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# U.S. Department of Energy
# Portsmouth Annual Environmental Report
# for 2004
# Piketon, Ohio

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LATA/PARALLAX PORTSMOUTH, LLC
managing the
Environmental Remediation Activities at the
Portsmouth Gaseous Diffusion Plant
under contract DE-AC24-05OH20192
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U.S. DEPARTMENT OF ENERGY

This document is approved for public release
per review by:

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PORTS Classification/Information Office Date

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# ACRONYMS

| | |
|---|---|
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| Ci | curie |
| DOE | U.S. Department of Energy |
| DOE PORTS | facilities operated by DOE (not leased to USEC) at the Portsmouth Gaseous Diffusion Plant |
| EPA | Environmental Protection Agency |
| kg | kilogram |
| LLW | low-level radioactive waste |
| MCL | maximum contaminant level |
| mg/kg | milligram per kilogram (equivalent to part per million) |
| mg/L | milligram per liter (equivalent to part per million) |
| $\mu$g/g | microgram per gram (equivalent to part per million) |
| $\mu$g/L | microgram per liter (equivalent to part per billion) |
| $\mu g/m^3$ | microgram per cubic meter |
| mrem | millirem |
| NPDES | National Pollutant Discharge Elimination System |
| PCB | polychlorinated biphenyl |
| pCi/g | picocurie per gram |
| pCi/L | picocurie per liter |
| pCi/mL | picocurie per milliliter |
| PK | Peter Kiewit |
| PORTS | Portsmouth Gaseous Diffusion Plant |
| ppb | part per billion |
| ppm | part per million |
| RCRA | Resource Conservation and Recovery Act |
| TSCA | Toxic Substances Control Act |
| USEC | United States Enrichment Corporation |

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# DEFINITIONS

**absorption** – The process by which the number and energy of particles or photons entering a body of matter are reduced by interaction with the matter.

**activity** – See "radioactivity."

**alpha particle** – A positively charged particle having the same charge and mass as that of a helium nucleus (two protons and two neutrons). Alpha particles are emitted from the nucleus of an atom during radioactive decay.

**ambient air** – The atmosphere around people, plants, and structures.

**analyte** – A constituent or parameter being analyzed.

**aquifer** – A geologic formation capable of yielding a significant amount of groundwater to wells or springs.

**atom** – Smallest particle of an element capable of entering into a chemical reaction.

**background radiation** – Radiation that occurs naturally in the surrounding environment.

**beta particle** – A negatively charged particle emitted from the nucleus of an atom during radioactive decay. It has a mass and charge equal to those of an electron.

**biota** – The animal and plant life of a particular region considered as a total ecological entity.

**categorical exclusion** – A class of actions that either individually or cumulatively would not have a significant effect on the human environment and therefore would not require preparation of an environmental assessment or environmental impact statement under the National Environmental Policy Act.

**chain-of-custody** – A form that documents sample collection, transport, and analysis.

**closure** – Control of a closed hazardous waste management facility under Resource Conservation and Recovery Act requirements.

**compliance** – Fulfillment of applicable regulations or requirements of a plan or schedule ordered or approved by a government authority.

**concentration** – The amount of a substance contained in a unit volume or mass of a sample.

**contamination** – Deposition of unwanted material on the surfaces of structures, areas, objects, or personnel.

**cosmic radiation** – Ionizing radiation with very high energies that originates outside the earth's atmosphere. Cosmic radiation is one contributor to natural background radiation.

**critical habitat** – Specific areas that may require special management considerations or protection and on which physical or biological features essential to the conservation of a species are found.

**curie (Ci)** – A unit of radioactivity. One curie is defined as $3.7 \times 10^{10}$ (37 billion) disintegrations per second. Several fractions and multiples of the curie are commonly used:

**kilocurie (kCi)** – $10^{3}$ Ci, one thousand curies; $3.7 \times 10^{13}$ disintegrations per second.
**millicurie (mCi)** – $10^{-3}$ Ci, one-thousandth of a curie; $3.7 \times 10^{7}$ disintegrations per second.
**microcurie ($\mu$Ci)** – $10^{-6}$ Ci, one-millionth of a curie, $3.7 \times 10^{4}$ disintegrations per second.
**picocurie (pCi)** – $10^{-12}$ Ci, one-trillionth of a curie; 0.037 disintegration per second.

