Summary of the U.S. Department of Energy Portsmouth Annual Site Environmental Report (ASER) for 2020

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, students at Waverly High School, 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 our 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 leaders at Waverly HS who worked on this summary document. DOE congratulates each of the students for their effort, enthusiasm, and willingness to support this project. DOE hopes you enjoy reading the *PORTS 2020 Annual Site Environmental Report Summary.*

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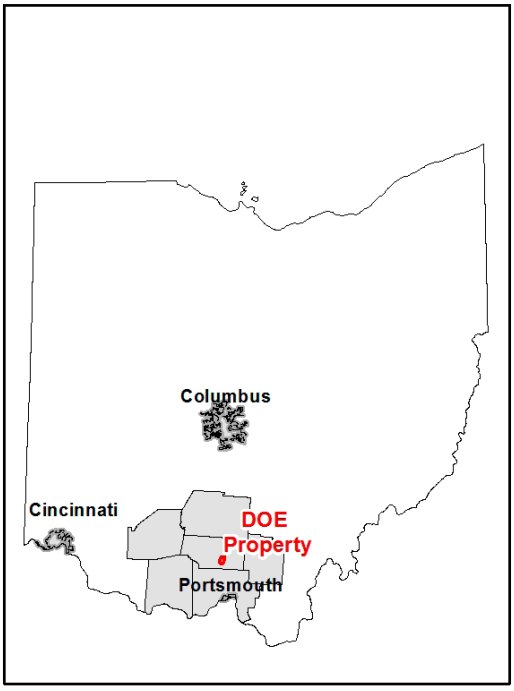
Waverly High School Student Recognition 2022-2023

The students of Mr. Chris Murphy's science class at Waverly HS worked in collaboration with Ohio University's Voinovich School of Leadership and Public Service PORTSfuture Program to produce this ASER Summary report. The students of Mrs. Megan Smith's art class at Waverly HS worked to contribute artwork inspired by ASER themes. 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:

Participating students include: Brock Adams, Laney Atencio, Alex Bates, Maddox Bock, Madison Davis, Abby Green, Mitchell Green, Harrison Henshaw, Larry Long, Nicholas Monroe, Thomas Noel, Aiden Peoples, Hannah Remy, Dylan Smith, Alexander Stoller, Isaac Tallman, Greenlee Thacker, Tommaso Tursi

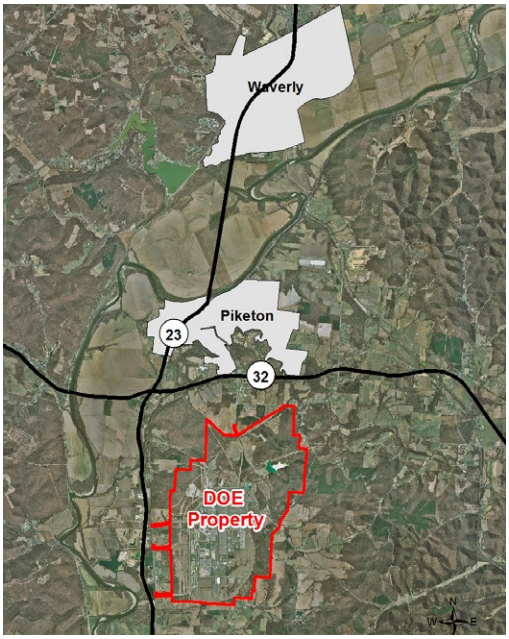
The PORTS Facility Plant Site History

The United States Atomic Energy Commission (AEC) expanded the nation's atomic energy program in 1952 as a response to the demands of the Cold War. As a part of this expansion, a gaseous diffusion plant was constructed to increase the production capacity of uranium-235 (U-235). The U.S. Department of Energy (DOE) Portsmouth Gaseous Diffusion Plant (PORTS) is located on a 5.8-square-mile site in rural Pike County, Ohio. Located roughly two miles west of the Scioto River, this site allowed for easy access to a water source to meet the plant's needs, as well as a sufficient labor force from the nearby communities of Piketon, Beaver, and Waverly. PORTS, which produced enriched uranium via the gaseous diffusion process from 1954 to 2001, is one of three former DOE uranium enrichment plants previously used for national security and the commercial nuclear power sector.
On November 18, 1952, construction of the plant began. It included 25 miles of road, 22 miles of railroad track, 500,000 cubic yards of concrete, approximately 100,000 tons of structural steel, and more than 600 miles of piping and 1,000 miles of copper tubing. A water pumping station with a capacity of 40 million gallons/day was also built, supplying the plant with the water that was needed to dissipate the large amounts of heat produced during the gaseous diffusion process. The Ohio Valley Electric Corporation (OVEC) generated power for the plant. The switchyards at this plant required the largest oil circuit breakers ever used in the United States. Construction of the site ended after four years, putting it six months ahead of schedule and about fifty million dollars under budget. By 1956, the facility was fully operational.



