OREM

Oak Ridge Office of Environmental Management

PROGRAM PLAN

FY 2014 to 2024

BIANNUAL UPDATE - FALL 2021

CONTINUING PROGRESS.
RESTORING THE ENVIRONMENT.
ENABLING MISSIONS.

U.S. DEPARTMENT OF ENERGY

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A MESSAGE FROM THE MANAGER

Dear colleagues and stakeholders:

We released the first edition of our 10-year program plan in 2014. It unveiled eight ambitious goals for DOE's Oak Ridge Office of Environmental Management (OREM) that guide our decisions and facilitate clear expectations for our employees and contractors through 2024.

This plan has been incredibly effective toward giving our workforce a uniform vision to strive toward. The goals, objectives, and performance measures listed in this document have remained constant, giving our employees a fixed target to pursue.

While the performance measures have not changed, our progress has. That is why we update the program plan every two years. This edition marks the third update to this document. Each new version highlights and captures the progress we have achieved in reducing risks, improving safety, and removing barriers to new missions and economic opportunities in Oak Ridge.

This document takes OREM through the completion of cleanup at the East Tennessee Technology Park and into a new chapter of cleanup at the Oak Ridge National Laboratory and Y-12 National Security Complex. As we near 2024, our work has already transformed a shuttered uranium enrichment site into a valuable, community-owned asset, and large-scale cleanup operations are underway that are changing the skyline at some of the nation's most important research and national security sites.

You will see many new successes recorded as you read through this edition. These successes were made possible through numerous contributing factors. Our leadership team does a tremendous job identifying and proactively planning for new opportunities. We also boast highly qualified and committed employees, strong community and contractor partners, and a clearly defined vision for the future. Together, these elements make Oak Ridge a special and unique site that is setting the standard for excellence within the Department of Energy's Environmental Management complex.

As I look at what we have accomplished in recent years, I am excited about the future that is possible for the Department and community locally. As we work to achieve the goals listed in this plan, our Congressional delegation is providing exceptional support, and our employees and contractors are using those investments effectively to accomplish the most meaningful and impactful cleanup possible across the site.

As we continue our operations, we are intently focused on maximizing the funding we receive to accomplish the most progress possible and enhance the region. Readers will see proof of this mentality as you go through this latest update. Our team will continue finding ways to achieve our goals and grow closer to realizing our ultimate vision of a remediated, modernized, and reindustrialized Oak Ridge Reservation.

Jay Mullis
Manager

OUR MISSION

The U.S. Department of Energy's (DOE) Oak Ridge Reservation occupies more than 32,000 acres within Anderson and Roane counties in East Tennessee. Three sites lie within its borders—they include the Y-12 National Security Complex (Y-12), Oak Ridge National Laboratory (ORNL), and East Tennessee Technology Park (ETTP).

DOE's Oak Ridge Office of Environmental Management (OREM) has cleanup responsibilities at all three of these sites. Its efforts are removing risks and hazards, enhancing safety, opening land for re-development, and modernizing campuses to enable important science and energy research and national security missions. To accomplish these outcomes, OREM's mission is three-fold.

PROTECT THE REGION'S HEALTH AND ENVIRONMENT

Our work enhances the health and safety of the region. At Y-12, we are tearing down deteriorated buildings and constructing infrastructure and advancing research to remove sources of mercury contamination from the environment. At ORNL, we are demolishing contaminated facilities, eliminating waste inventories, and removing radiological risks. Finally, at ETTP, we are in the final stages of addressing areas with impacted soil and groundwater.

ENABLE DOE'S NATIONAL SECURITY AND SCIENCE MISSIONS ONSITE

We are actively demolishing excess and contaminated buildings at Y-12. These projects are clearing land for the National Nuclear Security Administration to build new facilities that support important national security missions. Our cleanup at ORNL is removing dilapidated facilities and radiological risks to open land for DOE's Office of Science to continue advancing its world-leading research.

MAKE CLEAN LAND AVAILABLE FOR FUTURE USE

At ETTP, our work has transformed the former enrichment site into a multi-use industrial center, national park, and conservation area. We have successfully cleared away all of previous facilities and transferred 1,300 acres to the community for economic development that is attracting new investments and businesses to the region. We have also set aside more than 3,000 acres for conservation and recreational use.

CORE VALUES

The leadership and employees in OREM adhere to a set of core values that have proven invaluable as we conduct and accomplish challenging cleanup across the three major cleanup sites. These values provide a clear standard that guide our workforce and contributes to the organization's successful operations and oversight.