**decontamination and decommissioning** – The cleanup and removal of buildings, structures, or objects contaminated with hazardous substances during past production or disposal activities.

**derived concentration guide** – The concentration of a radionuclide in air or water that under conditions of continuous exposure for one year by one exposure mode (i.e., ingestion of water, submersion in air, or inhalation) would result in either an effective dose equivalent of 0.1 rem or a dose equivalent of 5 rem to any tissue, including skin and the lens of the eye. The guidelines for radionuclides in air and water are provided in DOE Order 5400.5, *Radiation Protection of the Public and the Environment.*

**dissolved solids** – Organic or inorganic material dissolved in water. Excessive amounts of dissolved solids make water unfit to drink or to use in industrial processes.

**downgradient** – In the direction of groundwater flow.

**downgradient well** – A well installed hydraulically downgradient of a site that may be capable of detecting migration of contaminants from a site.

**effluent** – A liquid or gaseous waste discharge to the environment.

**effluent monitoring** – The collection and analysis of samples or measurement of liquid and gaseous effluents to characterize and quantify the release of contaminants, assess radiation exposures to the public, and demonstrate compliance with applicable standards.

**Environmental Restoration** – A DOE program that directs the assessment and cleanup of its sites (remediation) and facilities (decontamination and decommissioning) contaminated with waste as a result of nuclear-related activities.

**exposure (radiation)** – The incident of radiation on living or inanimate material by accident or intent. Background exposure is the exposure to natural background ionizing radiation. Occupational exposure is exposure to ionizing radiation that takes place at a person's workplace. Population exposure is the exposure to the total number of persons who inhabit an area.

**external radiation** – The exposure to ionizing radiation when the radiation source is located outside the body.

**formation** – In geologic terms, a unit of rock or a unit of material that could form a rock such as sand.

**friable** – The ability of a material to be pulverized, crumbled, or reduced to powder by hand pressure when dry.

**gamma ray** – High-energy short-wavelength electromagnetic radiation emitted from the nucleus of a charged atom. Gamma rays are identical to X-rays except for the source of the emission.

**glove box** – An enclosure with built-in sleeves and gloves used by a person to manipulate hazardous materials such as highly enriched uranium without directly exposing the person to the material.

**groundwater** – Water below the land surface in a zone where all void space between rocks, soil, etc., is filled with water.

**hexavalent** – A compound that has six valence electrons.

**half-life, radiological** – The time required for half of a given number of atoms of a specific radionuclide to decay. Each nuclide has a unique half-life.

**industrial solid waste landfill** – A type of landfill that exclusively disposes of solid waste generated by manufacturing or industrial operations.

***in situ*** – In its original place; field measurements taken without removing the sample from its origin; remediation performed while the contaminated media (e.g., groundwater) remains below the surface.

**interim remedial measure** – Cleanup activities initiated after it has been determined that contamination or waste disposal practices pose an immediate threat to human health and/or the environment. These measures are implemented until a more permanent solution can be made.

**internal radiation** – Occurs when natural radionuclides enter the body by ingestion of food or water or by inhalation. Radon is the major contributor to the annual dose equivalent for internal radionuclides.

**ion** – An atom or compound that carries an electrical charge.

**irradiation** – Exposure to radiation.

**isotopes** – Forms of an element having the same number of protons but differing numbers of neutrons in their nuclei.

**leachate** – A liquid that results from water collecting contaminants as it trickles through wastes, agricultural pesticides, or fertilizers. Leachate may occur in farming areas, feed lots, and landfills and may result in hazardous substances entering surface water, groundwater, or soil.

**manifest** – A form required by RCRA that is used to document and track waste during transportation and disposal.

**maximally exposed individual** – A hypothetical individual who remains in an uncontrolled area and would, when all potential routes of exposure from a facility's operations are considered, receive the greatest possible dose equivalent.

**maximum contaminant level** – The maximum permissible level of a contaminant in drinking water provided by a public water system.

**migration** – The transfer or movement of a material through air, soil, or groundwater.

**monitoring** – Process whereby the quantity and quality of factors that can affect the environment or human health are measured periodically to regulate and control potential impacts.

**mrem** – Millirem: the dose equivalent that is one-thousandth of a rem.

**natural radiation** – Radiation from cosmic and other naturally occurring radionuclide sources (such as radon) in the environment.

**nuclide** – An atom specified by atomic weight, atomic number, and energy state. A radionuclide is a radioactive nuclide.

