Summary of the U.S. Department of Energy Portsmouth Annual Site Environmental Report (ASER) for 2018



Message from the U.S. Department of Energy

The U.S. Department of Energy (DOE) conducts environmental monitoring at the Portsmouth Gaseous Diffusion Plant Site (PORTS) on an ongoing basis. Each year, the information collected is presented in a data volume and a comprehensive publication entitled the Annual Site Environmental Report (ASER). This year, the Eastern High School (EHS) chemistry class, located in Pike County, Ohio, reviewed the most recent ASER, participated in educational outreach efforts to learn about PORTS, and then helped to develop this summary report. Both the ASER and this summary report are important as they allow DOE to clearly and concisely explain PORTS environmental monitoring programs to our many stakeholders. The information presented in this summary shows that the PORTS site near Piketon, Ohio, is operated in an environmentally safe manner. The work at DOE facilities is highly detailed and technically complex, but DOE is committed to performing each of these activities safely. DOE's first priority is to protect the well-being of our workers, the surrounding communities, and the environment. DOE would like to offer its sincerest appreciation to the students and faculty leader at EHS who worked on this summary document. DOE congratulates each of you for your effort, enthusiasm, and willingness to support this project.

DOE hopes you enjoy reading the PORTS 2018 Annual Site Environmental Report Summary.



Ally Crothers | Piketon High School | 2016–2017



Blake Reader | Piketon High School | 2016–2017

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Artwork Retrospective

In recognition of this 10-year anniversary of the ASER Student Summary Program, the artwork showcased herein has been pulled from past summaries as a retrospective.

Eastern High School Student Recognition 2020–2021



The students of Mrs. Janet Pennington's chemistry class at EHS worked in collaboration with OU's Voinovich School of Leadership and Public Service to produce this 2020 ASER Summary report on monitoring conducted at PORTS during 2018. The Voinovich School thanks the students for their hard work. Their effort in this public service is much appreciated and worthy of special recognition, particularly for persevering through the many challenges and limitations caused by the COVID-19 pandemic throughout the school year. The 9 high school students who participated in the preparation of this ASER Summary report are listed below.

Lance Barnett | Abby Cochenour | Addison Cochenour | Maddie Colley | Orion Doron Mady Martin | Matthew Martin | Andrea Peters | Brayden Williams

The PORTS Plant Site History

In 1952, the United States Atomic Energy Commission (AEC) proposed a new expansion of the nation's atomic energy program in support of the Cold War. A major part of the expansion would be the construction of a new gaseous diffusion plant to increase the production capacity of uranium-235 (U-235), a fissionable material. The total cost of the proposed expansion was approximately \$2 billion. The commission announced the selection of a site in Pike County, Ohio, for the new plant. Primary considerations in the selection of the site included the ability to obtain enormous amounts of electrical power, a large and dependable source of water, and adequate potential labor supplies.

Groundbreaking for construction of the plant began on November 18, 1952. To provide a suitable area for constructing the process and auxiliary buildings, site grading required nine million cubic yards of excavation and backfill. A total of 25 miles of road and 22 miles of railroad track were laid inside the plant area to allow easy access to construction locations and to facilitate movement of materials and supplies into buildings. To speed up construction, one central concrete batching and mixing plant was erected to supply all contractors, producing more than 500,000 cubic yards for the project. Meteorologists were onsite during construction to provide contractors with up-todate weather forecasting to help protect existing construction as well as schedule work properly. Approximately 100,000 tons of structural steel, 600 miles of piping, and 1,000 miles of copper tubing were installed in the plant. Cooling towers were constructed for each of the process buildings to remove the huge quantities of heat produced during the gaseous diffusion process. The cooling towers released 20 million gallons of steam each day into the atmosphere, a main reason that an adequate water supply was important to the location of the new plant. A pumping station at the Scioto River with a pumping capacity of 40 million gallons/day was constructed to provide the plant with water. Power for the plant was generated by the Ohio Valley Electric Corporation (OVEC) and was delivered to the plant by circuit lines which were equal to the all-time high voltage record



Matt Trainer, Voinovich School of Leadership and Public Service



Matt Trainer, Voinovich School of Leadership and Public Service

in the United States, and the site's switchyards required the largest oil circuit breakers ever used in this country. Although it involved a monumental effort, the construction of the site took four years, finished six months ahead of schedule, and was completed nearly fifty million dollars under budget. The facility was fully operational by 1956.