The safety and security of our employees, local residents, and the environment is our highest priority

Our results will demonstrate accountability and value for taxpayers' investment

We will value and utilize the diversity, experience, and skills of our people

We will pursue innovation and continuous improvement in every aspect of our operations

We will promote openness, collaboration, and teamwork with our stakeholders

THE 10-YEAR PROGRAM PLAN

This plan builds on the successes our program has accomplished since it was formed in 1989. Over the decades, we have made incredible progress remediating contaminated soil and groundwater and demolishing radioactively contaminated facilities across the Oak Ridge Reservation (see Cleanup Accomplishments on page 11).

Contamination areas that once threatened the environment have been contained through early actions and institutional controls. Through the years, we have also removed radioactive and hazardous wastes and portions of nuclear material inventories that could pose risks to the public or DOE's ongoing missions.

This plan outlines our approach from fiscal year 2014-2024 to continue removing contaminated facilities, reducing waste inventories, and addressing impacted soil and groundwater on the Oak Ridge Reservation in a safe and cost effective manner. This work is protecting human and environmental health and ushering in a future with new opportunities for DOE, the City of Oak Ridge, and the region.

HISTORY AND BACKGROUND

The U. S. Army Corps of Engineers began acquiring land, in the area that became Oak Ridge, in October 1942 for the Manhattan Project. By March 1943, 56,000 acres were sealed behind fences and major industrial facilities were under construction.

The K-25, S-50, and Y-12 plants were all built to explore different methods to enrich uranium, while the X-10 site was established as a pilot plant for the Graphite Reactor and to explore how to produce plutonium. Throughout the following decades the three major sites— K-25 (present day ETTP), X-10 (present day ORNL), and Y-12— purified isotopes, conducted research, built weapons, and created environmental legacies that OREM is now cleaning and removing.

Above Left: East Tennessee Technology Park
Above: Oak Ridge National Laboratory
Left: Y-12 National Security Complex

EAST TENNESSEE TECHNOLOGY PARK

The K-25 plant was constructed during the Manhattan Project to enrich uranium for the first atomic weapon using the gaseous diffusion process. Due to the success of this technique, the original plant was expanded during the Cold War and employed 12,000 workers. At its peak, the site contained five enormous uranium enrichment facilities—K-25, K-27, K-29, K-31, and K-33— and hundreds of support facilities.

DOE ceased all gaseous diffusion operations at the K-25 plant in 1987. Environmental cleanup began in the early 1990's to address the deteriorating facilities and the environmental hazards created during decades of enrichment. The site was renamed the East Tennessee Technology Park in 1997 and DOE began transitioning the site into a privately owned and operated industrial park.

Today, OREM is in the final phase of completing cleanup at ETTP, which involves addressing any remaining areas of impacted soil or groundwater. OREM is steadily transferring infrastructure to the City of Oak Ridge and cleaned land to the Community Reuse Organization of East Tennessee. The non-profit organization then markets and transfers these assets to private industry, which is generating new economic growth for the region.

QUICK FACTS

Site manager: DOE Office of EM, Community Reuse Organization of East Tennessee

Size: 2,200 acres

Cleanup priority: Complete soil and groundwater remediation and transfer remaining federal land to the community for beneficial reuse

EM value-added: The cleaned site offers an abundance of flat real estate and robust infrastructure to attract large industry to the region. The EM program constructed a history center that tells the site's rich history for national park visitors, and it also created a 3,000-acre conservation easement adjacent to ETTP that protects wildlife and provides residents with nature-friendly trails.

Y-12 NATIONAL SECURITY COMPLEX

Y-12 was built to enrich uranium for the first atomic weapon using an electromagnetic separation process. By the end of World War II, the plant had more than 22,000 workers.

The Cold War brought change to Y-12 as new processes for separating lithium-6 were added and uranium enrichment missions were conducted elsewhere. During the 1950s and early 1960s, Y-12 used large amounts of mercury in the lithium separation process, and an estimated 700,000 pounds entered the environment. Public and Congressional concern began to mount in the 1970s and escalated in the late 1980s.

With the end of the Cold War, Y-12's mission changed from production to weapons reductions and disassembly. Today, Y-12 has three primary national security missions that protect the United States and its allies. They include maintaining the U.S. nuclear stockpile, reducing global threats through non-proliferation, and fueling the U.S. Nuclear Navy.

