

2018 Cleanup Progress

Annual Report to the
Oak Ridge Regional Community



Message from the Manager

DOE Oak Ridge Office of Environmental Management



To the Oak Ridge Regional Community:

I am proud to report another successful year of cleanup on the U.S. Department of Energy's (DOE's) Oak Ridge Reservation. With another year of record-level funding from Congress, our skilled, experienced, and committed workforce made tremendous strides in eliminating risk and making Oak Ridge a safer place to live and work. We are excited to unveil this year's edition of the Cleanup Progress Report. Through this publication, we provide you updates on all our projects at the East Tennessee Technology Park (ETTP), Y-12 National Security Complex (Y-12), and Oak Ridge National Laboratory (ORNL).

We remain intensely focused on achieving Vision 2020—our goal to complete all major cleanup at ETTP in 2020. Crews are working at a rapid pace and are altering the skyline on a monthly basis. They demolished three facilities in an area that contains the most contaminated buildings remaining at ETTP. They also removed the site's former wastewater treatment plant, and a renowned waste incinerator that treated more than 35 million pounds of waste during its operations. We also finished removing four miles of piping that previously transported enriched uranium from building to building.

Our vision for ETTP as a privately owned industrial park is already being realized. DOE has transferred more than 1,200 acres from government ownership that are available for economic redevelopment. The most recent transfer included 200 acres that are now owned by a company that specializes in producing valuable medical isotopes for cancer treatment. As we continue transforming ETTP, new opportunities are emerging, and more companies are seeing its potential.

This year, Congress also continued its unwavering support for reducing risk associated with the large number of excess contaminated facilities located on the reservation. We were able to continue addressing a portion of the 220 excess, contaminated, and deteriorating facilities located at ORNL and Y-12 years ahead of schedule.

These funds allowed us to clean out and demolish old equipment at Y-12 that prevented almost 6,500 pounds of mercury from entering the environment. We also tore down two high-risk facilities in the Biology Complex, and work is underway to prepare the five remaining buildings for demolition. Their removal clears an area that can be reused for important national security missions. Congressional support has also enabled us to stabilize two buildings at ORNL, and we look forward to ramping up efforts next year to begin deactivating the old research reactors surrounding the historic Graphite Reactor.

Teams also finished the site preparations necessary to begin construction on the new Mercury Treatment Facility. This project will fulfill a longtime commitment to reduce mercury levels leaving Y-12 in the Upper East Fork Poplar Creek. This facility will provide an essential control mechanism when we begin large-scale demolition in the mercury-contaminated area at Y-12.

Most of all, I am very pleased with our employees and contractors' continued commitment to safety. While our projects are enhancing safety in the region, we are also very mindful of the men and women who are performing those projects in very challenging environments. Despite those obstacles, our primary cleanup contractor, UCOR, an AECOM-led partnership with Jacobs, and our contractor for the Transuranic Waste Processing Center, North Wind Solutions, LLC, both received DOE's highest safety recognition this year.

Lastly, but certainly not least, thank you to the residents of this incredible community. We appreciate your consistent interest and support of our program. My staff and I are working harder than ever to be involved and available to you to discuss our projects, opportunities, and vision as we work together to eliminate the legacies from past operations.

Jay Mullis



On the cover

Deactivation, which involves removing contaminated items, severing lines to a facility, and other activities to make demolition safe, is a key step in the cleanup process. Workers are pictured cutting lines to the Toxic Substances Control Act Incinerator, which was a key facility demolished in Fiscal Year 2018.

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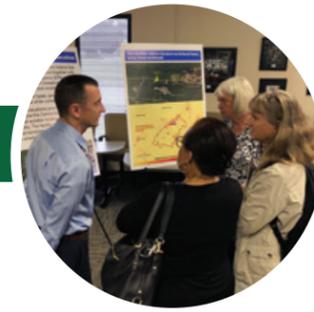
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This report was produced by UCOR, DOE's Environmental Management contractor for the Oak Ridge Reservation.

Introduction

In Fiscal Year (FY) 2018, the DOE 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 (ETTP) by 2020. The cleanup work is making parcels of land available for private sector development 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, and industrial wastes.

The contaminated areas of the reservation are on the U.S. Environmental Protection Agency’s (EPA’s) 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.





Workers demolish one-of-a-kind incinerator

OREM completed demolition of a one-of-a-kind incinerator that once treated radioactive and hazardous wastes. The Toxic Substances Control Act Incinerator is named after a law passed in 1976 that addressed the production, use, and disposal of specific chemicals.

Cleanup contractor UCOR wrapped up the demolition project three months ahead of schedule and under budget.