**outfall** – The point of conveyance (e.g., drain or pipe) of wastewater or other effluents into a ditch, pond, or river.

**person-rem** – Collective dose to a population group. For example, a dose of 1 rem to 10 individuals results in a collective dose of 10 person-rem.

**pH** – A measure of the hydrogen ion concentration in an aqueous solution. Acidic solutions have a pH from 0 to 7, neutral solutions have a pH equal to 7, and basic solutions have a pH from 7 to 14.

**polychlorinated biphenyl (PCB)** –An industrial compound, used primarily as a lubricant, which is produced by adding chlorine to biphenyl, a colorless, crystalline compound.

**preliminary remediation goal** – The concentration of a constituent in environmental media (soil, groundwater, etc.) that is considered protective of human health and the environment.

**quality assurance** – Any action in environmental monitoring to demonstrate the reliability of monitoring and measurement data.

**quality control** – The routine application of procedures within environmental monitoring to obtain the required standards of performance in monitoring and measurement processes.

**rad** – The unit of absorbed dose deposited in a volume of material.

**radioactivity** – The spontaneous emission of radiation, generally alpha or beta particles or gamma rays, from the nucleus of an unstable isotope.

**radioisotopes** – Radioactive isotopes.

**radionuclide** – A radioactive nuclide capable of spontaneous transformation into other nuclides by changing its nuclear configuration or energy level. This transformation is accomplished by the emission of photons or particles.

**release** – Any discharge to the environment. "Environment" is broadly defined as any water, land, or ambient air.

**rem** – The unit of dose equivalent (absorbed dose in rads multiplied by the radiation quality factor). Dose equivalent is frequently reported in units of millirem (mrem), which is one-thousandth of a rem.

**remediation** – The correction or cleanup of a site contaminated with waste. See "Environmental Restoration."

**reportable quantity** – A release to the environment that exceeds reportable quantities as defined by the Comprehensive Environmental Response, Compensation, and Liability Act.

**Resource Conservation and Recovery Act (RCRA)** – Legislation that regulates the transport, treatment, and disposal of solid and hazardous wastes.

**source** – A point or object from which radiation or contamination emanates.

**stable** – Not radioactive or not easily decomposed or otherwise modified chemically.

**Superfund** – The program operated under the legislative authority of the Comprehensive Environmental Response, Compensation, and Liability Act and Superfund Amendments and Reauthorization Act that funds and conducts EPA emergency and long-term removal and remedial actions.

**surface water** – All water on the surface of the earth, as distinguished from groundwater.

**suspended solids** – Mixture of fine, nonsettling particles of any solid within a liquid or gas.

**terrestrial radiation** – Ionizing radiation emitted from radioactive materials in the earth's soils such as potassium-40, thorium, and uranium. Terrestrial radiation contributes to natural background radiation.

**transuranics** – Elements such as plutonium and neptunium that have atomic numbers (the number of protons in the nucleus) greater than 92. All transuranics are radioactive.

**trichloroethene** – A colorless liquid used in many industrial applications as a cleaner and/or solvent. One of many chemicals that is classified as a volatile organic compound.

**trip blank** – A quality control sample of water that accompanies sample containers from the analytical laboratory, to the field sampling location where environmental samples are collected, back to the analytical laboratory to determine whether environmental samples have been contaminated during shipment.

**troughing system** – A system designed to collect leaking PCBs in the PORTS process buildings.

**turbidity** – A measure of the concentration of sediment or suspended particles in solution.

**upgradient** – In the opposite direction of groundwater flow.

**upgradient well** – A well installed hydraulically upgradient of a site to provide data to compare to a downgradient well to determine whether the site is affecting groundwater quality.

**volatile organic compounds** – Chemicals composed primarily of hydrogen, oxygen, and carbon that readily volatilize into the air. They include light alcohols, acetone, trichloroethene, dichloroethene, benzene, vinyl chloride, toluene, methylene chloride, and many other compounds.

**wetland** – An area that is inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, floodplains, fens, and similar areas. A jurisdictional wetland is one that falls under state or federal regulatory authority; a non-jurisdictional wetland does not.

