

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 2009. 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, respectively. PORTS is located on 5.9 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). PORTS gaseous diffusion production facilities that were used for uranium enrichment are currently leased to USEC; however, most activities associated with the gaseous diffusion process ceased in 2001. USEC is responsible for cold shutdown operations and removal of uranium deposits from process equipment. Further, USEC, Inc., the parent company of USEC, is developing a gas centrifuge uranium enrichment facility, the American Centrifuge Plant.

The DOE is responsible for certain environmental restoration and waste management activities, uranium programs, and long-term stewardship of nonleased facilities at PORTS. LATA/Parallax Portsmouth, LLC (LPP), Theta Pro2Serve Management Company, LLC (TPMC) and Uranium Disposition Services, LLC (UDS) managed DOE PORTS programs throughout 2009. LPP was responsible for the following activities: 1) environmental restoration of contaminated areas; 2) environmental monitoring and reporting; 3) disposition of legacy radioactive waste; 4) decontamination and decommissioning of inactive facilities; 5) disposition of highly enriched uranium; and 6) operation of the site's waste storage facilities. TPMC provided infrastructure services including the following: 1) maintenance of facilities, grounds, and roadways; 2) janitorial services; 3) security access for DOE facilities; and 4) information technology/network support for DOE operations.

UDS was responsible for construction of the Depleted Uranium Hexafluoride Conversion Facility at PORTS, the surveillance and maintenance of depleted uranium cylinders, and environmental compliance and monitoring activities associated with UDS operations. Depleted uranium hexafluoride, which was 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 and hydrogen fluoride, which will be shipped off site. The uranium oxide will be disposed as waste, and the hydrogen fluoride will be sold for reuse.

In 2009, DOE Headquarters continued the planning process for decontamination and decommissioning (D&D) of the PORTS gaseous diffusion facilities and associated buildings. D&D includes removing equipment, demolishing buildings, disposing of wastes, and investigating potential contamination beneath the demolished buildings.

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 or the responsible DOE contractor has been issued permits for discharge of water to surface streams, 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 biennial report of specified non-radiological air emissions; a monthly report of National Pollutant Discharge Elimination System (NPDES) monitoring data; a quarterly radiological discharge monitoring report for NPDES outfalls; 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 current USEC operations.

DOE PORTS received one Notice of Violation during 2009. During a hazardous waste inspection on December 16, 2009, the Ohio Environmental Protection Agency (EPA) identified a deficiency in the paperwork required for one shipment of hazardous waste. The paperwork was immediately corrected and procedures for preparation and review of the documentation for hazardous waste shipments were revised to address these deficiencies. There was no environmental harm or risk to human health from the error in completing the hazardous waste shipment paperwork.

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.

In 2009, DOE PORTS received \$118 million in funding under the American Recovery and Reinvestment Act (ARRA). Five projects that involve environmental remediation, D&D of inactive facilities, or materials disposition were underway at the end of 2009. These projects are: environmental remediation (source removal) at the X-701B Holding Pond; D&D of the X-533 Switchyard Complex, X-633 Cooling Towers Complex, and X-760 Chemical Engineering Building; and repackaging and disposition of excess uranium materials.

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 1989 Ohio Consent Decree and the 1989 U.S. EPA Administrative Consent Order (as amended in 1994 and 1997) 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, also called remedial actions, are underway in each quadrant.

In 2009, DOE contractors installed an additional groundwater extraction well in the Quadrant I Groundwater Investigative Area, conducted an investigation of potential contaminant sources in the Quadrant II Groundwater Investigative Area, and evaluated remedial alternatives for the X-701B Holding Pond and the groundwater plume near the former X-740 Waste Oil Handling Facility. DOE proposed to excavate soil in the western portion of the X-701B area and directly mix oxidant into the contaminated soil. Ohio EPA approved this additional action in October 2009 and excavation and soil mixing began in December 2009.

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 2009, approximately 7 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 listed under RCRA or waste 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-contaminated materials is regulated under the Toxic Substances Control Act (TSCA).
- *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 the first three waste types listed above; for example, some wastes are both RCRA hazardous waste and low-level radioactive waste (called mixed waste).

