

TENNESSEE

Oak Ridge Reservation

Background

The Oak Ridge Reservation in eastern Tennessee consists of three major U.S. Department of Energy (DOE) facilities: the Oak Ridge National Laboratory (ORNL), the Y-12 National Security Complex and the East Tennessee Technology Park (ETTP) (formerly the K 25 Gaseous Diffusion Plant). Separate DOE offices—the Office of Science, the National Nuclear Security Administration and the DOE Office of Environmental Management, respectively—manage each facility. In the more than 60 years since the Oak Ridge Reservation was established, a variety of production and research activities have generated large quantities of radioactive, hazardous and mixed wastes. Historical waste management practices contaminated more than 500 locations on and near the Oak Ridge Reservation.¹²¹

Several agreements embody the regulatory framework at Oak Ridge Reservation. The 1992 Federal Facilities Agreement established environmental cleanup as well as restoration procedures and milestones.¹²² A 1995 Tennessee Department of Environment and Conservation commissioner's order addressed mixed-waste treatment and storage at all DOE facilities at Oak Ridge Reservation, as established in the Federal Facilities Compliance Act.¹²³ In addition, relevant state statutes and regulations are applied to DOE waste management and cleanup activities.

Major Accomplishments

DOE's cleanup mission, in coordination with the state, has made progress on several cleanup and disposal activities, including:

- Shipping 5,952 depleted uranium hexafluoride cylinders off-site and elimination of the entire Oak Ridge Reservation inventory of legacy low-level waste (LLW).
- Closure of the compliance agreement between the state of Tennessee and DOE EM with the disposition of more than 7,700 containers of industrial, low-level and polychlorinated biphenyl-contaminated waste.
- Completion of the Uranium-233 Direct Disposition Campaign.¹²⁴
- Shipping 1,105 cubic meters (m³)—or 69 percent of the original inventory—of contact-handled transuranic (TRU) waste and 218 m³—or 31 percent of the original inventory—of remote-handled TRU waste from Oak Ridge Reservation for permanent disposal.¹²⁵
- Completion of Melton Valley interim Record of Decision (ROD) remedial actions by 2006.¹²⁶

¹²¹ U.S. Environmental Protection Agency. (2018, October 23). Superfund site: Oak Ridge Reservation (USDOE): Oak Ridge, TN, cleanup activities. Retrieved from <https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.cleanup&cid=0404152>.

¹²² U.S. Department of Energy, Office of Environmental Management. (n.d.). Federal facility agreement (FFA) signed at Oak Ridge. Retrieved from <https://www.energy.gov/em/downloads/federal-facility-agreement-ffa-signed-oak-ridge>.

¹²³ U.S. Department of Energy, Office of Environmental Management. (1995, September 26). Oak Ridge Reservation compliance order, September 26, 1995. Retrieved from https://www.energy.gov/sites/prod/files/em/2001_Agreements/ORR_CO_9-26-1995.pdf.

¹²⁴ Munger, F. (2016, April 28). The word on U-233 at Oak Ridge [Web log post]. Retrieved from <http://knoxblogs.com/atomiccity/2016/04/28/word-u-233-oak-ridge/>.

¹²⁵ Wilkerson, L., & Deacon, K. (2014, May 14). Transuranic waste processing update: Oak Ridge Site Specific Advisory Board. Retrieved from <https://www.energy.gov/sites/prod/files/2014/05/f15/Transuranic%20Waste%20Processing%20Update%20-%20Laura%20Wilkerson%2C%20DOE.pdf>.

¹²⁶ DOE EM Fact sheet "DOE Oak Ridge Environmental Management Program: Melton Valley Remediation Completed," April 2008.

- Demolition of all five former gaseous diffusion buildings at ETTP (buildings K-25, K-27, K-29, K-31 and K-33) and approximately 400 additional support facilities at ETTP.¹²⁷
- Demolition of the Toxic Substances Control Act (TSCA) Incinerator.¹²⁸
- Completion of design and initiation of construction for the Outfall 200 Mercury Treatment Facility at the Y-12 National Security Complex.¹²⁹
- Initiation of liquid mercury and equipment removal at the Y-12 National Security Complex.¹³⁰

Site-Specific Issues

Tennessee's primary concern is to ensure the protection of the health, safety and environment for its citizens given that Oak Ridge Reservation has an abundance of surface water and complex groundwater pathways. Tennessee, DOE and the U.S. Environmental Protection Agency are working together with stakeholders to address concerns about the proximity of the public to contaminated surface water and waste burials at DOE facilities in areas of abundant rainfall, shallow groundwater tables and karst hydrogeology.