QUICK FACTS

Site manager: National Nuclear Security Administration

Employees: 11,600

Size: 811 acres

Cleanup priority: Large excess contaminated facilities and mercury in soil and groundwater

EM value-added: We are working to address and remove more than 90 deteriorated and contaminated facilities and remediate the large volume of mercury from soil and groundwater at the site. These projects will eliminate risks, enhance safety, and open land for important national security missions.

Y-12 has evolved to become the complex the nation looks to for support in protecting America's future, developing innovative solutions in manufacturing technologies, prototyping, safeguards and security, and technical computing.

OAK RIDGE NATIONAL LABORATORY

Construction of X-10, also known as the Clinton Laboratories, began in 1943. Its first mission was to develop and test the experimental Graphite Reactor, which went critical in March 1944. It was used initially as a pilot test facility for plutonium production. Since then, 13 reactors were designed and built onsite, and staff developed numerous nuclear materials reprocessing methods.

In the 1960's, research into genetics and the biological effects of radiation were added to the site's mission. In the 1970's, ORNL began ecological and biological research concerning the environmental effects and safety of nuclear power plants. During the 1980s and 1990s, the mission grew to encompass alternative energy and Strategic Defense Initiative research.

Today, ORNL has grown and expanded its capabilities, and it is at the forefront of supercomputing, advanced manufacturing, materials research, neutron science, clean energy, and national security.

QUICK FACTS

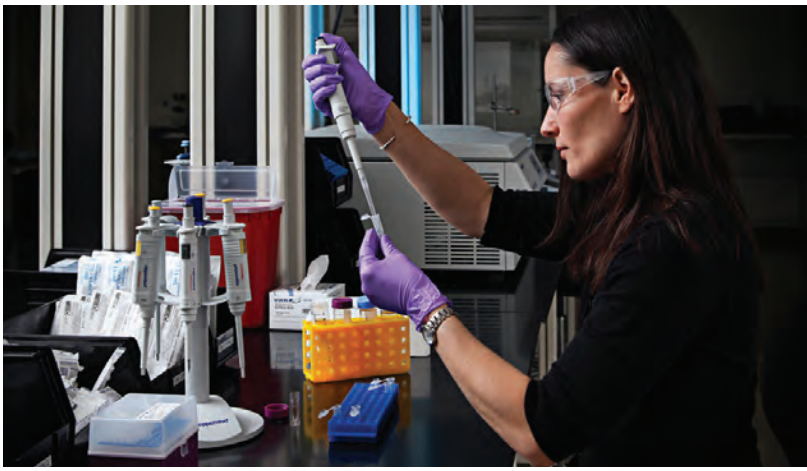
Site manager: DOE Office of Science

Employees: 5,450

Size: 4,400 acres

Cleanup priority: Removing radiologically and chemically contaminated facilities and eliminating inventory of uranium-233 and transuranic waste.

EM value-added: We are working to remove inventories of nuclear waste and more than 100 deteriorated and contaminated facilities that formerly conducted reactor and isotope production research. These projects will eliminate risks, enhance safety, and open land for new research at one of DOE's most important science institutions.



REGULATORY FRAMEWORK

As a result of legacy contamination from past operations, in 1989, the U.S. Environmental Protection Agency (EPA) placed the Oak Ridge Reservation on the National Priorities List. The list names national priorities where there are known or threatened releases of hazardous substances (Since then, OREM performed extensive sampling that showed more than 19,000 of the 32,400 acres are clean, and they were eliminated from the list.).

In 1989, DOE responded by establishing the Office of EM to oversee cleanup of hazardous materials at its facilities located across the U.S. Three years later, DOE, EPA, and the Tennessee Department of Environment and Conservation (TDEC), signed the Federal Facility Agreement, which establishes the guidelines and milestones for cleanup in Oak Ridge in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and other laws.

This tri-party agreement provides a checks and balances system to ensure the cleanup in Oak Ridge is prioritized and conducted in a way that best protects human health and the environment in the region. Members of each organization communicate and collaborate regularly as we plan and execute projects.

CLEANUP ACCOMPLISHMENTS

We have made significant progress cleaning the Oak Ridge Reservation. While the transformation is ongoing, it is important to highlight the magnitude of work our employees have already accomplished. Since the EM program's inception, we have removed hundreds of facilities, remediated environmental legacy sites, constructed infrastructure to treat, process, and dispose waste, and helped form key decisions with regulators.