The PORTS plant enriched uranium for the purposes of national defense and nuclear energy. In the 1950s, the country was in the midst of the Cold War and focused on building up its nuclear defense systems. The PORTS plant supported this effort by producing highly enriched (HE) uranium with an assay of 97.65% U-235. In the



Zariah Hall | Waverly High School | 2018–2019

DOE is "making our homes safer everyday."

Lance Barnett, EHS Chemistry Class

1960s, enrichment of HE uranium was suspended and the plant transitioned to enriching uranium at a lower assay for use in nuclear reactors aboard Navy ships and submarines as well as in civilian power plants. By the 1990s, the primary mission of the PORTS plant was to produce low-enriched uranium assay between 3% and 5% for use in nuclear power plants throughout the United States and the world. In 2001, enrichment activities were transferred to other plants within the nation's atomic energy program, and the PORTS plant began to operate in "Cold-Standby" condition in which operations could be resumed in a period of 18-24 months if the need arose. In 2006, the plant transitioned from "Cold Standby" to "Cold Shutdown" and began preparing for the eventual decontamination and decommissioning cleanup project. The effort to tear down buildings and clean up the site is currently ongoing and will likely continue well into the future. In doing so, EHS students understand that DOE is "making our homes safer everyday."

Today, environmental monitoring is conducted at PORTS to assess the impact, if any, that site activities may have on public health and the environment. Each year, an ASER is prepared to summarize environmental monitoring and compliance activities conducted at the site. The report fulfills a requirement of DOE Order 231.1B, Environment, Safety and Health Reporting, for characterizing environmental management performance. The ASER also provides the means by which DOE demonstrates compliance with the radiation protection requirements of DOE Order 458.1, Radiation Protection of the Public and the Environment.

- *Portsmouth Gaseous Diffusion Plant Virtual Museum*, Fluor-BWXT Portsmouth for DOE, 7 July 2021, retrieved from <u>www.portsvirtualmuseum.org</u>
- DOE 2020. U.S. Department of Energy Portsmouth Gaseous Diffusion Plant Annual Site Environmental Report-2018, Piketon, Ohio, DOE/PPPO/03-0932&D1, U.S. Department of Energy, Piketon, OH, June.

ASER Site Map



U.S. Department of Energy PORTS Annual Site Environmental Report (ASER) for 2018: Student Summary

Public Engagement

A comprehensive public engagement and community relations program is in place at the PORTS site. The purpose of the program is to foster credibility and openness between PORTS officials and local citizens, elected officials, business, media, and the public at-large. The program also provides opportunities for the public to become involved in decisions that affect environmental issues at the site.

The PORTS Site Specific Advisory Board (SSAB) is an important component of the public engagement program. The SSAB is comprised of citizens from the local area and provides the public with opportunities for input and recommendations to DOE on environmental remediation, waste management, and other related issues. There are currently eight community members serving on the board. The SSAB holds regularly scheduled meetings with DOE that are open to the public, and additional information is available to the public at <u>energy.gov/pppo/ports-ssab</u>. Periodic public update meetings and public workshops on specific topics are also held to keep the public



Mikaila Fremder | Piketon High School | 2019–2020

"It is important for high school students to know what is going on at the site because many of the students are interested in a career that the PORTS site has to offer."

Abby Cochenour & Mady Martin, EHS Chemistry Classs

informed and to provide additional opportunities for comments and questions. Occasionally, fact sheets about major projects are written for the public. Notices of document availability and public comment periods, as well as other communications on specific programming, are regularly distributed to local newspapers and to a community relations mailing list, neighbors within 2 miles of the plant, and plant employees.

The PORTS Envoy Program is another important component of the public engagement program which matches employee volunteers with various community stakeholders such as community groups, local government organizations, and families living next to DOE property. The envoys help to communicate information about various site issues, including decontamination and decommissioning (D&D) activities, to the community. The envoys are also available to answer stakeholder questions about PORTS.

