

*2026 U.S. Department of Energy
PORTS Annual Site Environmental Report (ASER):
Student Summary*



Message from the U.S. Department of Energy

The U.S. Department of Energy's (DOE) Portsmouth Site (PORTS) is committed to the expeditious and safe environmental cleanup of the former Portsmouth Gaseous Diffusion Plant. Our highest priority is the safety of our workforce, our community and the surrounding environment. To confirm cleanup operations are maintaining regulatorily safe standards, DOE conducts environmental monitoring on an ongoing basis. Each year, the information collected is presented in a comprehensive publication entitled the Annual Site Environmental Report (ASER). It is the principal document used to summarize environmental conditions, monitoring data and regulatory compliance at DOE sites across the nation.

Generating interest in the site and its science-based mission to prepare the next generation of local site workforce is also a high priority for DOE. Through a grant with Ohio University (OU), two high schools from the surrounding area are selected each year to participate in the Student ASER project. The classes use the most recent ASER as a springboard for learning about the site's history and the science of sampling, data and risk results. Classes work with site subject matter experts and academic professionals from OU to understand the technical elements of the report that allow them to develop material in their own words.

At the end of the year, students produce a summarized report known as the Student ASER. This document serves the public by accurately translating complex technical information into clear, relatable language for non-technical audiences. Students conclude the annual program by participating in a public outreach session to present their academically produced posters.

DOE would like to offer its sincerest appreciation to the students and faculty leaders at the Pike CTC and Portsmouth West high schools, this year's participants in the Student ASER program. We congratulate the student's commitment, desire, effort, and enthusiasm who successfully completed the 15th annual Student ASER.

Teams and Partners

Production Team

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Special Thanks To

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Richard Smalley, Portsmouth West High School

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Stephanie Howe, Director of Energy Programs, PORTSfuture Program Director, OU Voinovich School of Leadership and Public Service

Samantha Reese, Senior Director of Finance, OU Voinovich School of Leadership and Public Service

Pike County Career Technology Center (CTC) Student Recognition 2025-2026



The students of Mr. Matt Lawson's physics class at Pike CTC worked in collaboration with Ohio University's Voinovich School of Leadership and Public Service PORTSfuture Program to produce this ASER Student Summary report. The Voinovich School thanks the students for their hard work. Their effort in this public service is much appreciated and worthy of special recognition. The high school students who participated in this year's project are listed below:



Wyatt Brownfield, Malachi Lamerson, Noah Cooper, Alexandra Vulgamore, Rayse Fredrick, Brody Collins, Hayden Barker, Jack Holsinger, Carter (CJ) Jones, Slade McGraw, Storm Jennings, Kevin Coate, Isiah Mcquay, Donte McCary, Mykala Ledbetter, Kolton Young, Josiah Satterfield, Eloisa (Ellie) Farmer, Mara Conley, Timothy (Tim) Perry, Joseph (Chase) Ware, Brooklyn Cossey

Portsmouth West High School Student Recognition 2025-2026



The students of Mr. Richard Smalley's chemistry class at Portsmouth West High School worked in collaboration with Ohio University's Voinovich School of Leadership and Public Service PORTSfuture Program to produce this ASER Student Summary report. The Voinovich School thanks the students for their hard work. Their effort in this public service is much appreciated and worthy of special recognition. The high school students who participated in this year's project are listed below:

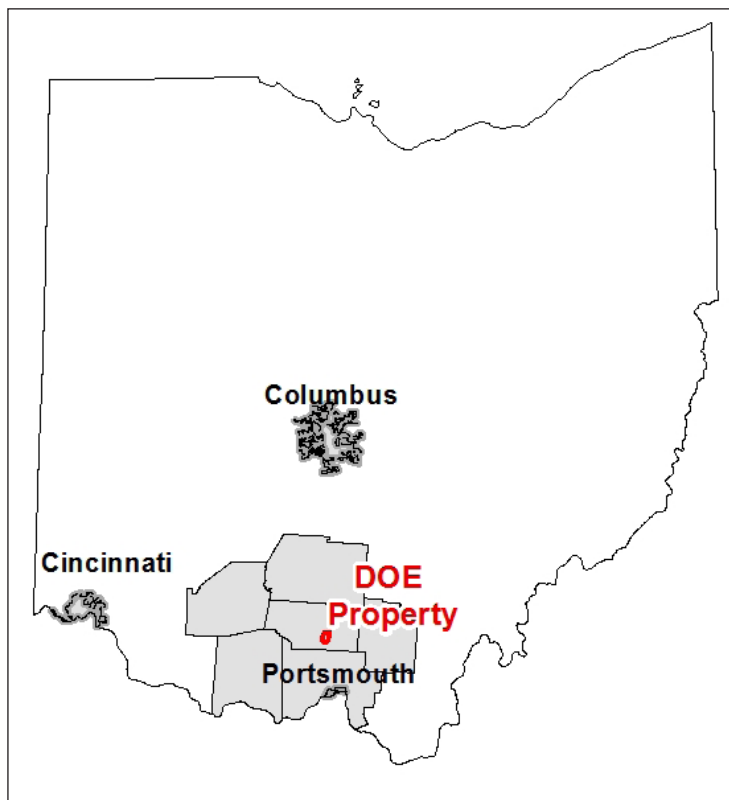


Adriann Carver, Laiken Caudill, Roschelle Cantrell, Luke Elliot, Bralyn Newman, Ethan Patton, Cristian Quirasco, Rileigh Miller, Chloe Bryant

Annual Site Environmental Report (ASER)

The Portsmouth Gaseous Diffusion Plant located in Pike County, Ohio, was the DOE's third plant of its kind. Selection criteria for this specific plant included the abundance of water resources, reliable electric power, and a dependable labor force. With construction beginning in 1952, production of enriched uranium for nuclear defense and energy systems was initiated in 1954 and continued through 2001.

In total, the plant site occupies 5.4 square miles of land within rural Pike County, Ohio, surrounded by farmland and wooded hills, as well as private residences. Home to just over 27,000 residents (according to the 2020 Census), Pike County contains several small villages among scattered rural development including the communities of Piketon, Beaver, and Waverly, all within 10 miles of the PORTS site. Little Beaver Creek flows northwest through the middle of the site, two additional streams are located in the southern portions of the industrialized area, and Big Run Creek flows in the southeast region of the site. All streams flowing through the site discharge into the Scioto River.