Demolishing old, contaminated facilities

Our efforts have removed hundreds of facilities across ETTP, Y-12, and ORNL. We became the first site in the world to remove a former enrichment complex, which involved removing 500 structures spanning a total footprint of 13 million square feet. Now, crews are busy deactivating and demolishing excess contaminated facilities at Y-12 and ORNL.

Waste treatment and removal

We have constructed numerous waste treatment systems and facilities to remove legacy contamination and keep sites safe. The TSCA Incinerator treated 35 million pounds of waste before it was taken down, while the Liquid and Gaseous Waste Treatment System treats millions of gallons of process wastewater and over a billion cubic meters of gaseous waste annually. Additionally, we have removed half of the uranium-233 inventory stored at ORNL, and we are almost finished processing and packaging Oak Ridge's inventory of legacy transuranic debris waste.

Risk reduction

We have addressed and eliminated major hazards across the Oak Ridge Reservation including dispositioning 7,000 cylinders of depleted uranium hexafluoride, emptying waste storage tanks, shipping all spent nuclear fuel offsite, excavating the greatest source of groundwater contamination at ORNL, clearing scrap yards, and retrieving large amounts of mercury before it entered the environment.

Addressing mercury

We have led projects to reduce offsite mercury migration from Y-12 since 1985, and we are actively investigating technologies that can effectively remove it from the environment. Our projects have eliminated some of the mercury sources in and around mercury-contaminated tanks and facilities, cleaned storm drain systems, excavated contaminated soil, dredged sediments, re-routed and removed old process piping, extracted more than five tons of mercury from old equipment, and constructed an onsite mercury treatment system.

Groundwater monitoring and treatment

EM has invested more than $420 million in capital projects supporting groundwater protection for Oak Ridge. Annually, we spend $15 million on groundwater actions, treat 100 million gallons of groundwater, and collect 2,000+ samples across the Oak Ridge Reservation to ensure safety and inform plume modeling.

Innovative transportation

We constructed a private road specifically for waste shipments to our onsite disposal facilities. This road prevents the potential for traffic accidents or spills on public highways. So far, more than 200,000 truckloads have been diverted from local roadways. We have also developed advanced tracking systems to identify the location and contents of each truck while they are in transit.

Reindustrialization and economic development

We are the first site in DOE to launch a reindustrialization program. To date, we have transferred nearly 1,300 acres, 14 buildings, along with roadways, electrical and water and sewer systems, and emergency services. These transfers have saved taxpayers millions of dollars, and they are attracting industry and generating hundreds of millions of dollars in new economic development for the region.

Public involvement and input

Since 1995, the Oak Ridge Site Specific Advisory Board has provided independent advice and recommendations to our cleanup program. The federally appointed citizens' advisory panel is comprised of 22 members that reflect the diversity of the region, and their active engagement and insight is invaluable as we formulate cleanup strategies and decisions.

BALANCING PRIORITIES

We developed a portfolio of projects designed to complete cleanup at ETTP, Y-12, and ORNL. All three portfolios are integrated into a single plan that balances risks from the perspective of the Department, regulators, and stakeholders.

We have successfully completed most of the cleanup scope at ETTP, with only select soil and groundwater projects remaining. Completing these efforts allows us to transfer the remaining federally owned land at ETTP to the community for beneficial reuse. This approach reduces our costs associated with overseeing and managing a site, and it allows us to dedicate a greater percentage of our budget toward advancing environmental cleanup.

Since Y-12 and ORNL performed different operations and maintain current day missions, their cleanup needs vary greatly from those at ETTP. Our work at Y-12 is focused on removing excess, contaminated buildings and environmental risks. Mercury from on-site sources continues to migrate into the Upper East Fork Poplar Creek, which enters public water at the site boundary. We are funding research and executing projects that will reduce mercury migration into waterways and address its sources.

At ORNL, our work is focused on removing nuclear and radiological risks left behind by previous isotope production and reactor research. Currently, the greatest priority is the removal of legacy nuclear materials and waste, removing excess contaminated facilities, and maintaining and upgrading aging waste treatment infrastructure.