A public Environmental Information Center is also maintained by DOE to provide public access to documents used to inform decisions on environmental remediation 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, and additional information is available to the public at <u>energy.gov/pppo/</u> <u>portsmouth-environmental-information-center</u>. There is also an online document repository associated with the Environmental Information, including the ASER, is available to the public on the DOE PPPO web site at <u>energy.gov/pppo</u> or the Fluor-BWXT Portsmouth web site at <u>fbportsmouth.com</u>.

An educational outreach program facilitated by a DOE grant administered by OU includes a project in which local high school students learn about PORTS and produce a summary of the ASER for distribution to the public. This project includes classroom experiments, guest presentations, and field trips. The DOE PPPO web site at <u>energy.gov/pppo</u> provides additional information about this outreach project.



Delaney Rigsby | Piketon High School | 2019–2020

- DOE 2020. U.S. Department of Energy Portsmouth Gaseous Diffusion Plant Annual Site Environmental Report-2018, Piketon, Ohio, DOE/PPPO/03-0932&D1, U.S. Department of Energy, Piketon, OH, June.
- Portsmouth Site Specific Advisory Board, DOE, 7 July 2021, retrieved from <u>https://www.energy.gov/pppo/ports-ssab/portsmouth-site-specific-advisory-board</u>
- Portsmouth Environmental Information Center, DOE, 7 July 2021, retrieved from https://www.energy.gov/pppo/portsmouth-environmental-information-center
- Portsmouth Environmental Information Center Online Repository, DOE, 7 July 2021, retrieved from https://eic.ports.pppo.gov/
- Portsmouth/Paducah Project Office, DOE, 7 July 2021, retrieved from <u>https://www.energy.gov/pppo/portsmouthpaducah-project-office</u>
- Fluor-BWXT Portsmouth LLC, 7 July 2021, retrieved from <u>http://fbportsmouth.com/</u>

Environmental Sustainability

Environmental sustainability principles have been integrated into DOE activities at PORTS in an effort to reduce potential environmental risks, costs, wastes, and future liability. The DOE takes a balanced, holistic approach that links planning, budgeting, measuring, and improving PORTS overall environmental performance to specific goals and outcomes that are outlined in its Environmental Sustainability Program. This program includes efforts aimed at pollution prevention, waste minimization, affirmative procurement, sustainable design, and energy and water efficiency. Specific qualitative and quantitative objectives of DOE programs and operations at PORTS include:

- eliminating, minimizing, or recycling wastes that would otherwise require storage, treatment, disposal, and long-term monitoring and surveillance;
- eliminating or minimizing use of toxic chemicals and associated environmental releases that would otherwise require control, treatment, monitoring, and reporting;
- maximizing the use (procurement) of recycled-content materials and environmentally preferable products and services, thereby minimizing the economic and environmental impacts of managing byproducts and wastes generated in the conduct of mission-related activities; and
- reducing the life-cycle cost of managing personal property at PORTS.



Paisley Alderman Waverly High School | 2018–2019

"While being involved in this project, I have seen the importance of environmental concerns... I think that these programs are going to result in the DOE being able to turn the site over for future use and economic development."

Maddie Colley and Addison Cochenour, EHS Chemistry Class

DOE has continued energy reduction programs at PORTS that are focused on greenhouse gas emission reductions and environmental sustainability (including energy and water efficiency; waste and pollution prevention; and electronics stewardship). The following accomplishments were observed in 2018:

- a decrease of 64% in greenhouse gas emissions versus the 2008 baseline emissions;
- a decrease in water consumption of 16% versus 2017;
- the replacement of nitric acid used as a cleaner with citric acid, a less hazardous alternative.

ASER is an important component of PORTS environmental sustainability efforts in that it provides important information needed by site managers and DOE headquarters to assess environmental program performances. ASERs are also important for conveying DOE's environmental protection performance to stakeholders and members of the public living near or around a DOE site. ASERs are also used to demonstrate DOE compliance with environmental regulations. By participating in the ASER summary outreach program, students have gained increased awareness of the various environmental sustainability efforts at PORTS. "While being involved in this project, I have seen the importance of environmental concerns. I think that these programs are going to result in the DOE being able to turn the site over for future use and economic development."

- DOE 2020. U.S. Department of Energy Portsmouth Gaseous Diffusion Plant Annual Site Environmental Report-2018, Piketon, Ohio, DOE/PPPO/03-0932&D1, U.S. Department of Energy, Piketon, OH, June.
- DOE 2018. Fiscal Year 2019 Site Sustainability Plan for the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio, DOE/PPPO/03-0896&D1, U.S. Department of Energy, Piketon, OH, December.