Map: Matt Trainer, Voinovich School of Leadership and Public Service

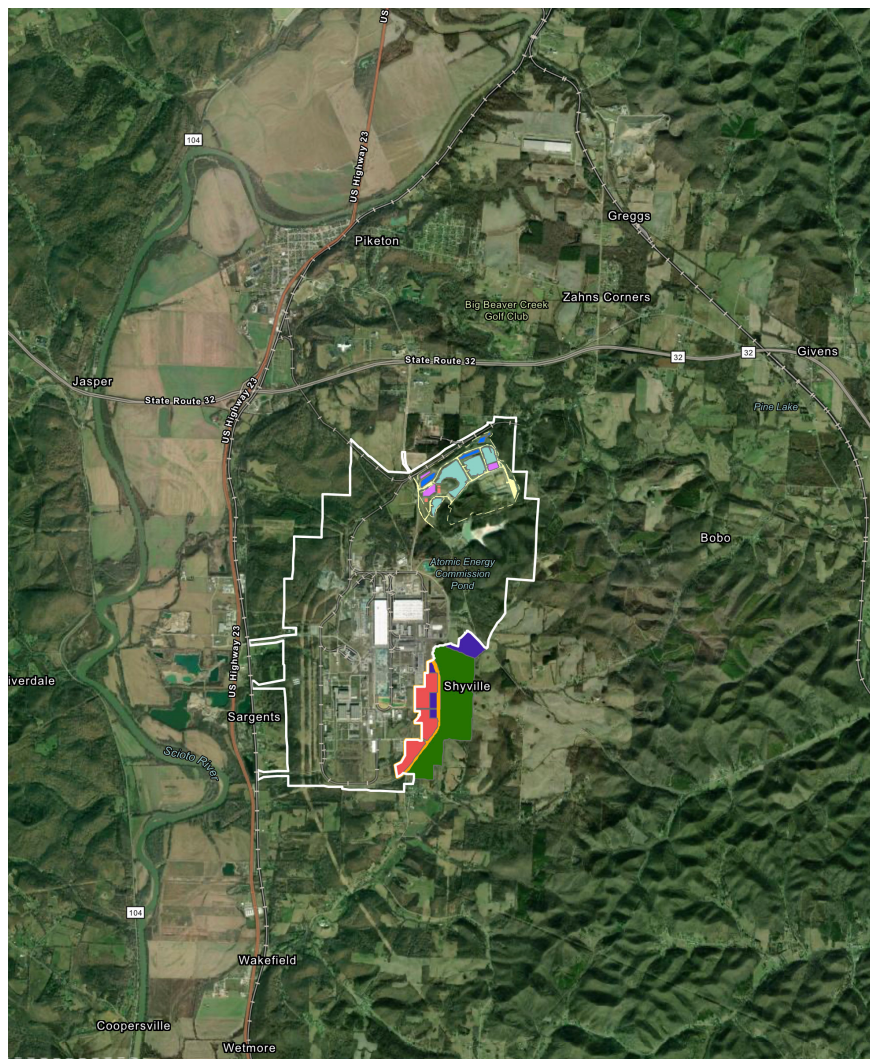
Uranium enrichment occurred at the PORTS site for 45 years with the latter half managed by the United States Enrichment Corporation (USEC), which began leasing the plant in 1993. Enrichment of uranium concluded in 2001. At present, DOE and managing contractors are responsible for deactivation and demolition (D&D) gaseous diffusion uranium enrichment buildings and other associated facilities. Additional responsibilities include environmental restoration, waste management, uranium management, risk evaluation, and remediation efforts. Various tasks are associated with D&D including deactivation of equipment, removal and cleansing of residue on equipment, structures, and piping, and dismantling and removal of equipment, structures, and piping that are no longer part of current operations. Additionally, this endeavor involves evaluation of alternatives for the disposition of waste produced through this process. Environmental program and activities efforts involve investigation into past operational releases associated with uranium enrichment through the gaseous diffusion process and implementation of necessary remedial measures to protect the health of both humans and the environment. Investigations involve defining the nature and extent of contamination, evaluation of potential risks, implementation of remediation efforts, and continued monitoring. Waste management involves waste generated by DOE activities at PORTS including those resulting from D&D, environmental restoration, and the Depleted

Annual Site Environmental Report (ASER)

Uranium Hexafluoride (DUF6) Conversion Facility. Waste is identified and stored in accordance with environmental regulations through generation to treatment, recycling, or disposal. Uranium management includes management of uranium product and coordination with the DUF6 Conversion Facility. The ASER is a key component of DOE's effort to keep the public informed about environmental conditions at PORTS.

References

- DOE 2025. U.S. Annual Site Environmental Report-2024, Piketon, Ohio, DOE/PPPO/03-1327&D1, U.S. Department of Energy, Piketon, OH, October 2025.



Map: Matt Trainer, Voinovich School of Leadership and Public Service

PORTSfuture Program & STEM Enrichment

Students from Pike County, Ohio, have been participating in the Ohio University Voinovich School of Leadership and Public Service PORTSfuture project, funded by a grant from the U.S. DOE of Environmental Management Portsmouth/Paducah Project Office, for over 15 years. This ongoing program has been a huge success for the region and has reached hundreds of Pike County students and residents.

As a result, the PORTSfuture Program ASER Student Summary Project was expanded beyond Pike County to provide for a Regional ASER Student Summary Project to rotate among other counties in the DOE four-county footprint. This year, Portsmouth West High School in Scioto County participated in the project. This expansion brought students from Scioto and Pike counties together to learn about PORTS and participate in professional development. The Regional Program has added a level of student collaboration that has amplified students' understanding of the PORTS site and future redevelopment plans, fosters community outreach, and expands Science, Technology, Engineering and Math (STEM) enrichment opportunities.

The PORTSfuture Program STEM enrichment efforts are designed to inspire regional students to learn about and engage in activities in STEM disciplines with the goal of encouraging students to pursue careers in these in-demand fields that provide well-paying employment opportunities. STEM enrichment is a learner-centered approach to education that provides students with a problem-based, multidisciplinary, personalized learning experience. Through STEM learning, students build the necessary skills for critical thinking, problem-solving and solution design, and career exploration through real-world experiences. STEM enrichment has the ability to enhance learning experiences and to overcome obstacles for students by providing accessible, inclusive, and culturally responsive experiences.



Some of the opportunities the PORTSfuture Program offers include direct connection to industry professionals, demonstrations in industry-level STEM occupations, and collegiate-level activities and experiences. The program directly connects students with industry professionals working in STEM careers to learn about diverse available regional opportunities. It is a valuable experience for students to gain insight into specific careers or industry sectors and can help build connections and networks in the regional STEM career field. The program also offers students collegiate engagement to prepare them for a post-secondary education to enhance their opportunity for successful employment.

The PORTSfuture Program involves the development of the ASER Student Summary, which is tailored after a similar report produced by DOE's PORTS operations. The ASER Student Summary combines information found in the most recent ASER (2024) released publicly by PORTS with presentation materials developed by high school students and staff. The goals of the ASER Student Summary are to educate regional high school students about activities and opportunities at the PORTS site and develop materials that facilitate area residents learning more about DOE operations at the PORTS site.