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

The United States AEC originally constructed the plant to provide very highly enriched (VHE) uranium with an assay of 97.65% U-235 for the nation's nuclear defense system. After the Cold War, there was a reduced need for nuclear weapons and defense. Production of VHE uranium ceased in the 1960s, and the plant transitioned to enriching uranium at a lower assay to be used in nuclear reactors aboard ships, submarines, and commercial power plants. The PORTS plant shifted from a military focus to a commercial focus by the 1990s, and it supplied low-enriched uranium to electric utilities that operated nuclear power plants both domestically and abroad.



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

PORTS Site Field Trip

ASER students received a guided tour of the PORTS plant site

The plant processes continued operation until May 2001, when the United States Enrichment Corporation ceased enrichment activities at the Piketon plant. (The United States Enrichment Corporation (USEC) was created in October 1992 to manage the government's uranium enrichment enterprise). The plant entered a "Cold Standby" with the potential to resume operations in 18-24 months if needed. The plant then transitioned to "Cold Shutdown" status in 2004 and began preparations for decontamination and decommissioning.

Today, DOE is conducting an extensive environmental cleanup of the site. Several inactive facilities have been removed, and the remaining structures, including the gaseous diffusion process buildings and support facilities, will be demolished through Decontamination and Decommissioning (D&D). Environmental monitoring is conducted at PORTS to assess the impact, if any, that site activities may have on both public health and the environment. A summary of the monitoring results is displayed each year in an Annual Site Environment Report (ASER). An essential facet of the ASER is complete transparency with the community regarding site activities, a requirement of DOE Order 231.1B, Environment, Safety and Health Reporting, for characterizing environmental management performance. The ASER complies with the radiation protection requirements of DOE Order 458.1, Radiation Protection of the Public and the Environment.

"The Portsmouth Gaseous Diffusion Plant site has been in [existence] for approximately 69 years and, throughout those years, has infused Pike County with a rich history. Through its construction and maintenance, the site gave jobs to many people and migrated many families into Pike County. The Portsmouth Gaseous Diffusion Plant is a staple in our community."

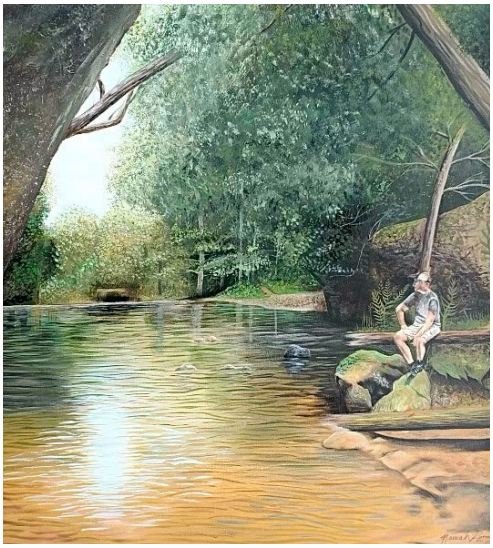
- Greenlee Thacker and Tommy Tursi, WHS Students

References

- *Portsmouth Gaseous Diffusion Plant Virtual Museum,* Fluor-BWXT Portsmouth for DOE, www.portsvirtualmuseum.org
- DOE 2020. U.S. Department of Energy Portsmouth Gaseous Diffusion Plant Annual Site Environmental Report 2020, Piketon, Ohio, DOE/PPPO/03-1034&D1, U.S. Department of Energy, Piketon, OH, December.

Environmental Stewardship Winners

Waverly HS students participated in an ASER art competition. Below are the winners for the "Environmental Stewardship" category.

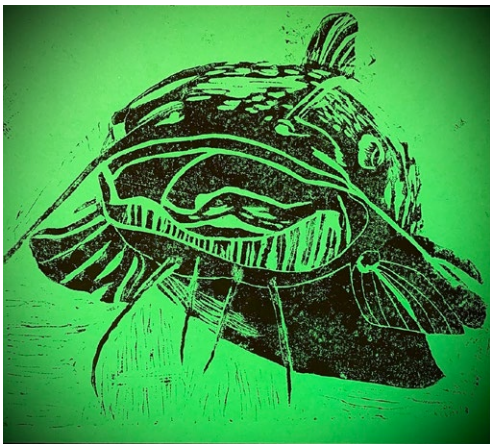


1. Hannah Remy

Artwork demonstrates the enjoyment of keeping the environment clean from waste.