The incinerator began operating in 1991, treating radioactive and hazardous wastes (mixed wastes) contaminated with polychlorinated biphenyls (PCBs). As the only U.S. facility permitted to incinerate those types of wastes, it accepted material from the Oak Ridge Reservation and other facilities across the nationwide DOE complex.

The incinerator was shut down in December 2009 after treating 35.6 million pounds of waste. Workers then began preparing the facility for demolition, which included cleaning, rinsing, and filling sumps; encapsulating PCB and radioactive contamination; disconnecting pipes; and removing and disposing of carbon vessels, which were part of the water management system.



TSCA Incinerator before and after demolition



Former wastewater treatment facility demolished

OREM has completed demolition of ETPP's Central Neutralization Facility (CNF), which once treated the site's industrial wastewater.

OREM's cleanup contractor UCOR safely completed the project five weeks early and under budget.

CNF was constructed in the mid-1980s to treat wastewater resulting from operations at the former uranium enrichment plant. It consisted of tanks, trailers, and a variety of other treatment facilities that were used to remove radioactive materials, metals, and suspended solids from wastewater prior to discharge to the Clinch River. The treatment process provided elementary neutralization, metals removal, organic oxidation/filtration, solids settling, solids removal, and filtration of contaminants.



All operations at CNF ceased in 2013, and a new wastewater treatment facility, called the Chromium Water Treatment System, began operating on the CNF footprint that same year.



Demolition of a silo that was part of the sprawling CNF site



The CNF site contained numerous facilities, as seen in the photo above before demolition. Below is the site after demolition was completed.



Workers bring down K-633 Test Loop Facility

Demolition of ETPP's K-633 Test Loop Facility, one of several radiologically contaminated facilities in ETPP's Poplar Creek area, has been completed. The building consisted of four separate and independent testing loops that have common auxiliary systems and utilities.

The first three loops were built to test and evaluate gaseous diffusion plant stage equipment performance

under production conditions. In 1981, a fourth test loop was installed, which evaluated prototype equipment designed for withdrawal of depleted uranium hexafluoride tails from the gas centrifuge enrichment plant. The 18,100-square-foot facility was shut down in 1984. The radiological contaminants in the building were affixed inside piping and equipment using fixatives and foam, allowing for safe demolition of the structure.



Major facilities being prepared for demolition

The two largest facilities remaining at ETPP—K-1037 and the K-1200 Centrifuge complex—have been undergoing deactivation to prepare them for safe demolition. Demolition of both facilities will take place in the next couple of years.

The deactivation process includes asbestos abatement, utility disconnection, equipment and waste removal, and other necessary steps to ensure demolition can be performed safely.

Building 1037 is a 380,000-square-foot structure that produced barrier material for the gaseous diffusion process. Deactivation of the facility has been ongoing for more than a year, and demolition is expected in FY 2019.

Deactivation also began in the Centrifuge complex in FY 2018. The facility was used to gauge the reliability of test centrifuges.



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, land use controls, and a future industrial workforce. In FY 2018, remediation of the Duct Bank was completed. The Duct Bank was an underground power transmission system that provided power from the former K-704 Switchhouse to the gaseous diffusion plant uranium enrichment facilities. The Duct Bank was constructed in 1944 and abandoned in the early 1970s.

Also in FY 2018, remediation of two areas on Duct Island was completed to ensure there were no

ecological risks to wildlife. Duct Island, which is actually a peninsula, is a stretch of land located between the old Powerhouse area and the main plant site. It got its name from the numerous underground electrical ducts that crossed the peninsula to deliver power to 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 2018, OREM and UCOR completed characterization of EUs Z2-19 and remediation of EUs Z2-11, 12, 14, and 17. Three separate remedial actions were completed in EU-22 (two were associated with removing soil contaminated with concentrations of uranium (U)-234 exceeding the groundwater soil screening level, and the third was associated with removing PCB-contaminated soil with concentrations exceeding the Zone 2 ROD maximum remediation level for PCBs). Also within EU-22



EU-Z-12 remediation



Duct Island during remediation

(K-25 Building footprint), a major remedial action was initiated to excavate soil contaminated with concentrations of technetium-99 exceeding the Zone 2 groundwater soil screening level criterion. The soil contaminated with technetium-99 poses a threat to groundwater, but crews are working to address and remove those risks.

Alternatives were evaluated for the remediation of trichloroethene (TCE) contaminated soil within the footprint of the former K-25 Building because the soil could pose a threat to groundwater. The remedy in the Zone 2 ROD is soil excavation, but due to several factors, including the volume of soil to be excavated and the structural integrity of surrounding buildings, other alternatives were considered. The recommendation was to excavate the soil as required by the Zone 2 ROD.

Chromium Surface Water

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 hexavalent chromium and treating the water prior to its discharge into the Clinch River. Since then, the concentrations in the groundwater plume and in the two interception wells have declined significantly. OREM continued using the wells in FY 2018 to ensure the waters are protected.