References

- DOE 2025. U.S. Annual Site Environmental Report-2024, Piketon, Ohio, DOE/PPPO/03-1327&D1, U.S. Department of Energy, Piketon, OH, October 2025.
- "STEM – Science, Technology, Engineering and Mathematics: Ohio Department of Education and Workforce." Ohio Department of Education, education.ohio.gov
- "STEM Entrepreneurship." PORTSfuture, 8 May 2019, www.portsfuture.com/ASER.

Student Expo



As part of this year's PORTSfuture Program, the students participated in the third annual ASER Student Expo. An expo is a student-led celebration of deeper learning where students can highlight their abilities and share what they have learned with a wider audience through the development and presentation of a scientific poster.

This culminating experience not only provides an outlet to summarize the annual report, but also promotes student engagement, deepens significant learning, encourages visual and scientific communication, and spreads knowledge throughout the community. Student Expos are highly research-focused and lead to greater development and engagement. Through the ASER Student Expo, students were able to articulate their research about the PORTS site and the reindustrialization directly to their local communities.



The ASER Student Expo allowed students to produce high-quality research and develop confidence in their public speaking skills. The students were able to articulate what they learned and work through a structured process that aimed to build supportive relationships with the community. The students summarized several sections of the 2024 PORTS ASER to support community understanding of the past and present operations at the PORTS site. The sections below showcase the students' poster work and summary of the 2024 PORTS ASER.



Posters were developed to provide an overview of the following topics from the Annual Report:

Site History and Compliance

Environmental Programs and Activities

Environmental Radiological Protection and Monitoring

Environmental Non-Radiological Programs

Groundwater Protection Programs



Site History and Compliance

PORTS Site History Overview:

Wyatt Brownfield, Alexandra Vulgamore, Noah Cooper, and Malachi Lamerson

PORTS Site History:

Adriann Carver, Laiken Caudill, and Roschelle Cantrell

Analytical Quality Assurance:

Joseph (Chase) Ware, Kolton Young, Josiah Satterfield



PORTS Site History Overview

Wyatt Brownfield, Alexandra Vulgamore, Noah Cooper, and Malachi Lamerson
Pike County Career Technology Center

How It Began

The construction to create the PORTS site began in 1952. Out of all places, the DOE decided that Pike County, Ohio, was the best place to put this site. The reason that this middle-of-nowhere location was chosen? Well, due to the immense amount of water resources, reliable electric power, and a large, dependable population of people willing to work, it made this location quite reputable and appealing. Construction over the site required 100,000 tons of structural steel, 14,500 tons of reinforced steel, and 500,000 cubic yards of concrete!



1961 August, X-720 storage area



News Report Announcing PORTS plant

The Gaseous Diffusion Method

The PORTS site ran from 1954 to 2001 and used the gaseous diffusion method, which is the process of enriching uranium for weapons and nuclear fuel. During this process uranium hexafluoride is forced through 4,000 stages of barriers to separate the uranium isotopes according to mass differences. Uranium hexafluoride is a chemical form of uranium and it is used to transition from solid to gas for the diffusion process. The use of this fluoride in the process required monitoring of the atmosphere and vegetation throughout the area.

Conclusion

The overall goal of the PORTS site is to conduct a large-scale deactivation and demolition of the former gaseous diffusion plant. This project aims to remove environmental threats in a safe and ethical manner. The agenda details things like tearing down contaminated facilities and repurposing soil and other resources to prepare the site for industrial re-use and development.



Historical Image of the Construction at PORTS Site

PORTSFUTURE
MAINTAINING THE U.S. ENVIRONMENTAL, SAFETY AND HEALTH RECORD
THE FACILITY AT PADUCAH, OHIO



The ASER Summary Project
is funded by a grant from the U.S.
Department of Energy Office of
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Portsmouth/Paducah Project Office

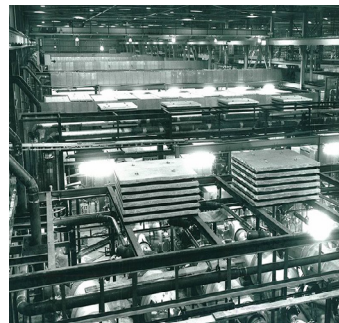


PORTS Site History

Adriann Carver, Laiken Caudill, and Roschelle Cantrell, Portsmouth West High School

PORTS Site History

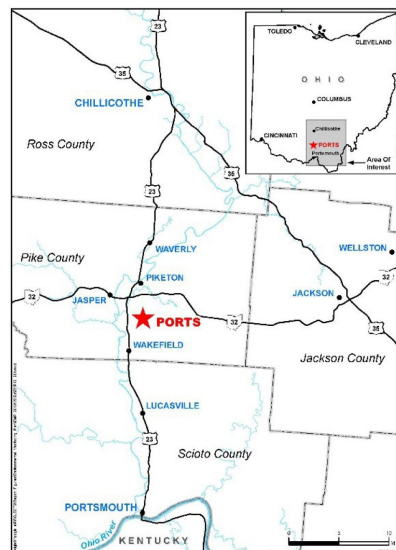
- Construction of the Portsmouth Gaseous Diffusion Site (PORTS) began in 1952.
- In 1954, PORTS began producing enriched uranium to supply the nation's nuclear defense and nuclear energy systems. This continued until 2001.
- In 1993, the Department of Energy (DOE) leased the plant to the United States Enrichment Corporation (USEC).
- The USEC produced enriched uranium until 2001 and then returned the facilities to DOE for deactivation and demolition.



X-326 Process Building in 1955

Site Location

- PORTS occupies a 5.4-square-mile site in a rural area of Pike County, Ohio.
- Pike County has approximately 27,000 residents.
- Piketon is about 4 miles north of the site and has a population of about 2,200 residents.
- The population within 50 miles of the plant is approximately 662,000, which includes people on the outskirts of Cincinnati and Columbus, Ohio; Ashland, Kentucky; and Huntington, West Virginia.



Location of PORTS

Site Operations

- In 1993 DOE leased the uranium production facilities at the site to USEC, which was established by the Energy Policy Act of 1992.
- USEC produced enriched uranium in the gaseous diffusion process facilities through 2001.
- The goal of the Environmental Restoration Program is to verify that releases from past operations at PORTS are thoroughly investigated and that, if applicable, remedial actions are taken to protect human health and the environment.