2. Abby Green

Painting of our world set ablaze by pollution that isn't regulated.



3. Maddox Bock

This art shows how it is important to keep our rivers and streams clean for the aquatic life.

Laney Atencio

This art is a watercolor that shows the desired cleanup outcome for the site.

Environmental Radiological Program

State and federal regulations, the Ohio EPA, and DOE Orders all require environmental monitoring. At PORTS, radiological and chemical parameters are monitored in the environment and used to evaluate the possible impacts of radionuclides (the unstable chemical elements that release radiation as deterioration occurs) on human health and the environment surrounding the site. Groundwater monitoring of the PORTS area began in the 1960s. Although environmental monitoring efforts have expanded substantially since then, the efforts continue to focus on radionuclides. All environmental monitoring data is open to the public an can be viewed through a dynamic mapping data display at https://pegasis.ports.pppo.gov/Pegasis/about.aspx

"The small amount of radiation measured from the plant is surprising to many people. The idea around the general area of PORTS is that the site puts off massive amounts of radiation and can cause adverse effects on the residents and biota of the area. It is important for people to learn that the narrative of high levels of radiation is false, there is no need for people to be scared of the radiation and they need to be educated about the facts."

- Aiden Peoples & Brock Adams, Waverly HS Students

The impact of radionuclides on human health is measured by what is termed a "dose." Humans receive a dose of radiation through exposure to radionuclides, which may be present in the air, water, soil, or other surroundings, such as buildings that store uranium. Radionuclides are both naturally occurring as well as created through man-made activities. According to the National Council on Radiation Protection (NCRP), a person residing in the United States receives an average annual dose of 620 mrem per year. See the Definitions section for further explanation of radiation and doses.

The environmental radiological programs at the PORTS site have several different focus areas to collect data for the following: airborne discharges, ambient air, external radiation, surface water, discharges to surface water, sediment, soil, and biota (deer, fish, crops, milk, and eggs). The Environmental Radiological Program monitored external radiation at areas near the depleted uranium hexafluoride (DUF_6) cylinder storage locations at PORTS. Surface water, sediment, soil, and vegetation are also tested for radiological contamination.

Radionuclides were not detected in samples of residential drinking water, deer, fish, milk, or eggs, in 2020. Radiation near the cylinder storage yard (a northwest portion of the plant, close to Perimeter Road) was measured at 744 mrem/year, but a person would only receive this dose if they were exposed to this area of the plant 24 hours/day, 365 days/year. The Radiological program tested sediment (0.013 mrem/year), soil (0.014 mrem/year), vegetation (0.00038 mrem/year), and crops (beans) (0.16 mrem/year), all combined for a total of 0.19 mrem/year.

In 2020, the maximum dose of radiation exposure caused by the Portsmouth site was estimated to be 1.0 mrem/year, which includes 0.068 mrem/year from airborne radionuclides and 0.0016 mrem/year from surface water.

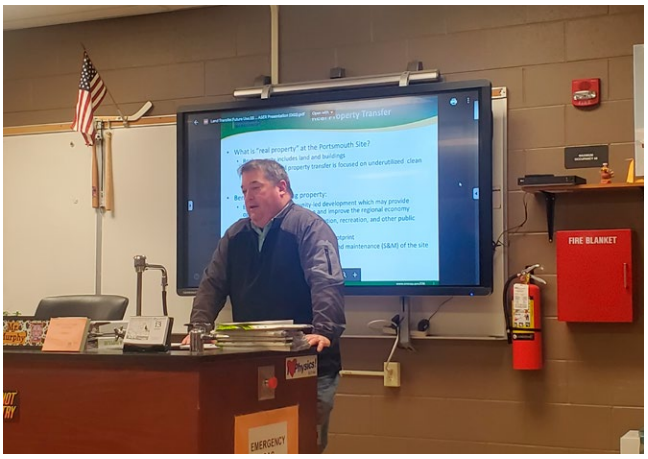
The 1.0 mrem/year dose of radiation serves as an overestimation as it is assumed that a person receiving this dose routinely drives on Perimeter Road (the road immediately surrounding the plant site), and lives very close to the PORTS site. This falls far below the DOE target for PORTS of 10 mrem/year, and also far below the 311 mrem/year annual dose that the average individual in the U.S. is expected to receive from natural sources of radiation.