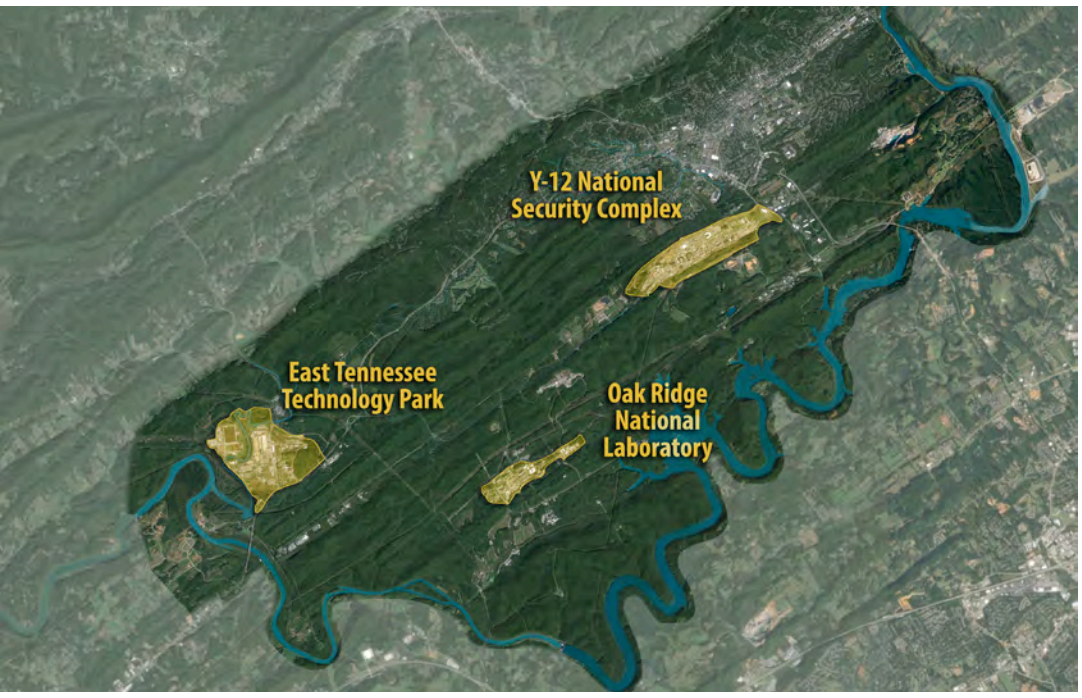
While each site has important and pressing needs, the remaining cleanup scope in Oak Ridge is so large that we must carefully prioritize our work and operate within the bounds of our annual budget. Upcoming work is generally prioritized in the following order:

1. **Eliminate any offsite releases**
2. **Prevent contamination from traveling offsite**
3. **Control sources of onsite contamination**
4. **Demolish old, contaminated facilities**
5. **Address soil, groundwater, and surface water**

CHALLENGES AND CONSIDERATIONS

Oak Ridge is very unique within the Department's Office of Environmental Management complex, and our employees are tasked with weighing numerous considerations as they plan and prioritize work. The Oak Ridge Reservation has three major cleanup sites that each have different operational histories, risks, cleanup needs, and diverse ongoing missions.

- More than 500,000 people live within a 30-mile radius of our cleanup, and the entire Oak Ridge Reservation is within the Oak Ridge city limits.
- Oak Ridge receives one of the highest annual rainfall levels of any site within the Environmental Management complex. It also has shallow groundwater capable of carrying contaminants into local waterways.
- The Department's largest inventory of high-risk excess contaminated facilities is in Oak Ridge, specially at Y-12 and ORNL.
- Cleanup at Y-12 and ORNL must be conducted safely and without disrupting or threatening thousands of employees who are onsite conducting important research and national security missions.
- We must balance diverse risks and meet regulatory requirements with varying annual budgets, and we have a diverse group of partners and stakeholders with differing priorities and expectations.



Above Left: *Satellite view of the Oak Ridge Reservation.* ***Top Right:*** *Anticipated cleanup scope at ORNL (labeled in red).*
Above Right: *Anticipated cleanup scope at Y-12 (labeled in red)*

OUR GOALS

This plan focuses on environmental restoration activities that we will perform across the Oak Ridge Reservation from fiscal year 2014-2024. We have established eight goals that will drive the execution of our work during this timeframe. The first four goals are cleanup-centric, while the final four are programmatic goals that address how we perform and accomplish our work. Key objectives have been identified for each goal along with metrics for measuring progress.