Historical Announcement for PORTS Site

PORTSFUTURE
REPAIRING THE ENVIRONMENTAL DAMAGE FROM THE
THE FACILITY AT PIKETON, OHIO



The ASER Summary Project is funded by a grant from the U.S. Department of Energy Office of Environmental Management Portsmouth/Paducah Project Office



Analytical Quality Assurance

Chase Ware, Kolton Young, and Josiah Satterfield, Pike County Career Technology Center

Analytical Procedures

- The sampling methods and procedures at the PORTS site follow the United States Environmental Protection Agency (U.S. EPA) methodology and are used to ensure continual compliance
- When U.S. EPA approved methods are not available, PORTS will use other nationally recognized methods like those developed by the United States Department of Energy (DOE) and American Society for Testing Materials
- All analytical laboratories follow chain-of-custody procedures



United States Department of Energy Official Seal

Laboratory Quality Control

- In 2024, samples from the PORTS Environmental Monitoring Program were collected and sent to a third party analytical laboratory for unbiased analytics
- To ensure PORTS site sample data quality, the third party analytical laboratories must demonstrate compliance in the following areas by participating in independent audits and surveillance programs including:
 - Compliance with federal waste disposal regulations
 - Data quality
 - Materials management
 - Sample control
 - Data management
 - Electronic data management
 - Implementation of a laboratory quality assurance plan
 - Review of external and internal performance evaluation program



PORTS Deactivation & Demolition Project

Independent Quality

- To ensure data quality, the PORTS site and data collection partners (Ohio Environmental Protection Agency (OEPA), U.S. EPA, and Ohio Health Department (ODH)) are required to participate in independent quality control programs
- The DOE also participates in voluntary programs to improve analytical accuracy
 - These programs provide objective performance data for evaluation
 - Programs are conducted by OEPA, ODH, DOE, and commercial laboratories
 - Unacceptable results are formally investigated and documented



The ASER Summary Project is funded by a grant from the U.S. Department of Energy Office of Environmental Management Portsmouth/Paducah Project Office



Environmental Programs and Activities

Public Awareness Program:

Rileigh Miller and Chloe Bryant

Public Awareness Program:

Ellie Farmer, Mara Conley, Timothy Perry

PORTS Site Sustainability:

Luke Elliott and Bralyn Newman

Site Sustainability Program:

Kevin Coate, Brooklyn Cossey, Slade McGraw, and Storm Jennings



Public Awareness Program

Raleigh Miller and Chloe Bryant, Portsmouth West High School

The PORTS Programs

- PORTS is committed to its community relations and public participation program.
 - Programs are created to help with openness and credibility between PORTS operations and the public.
 - They offer opportunities for the public to be involved in decision making about environmental issues at PORTS.
- The PORTS Envoy Program matches employee volunteers with the site's fence line neighbors to provide them with information and answer questions. DOE holds open houses in neighboring communities or virtual public meetings to keep the public informed and to hear their comments and questions and periodically publishes fact sheets on major projects.
- The Portsmouth Environmental Information Center (EIC) provides accessibility for residents interested in learning more about DOE's environmental management activities at PORTS.



The South Central Ohio Regional Science Bowl

Educational Outreach

- Besides building community relations, DOE also helps grow a science, technology, engineering, and math (STEM) environment for rural Appalachian schools.
 - The PORTSfuture Program engages K-12 and college students in STEM activities, including producing a summary of the Annual Site Environmental Report for the public.
- DOE and PORTS contractors support the South Central Ohio Regional Science Bowl, an academic competition for high school students in which teams answer questions about biology, chemistry, earth science, math, and physics.
- The PORTS Annual Science Alliance event brings more than 1,500 high school juniors to PORTS for an interactive science fair that includes scientific demonstrations and information on careers in STEM fields.



Students participating in the PORTS Annual Science Alliance

Site Specific Advisory Board

- The PORTS Site Specific Advisory Board comprises citizens from the local area.
- It provides public input and recommendations to DOE on:
 - Deactivation and demolition
 - Environmental remediation
 - Waste management
 - Related issues
- The Board holds regular meetings with the DOE that are open to the public.



A Site Specific Advisory Board tour at the site

PORTSFUTURE
IMPROVING THE APPALACHIAN ENVIRONMENT THROUGH SCIENCE



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Public Awareness Program

Ellie Farmer, Mara Conley, and Tim Perry, Pike County Career Technology Center

Community and Educational Outreach

- The Envoy Program matches DOE employees with fence line neighbors to inform on activities at PORTS site
 - Open houses are held to distribute public fact sheets and share information
- The PORTSfuture Program is funded by the Portsmouth Paducah Project Office (PPPO) and has reached over 13,000 students in the four-county area in southern Ohio
- In one of the PORTSfuture programs, high school students summarize the Annual Site Environmental Report (ASER) for the public to read in the ASER Student Summary Report



PORTS Envoy Program

Site Specific Advisory Board

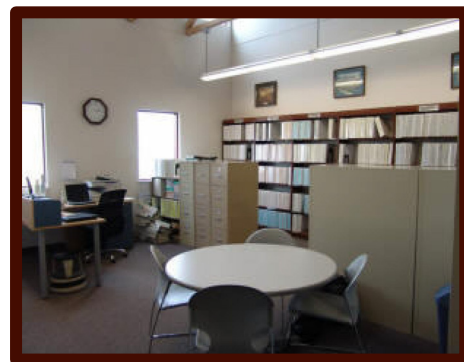
- The Site Specific Advisory Board (SSAB) is made up of citizens from the local area
 - The local citizens provide public input and recommendations for the DOE
- The SSAB input usually advances recommendations about:
 - Waste management
 - Deactivation and demolition
 - Environmental remediation



SSAB Meeting

Environmental Information Center

- The PORTS Environmental Information Center (EIC) provides public access to documents
 - These documents are often used to support decisions related to remedial actions at PORTS
- The EIC is located just north of the PORTS site at the Ohio State University Endeavor Center, 1862 Shyville Road, Piketon, Ohio 45661
 - Room 207



PORTS Environmental Information Center



The ASER Summary Project is funded by a grant from the U.S. Department of Energy Office of Environmental Management Portsmouth/Paducah Project Office



PORTS Site Sustainability

Luke Elliott and Bralyn Newman, Portsmouth West High School

Environmental Management

- According to DOE Order 436.1A, PORTS is required to develop and implement an Environmental Management System to reduce emissions, decrease energy and water use, and promote environmental justice.
- Environmental Management System goals include:
 - Reducing greenhouse gas emissions
 - Reducing energy consumption and intensity in site buildings
 - Increasing the use of clean or renewable energy
 - Enhancing water use efficiency and management
 - Managing fleets to reduce petroleum use and increase alternative fuel and vehicle use
 - Promoting sustainable acquisition
 - Preventing pollution and preventing waste