References

- DOE 2020. U.S. Department of Energy Portsmouth Gaseous Diffusion Plant Annual Site Environmental Report-2020, Piketon, Ohio, DOE/PPPO/03-1034&D1, U.S. Department of Energy, Piketon, OH, December.
- 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

Classroom Activities

Subject Matter Experts (SME) provide ASER students with guest presentations and interactive activities to enhance their learning of the PORTS site



Non-Radiological Program

The Non-Radiological Environment Monitoring Program refers to monitoring of contaminants that are considered non-radiological, such as heavy metals and chemicals. Samples of air, water, sediment, and fish are part of the survey conducted at the Portsmouth Gaseous Diffusion Plant (PORTS) every year. Monitoring of non-radiological parameters is a requirement of state and federal regulations and/or permits. Additionally, monitoring is performed to reduce public concerns through providing transparency regarding PORTS site operations. The DOE Environmental Monitoring Plan for PORTS specifies non-radiological monitoring requirements for ambient air, surface water, groundwater, sediment, and fish. The results in 2020 from non-radiological data collection are comparable to previous years.

"It is vital for students to learn about non-radiological contamination because it directly relates to their local environment... Students use their knowledge of non-radiological contamination to understand the monitoring that takes place on site and how it affects the local ecosystem and how the plant continues to affect the environment during its D&D process."

-Waverly HS Physics Class

The PORTS site monitors for non-radiological contamination for ambient air through five monitoring stations that are designed to monitor the air for particulate matter (small solid particles and liquid droplets in air), metals, volatile organic compounds (VOCs), and fibers/asbestos. There are fifteen air monitoring stations that measure fluoride. Fluoride does occur naturally; however, it can also be present due to former gaseous diffusion processes as well as the operation of the Depleted Uranium Hexafluoride Conversion Facility. Samples for fluoride were collected weekly from the ambient air monitoring stations in and around PORTS; fluoride was not detected in 76 percent of the samples collected. The determined concentrations of fluoride were found to be within ambient background concentrations measured in the United States.

Surface water and groundwater are monitored at PORTS according to Ohio EPA parameters at each of the water discharge sites (outfalls). These parameters rely on the federal National Pollution Discharge Elimination Systems (NPDES) program that was initiated by the Clean Water Act in 1972. In 2020, DOE contractors Fluor-BWXT Portsmouth (FBP) and Mid-America Conversion Services (MCS) were responsible for monitoring twenty NPDES discharge points at PORTS. The overall FBP compliance rate with the NPDES permit was 99%, and the overall MCS compliance rate with the NPDES permit was 100%. Centrus Energy Corp., a nuclear energy company that works to develop advanced centrifuge technology to produce enriched uranium for commercial and government uses, was responsible for monitoring three additional discharge points. Centrus operates independently of the DOE and is regulated by the U.S. Nuclear Regulatory commission (NRC). The overall Centrus compliance rate with the NPDES permit was 100%. Polychlorinated Biphenyls (PCBs) were not detected in any surface water samples in 2020. These high compliance rates demonstrate the overall contamination was far within the set parameters.

Sediment samples were collected at the same locations where surface water samples were collected – including local streams, the Scioto River upstream from the PORTS facility, the Scioto River downstream from the PORTS facility, and drainage basins downstream from MCS cylinder storage yards. PCB concentrations at the on-site sampling locations (Little Beaver Creek, Big Run Creek, and West Drainage Ditch) ranged from 9.73 to 24.2 µg/kg, while concentrations at the off-site sampling locations (Little Beaver Creek, Big Beaver Creek, and the Scioto River) ranged from 5.13 to 14.6 µg/kg. The regional screening level for PCBs has been established at 240 µg/kg (U.S. EPA 2019). Screening levels are risk-based concentrations that have been determined by considering both exposure and toxicity information. The off-site sample did not exceed this regional screening level.

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 and are also released in the air from fuel combustion/industrial processes, it is not likely that the metals detected in the samples were result of activities at PORTS.