Goal 1: Complete ETTP cleanup

Objective 1: Complete all demolition and remedial action consistent with CERCLA agreements
Objective 2: Implement reindustrialization and historic preservation activities at ETTP

Goal 2: Disposition ORNL uranium-233 inventory

Objective 1: Complete uranium-233 direct disposition campaign
Objective 2: Conduct down-blending operations and dispose remaining uranium-233 inventory

Goal 3: Disposition ORNL transuranic waste inventory

Objective 1: Complete disposition of transuranic debris waste
Objective 2: Begin construction of the Sludge Processing Facility

Goal 4: Address Y-12 mercury contamination

Objective 1: Ensure proper planning for future mercury cleanup
Objective 2: Reduce mercury in surface water exiting Y-12
Objective 3: Begin addressing mercury contaminated buildings

Goal 5: Support efficient and effective cleanup of the Oak Ridge Reservation

Objective 1: Support efficient disposition of cleanup waste
Objective 2: Conduct cost efficient base operations at ETTP, ORNL, and Y-12
Objective 3: Routinely evaluate surveillance and maintenance plans to ensure unacceptable risks are identified and addressed

Goal 6: Focus on continuous improvement in safety, security, environmental compliance, and quality performance

Objective 1: Integrate safety, security, and quality into all work aspects through more focused activities
Objective 2: Foster a Safety Conscious Work Environment
Objective 3: Implement all program activities in an environmentally sound manner
Objective 4: Maintain a qualified workforce to ensure federal oversight of work performed

Goal 7: Achieve excellence in project and contract management

Objective 1: Complete projects on time and within budget
Objective 2: Continue to hold contractors accountable for delivering results and ensure contractors' performance is fairly evaluated and documented
Objective 3: Promote the use of small business contractors

Goal 8: Optimize collaboration with external stakeholders and oversight agencies

Objective 1: Provide public access to program information and opportunity to provide input
Objective 2: Collaborate effectively with external regulatory agencies
Objective 3: Maintain a proactive relationship with the Defense Nuclear Facilities Safety Board

PROGRESS ON THE ROAD TO 2024

GOAL 1: COMPLETE ETTP CLEANUP

Objective 1: Complete all demolition and remedial action consistent with CERCLA agreements

PERFORMANCE MEASURES:

- [x] Complete K-25 D&D
- [x] Complete K-27 D&D
- [ ] **Complete ETTP remaining D&D and remediation**

Since our last update, crews have successfully completed all demolition at ETTP. In doing so, Oak Ridge reached a historic achievement and became the first site in the world to remove a former enrichment complex. This massive effort involved taking down 500 deteriorated and contaminated structures with a total footprint that could cover 225 football fields.

In our last edition, the Centrifuge Complex, Building K-1600, and numerous support structures were still standing. The Centrifuge Complex and Building K-1600 previously supported the development and testing of centrifuge technologies for uranium enrichment. Due to the designs needed for that research, they were the tallest buildings at the site with portions of the sprawling Centrifuge Complex measuring 180 feet in height.

Our crews have also worked steadily to remove any areas of soil contamination across the site. Workers completed numerous projects in the former Poplar Creek facilities area. Crews also completed the biggest soil remediation to date on Building K-25's footprint. Workers excavated 9,000 truckloads of soil and backfilled and seeded the area. Completing this project eliminated risks and helps facilitate future plans to transform the building's footprint into a commemorative site as part of the Manhattan Project National Historical Park.

OREM has achieved significant progress on remediation efforts, and we anticipate completing all soil related projects in 2024. We will also work with the EPA and State of Tennessee to complete necessary Records of Decision for groundwater remedies at ETTP in the coming years.

OREM and UCOR have worked together to develop a closure plan that identifies activities required to complete our work at the site. Our efforts have transformed the site from a shuttered enrichment complex into an asset that is attracting new industry, history enthusiasts, and nature lovers. As remediation is completed, additional land will be transferred from federal ownership to the community to achieve our ultimate vision for the site.

Objective 2: Implement reindustrialization and historic preservation activities at ETTP

PERFORMANCE MEASURES:

- [x] Implement commitments listed in the Memorandum of Agreement for Historic Preservation
- [ ] **Complete the transfer of all applicable economic development parcels to the Community Reuse Organization of East Tennessee**
- [ ] **Complete transfer of infrastructure to the City of Oak Ridge**

We are nearing our ultimate vision of transforming the former enrichment complex into a multi-use industrial center, national park, and conservation area. We have transferred 1,300 acres for economic development, set aside 3,000 acres for conservation, and constructed a new history center adjacent to a component of the Manhattan Project National Historical Park.