Canada geese with goslings at PORTS

Site Sustainability Goals

- DOE is committed to reducing potential environmental risks, costs, wastes, and future liability by effectively integrating environmental sustainability in DOE activities at PORTS in a cost effective and environmentally conscious way.
- Goals for this program include:
 - Eliminating, minimizing, or recycling wastes that would otherwise require storage, treatment, disposal, and long-term monitoring and a surveillance program
 - Eliminating or minimizing the use of toxic chemicals and associated environmental releases
 - Maximizing the procurement and use of recycled-content materials and environmentally preferable products and services
 - Reducing the life-cycle cost of managing personal property at PORTS



Overview of PORTS site

Sustainability Accomplishments

- Goals accomplished by the site sustainability program in 2024 include:
 - Energy use has decreased by 66% compared to the 2021 baseline
 - Greenhouse gas emissions have been reduced by 76% compared to 2008
 - Water use intensity has been reduced by 63% over the 2021 baseline
- Approximately 191 tons of recyclable or reusable materials were sent off site in 2024:
 - Aluminum cans: 6,500 lbs
 - Batteries: 133,430 lbs
 - Electronic materials: 4,645 lbs
 - Light bulbs: 906 lbs
 - Paper and cardboard: 159,700 lbs
 - Plastic bottles: 25,000 lbs
 - Used oil: 35,143 lbs
 - Wooden pallets: 8.3 tons



Overview of PORTS surroundings



The ASER Summary Project is funded by a grant from the U.S. Department of Energy Office of Environmental Management Portsmouth/Paducah Project Office



Site Sustainability Program

Kevin Coate, Brooklynn Cossey, Slade McGraw, and Storm Jennings
Pike County Career Technology Center

PORTS Site Sustainability Program

- DOE provides an annual sustainability report to advance the sustainability goals including:
 - Reducing potential environmental risks, costs, wastes, and future liability
 - Integrating environmental sustainability principles in DOE activities at PORTS in a cost-effective and environmentally conscious manner
- The Environmental Sustainability Program is a balanced, holistic approach that comprises:
 - Planning
 - Budgeting
 - Measuring
 - Improving environmental performance



PORTS Landscape



PORTS Site Public Tour

Environmental Management System Goals

- An annual report to DOE Headquarters is submitted to report progress on achieving the Environmental Management System goals including:
 - Reducing greenhouse gas emissions
 - Reducing energy consumption and intensity in site buildings
 - Increasing the use of clean or renewable energy
 - Enhancing water use efficiency and management
 - Managing fleets to reduce petroleum use and increase alternative fuel and vehicle use
 - Promoting sustainable acquisition
 - Preventing pollution and reducing waste

Site Sustainability Plan

- An annual Sustainability Plan is released each year to ensure the Environmental Management System goals are met
- The PORTS Sustainability Plan includes elements of pollution prevention, waste minimization, sustainable procurement, sustainable design, and energy and water efficiency
- Sustainability accomplishments at the PORTS site for fiscal year 2024 include the following:
 - Energy use intensity decreased by 66% from 2021
 - Greenhouse gas emissions have been reduced by 76%
 - Water use intensity has been reduced by 63%

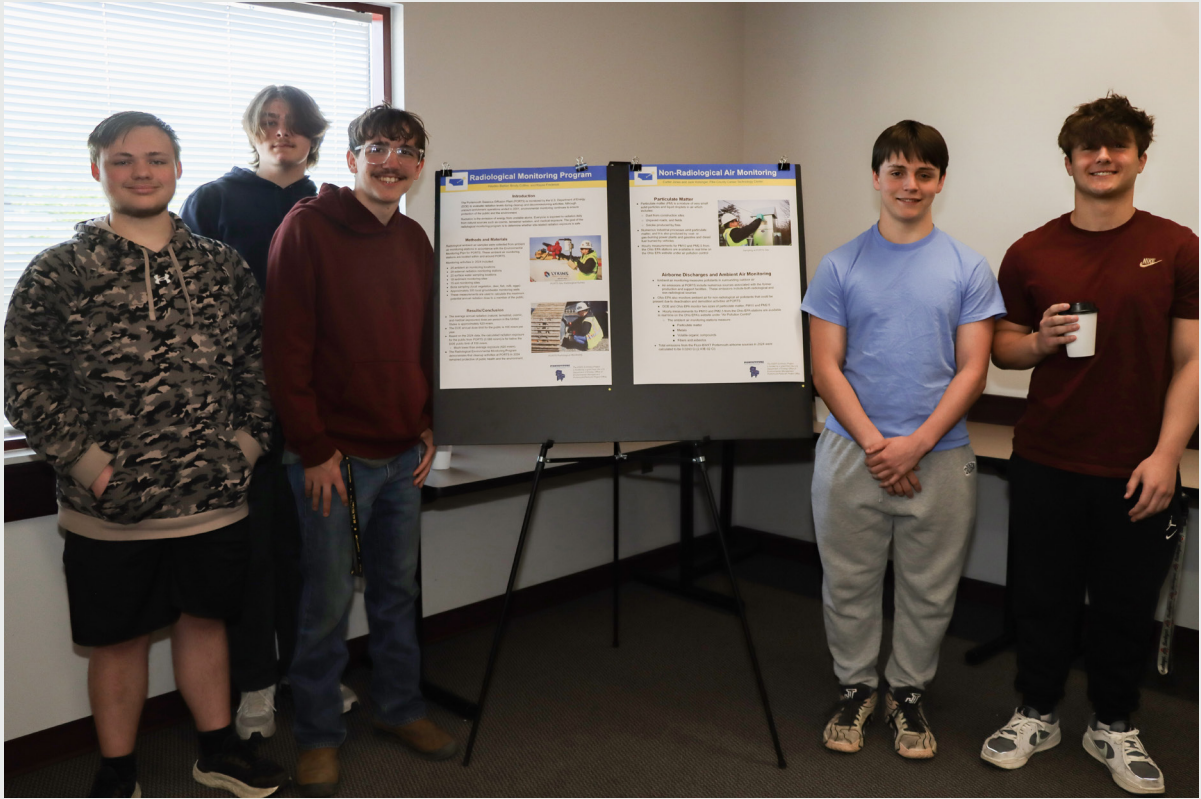


PORTS Site Deactivation and Demolition Program Activities

PORTSFUTURE
IMAGINING THE OPPORTUNITIES. GATHERING YOUR IDEAS.
FOR THE FUTURE OF PORTS, USA.



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Environmental Radiological Protection and Monitoring

*Radiological Monitoring Program:
Hayden Barker, Brody Collins, and Rayse Frederick*



Radiological Monitoring Program

Hayden Barker, Brody Collins, and Rayse Frederick

Introduction

The Portsmouth Gaseous Diffusion Plant (PORTS) is monitored by the U.S. Department of Energy (DOE) to evaluate radiation levels during cleanup and decommissioning activities. Although uranium enrichment operations ended in 2001, environmental monitoring continues to ensure protection of the public and the environment.

