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# OAK RIDGE SITE



Demolition progress at Oak Ridge



## OVERVIEW

The U.S. Department of Energy's (DOE) Oak Ridge Reservation is located on approximately 33,500 acres in East Tennessee. The reservation was established in the early 1940s by the Manhattan District of the U. S. Army Corps of Engineers, and the site played a vital role in the production of enriched uranium during the Manhattan Project and Cold War. The Oak Ridge site contains three primary cleanup areas – the Oak Ridge National Laboratory, the Y-12 National Security Complex, and the East Tennessee Technology Park. Each campus performs a diverse set of missions, but all share a crucial need for environmental cleanup.

The Department of Energy's East Tennessee Technology Park, originally known as the K-25 site, was built as a uranium enrichment

complex for defense programs. The majority of the facilities have been inactive since uranium enrichment production ceased in 1985, and DOE's Environmental Management (EM) program is currently performing demolition and cleanup of the area to convert it into a private industrial park.

Originally, the Oak Ridge National Laboratory supported defense production operations and civilian energy research efforts. Currently, the Oak Ridge National Laboratory's research portfolio includes basic and applied research, physical and life sciences, supercomputing, advanced material research, and next generation energy research. EM's cleanup activities will enable the laboratory to thrive as a world-leading center for advanced energy research. Cleanup includes environmental remediation, decontamination and decommissioning of radioactively-contaminated facilities, and disposition of legacy low, mixed low-level, and transuranic waste.

The Y-12 National Security Complex originally served as a uranium processing facility. Today, this site's missions include nuclear nonproliferation, dismantling of nuclear weapons components, and storing the nation's special nuclear materials. EM is working to drastically reduce the site's footprint and address contamination in the soil and surface water resulting from decades of operations. EM is working to ensure a brighter, safer future for the Y-12 National Security Complex so it can better perform its mission — securing and protecting our nation.

Every day, the EM organization works aggressively to improve Oak Ridge's environment, understanding the safety and future of the site hinges on its accomplishments.

## EAST TENNESSEE TECHNOLOGY PARK

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### **K-25 Demolition**

Demolition is nearly complete at the K-25 Building, a massive U-shaped structure that originally occupied 44 acres. When it was constructed, K-25 was the world's largest building under one roof. Today, the former gaseous diffusion building contains radioactive contamination and hazardous materials.

Demolition of the building's west wing began in December 2008 and was completed in January 2010, and demolition of the east wing began in July 2011. Most of the eastern portion was completed in October 2012 except for several units that require further deactivation due to the presence of technetium-99, a slow-decaying radioactive metal. While that section of the wing is small, the work is significant and challenging because of the material. Finally, demolition of the north end, the last of the three wings, began in October 2012. The Oak Ridge Office of EM anticipates the north end's demolition will conclude in January and debris removal will be completed in March. Following the removal of the north end, workers will continue pre-demolition activities in the final units of K-25's east wing.

### **K-27 Building**

The K-27 Building consists of nine building units occupying a 383,000 ft<sup>2</sup> footprint with more than 1.1 million ft<sup>2</sup> of total floor area. It is similar in structure to the K-25 Building, and it was one of the site's first gaseous diffusion process buildings. Initial characterization of the K-27 Building, which is in a severely deteriorated condition, began in fiscal year 2012, with limited deactivation activities (focusing on risk reduction), tie line removals, and structural repairs beginning in early FY 2013. The facility is one of the last remaining highly-contaminated former uranium enrichment facilities. Eliminating this facility will significantly reduce the site's security and surveillance and maintenance costs. Additionally, its removal will move the site closer to becoming a commercial industrial park.

## OAK RIDGE NATIONAL LABORATORY

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### **Building 3026**

In 2010, EM completed demolition on the wooden superstructure of one of the highest hazard excess facilities at ORNL — the 3026 C&D Radioisotope Development Laboratory. This building was one of the last remaining 1940s Manhattan Project facilities. The outer structure, which encased six hot cells, had deteriorated significantly over the years and lacked fire suppression systems. The

facility posed significant risk to billions of dollars in science investments at the national laboratory. To complete the project, EM must remove all of the remaining hot cells. To date, four of the six highly radioactive areas have been removed, and the remaining two are scheduled to be completed in the third quarter of FY13.

**U-233 Material Downblending and Disposition**

Oak Ridge has a significant inventory of Uranium-233 (U-233) stored at the Oak Ridge National Laboratory. Due to the expenses and schedule of the initial plan to remove the inventory, DOE commissioned a review of alternatives for dispositioning the U-233. Phase I of the alternatives analysis, which screened and identified potential alternatives, was completed in January 2011. The Deputy Secretary of Energy endorsed the review recommendations in April 2011, and the team began planning a direct disposition campaign. This campaign involved identifying inventory that could be used for other programmatic uses and potentially disposing of an inventory associated with a uranium solidification project.