Soil sampling at Duct Island

ETTP continues transformation to private sector park

Oak Ridge's Reindustrialization Program entered its 22nd year as the model DOE asset reuse program. During that time, ETTP has been undergoing transformation from a former government-owned uranium enrichment complex into a private-sector industrial business park, national historical park, and conservation area. A closure plan was developed in 2017 and updated in 2018 to address necessary transfers for all of the site remaining facilities, land, and utility infrastructure.

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

During FY 2018, the Reindustrialization Program transferred a 207-acre parcel (Duct Island) to CROET,

which is the largest ever land transfer at the site. CROET then transferred the property to Coqui Pharma, LLC, which plans to build a medical isotope production facility on the parcel.

The Reindustrialization Program also moved forward with making other parcels of land available for manufacturing developments, including the 400-acre Powerhouse Area. These larger acreage properties are the first available at ETTP that can accommodate large-scale manufacturing developments.

Other progress in FY 2018 included the refurbishment of a DOE-owned barge facility on the Clinch River. Its refurbishment was paid for by a private company so that they could receive the shipment of a large piece of equipment that could not be easily transported on public highways. The barge facility refurbishment provides another piece of infrastructure that could be attractive to potential businesses.



Refurbished barge on the Clinch River

Construction begins on commemorative facilities

Following successful procurement of construction and exhibit fabrication and installation services in FY 2018, work has begun on the K-25 Site commemorative facilities. The K-25 History Center will be located on the second level of the City of Oak Ridge-owned Fire Station #4 at ETTP. The K-25 History Center is expected to open in the latter part of 2019.

Construction of the Equipment Building and Viewing Tower should begin in FY 2019 pending funding availability. These facilities 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 tall, will provide a 360-degree view of the site.

Cleanup at 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.

Excess contaminated facilities stabilized

Workers completed removing combustible material and asbestos from Building 7500, also known as the Homogeneous Reactor Experiment, in FY 2018. This work significantly reduced risk in the facility.

Building 7500 was built in 1951 and operated until 1961. Since then, the insulation and building's interior has degraded significantly.

In January 2018, workers sprayed a fixative into the ports of the hot cells in Building 3028, known as the Radioisotope Production Laboratory. This process helps prevent the spread of contamination so it will remain in place. It



Fogging activity in Building 3028

involved spraying the fixative material in each of the five hot cells, where four of which contained high contamination levels. The work crew executed the work safely without any issues.



Pipe insulation removal in Building 7500

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, a total of 74 waste items were added to the facility's waste handling plan. In FY 2018, all of the items were disposed and characterized.

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 of legacy defueling equipment, such as the fuel salt probes and fuel salt probe glove box. OREM is continuing its routine surveillance and maintenance activities to manage the remaining hazards, including periodically removing reactive gas generated by the defueled salts.

Also in FY 2018, workers completed the successful Reactive Gas Removal System (RGRS) pumpdown of fuel drain tanks and a fuel flush tank. The RGRS pumpdown removed fluorine gas and backfilled the tanks with argon, an inert gas, to maintain a less corrosive environment in the tanks and to minimize pressure differential between atmosphere and the tank internals.



Workers examine RGRS configuration at MSRE

Prep for Uranium-233 processing phase continues

OREM has successfully completed its 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 that was stored in Building 3019—the world's oldest nuclear facility. Its removal is OREM's highest priority at ORNL. It will eliminate a Category 1 inventory of controlled nuclear material, save considerable security and oversight costs, and enable the facility's eventual demolition, opening land in ORNL's central campus for science and research missions.

Preparations for the second phase focus on implementing a capital project to develop the capability to down-blend and solidify the inventory remaining after the Direct Disposition Campaign, and then conducting the processing operation to dispose of the material.

Significant progress was made in FY 2018 to advance the design and safety basis document package in support of the DOE review and approval process. The capital project to prepare Building 2026 for processing and downblend the remaining U-233 is scheduled to achieve approval in the second quarter of FY 2019. Processing is forecast to begin in late 2020 and completed in 2024.

Upgrades extending LGWO life cycle

Several important upgrades were performed on the Liquid and Gaseous Waste Operations (LGWO) during FY 2018 as a follow up to an Engineering Evaluation and Extended Life Study issued in 2016. The extended life study included a forecast of future users and capacity requirements, required maintenance upgrades, new technology evaluation, and life-cycle cost analysis.

The report identified and prioritized recommendations for near-term maintenance upgrades and modifications needed for efficient future operation of the LGWO systems. Near-term corrective actions include replacement of heat trace systems and cooling water header, installation of a bypass line for the process wastewater system for redundancy, and dike repair/reseal in Building 7961.

