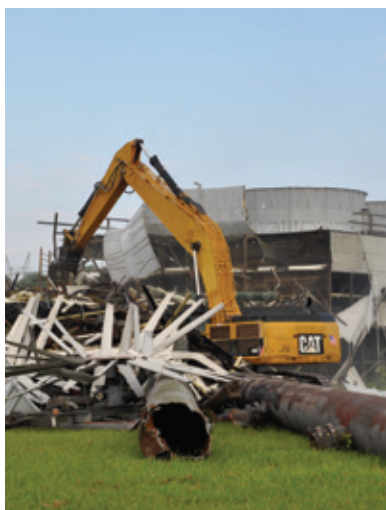


2017
**Cleanup
Progress**

Annual Report
to the Oak Ridge
Regional Community





Remediated P1 Pond at East Tennessee Technology Park

Message from the Manager

DOE Oak Ridge Office of Environmental Management

To the Oak Ridge Regional Community:

We are excited to share the Oak Ridge Office of Environmental Management's tremendous progress transforming DOE's Oak Ridge Reservation this year. Our employees are advancing ongoing cleanup efforts, and we are moving forward with several large projects that will position the program for continued success in the years to come. Together, we are reducing risks, improving safety, and removing barriers to new missions and economic opportunities in Oak Ridge.

The work underway at the East Tennessee Technology Park (ETTP) is transitioning the site into a valuable, attractive community-owned asset. Crews are continuing to alter the skyline by removing old electrical switchyards and demolishing numerous facilities, including an old electrical switch house and several facilities that formerly supported uranium enrichment operations. Our cleanup contractor is also working inside many other facilities to prepare them for demolition by 2020.

We have transferred hundreds of acres away from government ownership at ETTP in 2017— pushing us closer to our ultimate vision for the site as a privately owned and operated industrial park. Companies are seeing significant signs of progress and potential for its future. Months ago, a company onsite refurbished the barge area to transport large equipment from Michigan to Oak Ridge via river systems, adding to the abundant, existing offerings and infrastructure at the site.

As we pursue the completion of major cleanup at ETTP by 2020, we are ramping up planning and projects that will enable large scale cleanup to begin at the Y-12 National Security Complex. Additionally, through the recent Excess Contaminated Facilities Initiative, our program is beginning to remove risks and stabilize a portion of the 350 excess, contaminated, and deteriorating facilities that require demolition at Y-12 and the Oak Ridge National Laboratory (ORNL).

This year, we began site preparations for the new Mercury Treatment Facility, fulfilling a longtime commitment to the regulators and paving the way for an essential element needed for Y-12's cleanup. When completed, this facility will significantly reduce mercury migration into the Upper East Fork Poplar Creek and provide a control mechanism for disrupted mercury caused from the demolition of mercury-contaminated facilities located on the west end of Y-12.

Additionally, our program is successfully transporting waste offsite. For the first time in five years, we are once again shipping Oak Ridge's inventory of processed transuranic waste to the Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico. I am very proud of the men and women at our Transuranic Waste Processing Center who identified solutions that allowed us to maintain our workforce and continue making progress processing and packaging waste as WIPP performed necessary repairs and upgrades to accept waste. We also completed our Uranium-233 Direct Disposition Campaign, which removed half of the inventory that was stored at ORNL.

In addition to our incredible team of employees and contractors, this community has been one of the biggest contributors to our ongoing success. Your constant support of the Environmental Management program has helped propel our program forward, and in turn, we are striving to enhance the region to reach its highest potential. Thank you for your interest and contributions as together we work toward a clean, modernized Oak Ridge.



Jay Mullis



EM Environmental Management

safety ❖ performance ❖ cleanup ❖ closure

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This report was produced by URS | CH2M Oak Ridge LLC, DOE’s Environmental Management contractor for the Oak Ridge Reservation.

Introduction

In 2017, the U.S. Department of Energy's Oak Ridge Office of Environmental Management (OREM) continued its progress toward Vision 2020—the goal to complete major cleanup at the East Tennessee Technology Park by 2020. The work underway is enabling the transfer and transformation of the site into a private sector industrial park that can benefit the region economically. OREM also continued significant risk reduction activities at the Y-12 National Security Complex and Oak Ridge National Laboratory, including breaking ground on a new Mercury Treatment Facility and stabilizing excess contaminated facilities as they await eventual demolition.

The Oak Ridge Reservation has played key roles in our nation's defense and energy research. However, past waste disposal practices and unintentional releases have left portions of the land and facilities contaminated with radioactive elements, mercury, asbestos, polychlorinated biphenyls (PCBs), and industrial wastes.

The contaminated areas of the Reservation are on the U.S. Environmental Protection Agency's (EPA) National Priorities List (NPL), which includes sites across the nation that require cleanup under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). These areas on the Oak Ridge Reservation have been clearly defined, and OREM is working to clean and restore those areas under a partnership with the EPA and the Tennessee Department of Environment and Conservation (TDEC).

Together, through the support provided by contractors, unions, elected officials, and the public, OREM is enhancing safety, removing barriers to economic development, and enabling vital missions in science, energy, and national security.



East Tennessee Technology Park

The former K-25 Gaseous Diffusion Plant began operations during World War II as part of the Manhattan Project. Its original mission was to produce enriched uranium for use in atomic weapons. The 2,200-acre plant was shut down permanently in 1987 and is undergoing cleanup for ultimate conversion to a private-sector industrial park. Major activities at the site include environmental restoration, facility deactivation and demolition, waste disposition, and land transfers.





Demolition of the K-832-H Cooling Tower

Demolition of Poplar Creek facilities begins

Demolition has begun on the East Tennessee Technology Park's (ETTP) Poplar Creek facilities, a series of 11 buildings and numerous structures constructed in the 1940s and 1950s to support the site's former nuclear program and operations.

These are the most contaminated remaining facilities at ETTP now that the five large gaseous diffusion buildings have been removed from the former uranium enrichment plant.

Two of the larger facilities were demolished in 2017—the K-832-H Cooling Tower and the K-832 Cooling Water Pumphouse. The 5,500-square-foot cooling tower, which was used in the site's uranium enrichment process, was constructed in 1985 to replace the original cooling tower that began operating in 1945. It only operated a short time because uranium enrichment operations ceased at the site in 1985. The 11,000-square-foot cooling water pumphouse, which

operated from 1946 to 1985, pumped recirculating cooling water from the K-832-H Cooling Tower basin through the gaseous diffusion cascade equipment. After being shut down, it was used to store electrical equipment and batteries.

At the end of fiscal year (FY) 2017, workers were preparing to demolish the K-1203 facility, which provided the site with sanitary sewage treatment.

Workers have also been removing tie lines that once connected all of the gaseous diffusion buildings and transferred enriched uranium. Approximately 31,000 out of 43,665 linear feet of tie lines had been removed at the end of the fiscal year.