Fish samples were also collected from Little Beaver Creek, Big Beaver Creek, and the Scioto River. The samples comprised of catfish and bass and were then tested for the presence of PCBs in the portion of the fish that would be consumed by a person (fillets). A sample from Little Beaver Creek contained PCBs at a level of 149 µg/kg, while another sample contained 3170 µg/kg. According to the Ohio Sport Fish Consumption Advisory, available from the Ohio Department of Health, it is not recommended to eat fish that contain PCBS at a level higher than 1900 µg/kg. The fish collected from the Little Beaver Creek site are not at a location that is accessible to the public.

Students involved with the Annual Site Environmental Report (ASER) program learn the importance of different types of contamination, including radiological and non-radiological. Radiation is typically viewed as being the overall concern resulting from the PORTS years of operation and current demolition. However, non-radiological chemical contaminants are also an important focus of DOE's environmental monitoring programs. DOE continuously monitors radiological and non-radiological contaminants on and off site, and the ASER program is critical to keeping the public informed through student engagement. Students learn about the various monitoring efforts being done, and that the levels of contamination have greatly decreased over the decades. The ASER program also exposes students to various career pathways associated with science, technology, engineering, and mathematics (STEM)-focused environmental work. Collectively, student participation in the ASER program helps to raise public awareness about plant operations and environmental safety.

References

- DOE 2020. U.S. Department of Energy Portsmouth Gaseous Diffusion Plant Annual Site Environmental Report-2020, Piketon, Ohio, DOE/PPPO/03-1034&D1, U.S. Department of Energy, Piketon, OH, December.
- Ohio EPA 2010. State of Ohio Cooperative Fish Tissue Monitoring Program Sport Fish Tissue Consumption Advisory Program, State of Ohio, Columbus, OH, October.
- 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, https://www.atsdr.cdc.gov/ToxProfiles/tp11.pdf .
- 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, https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables.

Community Partnership Winners

Waverly HS students participated in an ASER art competition. Below are the winners for the "Community Partnerships" category.

1. Isaac Tallman

Colored Pencil on white paper.

"My artwork shows the steps taken with the community to achieve the same goal."

2. Madison Davis

Mixed Media on how working with the community can create solutions.

3. Hannah Remy

Artwork demonstrates how working together can prevent fatality in the community.

Alex Stoller

This art piece demonstrates the process of a system working together to attain one goal.

Environmental Sustainability

Environmental sustainability involves keeping a balance in the Earth's natural environment. This includes keeping various ecosystems in homeostasis, the state in which an ecosystem has reached stability and is best for survival. Each year, the Department of Energy (DOE) measures contamination levels at and around the PORTS site and reports the findings to Ohio's EPA and to the public through the Annual Site Environmental Report (ASER). The DOE and the EPA monitor potential threats to environmental sustainability such as air pollution, waste production and water pollution. The two work to ensure that the levels are non-threatening to humans, plants, and wildlife. The EPA has established a sustainability program that requires the DOE to follow proper management, evacuation, and destruction of harmful materials to the environment. The Environmental Management System (EMS) has established the following goals in compliance with DOE Order 436.1:

- reduction of greenhouse gas emissions, energy consumption and intensity in site buildings
- increased use of clean or renewable energy
- enhanced water use efficiency and management
- fleet management to reduce petroleum use and/or increase alternative fuel/vehicle use,
- sustainable acquisition
- pollution prevention and waste reduction

The Ohio EPA continually monitors the DOE to ensure compliance. Some environmental monitoring guidelines were set by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). This includes disassembly and removal of equipment, deactivation of utilities and other systems, and removal of wastes, including asbestos, PCBs, and Resource Conservation and Recovery Act (RCRA) hazardous waste.

Both on- and off-site disposal methods were used in the process of environmental sustainability. The waste that was disposed on-site was disposed of in an On-Site Waste Disposal Facility (OSWDF). According to the ASER 2020,

"Environmental sustainability is important because it allows for social and economic growth as well as sustainable and stable ground soil quality for food preservation. With a decrease in ground/soil quality, less efficient crop and plant growth follows. These two factors demonstrate the true importance of environmental sustainability, and how understanding the effects of a sustainable environment leads to a more efficient society, and a healthier world."

- Alex Stoller and Mitch Green, Waverly HS Students

345 tons of recyclable material was sent off-site and recycled in cooperation with the Southern Ohio Diversification Initiative (SODI) and the DOE. The following items were listed as part of the recyclable material:

- aluminum cans: 1000 lbs
- aerosol cans: 50 lbs
- batteries: 64,974 lbs
- electronic materials (computer equipment, circuit boards, etc.): 14,027 lbs
- used oil: 1688 lbs
- light bulbs: 2375 lbs
- paper/cardboard: 77,500 lbs
- plastic bottles: 21,500 lbs
- spent toner cartridges: 2000 lbs
- recyclable materials to SODI (excess equipment and materials, recyclable metals, recyclable oil, etc.): 252 tons.