OREM opened the K-25 History Center in 2020, which the public can visit free of charge. It offers visitors 7,500 square feet of exhibits with more than 250 original artifacts on display. OREM funded the collection of nearly 1,000 oral histories from former Manhattan Project and Cold War-era workers that were gathered over a 10-year span. Museum professionals used those first-hand perspectives to develop the exhibits and interactive galleries. Efforts are also underway to design and construct other facilities that will educate visitors about the world-leading technology developed at the site.

OREM is also intently focused on transforming the site into an economic engine for the region. Our reindustrialization efforts are giving new life to buildings, land, and infrastructure that no longer serve current day DOE missions but are capable of attracting new industry to the area.

Since our reindustrialization efforts began, more than 20 businesses have located at ETTP. With major cleanup complete, the development potential is more apparent, and the large parcels of available land are attracting significant private investments. In Summer 2021, Kairos Power announced their plans to invest $100 million to construct a low-power demonstration reactor on a 185-acre parcel that previously housed two massive uranium enrichments buildings. This latest announcement, which marks the biggest so far, joins another announcement by a medical isotope company that acquired 200 acres to construct its facility at the site.

OREM has also successfully transferred the majority of ETTP's electrical, water, and sewer systems from federal ownership to the city, and plans are moving forward to transfer 160 acres to the city for a proposed general aviation airport that will provide yet another attraction for industry at the site.

GOAL 2: DISPOSITION ORNL URANIUM-233 INVENTORY

Objective 1: Complete uranium (U)-233 direct disposition campaign

PERFORMANCE MEASURES:

- ☑ Complete transfer of material appropriate for programmatic reuse
- ☑ Ship all CEUSP material to an appropriate disposal facility

Canisters of U-233 are housed in ORNL's Building 3019, which is the oldest operating nuclear facility in the world. The material is in diverse forms and packages with various levels of isotopic purity. Removing the inventory is our highest priority at ORNL because it constitutes a Category I quantity of highly enriched fissile material and requires high security costs and access restrictions to the site.

This inventory included canisters that were eligible for programmatic reuse as well as those eligible for direct disposal. In 2017, we successfully completed shipping and disposal of approximately one-half of the U-233 inventory through the Direct Disposition Campaign. The work was completed 10 months ahead of schedule, saving approximately $9 million.

Objective 2: Conduct down-blending operations and dispose the remaining U-233 inventory

PERFORMANCE MEASURES:

- [x] Prepare Building 2026 for down-blending operations
- [ ] **Process, package, and dispose remaining inventory**

While approximately half of the U-233 inventory stored at ORNL was able to be directly disposed, the remaining material requires processing and downblending to convert it into a form that can be shipped and disposed offsite. Since the last update, we have achieved significant progress on this objective.

The original approach involved processing the remaining inventory in heavily shielded rooms, known as hot cells, inside Building 2026. However, the building required significant upgrades before that work could begin. Crews have now completed installation of the necessary equipment and finished upgrades to the facility and hot cells.

The Isotek team identified a subset of material that their employees could begin processing in gloveboxes while other crews prepared the hot cells for processing operations. This approach was made possible through a unique partnership with nuclear innovation company TerraPower. Isotek received funds from the company to extract medical isotopes from the U-233 inventory. Through this arrangement, TerraPower received rare medical isotopes to advance next generation cancer treatment research, and Isotek received funds it reinvested in the project to purchase gloveboxes and accelerate the processing schedule – saving significant tax dollars.

Isotek began extracting medical isotopes and processing the low dose material in gloveboxes in Fall 2019. With the facility upgrades now complete, employees will begin processing operations in the hot cells in 2021. This will allow for larger amounts of U-233 to be processed and increase the transfer of medical isotopes to TerraPower for cancer treatment research.

GOAL 3: DISPOSITION ORNL TRANSURANIC WASTE INVENTORY

Objective 1: Complete disposition of transuranic (TRU) debris waste

PERFORMANCE MEASURES:

- ☐ **Complete processing and disposition of contact-handled debris**
- ☐ **Complete processing and disposition of remote-handled debris**

Processing transuranic waste is an important component of Oak Ridge's cleanup portfolio, and its disposition is critical to achieving OREM's mission to protect the public and the environment. The Transuranic Waste Processing Center allows us to process and repackage transuranic materials for disposal offsite. Transuranic materials include elements that are heavier than uranium on the periodic table.