These demolitions are providing another skyline change and continue the transformation at ETTP. This cleanup work is making the site safer and helping OREM towards its goal of converting ETTP into a private sector industrial park.



ETTP Poplar Creek area before demolition activities



Demolition of the K-832 Cooling Water Pumphouse (above) and removal of tie lines (right).



Various support facilities demolished

In addition to the removal of two Poplar Creek facilities, OREM also completed demolition on other support facilities at ETPP, including Building K-731, the K-732 Electrical Switchyard, Building K-833, Building K-1028-81 and Building K-1028-64.

Constructed in 1944, Building K-731 Electrical Switch House and K-732 Switchyard provided electrical power to Building K-27 for uranium enrichment operations. The 31,000 square foot facility was a brick and concrete structure with two main floors, three third floor penthouses, and a basement. The building was demolished and the basement area was backfilled. Afterward, crews added topsoil and seeded the grounds.

Workers also removed the adjacent K-732 Electrical Switchyard. By the end of the project, crews had removed extensive electrical infrastructure and equipment, transported three 110-ton condensers, and characterized, excavated, and backfilled three condenser basements and 20 underground vaults. Additionally, more than 800 tons of steel, 28 tons of copper, and 7 tons of aluminum and brass were recycled, avoiding placing these materials in DOE's onsite disposal facilities.

Crews also demolished Building K-1028-64 (Portal 9), a 160 square foot permanent guardhouse that was built in 1973. Building K-1028-81 (Portal 19) and Building K-833 (the Cooling Water Return Pump House) also were also demolished in 2017, which concluded the removal of ancillary buildings associated with Building K-27.



Preparing for takedown and cleanup of the K-732 Electrical Switchyard



K-731 Building site after demolition

K-27 slab removed

The slab foundation of the K-27 Building, the last of five ETPP gaseous diffusion buildings to be demolished, was removed in FY 2017. More than 2,000 truckloads of the slab debris were disposed.



Building K-1037 deactivation continues

OREM continued deactivation work in Building K-1037 to prepare the facility for demolition in 2018. The facility was once a warehouse, but it was later used to produce the porous barrier material that was essential in the uranium separation and enrichment process.

Crews removed loose equipment and completed the asbestos abatement activities identified in the original scope. However, as equipment was removed throughout the building, additional asbestos was uncovered causing work to extend into 2018. In addition, a tremendous amount of effort was dedicated to the removal of chemicals throughout the facility. More than 1,400 chemicals have been collected, sampled, and prepared for disposal.



K-1037 Building

Central Neutralization Facility being characterized

The Central Neutralization Facility (CNF) was a wastewater treatment facility for industrial wastewater generated at ETPP. CNF was constructed in stages from 1945 until 2000. In 2013, CNF was decommissioned, and the facility's water treatment equipment was cleaned of all hazardous waste contamination.

In 2017, UCOR completed characterization of CNF for the disposal of demolition debris. Additionally, legacy waste removal, universal waste removal, and fixed equipment removal were nearing completion to prepare CNF for demolition.

Soil remediation preparing site for future use

Soil remediation efforts at ETPP are helping to prepare the site for its future industrial use. ETPP is divided into two cleanup regions: Zone 1, a 1,400-acre area outside the main plant, and Zone 2, an 800-acre area that comprises the main plant area. The areas in these zones are divided into varying-sized exposure units (EUs) for the purpose of remediation.

Zone 1

The Interim Record of Decision (ROD), which documents the cleanup method for Zone 1, requires OREM to remediate soil for the protection of groundwater, the surrounding ecosystem, land use controls, and a future industrial workforce. In FY 2017, remediation was completed in EU Z1-50, where the K-1066-K Cylinder Storage Yard is located, opening its 4.8 acres for industrial use.

OREM prepared a Remedial Investigation/Feasibility Study (RI/FS) to evaluate the nature and extent of contamination affecting groundwater, surface water, and ecology. Based on results of the study, OREM prepared the Zone 1 Final Soils Proposed Plan and Final Soil ROD to address the remaining soil/debris contamination. These documents were provided to EPA and TDEC for review and approval in FY 2017, and they move OREM one step closer to completing work at the site.

Zone 2

The Zone 2 ROD requires OREM to remediate soil for the protection of an industrial workforce and groundwater. It divides Zone 2 into 44 EUs that range in size from 6 to 38 acres. In FY 2017, OREM and UCOR completed characterization of EUs Z2-12, 14, and 19 (the Building K-27 slab is in EU Z2-14), and remediation of EUs Z2-17, 20, 22, 28, 29, and 41. Following remediation,



EU Z1-50

these six EUs were recommended for unrestricted industrial use— pushing ETPP closer to OREM's ultimate vision.

Sitewide ROD

OREM is performing a study that will help identify the most effective groundwater treatment technology that can be used for ETPP's final groundwater remedy. OREM completed Phase 1 of the study in FY 2010, and it resumed the study in FY 2016. Workers are characterizing the former K-1401 area to support the design of a pilot scale thermal treatment study.

In 2017, crews installed numerous groundwater boreholes and more than 100 sampling wells at varying depths. They also installed seven pump test/observation wells for hydraulic testing. OREM and UCOR are utilizing innovative technologies to determine the extent and composition of the contamination in the K-1401 area.

Upcoming work includes hydraulic testing, data evaluation, and planning for the pilot scale thermal demonstration.

Chromium Surface Water Investigation

In 2011, OREM performed a time-critical removal action to reduce the concentration of hexavalent chromium in Mitchell Branch. The project involved installing wells to intercept the material prior to its discharge into Mitchell Branch. Since then, the concentrations levels in the groundwater plume and in the two interception wells have declined significantly.

The interception wells were turned off for 48 hours to determine the new baseline level of hexavalent chromium concentrations in surface water. The test confirmed that even without the interception wells the concentrations in Mitchell Branch have declined significantly, but they still exceed requirements. OREM will continue using the wells to ensure the waters are protected.

OREM and UCOR are utilizing innovative technologies to determine the extent and composition of the contamination in the K-1401 area



Construction nears for commemorative facilities

National historic preservation initiatives at ETPP reached a milestone in FY 2017 with the completion of design activities. The final design documents were released to the historic preservation consulting parties in January 2017 for review and comment, and the designs of the facilities and exhibits were finalized in April 2017.

Consulting parties for the K-25 historic preservation activities participated in a meeting in July 2017 to review the current condition of the K-25 Building footprint. The highlight of the meeting was an opportunity to tour the building footprint and walk on portions of the original concrete slab. Following the tour, National Park Service staff facilitated discussions on plans for preservation and public use of the K-25 Building footprint.

At the close of the fiscal year, activities were underway to identify construction and exhibit fabrication subcontractors to begin work on the K-25 History Center. Construction of the Equipment Building and Viewing Tower is planned for FY 2018.