Projects nearing completion at the end of FY 2018 were upgrades to the motor control center and wastewater filtration system at Building 3608. These upgrade projects will enhance the reliability of the wastewater treatment facility for years to come.



Upgrades at Building 3608 will enhance wastewater treatment reliability for several years



Cleanup at 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 being drained from COLEX equipment

equipment and lines. Workers inspected, cleaned, and retrieved mercury from tanks and equipment prior to their removal. Approximately 9,477 feet of the 9,947 feet of piping, 22 tanks, and 4 heat exchangers have been tapped, drained, and deactivated on the west side through FY 2018. In addition, 21 of those tanks were demolished and removed from the site. Equipment on the east and south sides will be removed in the future.



COLEX facility before demolition activities

More than 3 tons of mercury removed at Alpha-4

OREM has retrieved more than 3.19 tons of elementary mercury 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 facility, which 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 OREM's top priorities.

While workers drained the majority of the materials from the equipment when operations ceased in 1962, not all of the systems and components were cleaned. Recoverable amounts of mercury were still in the



Demolition of evaporator feed tanks at COLEX

Work begins on Mercury Treatment Facility

OREM has broken ground on the Outfall 200 Mercury Treatment Facility at the Y-12 National Security Complex. The facility will reduce mercury in water exiting the site through the East Fork Poplar Creek. Outfall 200 is the point where the west end of the Y-12 storm drain system creates the headwaters of the Upper East Fork Poplar Creek.

The mercury treatment facility will help OREM achieve compliance with regulatory criteria for the East Fork Poplar Creek. It also supports and opens the door for large-scale facility demolition to begin at Y-12 by helping to control potential mercury releases that could occur when disturbing the mercury-contaminated buildings and soil.

In FY 2018, OREM began early site preparation ahead of the planned facility construction. Early site preparation includes construction of the necessary utilities, installation of secant piles, and demolition of existing structures in the area to prepare the site

for construction of the mercury treatment facility. OREM anticipates completing early site preparation and beginning construction of the mercury treatment facility in 2019.



Workers install the north secant pile wall, which serves as a retaining structure.



Deployment of sorbent test coupons in bank soils and sediments of East Fork Poplar Creek



U.S. Rep. Chuck Fleischmann and Sen. Lamar Alexander join others to break ground on the Mercury Treatment Facility

OREM explores mercury treatment technologies

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. Mercury contamination in the environment poses significant technical and regulatory challenges and can benefit from development of new tools and approaches that might be more effective, reduce costs, and accelerate cleanup schedules.

The importance of technology development was highlighted in a National Academies of Sciences Committee review of OREM’s technology development plans and activities on August 9–10, 2018. OREM is making significant investments into the development of new remediation technologies to help address the complex mercury challenge in Oak Ridge. In the near-term, mercury technology development activities will support the successful completion of the demolition of Y-12’s mercury-contaminated facilities and soils

remediation, waste disposition, and reduction of mercury-related ecological risks in East Fork Poplar Creek.

In the downstream environment, field characterization and research during the 2015-2020 time period will support an evaluation of potential remediation alternatives for the creek in the mid-2020s. With a better understanding of mercury transport processes in the watershed system, specific technologies and strategies can be assessed as potential targeted abatement actions. Quantitative modeling was initiated in FY 2018 to simulate various remediation and technology development scenarios and better inform future remedial decision-making.

Studies have been conducted to evaluate alternative treatment chemicals on mercury flux, the effect of sorbents on mercury and methylmercury

concentrations in the presence of dissolved organic matter, and the use of mussels as a tool for reducing particle-associated mercury in the water column. ORNL scientists are preparing a report titled “Mercury

Remediation Technology Development for Lower East Fork Poplar Creek—FY 2018 Update.” This report will provide a detailed description of each of the study areas and findings from studies performed in FY 2018.



Laboratory tests using clams and mussels to remove particles from the water column

Continued Biology Complex demolition planned

OREM is preparing to remove five high-risk excess contaminated facilities, known as the Biology Complex, at Y-12. The 350,000-square-foot area poses asbestos hazards as well as structural deterioration risks. Demolition of these facilities is part of a nationwide effort to eliminate excess contaminated facilities throughout the DOE complex.

Originally constructed in the 1940s to recover uranium from process streams, the complex later housed DOE’s research on the genetic effects of radiation. The facilities once housed more individuals with doctorates than anywhere in the world. The complex originally consisted of 11 buildings until OREM demolished four of them in 2010 as part of the American Recovery and Reinvestment Act of 2009.



Buildings 9743-2 and 9770-2 were demolished in FY 2018, and mobilization started for the demolition of the remaining buildings. The completion of this project will clear land for important future national security missions.