With the release of information regarding the plant's demolition, as well as the plant's usage of various studies, the importance of environmental sustainability becomes prevalent. The following accomplishments at the PORTS site are of note in this year's report:

- a decrease of 82% in greenhouse gas emissions compared to the 2008 baseline emissions
- a decrease in water consumption of 62% compared to the 2007 baseline
- 22% of nonhazardous waste was recycled (The diversion rate was less than last year due to reduced operations resulting from the COVID-19 response.)
- 26% of construction and demolition materials were recycled

References

- DOE 2020. U.S. Department of Energy Portsmouth Gaseous Diffusion Plant Annual Site Environmental Report-2020, Piketon, Ohio, DOE/PPPO/03-1034&D1, U.S. Department of Energy, Piketon, OH, December.

Lake Hope Field Trip

ASER students participated in a field trip to Lake Hope State Park where they learned about environmental monitoring principles and techniques

Public Awareness

Local citizens, elected officials, business, media, and several divisions of the public partake in comprehensive community relations and public participation programs at PORTS. This Public Awareness program was created with the aim of furthering the development of openness and credibility between the PORTS officials and the surrounding community. Such a program encourages an individual's input and/or advice on decision-making for issues pertaining to the PORTS site.

The PORTS Site Specific Advisory Board (SSAB) is a branch of the Department of Energy's (DOE) Environmental Management (EM) SSAB. The EM SSAB was established to provide stakeholders with a chance to be directly involved in making decisions for DOE EM cleanup. PORTS SSAB is made up of eight local citizens who provide input and recommendations to DOE on D&D, environmental remediation, waste management, and related activities at PORTS. In addition, there are frequently scheduled meetings between the DOE and the PORTS SSAB that are open to the public. Further desired information regarding the PORTS Site Specific Advisory Board can be found via their website, https://www.energy.gov/pppo/ports-ssab, or by calling 740-289-5249.

In neighboring communities, open houses are also held to provide information to the public. Fact sheets about major topics are periodically written for the public. Moreover, notices of document availability and public comment periods, as well as other communications regarding the program, are distributed to local newspapers, the community relations mailing list, neighbors within two miles of the plant, and plant employees on a regular basis.

The PORTS Envoy program is another way for the public to get involved. The Envoy Program matches employee volunteers with local stakeholders, such as families living close to DOE property, local government organizations, and community groups. Envoys voice information about PORTS D&D and other site activities to the stakeholders and are available to answer questions about PORTS. The PORTS version of the PPPO Environmental Geographic Analytical Spatial Information System (PEGASIS) is accessible to the public and allows the user to access PORTS environmental monitoring data and display it on a local map that shows the locations where data was collected. Data from 2013 through the current ASER year are available in PEGASIS (pegasis.ports.ppppo.gov).

"Just as it is important for local communities to be involved, it is equally important for high school students to be involved in PORTS site activities. Science, Technology, Engineering, and Math (STEM) occupations are on the rise with the progression of technology. Participating in activities related to the PORTS site allows students to gain experiences related to STEM occupations. Furthermore, with programs like the PORTSfuture Program, students have an opportunity to learn more about STEM and are incentivized to pursue a career in the STEM field."

- Dylan Smith, Waverly HS Student

There is an Environmental Information Center which grants the public access to the documents used to make decisions on remedial actions 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. More information on the center is available via their website, https://www.energy.gov/pppo/portsmouth-environmental-information-center. There is also an online document repository associated with the Environmental Information Center available at https://eic.ports.pppo.gov/. Additional information, including the Annual Site Environmental Report, is available to the public on the DOE PPPO web site at https://www.energy.gov/pppo/portsmouthpaducah-project-office or the Fluor-BWXT Portsmouth (FBP) web site at https://www.fbportsmouth.com/.

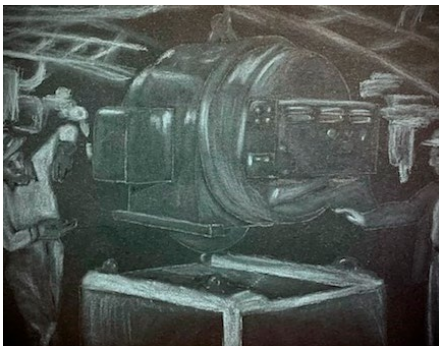
It is important for local communities to be involved in PORTS site activities and planning because it provides people with an opportunity to make a considerable impact on decision-making processes. It is in the best interest of the local communities near the PORTS site to be directly involved in the Public Engagement Program, as it allows the general public to have direct input in decision-making and propagates the chance of making absolutely necessary progress.