Radiation is the emission of energy from unstable atoms. Everyone is exposed to radiation daily from natural sources such as cosmic rays, terrestrial radiation, and medical exposure. The goal of the radiological monitoring program is to determine whether site-related radiation exposure is safe.

Methods and Materials

Radiological ambient air samples were collected from ambient air monitoring stations in accordance with the Environmental Monitoring Plan for PORTS. These ambient air monitoring stations are located within and around PORTS.

Monitoring activities in 2024 included:

- 25 ambient air monitoring locations
- 29 external radiation monitoring stations
- 22 surface water sampling locations
- 18 sediment monitoring sites
- 15 soil monitoring sites
- Biota sampling (local vegetation, deer, fish, milk, eggs)
- Approximately 300 local groundwater monitoring wells
- These measurements are used to calculate the maximum potential annual radiation dose to a member of the public.



PORTS Site Radiological Survey

Results/Conclusion

- The average annual radiation (natural, terrestrial, cosmic, and medical exposures) dose per person in the United States is approximately 620 mrem.
- The DOE annual dose limit for the public is 100 mrem per year.
- Based on the 2024 data, the calculated radiation exposure for the public from PORTS (0.088 mrem) is far below the DOE public limit of 100 mrem.
 - Much lower than average exposure (620 mrem).
- The Radiological Environmental Monitoring Program demonstrates that cleanup activities at PORTS in 2024 remained protective of public health and the environment.



PORTS Radiological Monitoring

PORTSFUTURE
REIMAGINING THE OPERATION OF THE FACILITY AT PADUCAH, OHIO



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Environmental Non-Radiological Programs

*Non-Radiological Air Monitoring:
Carter Jones and Jack Holsinger*



Non-Radiological Air Monitoring

Carter Jones and Jack Holsinger, Pike County Career Technology Center

Particulate Matter

Particulate matter (PM) is a mixture of very small solid particles and liquid droplets in air which includes:

- Dust from construction sites
- Unpaved roads, and fields
- Smoke produced by fires

Numerous industrial processes emit particulate matter, and it is also produced by coal- or gas-burning power plants and gasoline and diesel fuel burned by vehicles



Sampling at PORTS Site

Airborne Discharges and Ambient Air Monitoring

Ambient air monitoring measures pollutants in surrounding outdoor air

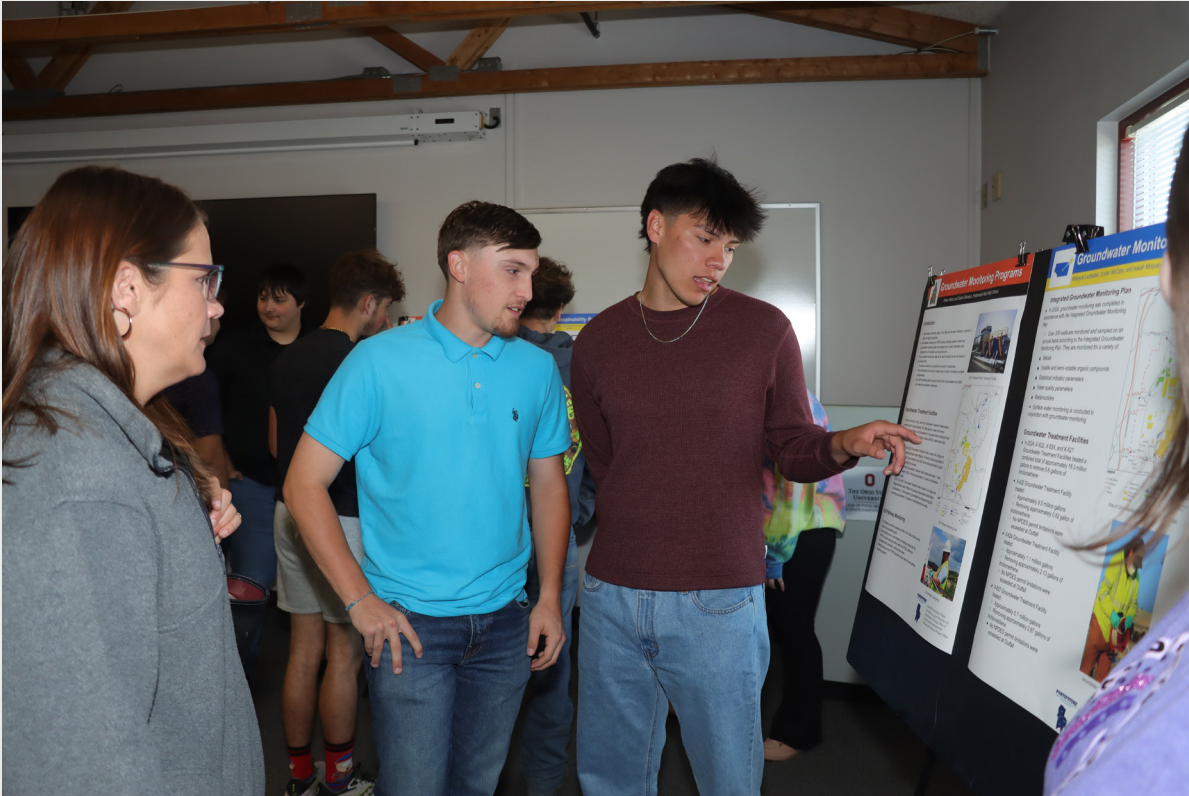
- Air emissions at PORTS include numerous sources associated with the former production and support facilities. These emissions include both radiological and non-radiological sources

Ohio EPA also monitors ambient air for non-radiological air pollutants that could be present due to deactivation and demolition activities at PORTS

- DOE and Ohio EPA monitor two sizes of particulate matter, PM10 and PM2.5
- Hourly measurements for PM10 and PM2.5 from the Ohio EPA stations are available in real time on the Ohio EPA's website under "Air Pollution Control"
 - The ambient air monitoring stations measure:
 - Particulate matter
 - Metals
 - Volatile organic compounds
 - Fibers and asbestos



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Groundwater Protection Programs

Groundwater Monitoring Program:
Mykala Ledbetter, Donte' McCary, and Isaiah Mcquay

Groundwater Monitoring Program:
Ethan Patton and Cristian Quirasco

Makayla Ledbetter, Donte' McCary, and Isaiah Mcquay, Pike County Career Technology Center

- In 2024, groundwater monitoring was completed in accordance with the Integrated Groundwater Monitoring Plan

- In 2024, X-622, X-624, and X-627 Groundwater Treatment Facilities treated a combined total of approximately 16.3 million gallons to remove 5.6 gallons of trichloroethene

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2026 U.S. Department of Energy PORTS Annual Site Environmental Report (ASER): Student Summary