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# EXECUTIVE SUMMARY

## SITE AND OPERATIONS OVERVIEW

The Portsmouth Gaseous Diffusion Plant (PORTS), which began operation in 1954, is one of two uranium enrichment facilities in the United States (see Fig. 1). In 1993, the U.S. Department of Energy (DOE) began leasing the uranium enrichment production and operations facilities at PORTS to the United States Enrichment Corporation (USEC). USEC enriched uranium at PORTS for use in commercial nuclear power reactors until May 2001 when USEC ceased production. At that time, USEC placed the production facilities at PORTS into a cold standby mode, under a contract with DOE. The cold standby mode allows the plant to be maintained in a condition so that uranium enrichment production could restart within 18-24 months, if necessary.

In January 2004, USEC, Inc. (the parent company of USEC) announced that its commercial scale American Centrifuge uranium enrichment plant would be built at PORTS. The plant is expected to employ up to 500 people and be operational by 2010. Additionally, a groundbreaking ceremony was held on July 28, 2004 for the Depleted Uranium Hexafluoride Conversion Facility at PORTS. Depleted uranium hexafluoride, which was produced by the gaseous diffusion process, is stored in cylinders on site and at the former gaseous diffusion plant in Oak Ridge, Tennessee. The facility will convert the depleted uranium hexafluoride from both PORTS and Oak Ridge cylinders to uranium oxide, which will be shipped off site.