Waste Management

Wastes generated from cleanup activities on the Oak Ridge Reservation are addressed in a variety of ways. Most of the volume is disposed onsite in the Environmental Management Waste Management Facility (EMWMF) or the Oak Ridge Reservation Landfills. However, the highly-contaminated material is shipped offsite. Wastewater is treated at the Chromium Water Treatment System at ETPP and the Process Waste Treatment Complex at ORNL.

Local facilities accept majority of waste volume, ship highly contaminated material offsite

Most of the waste generated during FY 2018 cleanup activities in Oak Ridge went to disposal facilities on the Oak Ridge Reservation.

EMWMF received 6,305 waste shipments, accounting for 73,510 tons, from cleanup projects at ETTP, ORNL, and Y-12. This engineered landfill consists of six disposal cells that only accept low-level radioactive and hazardous waste meeting-specific criteria. These wastes include soil, dried sludge and sediment, building debris, and personal protective equipment.

EMWMF operations collected, analyzed, and disposed of approximately 3.19 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, 10.04 million gallons of contact water were released to the storm water retention basin after laboratory analyses verified the water met all discharge standards. DOE also operates and maintains solid waste disposal facilities called the Oak Ridge Reservation Landfills. In FY 2018, 39,990 cubic yards of waste were disposed of in these three active landfills. In addition, 10,241 cubic yards of earthen material were collected and staged for reuse. OREM also effectively prevented erosion at these landfills.

Operation of the Oak Ridge Reservation Landfills generated approximately 4.2 million gallons of leachate that were collected, monitored, and discharged into the Y-12 Complex sanitary sewer system.



Progress made on proposed waste disposal facility

EMWMF will reach capacity before OREM completes its cleanup at Y-12 and ORNL. Planning continued in FY 2018 for another disposal facility that will provide the capacity required to complete Oak Ridge's cleanup. The new facility will be called the Environmental Management Disposal Facility (EMDF).

In December 2017, OREM, TDEC, and EPA settled formal dispute on the Remedial Investigation/ Feasibility Study with agreement to work toward submitting the Proposed Plan and perform characterization of the preferred site in Central Bear Creek Valley.

In February 2018, characterization of the site began. OREM installed 16 wells and began measuring and recording water levels and collecting other data needed to evaluate the proposed site.

The Proposed Plan was submitted to the public in September, and OREM received comments on the plan until January 2019. Preliminary design of the facility has been initiated as well, along with further site characterization to support the design work.



Well installation at the proposed EMDF site



Flumes installed on the proposed EMDF site measure flow rates and general condition of the surface water

Millions of gallons of 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 and groundwater generated from production and environmental cleanup activities. The site provided safe and compliant treatment of 119 million gallons of wastewater and groundwater during FY 2018.

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 DOE Office of Science mission activities in a safe and compliant manner.

TWPC continues shipments to WIPP



North Wind Solutions, LLC, operator of the Transuranic Waste Processing Center (TWPC), continued processing waste in FY 2018. TWPC is responsible for processing and packaging TRU 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 are 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 TRU 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. TWPC processed approximately 96 percent of the contact-handled TRU waste and 96 percent of the remote-handled TRU and complete key regulatory Site Treatment Plan milestones on schedule.

North Wind Solutions, LLC, completed 56 contact-handled TRU waste shipments to WIPP. As a result, OREM has been able to disposition approximately 72 percent of the contact-handled TRU waste and 46 percent of the remote-handled TRU waste.