K-25 History Center visitors will be invited to explore the rich history of the Manhattan Project site. The facility will feature a theater, period artifacts, equipment replicas, and workers' oral histories,



Consulting party members join DOE and its cleanup subcontractor, UCOR, to review the condition of the K-25 footprint.

placing K-25 in its proper historical context in World War II and the Cold War. It will provide an in-depth look at gaseous diffusion technology used to enrich uranium and highlight the people who sacrificed to make it a reality.

The Equipment Building and Viewing Tower will replicate the exterior appearance of the K-25 Building and will house a representative cross-section of gaseous diffusion technology. An enclosed observation deck, standing 70 feet, will provide a 360-degree view of the site and allow visitors to see the entire K-25 footprint from the height of the former facility.



Artist's rendering of History Center, Equipment Building, and Viewing Tower

ETTP closer to its future as a private sector park

Oak Ridge’s Reindustrialization Program entered its 21st year as the model DOE asset reuse program. During that time, ETTP has been transformed from a former government-owned uranium enrichment complex into a private sector industrial business park.

As OREM moves toward the final phases of environmental cleanup at ETTP, the site continues towards its future as a private sector industrial park, national historical park, and conservation area. A closure plan was developed this year to address all of the necessary transfers for all of the site assets, including the remaining facilities, land, and utility infrastructure.

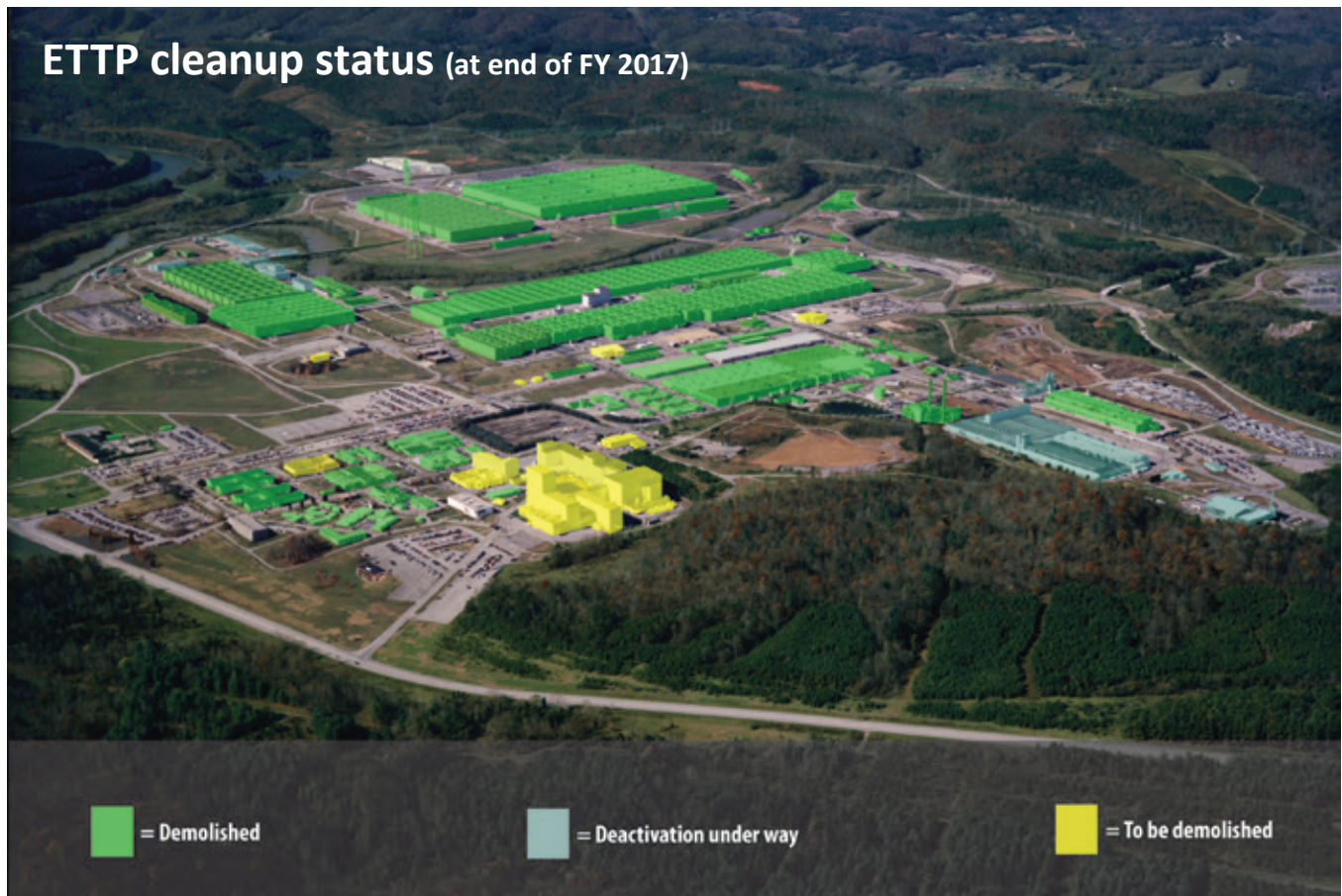
Additionally, UCOR and the Community Reuse Organization of East Tennessee (CROET) re-evaluated and modernized the existing revitalization plan for ETTP. The new approach accounted for recent cleanup accomplishments and new developments, such as the proposed regional general aviation airport.

Numerous stakeholders worked together to coordinate ETTP’s redevelopment. During FY 2017, the Reindustrialization Program transferred a 185-

acre parcel (formerly the K-31 and K-33 footprint) to CROET, which was the largest land transfer to date in the main plant area. It is a highly desirable parcel because of its large size, flat topography, and significant infrastructure.

The Reindustrialization program also moved forward with making other larger parcels of land available for major manufacturing developments, including the 400-acre Powerhouse Area and the 200-acre Duct Island parcel. These properties are the first available at ETTP that can accommodate large-scale manufacturing developments, which would contribute significantly to job growth in the area.

A proposed plan to build an airport on the ETTP site reached a major milestone in FY 2017 with the completion of a master plan, which was submitted to the Federal Aviation Administration (FAA) for approval. The Metropolitan Knoxville Airport Authority (MCAA), working closely with DOE, is leading this project. MCAA will proceed with final design work when the master plan is approved by FAA.



Oak Ridge National Laboratory

The Oak Ridge National Laboratory is DOE's largest multi-program national laboratory that conducts cutting edge research in energy, materials and chemical sciences, nuclear science, and supercomputing. However, there are large contaminated areas from past operations and waste disposal practices among its world class facilities and vital research. OREM has divided ORNL into two major cleanup areas: Bethel Valley and Melton Valley. The Bethel Valley area includes reactors and former research facilities, and the Melton Valley area includes reactors and waste management areas, such as burial grounds.





Asbestos removal in Building 7500

Excess contaminated facilities stabilized

OREM conducted stabilization activities at two ORNL facilities that are not scheduled for near term demolition.

Building 3026 was a laboratory facility and one of the site's original Manhattan Project facilities. The outer structure and four of the facility's six "hot cells" were demolished during the Recovery Act. Hot cells are heavily shielded rooms where scientists can perform research safely when studying and handling highly radioactive materials.

