or other objects at PORTS. The U.S. EPA sets a 10 millirem (mrem)/year limit for the dose from radionuclides released to the air, and the DOE sets a 100 mrem/year limit for the dose from radionuclides from all potential pathways (air, water, and direct radiation). A person living in southern Ohio receives a dose of approximately 300 mrem/year from natural sources of radiation (National Council on Radiation Protection 1987). Figure 1 provides a comparison of the doses from various common radiation sources.

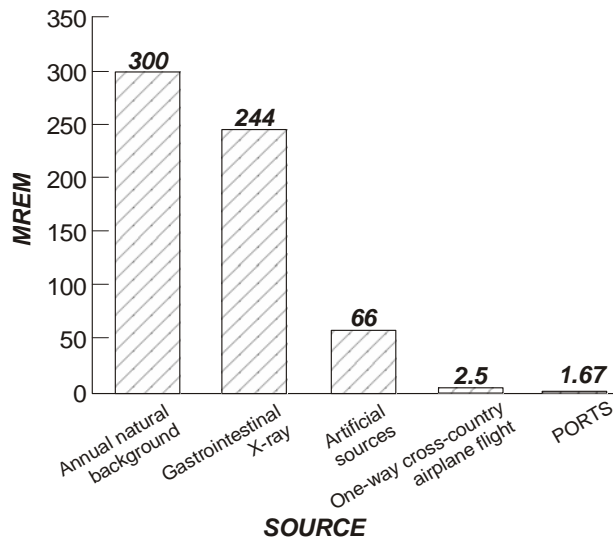


Figure 1. Comparison of dose from various common radiation sources.

This Annual Environmental Report includes radiological dose calculations for the dose to the public from radionuclides released to the environment based on environmental monitoring data collected by both the DOE and USEC. The maximum dose that a member of the public could receive from radiation released by PORTS in 2005 is 1.67 mrem, based on a maximum dose of 0.012 mrem from airborne radionuclides, 0.025 mrem from radionuclides released to the Scioto River, 1.1 mrem from direct radiation from the PORTS depleted uranium cylinder storage yards, and 0.53 mrem based on exposure to radionuclides detected at off-site monitoring locations in 2005. This dose (1.67 mrem) is significantly less than the

100 mrem/year limit set by DOE for the dose to a member of the public from radionuclides from all potential pathways. The dose to a member of the public from airborne radionuclides released by PORTS (0.012 mrem) is also significantly less than the 10 mrem/year standard set by U.S. EPA.

## GROUNDWATER PROGRAMS

Groundwater monitoring at DOE PORTS includes RCRA hazardous waste units, solid waste disposal units, and RCRA Corrective Action Program units. The *Integrated Groundwater Monitoring Plan* describes the groundwater monitoring program for PORTS, which has been reviewed and approved by the Ohio EPA. In general, samples are collected from wells at 11 groundwater monitoring areas and surface water locations that are part of the groundwater monitoring program. Samples are analyzed for metals, volatile organic compounds, and radiological constituents. DOE PORTS then evaluates constituents detected in the groundwater to assess the potential for each constituent to affect human health and the environment.

Some groundwater monitoring is conducted in order to meet DOE Order requirements. Exit pathway monitoring assesses the effect of DOE PORTS on regional groundwater quality and quantity.

Five groundwater contamination plumes have been identified on site at PORTS. The primary groundwater contaminant is trichloroethene. Remediation of groundwater is being conducted, in part, under Ohio EPA's RCRA Corrective Action Program. The contaminated groundwater plumes present at PORTS did not change significantly in 2005. In the southern portion of the X-749/X-120 groundwater plume near the DOE property boundary, trichloroethene decreased in three wells during 2005. In late 2005, trichloroethene and several other volatile organics were detected in the X-749/X-120 plume at concentrations less than 3 micrograms per liter ( $\mu\text{g/L}$  or parts per billion) in an off-site well approximately 45 feet south of the DOE property line.

The *Integrated Groundwater Monitoring Plan* also addresses monitoring of residential water supplies near PORTS to verify that site contaminants have not migrated into off-site drinking water wells. Results of this program indicate that PORTS has not affected drinking water outside the site boundaries.

## **QUALITY ASSURANCE AND QUALITY CONTROL**

Data reliability is of the utmost importance for monitoring releases and measuring radiation in the environment. To demonstrate that the monitoring and measurement results are accurate, DOE PORTS has implemented a quality assurance and quality control program based on guidelines from the U.S. EPA, the American Society for Testing and Materials, and other federal and state agencies. The DOE PORTS staff administers numerous quality control activities to verify reliability of the data on a day-to-day basis. DOE PORTS also participates actively in quality control programs administered by agencies outside the site such as the U.S. EPA.