Amanda Nichols | Western Local High School | 2014–2015

Leah Bender | Western Local High School | 2014–2015

Non-Radiological Program

Non-radiological environmental monitoring at PORTS includes collecting and analyzing samples of air, water, sediment, and fish. The monitoring of various non-radiological parameters is required by state and federal regulations and/or permits, but it is also performed in an effort to reduce public concerns about environmental impacts of PORTS site operations. *The DOE Environmental Monitoring Plan for the Portsmouth Gaseous Diffusion Plant* (DOE 2017) specifies non-radiological monitoring requirements for ambient air, surface water, sediment, and fish.

The DOE ambient air monitoring program measures fluoride emissions into the air at specific sites. Fluoride detected at the ambient air monitoring stations could be present due to background concentrations (fluoride occurs naturally in the environment), activities associated with the former gaseous diffusion process, and operation of the Depleted Uranium Hexafluoride (DUF₆) Conversion Facility. In 2018, samples for fluoride were collected weekly from 15 ambient air monitoring stations in and around PORTS. In 2018, fluoride was not detected in 83% of the samples collected for the ambient air monitoring program. Overall, the determined levels of fluoride in ambient air around PORTS were found to be within ambient background concentrations measured in the United States (there is no standard for fluoride in ambient air).



Sydney Schuyler | Waverly High School | 2015–2016

Jamie Welch | Waverly High School | 2015–2016

The Ohio Environmental Protection Agency (Ohio EPA) selects the chemical parameters that must be monitored at each surface water monitoring location based on the chemical characteristics of the water that flows into each monitoring location and sets discharge limitations for some of these parameters. For example, some of



Serah Jones | Western Local High School 2014–2015

"When it comes to what students learned from ASER regarding the environmental non-radiological program, students learned how...the EPA and the DOE keep tabs on the country and the ways that they keep us safer while the PORTS is in use."

Orion Doron & Brayden Williams, EHS Chemistry Class

the monitoring locations discharge water from the groundwater treatment facilities. These facilities treat water contaminated with volatile organic chemicals (VOCs), which are chemicals that have been used in various industrial applications at PORTS throughout its history. Therefore, the samples collected at these locations are monitored for selected VOCs. In 2018, two DOE contractors—Fluor-BWXT and Mid-American Conversion Services, LLC (MCS)—were responsible for monitoring surface water collected from 20 sampling locations. Centrus, a private company regulated by the Nuclear Regulatory Commission (NRC), was responsible for monitoring an additional three locations. The monitoring data were submitted to the Ohio EPA in monthly reports. The results from Fluor-BWXT monitoring throughout the year found 100% compliance relative to specific surface water limitations. The results from MCS monitoring throughout the year also found 100% compliance relative to specific surface water limitations. The results from Centrus monitoring throughout the year also found 100% compliance relative to specific surface water limitations.

Sediment samples were collected in and around PORTS and analyzed for polychlorinated biphenyls (PCBs) and 20 different metals. PCBs are man-made chemicals that were used in hundreds of industrials and commercial applications due to their chemical properties until production in the United States ceased in 1977. PCBs were detected in sediment samples collected upstream and downstream from PORTS surface water discharges. Only one sediment sample was found to have PCBs above the risk-based regional screening level for PCB-1254/1260 developed by the United States Environmental Protection Agency (U.S. EPA) and utilized by Ohio EPA: 240 µg/ kg (U.S. EPA 2019). The determined levels of PCBs in all other sediment samples ranged from 23.4 to 120 µg/ kg. The results also indicated no differences in the concentrations of metals present in sediment samples taken upstream from PORTS compared with samples taken downstream from the site. Because metals occur naturally in the environment, it was concluded the metals detected in the samples most likely did not result from activities at PORTS.

Fish samples were also collected and tested for the presence of PCBs. Only the portion of the fish that would be eaten by a person (fillets) were tested. In 2018, PCBs were detected in fish collected both upstream and downstream of PORTS, yet were not detected in all samples. The determined levels were compared to the Ohio Fish

Consumption Advisory Chemical Limits provided in the *State of Ohio Cooperative Fish Tissue Monitoring Program Sport Fish Tissue Consumption Advisory Program* (Ohio EPA 2010) which are set for the following consumption rates: unrestricted, 1/week, 1/month, 6/year, and do not eat.



