KENTUCKY

Paducah Gaseous Diffusion Plant

Background

The Paducah Gaseous Diffusion Plant is in rural western Kentucky, 10 miles west of Paducah (Figures 9 and 10). For more than 60 years, the Paducah Gaseous Diffusion Plant enriched uranium, first supporting the nation's nuclear weapons program and then producing fuel for commercial nuclear power plants. Paducah Gaseous Diffusion Plant enrichment operations ended in 2013, and the facility transitioned to US. Department of Energy Office of Environmental Management (DOE EM) in 2014.[47]

FIGURE 9: Aerial view of Paducah Gaseous Diffusion Plant. Photo courtesy of state of Kentucky.

Cleanup at the site is driven by the 1998 Federal Facilities Agreement (FFA) between DOE, U.S. Environmental Protection Agency (EPA) Region 4 and the Kentucky Energy and Environment Cabinet. The parties to the FFA are currently discussing the Site Management Plan to incorporate decontamination and demolition of the gaseous diffusion plant and investigation of areas deemed inaccessible when the plant was in operation.[48]

Major Accomplishments

DOE EM has worked with Kentucky to achieve the following outcomes:

- Two pump-and-treat systems have been in operation for two decades and have collectively treated more than 4 billion gallons of groundwater.[49] Approximately 7,800 gallons of trichloroethylene, a common industrial degreaser, and other volatile organic compounds have been removed by treating groundwater in the dissolved phase plume through the pump-and-treat technology and by remediating accessible source areas (spill and leak sites).[50]

[47] U.S. Department of Energy, Portsmouth/Paducah Project Office. (n.d.). Paducah site. Retrieved from https://www.energy.gov/pppo/paducah-site.
[48] Kentucky Energy and Environment Cabinet. (2019). Paducah Gaseous Diffusion Plant (PGDP). Retrieved from https://eec.ky.gov/Environmental-Protection/Waste/hazardous-waste/Pages/paducah-gaseous-diffusion-plant.aspx.
[49] U.S. Department of Energy, Office of Environmental Management. (2018, January 9). Paducah site develops "end game" strategy for groundwater contamination, Retrieved from https://www.energy.gov/em/articles/paducah-site-develops-end-game-strategy-groundwater-contamination.
[50] U.S Department of Energy, Office of Environmental Management. (2018, June). Paducah site cleanup by the numbers. Retrieved from https://www.energy.gov/sites/prod/files/2018/10/f56/Paducah-Site-by-Numbers-June-2018A.pdf.

- Depleted uranium hexafluoride (DUF6) conversion facilities were built at Paducah, Kentucky, and Portsmouth, Ohio, to convert an estimated 750,000 metric tons of DOE's surplus DUF6 inventory into a more stable chemical form.[51] Approximately 62,000 metric tons have been processed, with an estimated 30 years of operations to complete the remaining inventory (at the facility's process design rate).[52]
- In total, 84 inactive facilities successfully underwent deactivation and demolition as of June 2018.[53] More than 400,000 square feet have been demolished.
- In total, 33,000 tons of contaminated metal,[54] 420,000 cubic feet (ft^3) of legacy waste[55] and 866,000 ft^3 of DOE material storage areas have been disposed of.

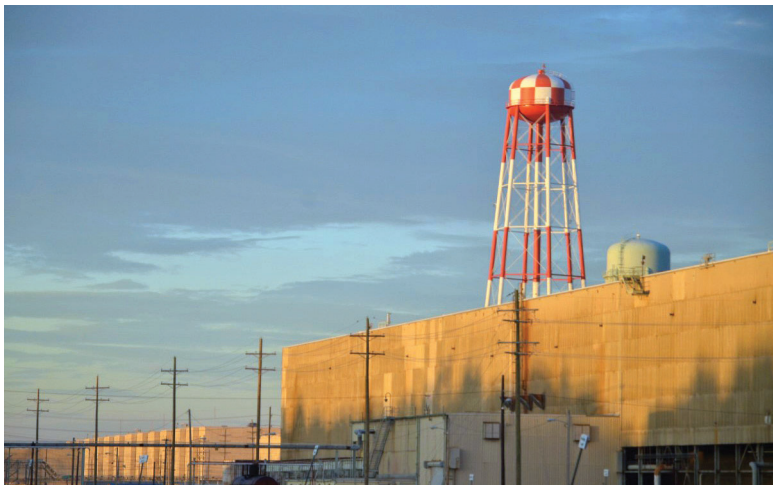

FIGURE 10: Paducah Gaseous Diffusion Plant. Photo courtesy of state of Kentucky.