TWPC sludge buildout facility planning continues

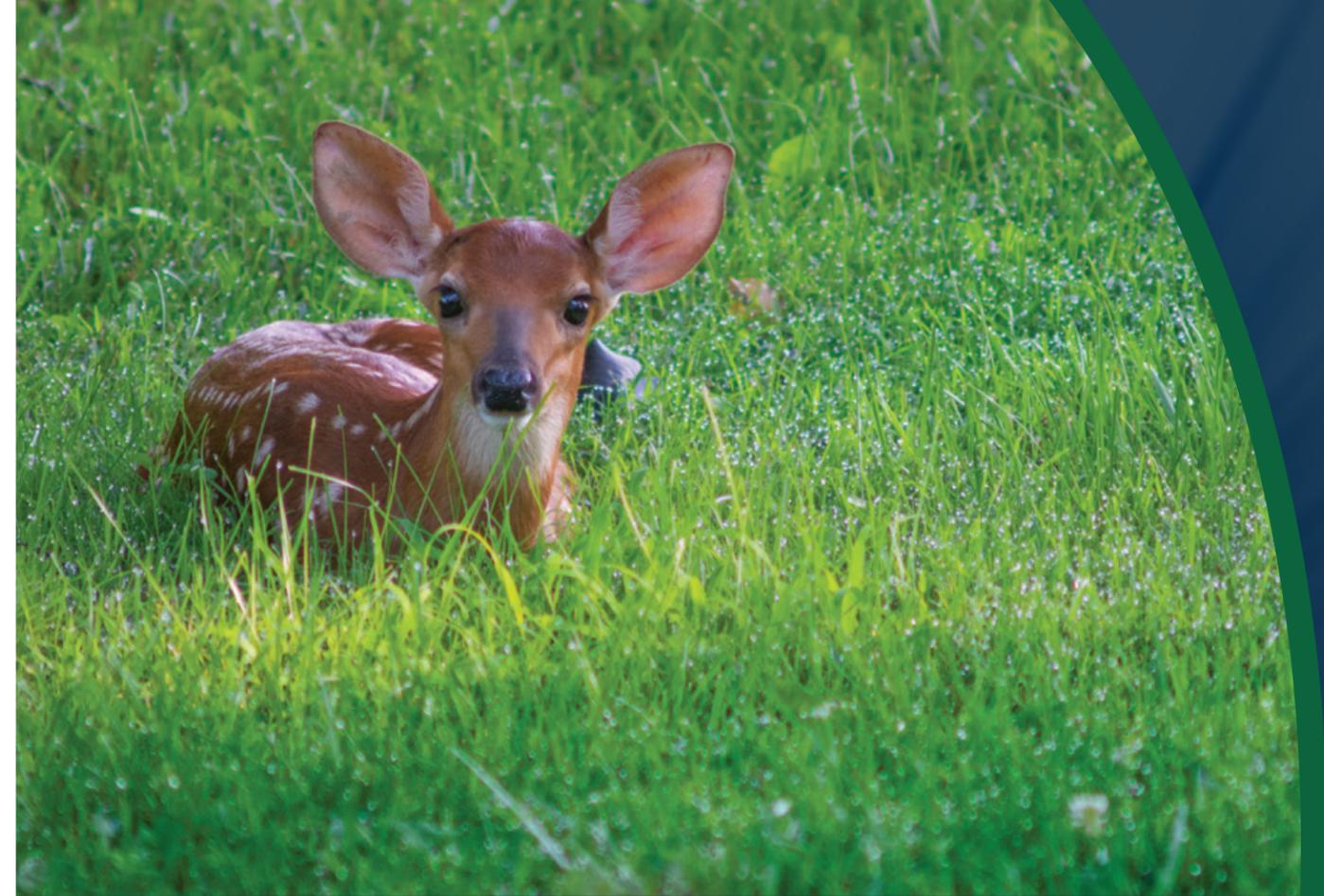
Once TRU debris processing is completed, OREM must process and dispose of the large inventory of TRU sludge waste that remains. Current TWPC facilities are not designed for sludge processing, so new facilities must be constructed to mobilize and transfer the sludge from the ORNL tanks to processing systems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

OREM awarded a contract to CH2M HILL Constructors, Inc., in March 2015 for the design of the Sludge Processing Facility Buildouts Project.

OREM will conduct initial testing through the design and construction of a mock test facility 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 2018 includes the following:

- Received vendor proposals for the Sludge Mobilization System, the Slurry Mixing and Characterization Tank, and the Sludge Test Area Construction, and awarded the contract for the testing of the Mobilization Measurement Instrumentation.
- Completed development of documents pertaining to the Integrated System Test Plan, Simulant Strategy, Slurry Mixing Characterization Tank/Mobilization Measurement Instrumentation, Flowsheet and Material Balance, Project Management Plan, Risk Management Plan, and Code of Record.



Oak Ridge Reservation

The DOE Oak Ridge Reservation is home to ETTP, ORNL, and Y-12, as well as other facilities and waste disposal areas. It contains approximately 32,400 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.



Field visit to a planned onsite exit pathway well location west of ORNL



Groundwater strategy projects implemented

In FY 2018, OREM continued to implement projects under the Oak Ridge Reservation Groundwater Strategy. A Phase 1 Melton Valley/Bethel Valley Exit Pathway Remedial Investigation Work Plan was completed and issued for regulator review. Exit pathways are areas where contaminants have the potential to exit the Oak Ridge Reservation to offsite areas. The plan provides details about fieldwork that will be performed to install three new onsite wells west of ORNL near the Clinch River.

Monitoring of the new wells will supplement current exit pathway monitoring in Bethel Valley near the Oak Ridge Reservation boundary. The plan also describes a groundwater flow model of the exit pathway area that was developed using a computer model program. The

groundwater flow model is used to help simulate and better understand groundwater movement.

Also in FY 2018, work on a Bethel Valley Final Record of Decision Remedial Investigation Work Plan was initiated. This plan will outline an investigation strategy to support a future, final groundwater decision for Bethel Valley.