Comparison of PCB Levels in Fish with Consumption Advisory Limits

- DOE 2020. U.S. Department of Energy Portsmouth Gaseous Diffusion Plant Annual Site Environmental Report-2018, Piketon, Ohio, DOE/PPPO/03-0932&D1, U.S. Department of Energy, Piketon, OH, June.
- DOE 2017. Environmental Monitoring Plan for the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio, DOE/ PPPO/03-0009&D5, U.S. Department of Energy, Piketon, OH, April.
- Agency for Toxic Substances and Disease Registry 2003. Toxicological Profile for Fluorides, Hydrogen Fluoride, and Fluorine, U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, <u>https://www.atsdr.cdc.gov/ToxProfiles/tp11.pdf</u>, accessed 2/11/2020.
- U.S. EPA 2019. Regional Screening Level (RSL) Summary Table (TR=1E-06, HQ=1) April 2019, Screening level for PCB-1254/PCB-1260 in residential soil, <u>https://www.epa.gov/risk/risk-based-screening-table-generic-tables</u> (accessed 8 July 2021).
- Ohio EPA 2010. State of Ohio Cooperative Fish Tissue Monitoring Program Sport Fish Tissue Consumption Advisory Program, State of Ohio, Columbus, OH, October.

Environmental Radiological Program

Environmental monitoring at PORTS includes assessing the potential impacts to human health and the environment from radionuclides released by current and historical activities at PORTS. This impact, called a dose, can be due to radionuclides being released into air and/or water, or due to radiation emanating directly from buildings or other objects at PORTS. It is estimated that a person living in the United States receives an average annual dose of approximately 311 mrem/year from natural sources of radiation (National Council on Radiation Protection [NCRP] 2009).

There are several different focuses of the environmental radiological monitoring programs at PORTS which include airborne discharges, ambient air, external radiation, discharge to surface water, sediment, soil, vegetation, and biota. The analysis of samples included monitoring external radiation with thermoluminescent dosimeters (TLDs) which are passive radiation detection devices used for personal dose monitoring or to measure patient dose. The Environment Radiological Program monitored external radiation at five areas near the DUF₆ cylinder storage locations at PORTS. Surface water, sediment, soil, and vegetation were also sampled for radiological contamination. Surface water tested resulted in an annual calculated dose of 0.0017 mrem/year. Sediment tested resulted in an annual calculated dose of 0.020 mrem/year. Vegetation tested, which was primarily grass, resulted in an annual calculated dose of 0.00041 mrem/year. All of these levels were found to be well below the DOE limit of 100 mrem/year.

From all measurements conducted in 2018 as part of the PORTS environmental radiological monitoring programs, it was determined that the maximum annual dose a member of the public could receive from radiation released by PORTS was 0.92 mrem/year. This amount was calculated assuming that a representative person is exposed to the maximum dose calculated from each possible pathway. The table below summarizes the dose information determined from 2018 monitoring data:



Katie Shreck Eastern Local High School | 2013–2014



Owen Strong | Eastern Local High School | 2013–2014

Summary of Potential Annual Doses to the Public from PORTS in 2018

Source of dose	Dose (mrem/year)
Airborne radionuclides (off-site individual)	0.10ª
Radionuclides released to the Scioto River	0.0017
External radiation near cylinder yards (northwest portion of Perimeter Rd)	0.78
Radionuclides detected by environmental monitoring programs	0.037
Total	0.92 ^b

^a10 mrem/year is U.S. EPA limit for airborne radionuclides. ^b100 mrem/year is the DOE limit for all potential pathways.



Katlin Smalley | Piketon High School | 2011–2012

Carly O'Brien | Piketon High School | 2011–2012



Comparison of Annual Doses from Various Common Radiation Sources

"By participating in this ASER Student Summary program, students have learned the dangers and precautions that the EPA and DOE take to prevent public harm. The students that were involved were surprised by the fact of how low the tests for radionuclides in PORTS are compared to the limit of the DOE Order 458.1. It is important for not only students, but for everyone to understand the importance of radiological contamination for it can help keep our environment safe and the future safe ... Based on the **Environmental Radiological Program** test results, we believe that the site is safe for DOE to turn over for future use/economic development."