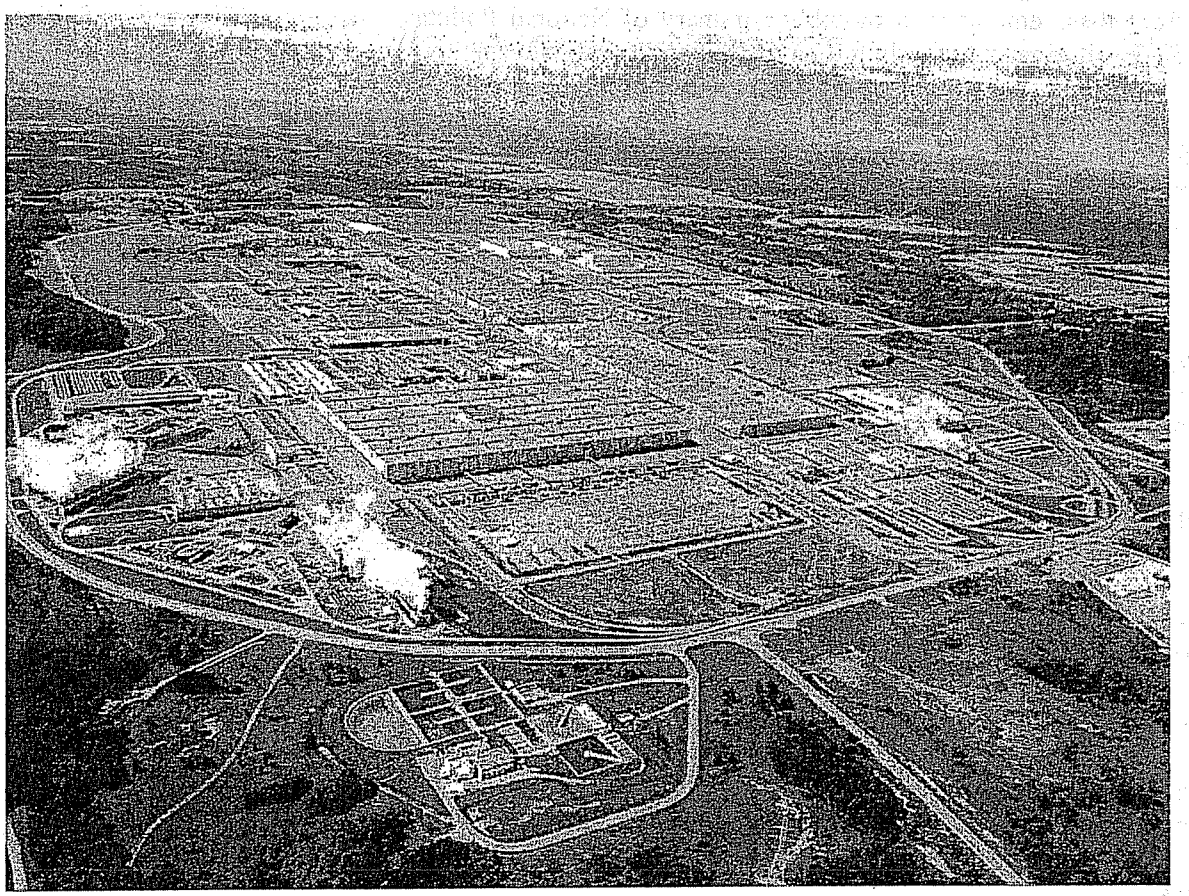

**Fig. 1. The Portsmouth Gaseous Diffusion Plant.**

DOE is responsible for certain environmental restoration and waste management activities, uranium programs, and long-term stewardship of nonleased facilities at PORTS. USEC is responsible for cold standby operations, removal of uranium deposits from process equipment, and the proposed gas centrifuge operations. With the exception of Chap. 2, Compliance Summary; Chap. 4, Environmental Radiological Program Information; and Chap. 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.

Bechtel Jacobs Company LLC managed the DOE programs at PORTS from April 1, 1998 through 2004.

PORTS is located on 5.8 square miles in Pike County, Ohio. The county has approximately 27,700 residents.

## 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 wastes. 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 2004, 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 alleged training and labeling deficiencies, alleged improper designation of an area where a container was stored, and alleged inspection deficiencies. DOE corrected the alleged deficiencies identified in the Notices of Violation. The Notices of Violation and DOE's responses are summarized in Sect. 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. 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.

In December 2003, 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, groundwater treatment through injection and recirculation of a chemical oxidant, and phytoremediation, if necessary. Planning to implement these corrective actions took place throughout 2004, with field activities beginning in 2005.

In 2004, a project began 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. 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 April 2004. By the end of 2004, concentrations of volatile organics had decreased in two monitoring wells in this area.

As required by Ohio EPA, corrective actions in Quadrants III and IV were maintained and monitored in 2004.

**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 2004, approximately 9.5 million lbs 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 (LLW)* – 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).

Many of the wastes generated by DOE PORTS are a combination of these waste types; for example, some wastes are both RCRA hazardous waste and low-level radioactive waste. Waste that is not any of these types is considered industrial sanitary 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**

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 on the plant site just outside the E-Vehicle portal and is open 9 a.m. to 12 p.m. Monday and Tuesday, 12 p.m. to 4 p.m. Wednesday and Thursday, or by appointment (740-289-3317). Due to additional security measures in place at the plant post-September 11, 2001, members of the public must call the Information Center in advance at the number listed above to be placed on the visitor list prior to visiting the Information Center. Additional information is provided by the DOE Site Office (740-897-5010) and the LATA/Parallax Portsmouth 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.

Semiannual 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 2004, 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.

Data collected for these programs in 2004 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. 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 2 provides a comparison of the doses from various common radiation sources.

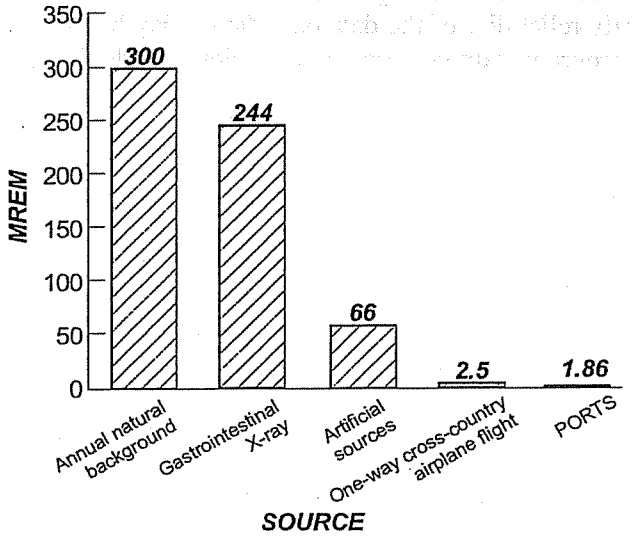


**Fig. 2. Comparison of dose from various common radiation sources.**

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 DOE and USEC. The maximum dose a member of the public could receive from radiation released by PORTS in 2004 is 1.86 mrem, based on a maximum dose of 0.031 mrem from airborne radionuclides, 0.038 mrem from radionuclides released to the Scioto River, 1 mrem from direct radiation from the PORTS depleted uranium cylinder storage yards, and 0.79 mrem based on exposure to radionuclides detected at off-site monitoring locations in 2004.