In 2017, crews installed new material to minimize or prevent rainwater intrusion into Building 3026's remaining hot cells, and they poured new concrete caps over the pads of the demolished hot cells to stabilize any surface contamination. Crews also characterized, removed, and transferred water from the building's transfer tunnel for treatment. Additionally, workers disposed all of the waste from this project, which reduces the potential for contaminant releases, risks to onsite workers, and the cost of surveillance and maintenance and future cleanup.

Building 7500, known as the Homogeneous Reactor Experiment, was built in 1951 and operated until 1961. Since then, the insulation and building's interior has degraded significantly. Workers began removing asbestos in late FY 2017, which will significantly reduce risk in the deteriorating facility.



Asbestos abatement crew inside Building 7500

Uranium-233 direct disposition complete, prep for processing phase continues

OREM has successfully completed its Uranium (U)-233 Direct Disposition Campaign—the first of its two-phase effort to remove the inventory stored at ORNL. Ultimately, the two-phase approach will eliminate approximately 1,100 containers of the highly-enriched material.

Completing the direct disposition campaign removed approximately half of the U-233 inventory, which is stored in Building 3019—the world’s oldest nuclear facility. Its removal is OREM’s highest priority at ORNL, and it will eliminate a Category 1 inventory of controlled nuclear material, save considerable security and oversight costs, and enable the demolition of an old facility that opens land in ORNL’s central campus for science and research missions.

In 2017, OREM also made another significant step that positions the program for the second phase of the project. The Office of Science transferred ORNL’s Building 2026 to the Office of Environmental Management, allowing the cleanup program to ready the facility for processing and downblending of the remaining U-233 stored onsite.

Building 2026 is located across from Building 3019. The close proximity helps simplify the logistics of transporting the material for processing. OREM’s schedule for approval of the final design for the Processing Preparation Campaign is in the second quarter of FY 2018.



The Office of Science transfers Building 2026 to the Office of Environmental Management

MSRE waste items being dispositioned

Work continued to characterize and dispose of waste items from the Molten Salt Reactor Experiment (MSRE) facility – a graphite-moderated, liquid-fueled test reactor that operated at ORNL from June 1965 until December 1969. The facility is one of the most challenging and complex projects at ORNL.

In 2014, 74 waste items were added to the facility’s waste handling plan. In FY 2017, all of the items were disposed and characterized according to the commitments listed in the schedule, and six items were dispositioned ahead of schedule, including four of the MSRE salt probes.

Since the reactor’s shutdown, OREM has performed several studies and removal actions to stabilize the facility, including removing uranium deposits and defueling the reactor salts. Employees are characterizing and disposing legacy defueling equipment, such as the fuel salt probes and fuel salt probe glove box. OREM is continuing its routine surveillance and maintenance activities there to manage the remaining hazards, including periodically removing reactive gas generated by the defueled salts.



MSRE probe being loaded

Fixative sprayed in Building 3029 hot cells

To help prevent the spread of contamination from the hot cells in Building 3029, known as the Source Development Laboratory, workers sprayed a fixative into the ports on the hot cells. This process helps prevent the spread of contamination so it will remain in place.

The work was conducted in September 2017. It involved spraying the fixative material in each of the four hot cells, where two of the hot cells contained high dose rates and high contamination levels. The team was able to execute the work safely and without any issues.



Fogging operations in Building 3029 hot cells

Upgrades from LGWO life cycle study implemented

Upgrades from an engineering evaluation and life cycle study of ORNL's Liquid and Gaseous Waste Operations (LGWO) were implemented in FY 2017. The facility is essential for ongoing operations at the largest multi-program national laboratory.

The study included four areas of focus. First, it evaluated the current conditions of the process water, gaseous waste, and liquid low-level waste systems. Then, it determined the future capacity needs to support OREM and the Office of Science missions at ORNL. Next, it researched alternate technologies, and finally, it recommended and prioritized repairs and/or system upgrades for long-term operations.

The LGWO operating systems vary in age from 30-60 years old, and all of them are well beyond their designed life. The systems are experiencing frequent equipment breakdowns, and in many cases, spare parts are not available due to the age of the equipment that

is in service. The engineering evaluation has confirmed and identified additional equipment repairs that need to be conducted.

The first phase of the upgrades contained seven individual activities. Five of those activities were completed in FY 2017, and the remaining two should be complete in 2018.

The second phase of the upgrades has three individual activities. One of those activities was completed in FY 2017. The second activity is in the proposal process, while the third activity's planning will begin in FY 2018.

Based on the efficiencies realized after completing activities in the first two phases, an effort is underway to evaluate the needs identified in the engineering evaluation to further define the future upgrades necessary to ensure continued operations of the LGWO.

Y-12 National Security Complex

The Y 12 National Security Complex is a premier manufacturing facility dedicated to protecting our nation. Y-12 helps ensure a safe and reliable U.S. nuclear weapons deterrent. The site also retrieves and stores nuclear materials from around the world, fuels the nation's naval reactors, and performs highly- skilled, specialized manufacturing for government agencies and private sector entities.



Mercury collected from Alpha-4 equipment is being poured into a container



Mercury and equipment removal begin at Alpha-4

OREM retrieved more than 2,000 pounds of elementary mercury in FY 2017 from the cleanout of old column exchange (COLEX) equipment on the west side of Alpha-4 at Y-12. The project prevents mercury releases in the environment and eliminates risks stemming from rusted, structurally-degraded equipment, clearing the way for Alpha-4's eventual demolition.

The mercury-contaminated COLEX equipment is connected to the four-story 500,000-square-foot Alpha-4. The building was used for uranium separation from 1944 to 1945. Workers finished installing the COLEX equipment in 1955 for lithium separation, a process that required large amounts of mercury. A significant amount of the element was lost into the equipment, buildings, and surrounding soils, and its cleanup is one of EM's top priorities.

While workers drained the majority of the materials from the equipment when operations ceased in 1962, all of the systems and components were not cleaned. Recoverable amounts of mercury are still in the equipment and lines. The Stormwater Pollution Prevention Plan actions have been effective during this work, and there have been no issues with the release of mercury.



Some of the mercury-contaminated pipes contain a grit-like substance that requires a more aggressive technique to remove

Workers inspected, cleaned, and retrieved mercury from tanks and equipment prior to their removal. Approximately 7,689 feet of the 9,947 feet of piping, two tanks, and four heat exchangers have been tapped and drained. The progress will continue with equipment demolition expected to be complete next calendar year. Additionally, equipment on the east and south sides will be removed in the future.



Workers use special equipment to view inside the COLEX equipment



A worker takes a sample from a concrete floor in one of the Biology Complex facilities to determine the extent of contamination present

Biology Complex characterization completed

OREM and UCOR completed characterization at the Biology Complex, identifying contaminants before demolition and waste disposition. The project is part of DOE's Excess Contaminated Facilities Initiative, an effort to reduce risks and stabilize facilities not scheduled for near-term demolition. In this case, OREM's activities can accelerate the demolition schedule because the facilities are collapsing due to age, and the location can be used for modern national defense missions.