Groundwater Monitoring Programs

Ethan Patton and Cristian Quirasco, Portsmouth West High School

Introduction

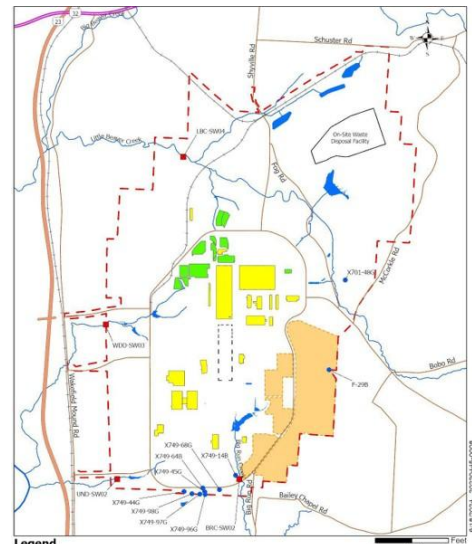
- Groundwater monitoring began in the 1980s and has been conducted in response to state and federal regulations.
- Groundwater monitoring at PORTS involves collecting samples of water from groundwater monitoring wells and analyzing them to obtain information about contaminants and naturally-occurring compounds.
- The groundwater monitoring wells can be used to estimate the rate and direction of groundwater flow.
 - The rate and direction can predict the movement of contaminants.
 - This information can be used to develop ways to control or remediate groundwater contamination.
 - Over 300 monitoring wells are used to track the flow of groundwater and to identify and measure groundwater contaminants.



X-622-1 Modular Water Treatment Facility

Groundwater Treatment Facilities

- In 2024, the X-622, X-624, and X-627 Groundwater Treatment Facilities treated a combined total of approximately 16.3 million gallons of water and removed approximately 5.6 gallons of trichloroethene. All processed water is discharged through National Pollutant Discharge Elimination System (NPDES) outfalls before exiting PORTS.
 - X-622: The X-622 Groundwater Treatment Facility consists of an air stripper with aqueous-phase activated carbon filtration. The facility processed approximately 9.5 million gallons of groundwater during 2024 and removed approximately 0.62 gallon of trichloroethene from the water.
 - X-624: The X-624 Groundwater Treatment Facility treated approximately 1.1 million gallons of water in 2024, removing approximately 2.13 gallons of trichloroethene from the water.
 - X-627: The X-627 Groundwater Treatment Facility consists of an air stripper with offgas activated carbon filtration and aqueous-phase activated carbon filtration. Approximately 5.7 million gallons of groundwater were processed during 2024, removing approximately 2.87 gallons of trichloroethene from the water.



Exit Pathway Monitoring Area

Exit Pathway Monitoring

- Exit pathway monitoring assesses the effect of the facility on off-site surface water and groundwater quality.
- Sample locations are on local streams and drainage channels near the PORTS boundary because surface water from NPDES outfalls and groundwater both discharge to these surface waters.
- Monitoring wells near the PORTS boundary are also used in the exit pathway monitoring program.



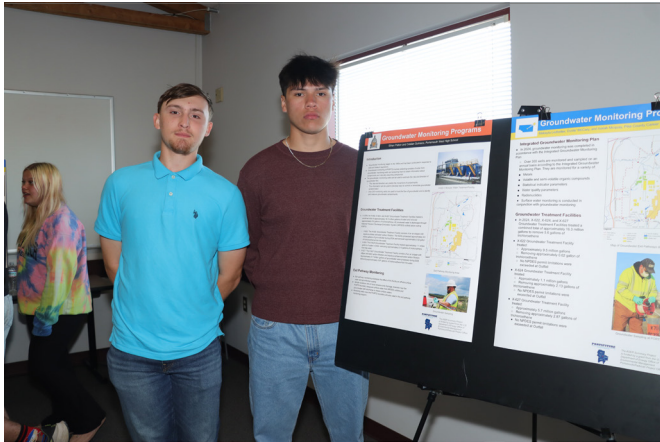
Groundwater Sampling

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The ASER Summary Project is funded by a grant from the U.S. Department of Energy Office of Environmental Management Portsmouth/Paducah Project Office







Conclusion

The PORTS facility is a substantial, complex industrial site that played a significant historical role in national security from 1954 to 2001. It is one of only three uranium enrichment plants in the nation used for national security and the commercial nuclear sector. Since 2011, through science-based and well-regulated cleanup activities, it has been the mission of DOE and those involved with the D&D of the facility to safeguard the people of the region and surrounding environment from any potential dangers presented by facility operations, past or present.

Furthermore, DOE is working toward transferring facility property and land to reduce the federal footprint while fostering reindustrialization and revitalization for the region. The ASER is a key component of DOE's effort to keep the public informed about environmental conditions at PORTS.

The ongoing processes of D&D, monitoring, and remediation are intensive tasks that require a dedicated workforce and involved community. This summary emanates from the environmental monitoring activities at PORTS. The following are some of the highlights of 2024:

- Eleven National Pollutant Discharge Elimination System outfalls at Littler Beaver Creek, the Scioto River, and other water bodies were monitored for radionuclides, chemicals, and other potential contaminants.
- External radiation was measured continuously at 29 on-site and off-site locations. The measurements were reported quarterly.
- Ambient air was sampled at 25 on-site and off-site locations and analyzed for radionuclides. Twelve ambient air monitoring stations monitored non-radiological air pollutants that could be released due to decontamination and decommissioning activities: metals, volatile organic compounds (VOCs), and asbestos. Particulate matter was monitored at seven locations. Fluoride was monitored at 15 on-site and off-site locations.
- Surface water samples were collected from 22 on-site and off-site locations and analyzed for radionuclides. Samples from locations that monitor the On-Site Waste Disposal Facility (OSWDF) were also analyzed for chlorinated organic compounds and polychlorinated biphenyls (PCBs).
- Sediment was sampled at 18 locations and analyzed for radionuclides, metals, and PCBs.
- Soil samples were collected at 15 locations, including on-site, fence line, off-site, and background locations and analyzed for radionuclides.
- Biota samples, including vegetation, deer, fish, food crops, milk, and eggs, were analyzed for radionuclides. Fish were also analyzed for PCBs.
- Approximately 300 wells were sampled at varying frequencies to monitor remedial actions, movement of groundwater contaminants, and groundwater quality.