Matthew Martin, EHS Chemistry Class



Emily Rosen | Waverly High School | 2012–2013



Sarah Dresbach | Waverly High School | 2012–2013

- DOE 2020. U.S. Department of Energy Portsmouth Gaseous Diffusion Plant Annual Site Environmental Report-2018, Piketon, Ohio, DOE/PPPO/03-0932&D1, U.S. Department of Energy, Piketon, OH, June.
- National Council on Radiation Protection 2009. Ionizing Radiation Exposure of the Population of the United States, NCRP Report No. 160, National Council on Radiation Protection and Measurements, Bethesda, MD.

Groundwater Program

Groundwater monitoring at PORTS is conducted due to a combination of state and federal regulations, legal agreements with Ohio EPA, and DOE Orders. The program involves the use of more than 400 monitoring wells to track the flow of groundwater and to identify and measure groundwater contaminants. The PORTS groundwater monitoring program also includes on-site surface water monitoring and water supply monitoring.

Samples of water are collected from groundwater monitoring wells and analyzed to determine levels of contaminants and naturally occurring compounds. Monitoring wells are also used to obtain other information about groundwater. For example, the rate and direction of groundwater flow can be used to predict the movement of contaminants in the groundwater and to develop ways to control or remediate groundwater contamination. Surface water monitoring is also conducted in conjunction with groundwater assessment monitoring to determine if contaminants present in groundwater are detected in surface water samples as well. Private residential drinking water sources are monitored in accordance with the requirements of the September 1989 Consent Decree between the State of Ohio and DOE and the Integrated Groundwater Monitoring Plan (DOE 2017) to determine whether PORTS has had any impact on the quality of the private residential drinking water sources. Four residential drinking water sources participated in the program in 2018.

In general, concentrations of most contaminants detected within the groundwater were found to be stable or decreasing during 2018, although a few contaminants were found to have increased. In 2018, a combined total of approximately 32.8 million gallons of water were treated at PORTS, with approximately 18.4 gallons of the contaminant trichloroethene (TCE) estimated to have been removed from the treated water. In 2018, TCE was not detected in groundwater beyond the DOE property boundary at concentrations that exceed the Ohio EPA drinking water standard of 5 μ g/L.



Matt Ly | Piketon High School | 2011–2012

"By routinely monitoring the groundwater scientists can predict where contamination is likely to flow and if drinking water wells are impacted or not."

Andrea Peters, EHS Chemistry Class

- DOE 2020. U.S. Department of Energy Portsmouth Gaseous Diffusion Plant Annual Site Environmental Report-2018, Piketon, Ohio, DOE/PPPO/03-0932&D1, U.S. Department of Energy, Piketon, OH, June.
- DOE 2017. Integrated Groundwater Monitoring Plan for the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio, DOE/PPPO/03-0032&D10, U.S. Department of Energy, Piketon, OH, August.

Conclusions

The PORTS facility is a large and complex industrial site that played a role in ensuring our nation's security. The people who worked and continue to work there have provided an invaluable service to our country and its people. It is now tasked to those involved in the environmental management of the facility to make sure that the people of this region are safe from any dangers presented by the facility.

The processes of D&D, monitoring, and environmental remediation are huge tasks that require the hard work of many people and entities. From the individual worker to the U.S. DOE and from the local environmentalists to the U.S. EPA and Ohio EPA, we thank everyone for their hard work and dedication. This summary emanates from the environmental monitoring activities at PORTS for calendar year 2018. The following are some of the highlights of 2018:

- D&D of PORTS continues through the disassembly and removal of equipment, removal of wastes including asbestos, PCBs, and hazardous waste, and deactivation of utilities and other systems.
- The *Deferred Units RCRA Facility Investigation/Corrective Measures Study Report (DOE 2017)* was submitted to Ohio EPA on September 27, 2017. Ohio EPA reviewed the report from the remainder of 2017 through November of 2018 and submitted comments to DOE on December 4, 2018.
- Southern Ohio Diversification Initiative (SODI) received approximately 103 tons of materials from PORTS, primarily recyclable metals, recyclable oil, and reusable equipment.
- Environmental monitoring data collected in 2018 are consistent with data collected in previous years and indicated that any radionuclides, metals, and other chemicals released by PORTS operations have a minimal effect on human health and the environment due to releases falling far below limits of concern for human health.