Phase II of the alternatives analysis will provide a more detailed evaluation of processing options for the inventory that will not be able to be directly dispositioned. The new plans are expected to save \$500 million and complete the project ten years earlier.

**Y-12 NATIONAL SECURITY COMPLEX**

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**Upper East Fork Poplar Creek**

In 1953, the site began efforts to separate lithium isotopes to develop hydrogen bombs. This method of separation required millions of pounds of mercury. Flowing at relatively high rates and pressures through numerous pipes and valves, the mercury often dripped or spilled. An estimated 240,000 pounds of mercury were released from Y-12 directly into the Upper East Fork Poplar Creek from 1950 to 1982. Overall, an estimated 2 million pounds of mercury were lost to the environment or otherwise unaccounted for, although limited inventory control during that time makes estimating difficult.

The remediation of the creek is being conducted in phases. Phase 1 addresses interim actions to remediate mercury-contaminated soil, sediment, and groundwater discharges that contribute contamination to surface water. Phase II addresses the remediation of the balance of contaminated soil, scrap, and buried materials within the Y-12 Complex. Multiple projects are ongoing to identify mercury sources and remove or lessen mercury flow from groundwater.

**Alpha-5**

Building 9201-5, also known as Alpha-5, was constructed in 1946 to house uranium process equipment and conduct lithium/mercury enrichment operations. It is Y-12's largest building, measuring 613,000 ft2, requiring demolition. In 2010, EM emptied the building of all legacy materials, moving the facility one step closer to demolition. Alpha-5 is a pivotal element within Y-12's cleanup and transformation plan. Eliminating the facility significantly reduces the site's footprint, eliminates surveillance and maintenance costs, and creates accessibility to significant mercury sources trapped beneath the foundation.

**Beta-4**

Building 9204-4, also known as Beta 4, is another sizeable demolition project on Y-12's horizon. In 2010, considerable legacy material was removed from the 313,000 ft2 structure, helping prepare the facility for deactivation and demolition as part of the site's transformation plan. The building was constructed in 1944–45; Beta-4 housed uranium processing equipment and produced Lithium-6. Eliminating the facility significantly reduces the site's footprint, eliminates surveillance and maintenance costs, and creates accessibility to significant mercury sources trapped beneath the foundation.

**OTHER**

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**Transuranic Waste Processing Facility and Processing**

Through years of defense-related research, a great deal of transuranic material, material that is heavier than uranium and usually man-made, was generated and stored in Oak Ridge. In 2003, the TRU Waste Processing Facility was constructed to treat the many

forms of waste found around the Oak Ridge Reservation. The EM program is steadily working to remove its entire inventory of transuranic waste from the state of Tennessee.

The handling of TRU waste is determined by its composition. Waste that is considered contact-handled can be safely handled without remote equipment. Higher energy radioactive TRU, or remote-handled waste, must be processed by remote control equipment in special rooms called “hot cells.” The TRU Waste Processing Center characterizes and packages TRU waste for transportation and disposition at DOE's Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico. Any mixed low-level waste or low-level waste processed from the TRU waste inventory is prepared for compliant disposal at the Nevada Nuclear Security Site.

**Environmental Management Waste Management Facility**

Wastes generated from cleanup throughout the Oak Ridge Reservation is disposed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Oak Ridge's CERCLA waste facility, the Environmental Management Waste Management Facility (EMWMF), was constructed to receive these wastes, and it significantly reduces cleanup costs. The facility is authorized to receive low-level radioactive waste and wastes regulated under the Resource Conservation and Recovery Act and Toxic Substances Control Act from CERCLA-regulated cleanup work. Potential wastes include soil, sludge, sediments, solidified waste forms, stabilized waste, vegetation, building debris, personal protection equipment, and scrap equipment. The latest expansion of the facility increased the EMWMF's capacity to 2.2 million yd3.

Other links that may help:

- [East Tennessee Technology Park](#)
- [Oak Ridge National Laboratory](#)
- [TRU Waste Processing Center](#)
- [Y-12 National Security Complex](#)
- [Annual Site Environmental Report](#)
- [Cleanup Progress Report](#)
- [Site Specific Advisory Board](#)
- [History of Oak Ridge EM Program](#)

CAREERS & INTERNSHIPS



CLEANUP SITES



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