More than 300 samples were taken, validated, and evaluated from the eight remaining Biology Complex buildings that span almost 350,000 square feet. Like many facilities built in the 1940s, the characterization results showed significant amounts of asbestos and other wastes, such as polychlorinated biphenyls (PCBs). Workers also found radiological constituents in some buildings.

Getting crews into the complex before the working environment became too hazardous was crucial.

Already, team members could not enter one building due to a failed roof. Elsewhere, exterior tiles have fallen from the façade, and asbestos and other material present risks to workers due to roof leaks.

The characterization results verified that six of the buildings could be disposed in the Y-12 sanitary landfills because they do not contain radiological contamination. The remaining two will be disposed in the Environmental Management Waste Management Facility.

Originally constructed to recover uranium from process streams, the complex later housed DOE's research on the genetic effects of radiation from the late 1940s. The facilities once housed more individuals with doctorates than anywhere in the world. The complex originally consisted of 12 buildings until EM demolished four of them in 2010 as part of the American Recovery and Reinvestment Act.

Mercury Treatment Facility design work complete and project moves toward construction

OREM is working to construct the Outfall 200 Mercury Treatment Facility at the Y-12 National Security Complex to reduce mercury concentrations in water exiting the site through the East Fork Poplar Creek. The facility opens the door for large-scale demolition to begin at Y-12 by providing a mechanism to limit and control potential mercury releases caused from disturbing the western portion of the site that contains mercury-contaminated buildings and soil. It will also help the cleanup program make progress toward achieving compliance with regulatory criteria for the East Fork Poplar Creek.

Outfall 200 is the point where the west end Y-12 storm drain system creates the headwaters of the Upper East Fork Poplar Creek. An estimated 700,000 pounds of mercury went into the environment at Y-12 during operations during the 1950s and 1960, and this facility will help capture this material to prevent it from traveling offsite through the creek.

In FY 2017, OREM completed the designs for the early site preparation and the facility construction. At the end of FY 2017, OREM planned to begin early site preparation by the end of 2017. Early site preparation includes installing necessary utilities and infrastructure and demolishing existing structures in the area to clear the area for construction.

OREM anticipates awarding a construction contract in 2018. The Mercury Treatment Facility will have the capability to treat 3,000 gallons of water per minute and store up to 2 million gallons of additional storm water collected during higher storm flow conditions. The treated water will then be discharged back into Upper East Fork Poplar Creek.



Artist's rendering of the Mercury Treatment Facility, which includes a headworks facility and a treatment center



Mercury remediation technologies explored

Mercury remediation is OREM's highest priority at the Y-12 National Security Complex due to the large historical losses of the element in buildings, soils, and surface waters. Remediation of Y-12 and East Fork Poplar Creek is based on a phased, adaptive management approach.

The approach to address surface water includes Outfall 200 treatment actions in the short term, and research and technology development to evaluate longer-term solutions and in the downstream environment. In FY 2017, OREM led a multi-organizational meeting series focused on updating and prioritizing the mercury remediation strategy and technology development plans.

In the near-term, the recommended mercury technology development activities will support the successful completion of the demolition of Y-12's mercury-contaminated facilities and soils remediation and reducing mercury-related ecological risks in the East Fork Poplar Creek.

Mercury technology development activities have been ongoing since 2015, and they will ultimately support an evaluation of remediation alternatives

for the creek in the 2020s. East Fork Poplar Creek research activities have emphasized understanding mercury transport as an important precursor to the development of targeted remedial technologies.

To date, stream bank sources in select areas with higher mercury values are thought to be a major source of mercury to surface waters. Technologies under investigation include the use of materials that will bind mercury and prevent its release into surface waters. Water chemistry is also thought to play a major role in mercury transport and uptake in the food chain. Controlling nutrient releases that impact algae in the creek is one strategy under investigation. Lastly, studies on the form of mercury in animal and plant life in the area are providing new insights that suggest managing stream biological communities may help decrease mercury risks.

ORNL scientists are preparing a report titled "Mercury Remediation Technology Development for Lower East Fork Poplar Creek—FY 2017 Progress Report." This report will provide a detailed description of each of the study areas and findings from studies performed in FY 2017.



ORNL researchers collect sediment samples from East Fork Poplar Creek to determine the relationship of particle size to mercury concentrations

Waste Management

Wastes on the Oak Ridge Reservation are being disposed in a variety of ways. Most of the waste is being disposed onsite in the Environmental Management Waste Management Facility (EMWMF) or the Oak Ridge Reservation Landfills. Some wastes are shipped offsite for treatment and/or disposal. Wastewater is treated at the Chromium Water Treatment System at ETTP and the Process Waste Treatment Complex at ORNL.





Reservation facilities receive most cleanup wastes

Most of the waste generated during FY 2017 cleanup activities in Oak Ridge were disposed at disposal facilities on the Oak Ridge Reservation.

This year, EMWMF received 5,309 waste shipments, accounting for 71,534 tons, cleanup projects at ETPP, ORNL, and Y-12. This engineered landfill consists of six

disposal cells that only accept low-level radioactive and hazardous CERCLA waste that meets specific waste acceptance criteria. Waste types that qualify for disposal include soil, dried sludge and sediment, building debris, scrap equipment, and personal protective equipment.

In FY 2017, EMWMF operations collected, analyzed, and disposed approximately 4.46 million gallons of leachate at the ORNL Liquid and Gaseous Waste Operations facility. No contact water (water that comes in contact with waste but does not enter the leachate collection system) required treatment. Instead, 8.98 million gallons of contact water was released to the storm water retention basin after laboratory analyses verified the water met all discharge standards. OREM also effectively prevented erosion at EMWMF. OREM was able to divert 17.7 million gallons of clean stormwater runoff away from the disposal facility by using an enhanced operational cover that spans approximately 12 acres.

DOE also operates and maintains solid waste disposal facilities called the Oak Ridge Reservation Landfills. In FY 2017, 54,740 cubic yards of waste were disposed in three of these active landfills, which marks a 63 percent increase from FY 2016 volumes.

Operation of the Oak Ridge Reservation Landfills generated approximately 2.8 million gallons of leachate that was collected, monitored, and discharged into the Y-12 Complex sanitary sewer system.

Wastewater treated

Each year, activities on the Oak Ridge Reservation generate millions of gallons of wastewater that must be treated to remove oil, chemicals, radiological constituents, and other contaminants.

The Y-12 National Security Complex treats wastewater generated from production and environmental cleanup activities. The site provided safe and compliant treatment of 115 million gallons of wastewater during FY 2017. At ORNL, the Process Waste Treatment Complex treated 94 million gallons of wastewater.