## 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 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 2004. In the southern portion of the X-749/X-120 groundwater plume near the DOE property boundary, injection of hydrogen release compounds caused decreases in the concentrations of trichloroethene in two monitoring wells. Trichloroethene and two other volatile organics were detected at estimated concentrations less than 1 $\mu$g/L (1 part per billion) in an off-site monitoring 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.

# 1. INTRODUCTION

## 1.1 SUMMARY

The Portsmouth Gaseous Diffusion Plant (PORTS) is located on a 5.8-square-mile site in a rural area of Pike County, Ohio. U.S. Department of Energy (DOE) activities at PORTS include environmental restoration, waste management, and long-term stewardship of the facilities that are not leased to the United States Enrichment Corporation (USEC). Production facilities for the separation of uranium isotopes are currently leased to USEC, but most activities associated with the gaseous diffusion process of uranium enrichment ceased in 2001. USEC, Inc. (the parent company of USEC) is currently constructing the American Centrifuge uranium enrichment plant at PORTS. In general, USEC activities are not covered by this document, with the exception of some environmental compliance information provided in Chap. 2 and radiological and non-radiological environmental monitoring program information discussed in Chaps. 4 and 5.

## 1.2 INTRODUCTION

PORTS, which began operation in 1954, is owned by DOE. Effective July 1, 1993, DOE leased the production facilities at the site to USEC, which was established by the Energy Policy Act of 1992. USEC became a publicly-held corporation in 1998. USEC enriched uranium at PORTS for use in commercial nuclear power reactors until May 2001 when USEC ceased production. At that time, USEC placed the production facilities at PORTS into a cold standby mode under a contract with DOE. In 2002, USEC, Inc. decided to site a small-scale demonstration centrifuge for uranium enrichment at PORTS, and in January 2004, USEC, Inc. announced that its commercial scale American Centrifuge uranium enrichment plant would be built at PORTS. The plant is expected to employ up to 500 people and be operational by 2010.

Additionally, a groundbreaking ceremony was held on July 28, 2004 for the Depleted Uranium Hexafluoride Conversion Facility at PORTS. Depleted uranium hexafluoride, which was produced by the gaseous diffusion process, is stored in cylinders on site and at the former gaseous diffusion plant in Oak Ridge, Tennessee. The facility will convert the depleted uranium hexafluoride from both PORTS and Oak Ridge cylinders into uranium oxide, which will be shipped off site. The facility is being constructed and initially operated by Uranium Disposition Services, LLC.

Bechtel Jacobs Company, LLC managed the DOE programs at PORTS from April 1, 1998 throughout 2004.

This report is intended to fulfill the requirements of DOE Order 231.1A, *Environment, Safety and Health Reporting*. This DOE Order requires development of an Annual Site Environmental Report that includes information on regulatory compliance, environmental programs, radiological and non-radiological monitoring programs, groundwater programs, and quality assurance. This report is not intended to present all of the monitoring data at PORTS. Additional data collected for other site purposes, such as environmental restoration and waste management, are presented in other documents that have been prepared in accordance with applicable laws and regulations. These data are presented in other reports, such as the *2004 Groundwater Monitoring Report* and the *2004 Annual Hazardous Waste Report*, which are available at the DOE PORTS Environmental Information Center.

## 1.3 DESCRIPTION OF SITE LOCALE

DOE PORTS is located in a rural area of Pike County, Ohio, on a 5.8-square-mile site (see Fig. 1.1). The site is 2 miles east of the Scioto River in a small valley running parallel to and approximately 120 feet above the Scioto River floodplain. Figure 1.2 depicts the plant site and its immediate environs.

Pike County has approximately 27,700 residents. Scattered rural development is typical; however, the county contains a number of small villages such as Piketon and Beaver that lie within a few miles of the plant. The county's largest community, Waverly, is about 10 miles north of the plant and has a population of about 4,400 residents. The nearest residential center in this area is Piketon, which is about 5 miles north of the plant on U.S. Route 23 with a population of about 1,900. Several residences are adjacent