Site-Specific Issues

In August 2017, DOE, EPA Region 4 and the Kentucky Department for Environmental Protection signed a memorandum of agreement to resequence all the environmental remediation work at the Paducah site to concentrate first on the C-400 building, which is the main source of the two 4-mile-long trichloroethylene groundwater contamination plumes. The C-400 building is scheduled to start demolition to slab in late 2018.[56] The demolition will be followed by a comprehensive investigation beneath and around the building to define all sources of contamination and determine how each contaminant is distributed vertically and laterally. All remaining environmental projects, except the area directly north of the C-720 "Machine Shop" building (referred to as "SWMU 211A"), will be moved out into the future.

Since DOE EM resumed control of the Paducah Gaseous Diffusion Plant in October 2014, resources are being realigned to support deactivation and demolition activities. More than 500 structures/systems will eventually undergo deactivation and demolition. The estimated volume of waste material that requires disposal from deactivation and demolition operations is about 3.6 million cubic yards.[57] As deactivation and demolition operations progress, it is anticipated that opportunities will arise to address contamination previously considered inaccessible (underneath buildings and infrastructure).

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[51] U.S. Department of Energy, Portsmouth/Paducah Project Office. (n.d.). DUF6 Conversion Project. Retrieved from https://www.energy.gov/pppo/pppo-services/pppo-cleanup-projects-portsmouth-paducah-duf6/duf6-conversion-project.

[52] U.S. Department of Energy, Office of Environmental Management. (2019, January 22). DUF6 Conversion Project off to strong start following improvements. Retrieved from https://www.energy.gov/em/articles/duf6-conversion-project-strong-start-following-improvements.

[53] U.S Department of Energy, Office of Environmental Management. (2018, June). Paducah site cleanup by the numbers. Retrieved from https://www.energy.gov/sites/prod/files/2018/10/f56/Paducah-Site-by-Numbers-June-2018A.pdf.

[54] U.S. Department of Energy, Office of Environmental Management. (2017, March 9) Portsmouth/Paducah Project Office: Waste Management Symposia, Phoenix, Arizona. Retrieved from http://archive.wmsym.org/2017/presentations/PowerPointFile_75_0307163206.pdf.

[55] U.S. Department of Energy, Office of Environmental Management. (2017, March 9) Portsmouth/Paducah Project Office: Waste Management Symposia, Phoenix, Arizona. Retrieved from http://archive.wmsym.org/2017/presentations/PowerPointFile_75_0307163206.pdf.

[56] U.S. Department of Energy, Office of Environmental Management. (2018, January 9). Paducah site develops "end game" strategy for groundwater contamination. Retrieved from https://www.energy.gov/em/articles/paducah-site-develops-end-game-strategy-groundwater-contamination.

[57] UU.S. Department of Energy, Office of Environmental management. (n.d.). DOE Paducah site tour. Retrieved from https://www.emcbc.doe.gov/SEB/PGDP%20Deactivation/Documents/Site%20Tours/DOE%20Paducah%20Site%20Tour-Deactivation%20Task%20Order.pdf.

Relationships to Other Sites in the Complex

- Portsmouth, Ohio, and Oak Ridge, Tennessee, also had gaseous diffusion plants in various stages of deactivation and demolition.[58]
- Portsmouth also has a DUF6 conversion facility.[59]
- Paducah has shipped waste to the Nevada National Security Site.[60]

[58] U.S. Department of Energy, Oak Ridge Office of Environmental Management. (2016, August 30). DOE completes decade-long project at Oak Ridge gaseous diffusion complex. Retrieved from https://www.energy.gov/orem/articles/doe-completes-decade-long-project-oak-ridge-gaseous-diffusion-complex.

[59] U.S. Department of Energy, Portsmouth/Paducah Project Office. (n.d.). PPPO cleanup projects—Portsmouth, Paducah, & DUF6. Retrieved from https://www.energy.gov/pppo/pppo-services/pppo-cleanup-projects-portsmouth-paducah-duf6.

[60] U.S. Department of Energy. (2019, January 31). Energy Department statement on plutonium shipments to Nevada. Retrieved from https://www.energy.gov/articles/energy-department-statement-plutonium-shipments-nevada.