An offsite groundwater study report was approved by EPA and TDEC in FY 2018. While the study confirmed there were no offsite health risks related to possible DOE groundwater contamination, groundwater monitoring of offsite locations will continue for a limited time.

Public Involvement

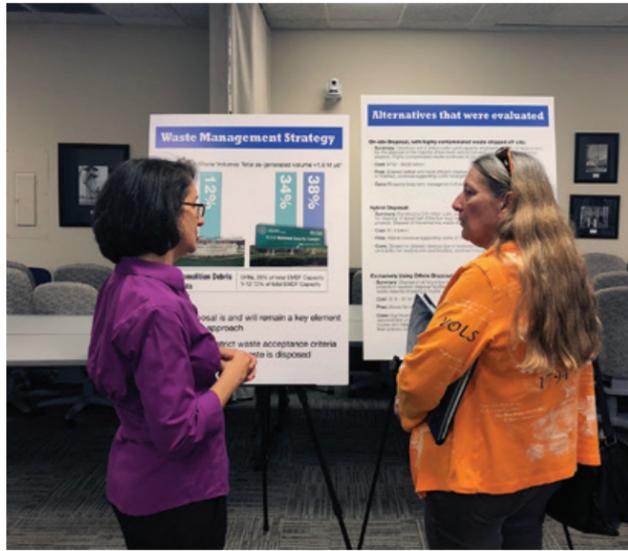
The public is involved in all cleanup decisions made by DOE. To keep the public informed, DOE provides information through a variety of outlets, including tours, meetings, briefings, conferences, media outreach, fact sheets, public notices, websites, social media, and various publications.

Information sessions held on new disposal facility

OREM sponsored information sessions at the end of FY 2018, leading to a public hearing in FY 2019, on the Proposed Plan for the Environmental Management Disposal Facility, which will accept waste from cleanup activities after the current facility reaches capacity.

Two informal sessions were held with all of the staff and project managers to provide information about the new facility, which is proposed to be built near the Y-12 Complex.

The new disposal facility is necessary to ensure cleanup continues efficiently and on schedule. If all waste is required to be shipped and disposed offsite, the costs would increase significantly and schedules would be impacted.



Following are some of the board's major contributions and activities for FY 2018. More information about ORSSAB is available at www.energy.gov/orssab.

Recommendations support onsite waste disposal, groundwater remediation prioritization

ORSSAB's primary function is to provide advice and recommendations to DOE on its environmental cleanup of the Oak Ridge Reservation. Complete text of ORSSAB recommendations can be found on the board's website. In FY 2018, the board passed two recommendations for OREM.

Recommendation 240 on the Proposed Environmental Management Disposal Facility addressed the need for additional waste disposal capacity on the Oak Ridge Reservation to enable OREM to complete its cleanup mission at ORNL and Y-12 in the coming decades.

ORSSAB supports onsite disposal of OREM CERCLA wastes that meet the onsite waste acceptance criteria. Its recommendation included suggestions in five key areas for the project, including funding, community engagement, expansion/additional capacity, monitoring, and budgeting for future monitoring and maintenance needs.

Recommendation 241 on the FY 2020 OREM Program Budget Priorities recommends fully funding the activities that are currently supported by the OREM Program Plan for FY 2020. ORSSAB supports OREM's prioritization of completing ETTP cleanup. The board also agrees that disposition of uranium-233 and transuranic waste at ORNL will lead to significant improvements for the critical research taking place at the laboratory. Likewise, efforts to address mercury contamination at Y-12 will ensure the local community is protected as well as pave the way for extensive cleanup at the site in the future.

In addition, ORSSAB has identified three specific priorities for Oak Ridge Reservation cleanup. It recommends that the budget reflect adequate funding for these projects and that any savings or additional funding be targeted at accelerating completion of these projects: completion of a groundwater model within Vision 2020 for ETTP; technology selection and implementation for treatment of contaminated underground/groundwater plume under the footprint of Building K-1401 at ETTP if feasible within Vision 2020; and completion of sampling, evaluation and reports of findings on groundwater contamination at the southwest side of ORNL bordering the Clinch River. In addition, the board collaborated on a joint recommendation developed during one of the semiannual EM SSAB chairs meetings. Officers of

advisory boards from each EM site gather at these events to address issues of importance to all the sites.

Recommendation Regarding the ECA Report on Waste Disposition

The EM SSAB Chairs developed a recommendation regarding the Energy Communities Alliance (ECA) report titled "Waste Disposition: A New Approach to DOE's Waste Management Must Be Pursued." ORSSAB voted to support this effort. The EM SSAB recommends that DOE undertake a comprehensive analysis of the ECA Report, evaluate site-specific impacts, address questions from the EM SSAB Chairs, and provide a timeline.