References

- DOE 2020. U.S. Department of Energy Portsmouth Gaseous Diffusion Plant Annual Site Environmental Report-2019, Piketon, Ohio, DOE/PPPO/03-0932&D1, U.S. Department of Energy, Piketon, OH, December.
- Portsmouth Site Specific Advisory Board, https://www.energy.gov/pppo/ports-ssab/portsmouth-site-specific-advisory-board
- Portsmouth Environmental Information Center, https://www.energy.gov/pppo/portsmouth-environmental-information-center
- Portsmouth Environmental Information Center Online Repository, https://eic.ports.pppo.gov/
- Portsmouth/Paducah Project Office, https://www.energy.gov/pppo/portsmouthpaducah-project-office
- Fluor-BWXT Portsmouth LLC, https://www.fbportsmouth.com/

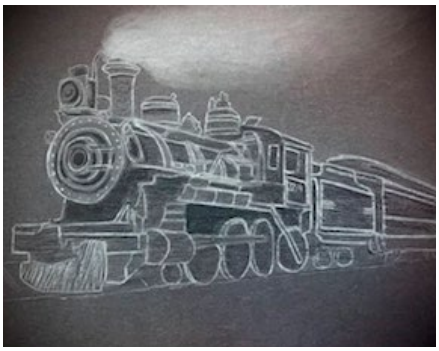
STEM Workforce Winners

Waverly HS students participated in an ASER art competition. Below are the winners for the "STEM Workforce" category.



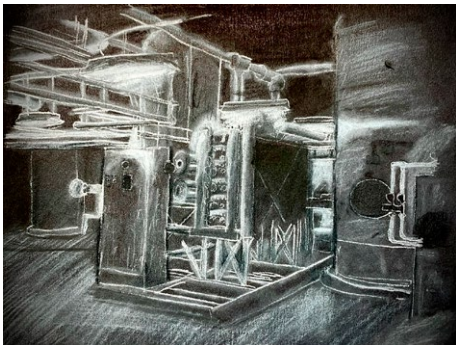
1. Aiden Peoples

White Charcoal on black paper. Workers on the job site.



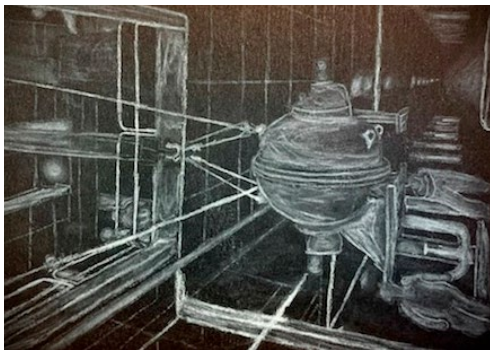
2. Larry Long

Black and White Charcoal of the transport of safely removing waste.



3. Dylan Smith

White Charcoal representing the equipment within the field.



Harrison Henshaw

Black and white charcoal drawing portraying the equipment used to produce the necessary materials.

Best Student Technical Writing Draft

Greenlee Thacker & Tommy Tursi (PORTS Site History)

Future Site Use

After the start of the D&D program at the PORTS site, the DOE began engaging community members and site stakeholders in conversations regarding the future use of the site. Through community input, ideas are proposed for future use of the site and how it could enhance community well-being. The focus of the future planning for the PORTS site is property transfer, site reindustrialization, and STEM entrepreneurship. Conversations and outreach activities have been a collaborative effort amongst Ohio University, DOE, SODI, and the local community.

Property or land transfer was a proposed idea by the Portsmouth SSAB, a community stakeholder organization dedicated to involvement in site decision-making processes. The SSAB offers DOE recommendations on cleanup standards and environmental restoration, waste management and disposition, excess facilities, future land use and long-term stewardship, and more. Land transfer of approved site property has been a top priority in DOE efforts to meet community needs. The goal of the land transfer process is to enable community-led development and job creation improving the regional economy, to create opportunities for conservation and other public benefits, to increase tax revenue for the Pike County community, specifically within the school district, and reducing the federal footprint. By the end of this project, approximately 2100 acres will be transferred back to the Pike County community.