In addition, the liquid low-level waste evaporator at ORNL treated approximately 96,000 gallons, and the ORNL 3039 Stack Facility treated 1.63 billion cubic meters of gaseous waste. These waste treatment activities supported both OREM and Office of Science mission activities in a safe and compliant manner.

Location sought for new onsite disposal cell

EMWMF, the existing onsite disposal facility for low-level, mixed, and classified waste, will reach capacity before OREM completes its cleanup at Y-12 and ORNL. Planning for another disposal facility to provide the capacity needed to complete Oak Ridge's cleanup continued in FY 2017. The new facility will be called the Environmental Management Disposal Facility (EMDF).

During 2017, OREM continued to work with regulators on issues associated with the Remedial Investigation/Feasibility Study (RI/FS) and submitted another version of the document. The document lists options for onsite and offsite disposal. The onsite disposal alternatives listed in the document include four sites in Bear Creek Valley, including a site to the east of EMWMF, sites in Central Bear Creek Valley, and a site on the west end of Bear Creek Valley.

OREM's preferred alternative is a site in Central Bear Creek Valley. While discussions continue with the regulators on the RI/FS and how to best present a preferred alternative to the public, OREM began planning for characterization efforts on the Central Bear Creek Valley site. These efforts included collecting soil types in the area, determining the depth to groundwater, and identifying other factors that are necessary before the final decision on a site is made and before a significant design effort can begin.

A Field Sampling Plan was developed with input from the regulators in FY 2017, and it will be submitted for final review and concurrence in FY 2018. In anticipation of the sampling outlined in the document, roughly 4,000 feet of temporary access roads were constructed on OREM's preferred site. These roads will allow drill rigs and supporting equipment to access areas identified to install wells, measure groundwater levels, and collect soil samples for engineering property analyses.



An access road to OREM's preferred site for EMDF

TWPC sludge buildout facility planning underway

OREM awarded a contract to CH2M HILL Constructors, Inc., in March 2015 for the design of the Sludge Processing Facility Buildouts Project at the Transuranic Waste Processing Center (TWPC).

Once transuranic debris processing is completed, it is important for OREM to process and dispose the large inventory of sludge transuranic waste that remains onsite. Current TWPC facilities are not designed for sludge processing, so new facilities must be constructed to mobilize and transfer the sludge from the ORNL tanks to processing systems that will enable the solidification, packaging, and disposing the waste offsite as remote-handled low-level waste.

OREM will conduct initial testing through the design and construction of a mock-up test facility (also referred to as the Sludge Test Area ORNL 7658) and offsite testing at vendor facilities. Once the technologies are matured,

the design of the final processing facilities and systems can be completed and construction can begin.

Key progress for the project in 2017 includes:

- Released Request for Information to potential vendors for the sludge mobilization system.
- Completed initial development of a design package for the Sludge Test Area, design of the density test element skid, and specification package for offsite vendor testing of the slurry mixing and characterization tanks and measurement system. These were issued to OREM to review.
- Completed process chemistry modeling and issued Chemistry Modeling Report (calculation) to support update of the Integrated Systems Test Plan.
- Conducted quarterly Safety Design Integration Team meetings.

TRU facility processes waste, resumes shipments

Employees at TWPC continued processing contact-handled and remote-handled transuranic waste in FY 2017. Through their work, OREM has been able to process approximately 96 percent of the contact-handled transuranic waste and 89 percent of the remote-handled transuranic based on the current inventory and generation forecasts.

TWPC, which is operated by North Wind Solutions, LLC, is responsible for processing and packaging transuranic waste from the Oak Ridge Reservation for shipment to DOE's Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico. This form of waste consists of materials and debris that are contaminated with elements that have a higher atomic mass and listed after uranium on the periodic table. The majority of Oak Ridge's inventory originated from previous research and isotope production missions at ORNL.

Two transuranic waste streams are processed at the facility—contact-handled and remote-handled waste. Contact-handled waste can be safely handled without remote equipment, although workers never actually touch the waste without protective barriers, such as special clothing or equipment. Higher energy radioactive, or remote-handled waste, is processed by remote control equipment in special protective rooms called "hot cells." Workers who process this form of waste are protected by barriers, such as thick concrete walls and leaded-glass viewing windows.

Most notably in FY 2017, TWPC resumed waste disposal to WIPP for the first time since 2012, and OREM is once again able to begin removing Oak Ridge's inventory of transuranic waste. With operations at WIPP ramping up, Oak Ridge anticipates making multiple shipments each month, with the possibility of increasing that total in the future.



The first TRU shipment to WIPP since 2012



The TWPC team celebrates waste shipments resuming to WIPP

Oak Ridge Reservation

The DOE Oak Ridge Reservation is home to ETPP, ORNL, and the Y-12, as well as other facilities and waste disposal areas. It contains approximately 33,500 acres that are predominantly undeveloped, forested areas. In addition to cleanup projects at the three sites on the Reservation, OREM is taking measures to address Reservation-wide issues.



Groundwater project with ORNL focus begins

OREM's top priority is ensuring the safety and protection of employees and local residents from environmental impacts caused from previous operations on the Oak Ridge Reservation. Groundwater sampling and research is one of the OREM has invested heavily to maintain this commitment.

In 2017, OREM began work on the third project that was implemented under the Oak Ridge Reservation Groundwater Strategy. This particular project focuses on plumes and potential exit pathways in Melton Valley

and Bethel Valley at ORNL. It will use flow modeling and data evaluation to identify where additional data is needed, and it will help determine where the new wells are located. The findings will be issued in September 2018.

Reporting is also underway on the first two projects—an offsite groundwater study and a regional groundwater flow model. Through this effort, OREM is working cooperatively with EPA and TDEC to investigate offsite groundwater quality and potential movement.