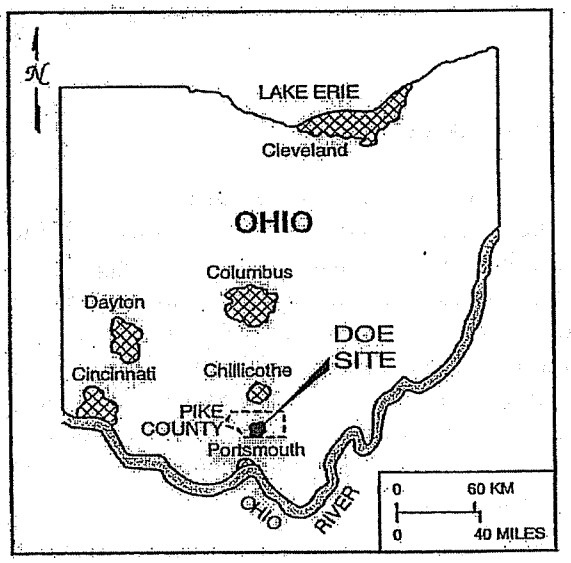


**Fig. 1.1. Location of PORTS within the State of Ohio.**

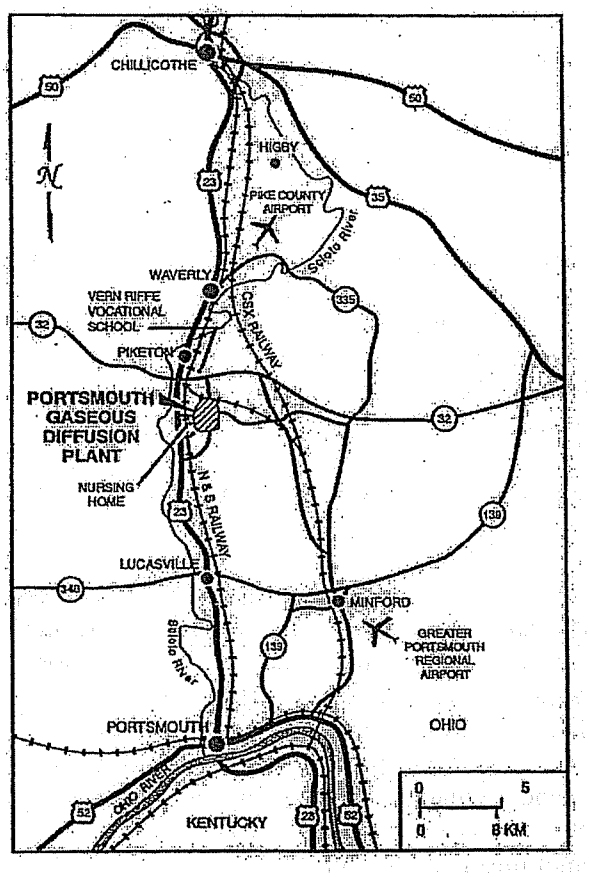


**Fig. 1.2. Location of PORTS in relation to the geographic region.**

to the southern half of the eastern boundary and along Wakefield Mound Road (old U.S. 23), directly west of the plant. One nursing home, with a capacity of 36 persons, is located along Wakefield Mound Road.

Additional population centers within 50 miles of the plant are Portsmouth (population 20,909), 22 miles south; Chillicothe (population 21,796), 27 miles north; and Jackson (population 6,184), 18 miles east (2000 U.S. Census). The total population within 50 miles of the plant is approximately 600,000 persons.

## 1.4 DESCRIPTION OF SITE OPERATIONS

DOE, through its managing contractor, is responsible for the Environmental Restoration, Waste Management, and Uranium Programs at the plant, as well as other nonleased DOE property. The Environmental Restoration Program performs remedial investigations and remedial actions to define the nature and extent of contamination; evaluate the risk to public health and the environment; and remediate areas of contamination at PORTS. The goal of the Environmental Restoration Program is to verify that releases from past operations at DOE

PORTS are thoroughly investigated and that remedial actions are taken to protect human health and the environment.

The Waste Management Program is responsible for managing wastes generated at the site. Wastes must be identified and stored in accordance with all environmental regulations. The Waste Management Program also arranges transportation and off-site disposal of wastes. The goal of the Waste Management Program is to manage waste from the time it is generated to its ultimate treatment, recycling, or disposal in accordance with all applicable regulations.

The Uranium Program is responsible for the cost-effective management of PORTS facilities and real property retained by DOE. Responsibilities include managing contracts between DOE PORTS and other subcontractors for such services as maintenance, utilities, chemical operations, uranium material handling, and laboratory analysis. The Uranium Program also oversees the management and coordination of the PORTS Depleted Uranium Hexafluoride Program and warehousing of uranium materials.

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