Specific issues for the site include:

- Uncertainty regarding the long-term effectiveness of the hydrologic isolation of the Melton Valley burial grounds, where maintenance activities have been steadily increasing with downgradient trench issues and water levels inside the capped areas.
- One hundred miles of rivers and streams affected by historical site activities, including 250,000 curies of radioactive waste discharged into surface streams and 339,000 pounds of mercury discharged into East Fork Poplar Creek and the Clinch and Tennessee rivers.¹³¹
- Hundreds of acres of buried waste, including deep well injections, containing millions of pounds of uranium and several million curies of radioactivity.
- Hundreds of surplus facilities in deteriorating condition, some heavily contaminated with mercury and radionuclides.
- The need for characterization and evaluation of the extent of groundwater contamination, including delineation of exit pathways.
- The need for adequate characterization and segregation of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) waste necessary to maximize the available on-site waste disposal capacity.
- Selecting a protective CERCLA waste disposal option to support future cleanup, including limits on the types and volumes of waste disposed on-site.
- The feasibility of entombing highly radioactive salts in fuel drain tanks of the Molten-Salt Reactor Experiment at ORNL containing 12,780 curies of radioactive waste.¹³²
- Lack of sufficient CERCLA project milestones to ensure a steady pace of cleanup.
- In addition to the issues above, current funding levels planned by DOE for Oak Ridge Reservation will extend the projected cleanup completion date.

¹²⁷ U.S. Department of Energy, Oak Ridge Office of Environmental Management. (n.d.). East Tennessee Technology Park. Retrieved from <https://www.energy.gov/orem/cleanup-sites/east-tennessee-technology-park>.

¹²⁸ U.S. Department of Energy, Office of Environmental Management. (2018, September 11). Oak Ridge crews tear down TSCA incinerator. Retrieved from <https://www.energy.gov/em/articles/oak-ridge-crews-tear-down-tsca-incinerator>.

¹²⁹ U.S. Department of Energy. (n.d.). Outfall 200 Mercury Treatment Facility. Retrieved from <https://www.emcbc.doe.gov/SEB/OF200MTF/>.

¹³⁰ U.S. Department of Energy, Office of Environmental Management. (2018, November 20). Oak Ridge crews finish removing mercury-contaminated equipment. *EM Update*, 10(46). Retrieved from <https://content.govdelivery.com/accounts/USDOEOEM/bulletins/21cd1dd>.

¹³¹ U.S. Environmental Protection Agency. (2018, October 23). Superfund site: Oak Ridge Reservation (USDOE) Oak Ridge, TN, cleanup activities. Retrieved from <https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.cleanup&cid=0404152>.

¹³² Crocker, B. (2017, December 14). Contaminated molten salt reactor experiment may be entombed in concrete. *USA Today*. Retrieved from <https://www.knoxnews.com/story/news/2017/12/14/oak-ridge-national-laboratory-molten-salt-reactor-experiment-may-cleaned-up-concrete/922963001/>.

Relationship to Other Sites in the Complex

A ROD was signed in October 1999 to construct an on-site CERCLA waste disposal facility at Oak Ridge Reservation.¹³³ This facility is now about 70 percent full, and DOE EM is currently planning to construct a second on-site disposal facility for CERCLA cleanup waste. Even with this new on-site disposal option, off-site disposal alternatives are necessary for other waste streams, including TRU waste destined for the Waste Isolation Pilot Plant. Approximately 1.7 million kilograms of remote-handled TRU waste sludge and 930,000 kilograms of remote-handled mixed low-level aqueous waste stored in tanks at ORNL will require on-site treatment and eventual off-site disposal of the final form.

A 1993 consent order issued by the Tennessee Department of Environment and Conservation modified storage and treatment permits for out-of-state waste from DOE-owned facilities, and the TSCA Incinerator was used to treat DOE complexwide liquid and solid LLW contaminated with polychlorinated biphenyls. In addition, Tennessee has assisted New York by accepting low-level liquid waste from the Separations Process Research Unit for treatment and disposal. The agreement was in place for three years (May 30, 2012 to May 30, 2015) to allow for an on-site treatment facility constructed at the Separations Process Research Unit.

¹³³ U.S. Environmental Protection Agency. (1999, November 2). *EPA Superfund record of decision: Oak Ridge Reservation* (USDOE) EPA ID: TN1890090003, OU 13, Oak Ridge, TN (Report No. EPA/ROD/R04-00/028 2000). Retrieved from <https://semspub.epa.gov/work/HQ/186989.pdf>.