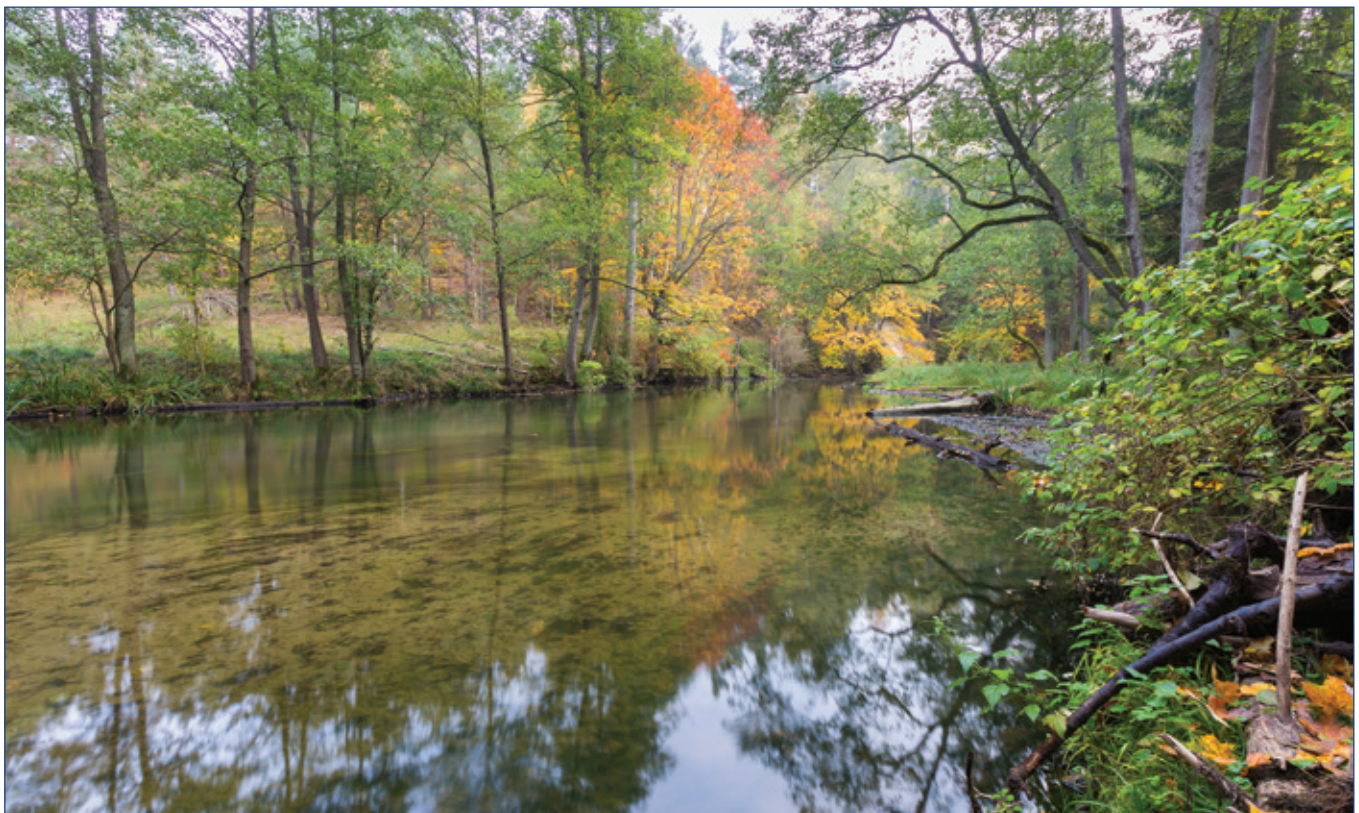
Five-year review of remedial actions completed

The Five-Year Review, which assesses the effectiveness of completed CERCLA remedial actions, was submitted to EPA and TDEC in FY 2017. This document included in-depth reviews on sites where remedial actions are ongoing, or where they have been completed but contamination was left in place above unrestricted cleanup levels.

The Five-Year Review also evaluates the land-use controls that are being utilized, which includes practices

such as property record restrictions, property record notices, excavation/penetration permit programs, and access controls. A protectiveness determination was completed for each of the sites and is included in the review.

The annual Remediation Effectiveness Report was also completed in FY 2017 and submitted to EPA and TDEC. This report documents the progress of the remedial actions toward cleanup goals.



Public Involvement and Information

The public is involved in all cleanup decisions made by DOE. To keep the public informed, DOE provides information through a variety of outlets, including tours, meetings, briefings, conferences, media outreach, fact sheets, public notices, websites, social media, and various publications.





Advisory board provides input on DOE cleanup activities

The Oak Ridge Site Specific Advisory Board (ORSSAB) is a federally appointed citizens' panel that provides independent advice and recommendations to the U.S. Department of Energy's Oak Ridge Office of Environmental Management (EM). The board is composed of up to 22 members, who are chosen to reflect the diverse occupations, perspectives, and interests of people living near the Oak Ridge Reservation (ORR). The board also includes two non-voting student representatives from area high schools.

Since 1995, ORSSAB has actively provided input to the DOE Oak Ridge EM Program on cleanup operations and stewardship of remediated areas and permanent

waste disposal sites. More information about ORSSAB is available online at www.energy.gov/orssab.

Following are some of the board's major contributions and activities for FY 2017.

Recommendations

ORSSAB's primary function is to provide advice and recommendations to DOE on its environmental cleanup of the ORR. Complete text of ORSSAB recommendations can be found on the board's website at www.energy.gov/orssab. Following are the board's recommendations for FY 2017:

- Groundwater Investigations at the DOE Oak Ridge Reservation



EMSSAB chairs meeting



ORSSAB members tour the TRU Waste Processing Center

- Biology Complex Facilities at the Y-12 National Security Complex
- Proposed Environmental Management Disposal Facility
- FY 2019 Oak Ridge EM Budget Priorities

In addition, the board collaborated on two recommendations developed during the semiannual EM SSAB chairs meetings:

- EM’s Cleanup Performance Road Map and Communication Strategy
- Above-Ground Storage at the DOE Waste Isolation Pilot Plant

Site Tours

ORSSAB has been restructuring its work plan in an effort to get members more engaged in work plan topics by having meetings at different locations, taking field trips, and ensuring that meeting presentations are focused only on EM issues where decisions are to be made and ORSSAB input is requested by DOE, and spending less time on project updates. Those efforts were successful and were continued in FY 2017. During the year, board members participated in a variety of special events and site tours:

- Transuranic Waste Processing Center
- Excess contaminated facilities at Y-12 and ORNL
- Groundwater contamination sites at ETPP and ORNL
- Oak Ridge Reservation waste disposal facilities and proposed siting for the EMWMF

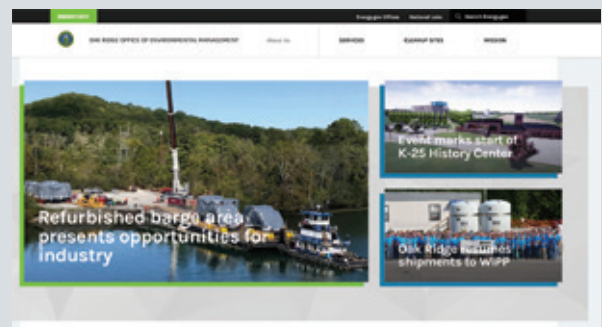
Historic Preservation

ORSSAB has a long history of involvement in historic preservation, beginning with its “Recommendation to DOE on Historic Preservation of the K-25 Building at East Tennessee Technology Park” in 2008. In FY 2017, ORSSAB continued its involvement by providing a liaison to the Consulting Parties to the Memorandum of Agreement for the Interpretation of the East Tennessee Technology Park and submitting comments on the Preliminary Design Documents for East Tennessee Technology Park Site Interpretation and K-25 Historic Preservation.

Public Outreach

The board completed a number of public outreach goals this year in its continuing mission of inform and involve the public in the EM decision-making process. The board issued three news releases, four Advocate newsletters, and the FY 2016 annual report. The board continued with broadcast of its monthly meetings on local cable stations, and postings on Facebook, YouTube, and Flickr. ORSSAB also published numerous ads and online postings about its new member recruitment, which provided information to the community at large.