Continuous environmental monitoring of the PORTS operations is critical to ensure an accurate assessment of human and environmental health and safety. The maximum annual dose that a member of the public could receive from radiation released by PORTS in 2024 is 0.088 millirem (mrem), compared to the 100 mrem/year limit set by DOE for all potential pathways. The maximum annual radiation dose that a member of the public could receive from all pathways of exposure associated with operation of the OSWDF was 0.00045 mrem, compared to the Ohio Department of Health (ODH) and DOE annual dose limit of 25 mrem. As shown by ambient air monitoring, contaminant levels for both radionuclides and fluoride continued to be either not detected, detected below DOE standards, or within background levels. Concentrations of most contaminants detected within the groundwater plumes at PORTS were stable or decreased in 2024. Concentrations of trichloroethene (TCE) or metals were increasing in a few wells in the monitoring areas; these locations continue to be closely monitored. Surface water monitoring contaminant levels for radionuclides at on-site and off-site locations upstream and downstream from PORTS continued to be either not detected or below DOE order limits. PORTS operations have not affected the safety of drinking water outside the site boundaries.

Concentrations of PCBs in on-site and off-site sediment samples that may be present from historical PORTS operations were below the level of concern established by regional screening levels of the United States Environmental Protection Agency (U.S. EPA) and Ohio EPA. In 2024, PCBs were detected in edible fish within the range of concentrations detected in recent years and were within the consumption advisory limits set by the ODH. Sampling of sediment in 2024 for metals indicated that no appreciable differences were evident in the concentrations detected at locations upstream and downstream from PORTS. Contaminant levels for radionuclides were within background levels or below DOE order limits. Finally, contaminant levels for radionuclides in soil, food crops, and deer were within background levels or below DOE standards, and radionuclides were not detected in samples of fish, milk, and eggs collected in 2024.

DOE is committed to reducing environmental impacts from site operations through stewardship and sustainability of land, air, and water by integrating best management practices such as eliminating the amount of waste generated, minimizing the use of toxic chemicals, and maximizing the use of recycled materials. Each year a report of Environmental Management Systems (EMS) goals is submitted to DOE Headquarters. In 2024, DOE received two Resource Conservation and Recovery Act (RCRA) Notices of Violation based on incomplete or illegible labels on hazardous waste containers. These labeling issues were immediately corrected. DOE also received a Clean Water Act NPDES Notice of Violation based on exceedances of the daily and monthly permit limitations for total suspended solids at NPDES Outfall 005. DOE and its contractors at PORTS are committed to continual improvement through the implementation of an EMS.

References

- DOE 2025. U.S. Annual Site Environmental Report-2024, Piketon, Ohio, DOE/PPPO/03-1327&D1, U.S. Department of Energy, Piketon, OH, October 2025.

Acronyms & Abbreviations

ACE	Appalachian Career Empowerment
ASER	Annual Site Environmental Report
CTC	Career Technology Center
D&D	Deactivation and Demolition
DOE	U.S. Department of Energy
DUF6	Depleted Uranium Hexafluoride
EIC	Portsmouth Environmental Information Center
EM	Environmental Management
EMS	Environmental Management System
ETAS	Enterprise Technical Assistance Services, Inc.
EXPO	Exposition
HS	High School
LLC	Limited Liability Company
mrem	Millirem
NPDES	National Pollutant Discharge Elimination System
ODH	Ohio Department of Health
Ohio EPA	Ohio Environmental Protection Agency
OSWDF	On-Site Waste Disposal Facility
OU	Ohio University

Acronyms & Abbreviations

PCB	Polychlorinated Biphenyl
PEGASIS	PPPO Environmental Geographic Analytical Spatial Information System
PM	Particulate Matter
PORTS	Portsmouth Gaseous Diffusion Plant
PPPO	Portsmouth Paducah Project Office
RCRA	Resource Conservation and Recovery Act
SODI	Southern Ohio Diversification Initiative
SSAB	PORTS Site Specific Advisory Board
STEM	Science, Technology, Engineering, and Mathematics
TCE	Trichloroethene
USEC	United States Enrichment Corporation
U.S. EPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds

Definitions

Ambient air – the atmosphere around people, plants, and structures. Ambient air usually means outdoor air (as opposed to indoor air)

Biota – animal and plant life characterizing a given region

Chain-of-custody – documentation that tracks the collection, handling, and transfer of samples to ensure authenticity and integrity

Clean Water Act – a primary federal law that sets regulations on discharges of pollutants into the nation's waterways, establishing water quality standards

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

Contaminant – any substance that enters a system (the environment, food, the human body, etc.) where it is not normally found, including substances that spoil food, pollute the environment, or cause other adverse effects

Deactivation and Demolition – removing equipment, demolishing buildings, disposing of wastes, and investigating potential contamination in areas of PORTS that are no longer part of current operations

Dose – energy imparted to matter by ionizing radiation; a unit of absorbed dose is the rad, equal to 0.01 joule per kilogram

External radiation – the exposure to ionizing radiation when the radiation source is located outside the body

Gaseous diffusion – technology used to produce enriched uranium by forcing gases through a porous barrier

Greenhouse Gases – gases in the atmosphere capable of absorbing infrared radiation emitted from the Earth's surface

Groundwater – any water found below the land surface

Groundwater plume – a body of groundwater that is contaminated that flows from a specific source

Isotope – each of two or more forms of the same element that contain equal numbers of protons but different number of neutrons in the nuclei

Millirem (mrem) – the dose that is one-thousandth of a rem

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

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

Definitions

PPPO – Portsmouth/Paducah Project Office – manages the DOE cleanup efforts at two gaseous diffusion plant sites

Polychlorinated biphenyls (PCBs) – man-made chemicals that range from oily liquids to waxy solids. PCBs were used in hundreds of industrial and commercial applications due to their chemical properties until production in the United States ceased in 1977. PCBs have been demonstrated to cause a variety of adverse health effects in animals and possibly cause cancer and other adverse effects in humans

Procurement – the process of sourcing and acquiring good and services

Radiation – emission of energy from unstable atoms

Radionuclide – radioactive nuclide capable of spontaneous transformation into other nuclides by changing its nuclear configuration or energy level; 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 – unit of radiation dose that reflects the ability of different types of radiation to damage human tissues and the susceptibility of different tissues to the damage

Remediation – the process of improving or correcting something, particularly in relation to environmental damage

Surface water – all water on the surface of the earth, as distinguished from groundwater

Trichloroethene (TCE) – a volatile chemical used as a solvent to remove grease from metal

Uranium enrichment – the process of enrichment by separating isotopes of uranium

Uranium hexafluoride – the chemical form of uranium used to transition from solid to gas for the diffusion process

Volatile organic compounds (VOCs) – organic (carbon-containing) compounds that evaporate readily at room temperature. These compounds are present in solvents, degreasers, paint, thinners, and fuels. Due to a number of factors including widespread industrial use, they are commonly found as contaminants in soil and groundwater. VOCs found at PORTS include TCE, vinyl chloride, benzene and dichloroethanes.

*The ASER Summary Project is funded by a grant from the U.S. Department of Energy
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