ORSSAB members participate in the annual Oak Ridge EM Community Workshop to discuss budget formulation and priorities for Oak Ridge cleanup



Advisory board provides input on DOE cleanup activities

The Oak Ridge Site Specific Advisory Board (ORSSAB) is a federally chartered volunteer citizens' panel that provides independent advice and recommendations to OREM. ORSSAB provides DOE and the regulators with a forum for understanding stakeholder perspectives. It also serves as a venue for members of the community to express their views or ask questions.

Since 1995, ORSSAB has provided more than 200 recommendations to OREM on important aspects of the cleanup program. Every major Record of Decision developed under EM has had extensive ORSSAB involvement, and none of the final RODs have conflicted with majority ORSSAB opinions.

ORSSAB can have up to 22 members. Individuals apply for membership annually and are selected by DOE to reflect a diversity of interests, gender, race, and other



ORSSAB team members

criteria of persons in the multicounty area affected by the Oak Ridge Reservation. Technical expertise is not a requirement for membership, although DOE strives to have a good mix of educational backgrounds among members to reflect the community.

ORSSAB provides community perspectives, offers avenue for public comment

ORSSAB offers a number of opportunities for the public to learn and express views about OREM work. The board regularly issues news releases, advertises in local media, broadcasts a portion of its monthly meetings on local cable stations, as well as posting the video to its YouTube channel, www.youtube.com/user/ORSSAB. It maintains several mailing lists and is active on Facebook at www.facebook.com/ORSSAB.

The primary way individuals can learn about the latest cleanup efforts is by attending board meetings. The board met seven times in FY 2018 and attended public meetings by DOE in its official capacity. ORSSAB's committee meetings are also open to the public.

The board completed a number of additional public outreach goals this year in its continuing mission to inform and involve the public in the EM decision-making process. Due to an increase in requests to speak about the board's mission, board officers undertook a complete review of outreach materials. The informational presentation was updated, improved, and distributed.

The board's website also received a host of new features, including more interactive components and the addition of a member education section to provide convenient access to documents for new members and curious potential members.

The website continues to be a resource for current and previous board meeting materials, from initial agendas to minutes of the proceedings.

The board focused significant effort on boosting its social media presence as a way to reach out to the broader community and promote dialogue. Staffers monitor the Facebook page daily. In addition to general news items, postings and ads received positive feedback during the annual member recruitment and contributed to several new member selections. Additional resources were invested in advertising of board meetings and other information on the platform, which resulted in dissemination to a much wider audience.

Four *Advocate* newsletters (published in January, April, July, and October) and the annual report serve as regular comprehensive updates on EM progress across the Oak Ridge Reservation. The newsletter is free to print or email to subscribers and is distributed in several public areas in Oak Ridge as well as provided to public libraries across the region.

The board also continued its long-standing tradition of appointing two student representatives to the board each year as part of its interest in long-term stewardship of the Oak Ridge Reservation. Exposing students to the work done by OREM ensures the next generation of stewards are prepared for their role in making sure cleanup is completed and stewardship of the site continues for as long as is needed.

ORSSAB members pursue continuing education



ORSSAB members participate in tours and other DOE events as part of a continuing education effort to provide a broader knowledge of issues affecting DOE. For example, board members visited excess contaminated facilities on the Oak Ridge Reservation. The board monitors these facilities closely because they affect the OREM budget, impact the environment and human health, and remain the ongoing, critical missions of their respective sites. Members on the tour learned how OREM performs surveillance and maintenance to ensure the safety of these buildings while they are awaiting demolition. They also heard from project directors about which buildings are prioritized for cleanup. As a result, several projects were noted in ORSSAB's recommendations and discussed at later meetings.

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 regarding environmental activities in Oak Ridge.

The Center hosts various meetings, including some of the ORSSAB meetings, relevant to cleanup activities in Oak Ridge. Staff is 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 2018 Stats

Number of public meetings held	23
Total citizen inquiries	722
Total number of documents at the center	48,600
Total number of documents online	17,033

Other Information Resources

DOE OREM Public Information
(865) 574-4912

DOE Oak Ridge Office 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
CNF	Central Neutralization Facility
CROET	Community Reuse Organization of East Tennessee
DOE	U.S. Department of Energy
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
RI/FS	Remedial Investigation/Feasibility Study
RGRS	Reactive Gas Removal System
ROD	Record of Decision
TDEC	Tennessee Department of Environment and Conservation
TRU	Transuranic
TSCA	Toxic Substances Control Act Incinerator
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 assessments, 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 2018 fiscal year spans from Oct. 1, 2017, to Sept. 30, 2018.

For more information, please contact
the DOE Public Affairs Office at (865) 574-4912.