Want to know more about what’s going on with Oak Ridge cleanup?

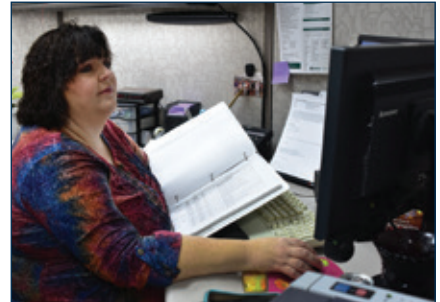
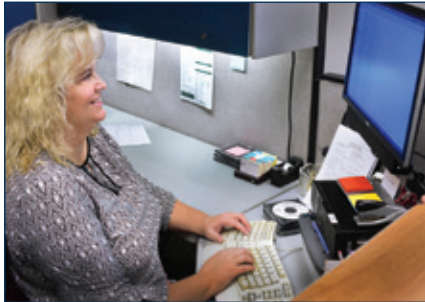


Visit: www.energy.gov/orem

DOE Information Center in Oak Ridge

The DOE Information Center is a one-stop information facility that maintains a collection of more than 48,000 documents involving environmental activities in Oak Ridge.

The Center hosts various meetings, including some of the ORSSAB meetings, relevant to cleanup activities in Oak Ridge. Staff are available Monday through Friday, 8 a.m. to 5 p.m., to assist with information needs. Users can consult the below website for information available from the Center.



Visit the DOE Information Center on the Web at <http://doeic.science.energy.gov/>

Phone: (865) 241-4780

The DOE Information Center is located at the Office of Scientific and Technical Information, Building 1916 – T1, 1 Science.gov Way, Oak Ridge, Tennessee 37831
E-mail: doeic@science.doe.gov
Hours 8 a.m. to 5 p.m., Monday – Friday

FY 2017 Stats

| | |
|---|--------|
| Average number of visitors per month | 77 |
| Number of public meetings held | 51 |
| Total citizen inquiries | 529 |
| Total number of documents at the center | 48,251 |
| Total number of documents on-line | 16,569 |

Other Information Resources

DOE OREM Public Information
(865) 576-0742

DOE-ORO Public Information Line
865-576-0885

Oak Ridge Site Specific Advisory Board
(865) 241-4583, (865) 241-4584
1-800-382-6938

Tennessee Department of Environment and Conservation - DOE Oversight Office
(865) 481-0995

U.S. Environmental Protection Agency
Region 4
1-800-241-1754

Internet Sites

| | |
|--|---|
| OREM | www.energy.gov/orem |
| DOE-ORO/OREM Facebook | https://www.facebook.com/Department-of-Energy-Oak-Ridge-Office-486186205206/ |
| OREM Twitter | https://twitter.com/OakRidgeOffice |
| DOE Main Website | www.energy.gov |
| Oak Ridge Site Specific Advisory Board | www.energy.gov/orssab |
| Tennessee Department of Environment and Conservation | www.state.tn.us/environment/ |
| U.S. Environmental Protection Agency | www.epa.gov/region4/ |

Commonly Used Acronyms and Initialisms

| | |
|--------|---|
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act of 1980 |
| CEUSP | Consolidated Edison Uranium Solidification Project |
| CH | Contact-handled |
| CNF | Central Neutralization Facility |
| CROET | Community Reuse Organization of East Tennessee |
| DOE | U.S. Department of Energy |
| EFPC | East Fork Poplar Creek |
| EM | Environmental Management |
| EMDF | Environmental Management Disposal Facility |
| EMWMF | Environmental Management Waste Management Facility |
| EPA | U.S. Environmental Protection Agency |
| ETTP | East Tennessee Technology Park |
| EU | Exposure Unit |
| FY | Fiscal year |
| LGWO | Liquid and Gaseous Waste Operations |
| MSRE | Molten Salt Reactor Experiment |
| NPL | National Priorities List |
| OREM | Oak Ridge Office of Environmental Management |
| ORNL | Oak Ridge National Laboratory |
| ORSSAB | Oak Ridge Site Specific Advisory Board |
| RH | Remote-handled |
| RI/FS | Remedial Investigation/Feasibility Study |
| ROD | Record of Decision |
| TDEC | Tennessee Department of Environment and Conservation |
| TRU | Transuranic |
| TWPC | Transuranic Waste Processing Center |
| WIPP | Waste Isolation Pilot Plant |

Commonly Used Terms

CERCLA: The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) established prohibitions and requirements concerning closed and abandoned hazardous waste sites, provided for liability of persons responsible for hazardous waste releases at these sites, and established a trust fund to provide cleanup when no responsible party could be identified. The law, which governs cleanup operations on the Oak Ridge Reservation, authorizes two kinds of response actions: short-term removal actions, where actions may be taken to address releases or threatened releases requiring prompt response, and long-term remedial actions, which permanently and significantly reduce the dangers associated with releases or threats of releases. Long-term actions can be conducted at sites on the U.S. Environmental Protection Agency's National Priorities List, a listing of the nation's most hazardous waste sites. The Oak Ridge Reservation was added to that list in 1989.

Federal Facility Agreement: CERCLA requires an agreement between state and federal entities to guide cleanup work at CERCLA sites. For the DOE Oak Ridge Office, the parties of this agreement, called a Federal Facility Agreement, is DOE, the U.S. Environmental Protection Agency, and the Tennessee Department of Environment and Conservation. The Federal Facility Agreement for Oak Ridge was initiated in January 1992.

Removal Actions: Some cleanup activities on the Oak Ridge Reservation are conducted as Removal Actions under CERCLA. These actions provide an important method for moving sites more quickly through the CERCLA process. When a site presents a relatively time-sensitive, non-complex problem that can and should be addressed, a Removal Action would be warranted.

Remedial Actions: Remedial actions are long-term response actions that seek to permanently and significantly reduce the risks associated with the release or threat of release of hazardous substances.

Remedial Investigation/Feasibility Study: The purpose of the remedial investigation/feasibility study (RI/FS) is to assess site conditions and evaluate alternatives to the extent necessary to select a remedy. Developing and conducting an RI/FS generally includes the following activities: project scoping, data collection, risk assessment, treatability studies, and analysis of alternatives. The scope and timing of these activities should be tailored to the nature and complexity of the problem and the response alternatives being considered.

Record of Decision: Under the CERCLA process, a Record of Decision formally documents the selection of a preferred cleanup method after a series of steps, including a Remedial Investigation/Feasibility Study. A preferred cleanup alternative is selected and presented to the public for comment in a Proposed Plan. The U.S. Environmental Protection Agency, the state, and the lead agency then select a remedy and document it in the Record of Decision.

Fiscal Year: The 2017 fiscal year spans from Oct. 1, 2016, to Sept. 30, 2017.

For more information, please contact the DOE Public Affairs Office
at (865) 576-0885 or 1-800-382-6938.