In addition to complying with DOE Orders and Ohio EPA/U.S. EPA regulations, the DOE has also implemented supplemental policies for waste management at PORTS 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 207), 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). The email address is eic@wems-llc.com. Additional information is provided by the DOE Site Office (740-897-5010) and the LPP Office of Public Affairs (740-897-2336). This Annual Environmental Report and other information can also be obtained from the PORTS web site at www.pppo.energy.gov.

The PORTS Site Specific Advisory Board, comprised of up to 20 citizens from the local area, provides public input and recommendations to the DOE on environmental remediation, waste management, and related issues at PORTS. Additional information about the board can be obtained at www.ports-ssab.org or by calling 740-289-5249.

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, notices of document availability and public comment periods, as well as other communications on the program, are regularly distributed to the local newspaper and those on the community relations mailing list, neighbors within 2 miles of the plant, and plant employees.

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 2009, 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
- Biota

Data collected for these programs in 2009 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 Chapter 6, Groundwater Programs.

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 the United States receives an average dose of approximately 311 mrem/year from natural sources of radiation (National Council on Radiation Protection [NCRP] 2009). Figure 1 provides a comparison of the doses from various common radiation sources.

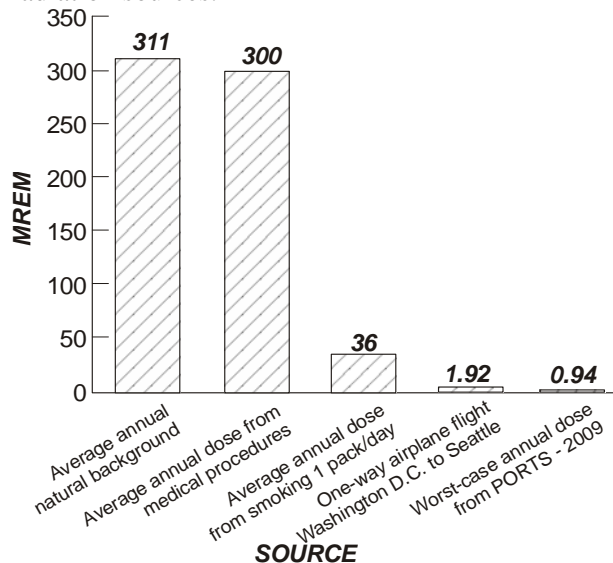


Figure 1. Comparison of dose from various common radiation sources (NCRP 2009).

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 2009 is 0.94 mrem, based on a maximum dose of 0.024 mrem from airborne radionuclides, 0.037 mrem from radionuclides released to the Scioto River, 0.72 mrem from direct radiation from the PORTS depleted uranium cylinder storage yards, and 0.16 mrem based on exposure to radionuclides detected at off-site monitoring locations in 2009. This dose calculation uses a worst-case approach; that is, the calculation assumes that the same individual is exposed to the most extreme conditions from each pathway. This dose (0.94 mrem) is

significantly less than the 100 mrem/year limit set by the 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 (0.024 mrem) is also significantly less than the 10 mrem/year standard set by U.S. EPA.

GROUNDWATER PROGRAMS

Groundwater monitoring at DOE PORTS is performed at 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 13 surface water locations that are part of the groundwater monitoring program. Samples are analyzed for metals, volatile organic compounds, and/or 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 in the following areas: X-749/X-120/Peter Kiewit (PK) Landfill (Quadrant I), Quadrant I Groundwater Investigative Area, Quadrant II Groundwater Investigative Area, X-701B Holding Pond (Quadrant II), and X-740 Waste Oil Handling Facility (Quadrant III). The primary groundwater contaminant is trichloroethene. Other monitoring areas may have groundwater contaminated with metals or may be monitored to comply

with regulatory requirements for closed landfills. Remediation of groundwater is being conducted primarily under Ohio EPA's RCRA Corrective Action Program.

Concentrations of trichloroethene are decreasing and the groundwater plumes are shrinking in both monitoring areas in Quadrant I (the X-749/X-120/PK Landfill area and the Quadrant I Groundwater Investigative Area). Although trichloroethene is still detected in one off-site monitoring well associated with the X-749/X-120/PK Landfill groundwater plume, concentrations of trichloroethene in the well have decreased to less than 1 µg/L from concentrations up to 4 µg/L in 2006. Trichloroethene has not been detected in groundwater beyond the DOE property boundary at concentrations that exceed the EPA drinking water standard of 5 µg/L. In general, the other contaminated groundwater plumes present at PORTS did not change significantly in 2009.

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 wells 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.