"To ensure economic stability and growth in our area, it is important that everyone takes a proactive approach to the future of the PORTS plant. The more people involved in offering suggestions and being informed of what is happening with the plant, the more we ensure that the plant will provide jobs for future generations."

- Nicholas Monroe and Alex Bates, Waverly HS Students

The site reindustrialization efforts were developed based on community stakeholder input. Through ongoing outreach activities, the reindustrialization partners work to inform the public on progress toward achieving community preferences through member-led meetings, grass-roots outreach, and public participation. From community input, a proposed plan to utilize the electrical resources onsite to supply Scioto, Pike, Ross, and Pickaway counties with electricity, has been suggested.

A STEM entrepreneurship program has been designed to empower regional students in science, technology, engineering, and math (STEM) with the goal of creating workforce opportunities. One aspect of the program is the ASER Student Summary report, an annual project for a local Pike County High School. Through the partnerships of the future use initiative, additional STEM programs are offered by FBP and OU and are targeted to the regional K-12 educational system.

References

- "Portsmouth Site Specific Advisory Board." www.energy.gov/pppo/ports-ssab/portsmouth-site-specific-advisory-board.
- "PORTSfuture." PortsFuture,www.portsfuture.com/.

Conclusion

The PORTS facility is a substantial, complex, industrial site that played a significant historical role in national security from 1954 to 2001. It was one of only three uranium enrichment plants in the nation used for national security and the commercial nuclear sector. Through science-based and well-regulated cleanup activities, it has been the mission of the 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. Furthermore, the DOE is working toward transferring facility property and land to reduce the federal footprint while fostering re-industrialization 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. From the laborers, the local environmentalists, the state and federal EPA, to the DOE agency, we thank everyone for their hard work and dedication. This summary emanates from the environmental monitoring activities at PORTS for calendar year 2020. The following are some of the highlights of 2020:

- Discharges of radionuclides, chemicals, and other water quality parameters to Little Beaver Creek, the Scioto River, or other water bodies were measured at 11 locations called National Pollutant Discharge Elimination System (NPDES) outfalls.
- External radiation was measured continuously at 24 on and off-site locations. The measurements were collected quarterly.
- Ambient air was sampled at 19 locations on and off site and analyzed for radionuclides and/or fluoride. Five new ambient air monitoring stations began sampling in 2020 for non-radiological air pollutants that could be released due to decontamination and decommissioning (D&D) activities: particulate matter, metals, volatile organic compounds (VOCs) and asbestos.
- Surface water samples were collected semiannually from 14 locations on and off-site and analyzed for radionuclides.
- 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 2020 is 1.0 mrem, equaling 1% of the 100 mrem/year limit set by DOE for all potential pathways. 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 decreasing in 2020.

Concentrations of trichloroethene (TCE) or metals were increasing in a few wells in the monitoring areas. These areas continue to be closely monitored. 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 were below the level of concern established by regional screening levels of the U.S. Environmental Protection Agency (EPA) and Ohio EPA. In 2020, PCBs were detected in fish caught in off-site creeks within the range of concentrations detected in recent years. The detections were within the consumption advisory limits set by the Ohio Department of Health. 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 2020.

The 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 2020, PORTS stewardship scorecard was green, indicating environmental and sustainable standards were met.

References

- DOE 2020. U.S. Department of Energy Portsmouth Gaseous Diffusion Plant Annual Site Environmental Report-2020, Piketon, Ohio, DOE/PPPO/03-1034&D1, U.S. Department of Energy, Piketon, OH, December.

Acronyms & Abbreviations

ASER	Annual Site Environmental Report
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
DUF_6	depleted uranium hexafluoride
EMS	Environmental Management System
FBP	Fluor-BWXT Portsmouth LLC
HS	High School
LLC	Limited Liability Company
µg/kg	microgram per kilogram (equivalent to part per billion)
MCS	Mid-America Conversion Services, LLC
mrem	millirem
NRC	U.S. Nuclear Regulatory Commission
Ohio EPA	Ohio Environmental Protection Agency
OU	Ohio University
PEGASIS	PPPO Environmental Geographic Analytical Spatial Information System
PCB	polychlorinated biphenyl
PORTS	Portsmouth Gaseous Diffusion Plant
RCRA	Resource Conservation and Recovery Act
SODI	Southern Ohio Diversification Initiative
STEM	Science, Technology, Engineering, and Mathematics
TCE	trichloroethene
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.

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."

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.

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.

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.

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 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.

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

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.

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

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.

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