Potential impacts to human health from PORTS operations are calculated based on environmental monitoring data. The maximum dose that a member of the public is assumed to be exposed to from radiation released by PORTS in 2018 is 0.92 mrem. This dose is significantly less than the 100 mrem/year limit set by DOE for the dose to a member of the public from radionuclides from all potential pathways. The dose to a member of the public from airborne radionuclides released by PORTS (0.10 mrem) is also significantly less than the 10 mrem/year standard set by the U.S. EPA. In addition, generally, concentrations of contaminants detected within the groundwater plumes at PORTS were stable or decreasing in 2018.

REFERENCES

• DOE 2017. Deferred Units Resource Conservation and Recovery Act Facility Investigation/Corrective Measures Study Report at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio, DOE/PPPO/03-0772&D1, U.S. Department of Energy, Piketon, OH, September.

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.

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. Contaminants include substances that spoil food, pollute the environment, or cause other adverse effects.

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

Dose – the energy imparted to matter by ionizing radiation. The unit of absorbed dose is the rad, equal to 0.01 joule per kilogram in any medium.

Absorbed dose – the quantity of ionizing radiation energy absorbed by an organ divided by the organ's mass. Absorbed dose is expressed in units of rad (or gray) (1 rad = 0.01 gray).

Effective dose – the sum of the doses received by all organs or tissues of the body after each one has been multiplied by the appropriate weighting factor.

Collective dose/collective effective dose – the sums of the doses of all individuals in an exposed population expressed in units of person-rem (or person-sievert). The collective effective dose is also frequently called the "population dose."

Environmental Sustainability – responsible interaction with the environment to avoid depletion or degradation of natural resources and ensure long-term environmental quality.

Exposure (radiation) – the incidence of radiation on living or inanimate materials 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.

Gaseous diffusion – technology used to produce enriched uranium by forcing gases through a porous barrier (United States Nuclear Regulatory Commission, 2017).

Groundwater – any water found below the land surface.

Ionizing radiation – radiation that has enough energy to remove electrons from substances that it passes through, forming ions (United States Nuclear Regulatory Commission, 2015).

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.

Polychlorinated biphenyls (PCBs) – man-made chemicals that range from oily liquids to waxy solids. PCBs were used in hundreds of industrials 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.

Radionuclide – 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 – 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

Remediate – correction or cleanup of a contaminated site.

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

Trichloroethene (TCE) – 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. High levels of TCE may cause health effects such as liver and lung damage and abnormal heartbeat; moderate levels may cause dizziness or headache. The International Agency for Research on Cancer considers TCE a probable human carcinogen.

Volatile Organic Compounds (VOCs) – organic (carbon-containing) compounds that evaporate readily at room temperature. These compounds are present in solvents, degreasers, paints, 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 dichloroethenes.

Acronyms & Abbreviations

ASER	Annual Site Environmental Report
AEC	Atomic Energy Commission
BWXT	BWX Technologies, Inc.
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
DUF ₆	depleted uranium hexafluoride
EHS	Eastern High School
EM	Environmental Management
Ohio EPA	Ohio Environmental Protection Agency
E-TAS	Enterprise Technical Assistance Services
Fluor-BWXT	Fluor-BWXT Portsmouth LLC
HE	highly enriched
LLC	Limited Liability Company
µg/kg	microgram per kilogram (equivalent to part per billion)
μg/L	microgram per liter (equivalent to part per billion)
mrem/year	millirem per year
MCS	Mid-American Conversion Services LLC
NCRP	National Council on Radiation Protection
NHPA	National Historic Preservation Act
NRC	Nuclear Regulatory Commission
OU	Ohio University
OVEC	Ohio Valley Electric Corporation
PCBs	polychlorinated biphenyls
PORTS	Portsmouth Gaseous Diffusion Plant
PPPO	Portsmouth/Paducah Project Office
SODI	Southern Ohio Diversification Initiative
SSAB	Site Specific Advisory Board
TCE	trichloroethene
TLD	thermoluminescent dosimeters
U-235	uranium-235
U.S. EPA	U.S. Environmental Protection Agency
VOCs	volatile organic compounds

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