Currently, the contractor at the facility is processing, repackaging, and certifying transuranic debris waste for disposal at the Waste Isolation Pilot Plant (WIPP). Through our workforce's innovation, we were able to continue processing activities despite WIPP's suspension. Together, we designed new containers to encase the packages of processed remote-handled waste for safe, long-term storage until they could be transported offsite.

WIPP is once again accepting waste, and we resumed shipping waste there in August 2017. Since that time, we have completed more than 100 shipments that were made up of 3,300 drums of legacy contact-handled transuranic waste. This figure represents a 50% reduction in our inventory.

Objective 2: Begin construction of the Sludge Processing Facility

PERFORMANCE MEASURES:

- **Complete design, construction, and operation of the Sludge Processing Mock Test Facility**
- **Test and advance sludge processing technology**
- **Complete final design of the Sludge Processing Facility**

500,000 gallons of transuranic sludges are stored in underground tanks at ORNL. Our commitment to regulators is to remove all of this waste from Oak Ridge. First, however, we need a facility and equipment capable of extracting the sludges and processing them into a solid form for disposal as low-level waste.

We will test six critical technology elements to gather the data necessary to complete the final design and construction of the Sludge Processing Facility later this decade. This facility will enable us to convert the waste from sludge into a solid form for permanent disposal. Two of those technologies will be tested at a mock test facility, which is now under construction.

Engineers at the mock test facility will focus on testing pump technologies and instrumentation measurement technologies. Advanced pump technologies are needed to pull the sludge wastes out of their storage tanks for processing. The instrumentation measurement technologies will inform operators what material is moving through the pumps, including its contents and density, to assist with processing needs.

Site preparation began for the Sludge Processing Mock Test Facility in January 2020, and construction is slated for completion in Spring 2022. We anticipate approximately two years of testing to gather the data needed to determine the best designs and approaches for the Sludge Processing Facility's final design.

GOAL 4: ADDRESS Y-12 MERCURY CONTAMINATION

Objective 1: Ensure proper planning for future mercury cleanup

PERFORMANCE MEASURES:

- ☑ Finalize strategic plan for mercury remediation at Y-12
- ☑ Complete comprehensive mercury technology development plan
- ☑ Complete evaluation of mercury treatment, stabilization, disposition options

Mercury cleanup at Y-12 is one of OREM's highest priorities, and our ongoing research is positioning us for future success. We developed a Comprehensive Mercury Technology Development Plan and a Strategic Plan that serves as a roadmap for what must occur to complete the mercury cleanup at the site.

OREM is supporting research at ORNL's Aquatic Ecology Laboratory that is expanding our understanding of mercury in the environment, advancing technology development, and identifying solutions for remediation of the East Fork Poplar Creek.

We are continuing this strong partnership and recently completed an expansion of the Aquatic Ecology Laboratory that enables new research capabilities. The expansion allows actual mercury-contaminated water from local streams to flow through the facility so researchers can test mercury removal technologies in less artificial settings. This first-of-a-kind capability will help researchers discover which technologies may be scaled up for field testing and offer the most effective remediation results.

Working together, the Office of Environmental Management and the Office of Science are gaining a deeper understanding of the local environment and finding answers to aid cleanup. This research is helping us find new tools and approaches that can be more effective, reduce costs, and accelerate cleanup schedules to address the complex mercury challenge at Y-12.

Objective 2: Reduce mercury in surface water exiting the Y-12 facility

PERFORMANCE MEASURE:

- [ ] **Complete construction and begin operation of the Outfall 200 Mercury Treatment Facility**

Some of the largest and most deteriorated structures that must be demolished at Y-12, specifically Alpha-4, Alpha-5, and Beta-4, are contaminated with mercury and have mercury trapped in the soil and groundwater beneath them. The Mercury Treatment Facility will enable large-scale cleanup and demolition in that area of Y-12 by providing a means to prevent mercury contamination from traveling offsite through the Upper East Fork Poplar Creek as buildings come down and the area is disrupted.

The Mercury Treatment Facility is designed to treat up to 3,000 gallons of surface water per minute and store 2 million gallons of excess stormwater. It will be comprised of two components at two locations — a headworks facility and a treatment plant— connected by a pipeline nearly a mile long. The headworks facility will capture creek flow on the west end of Y-12, store excess stormwater collected during large rainfalls, remove grit, and pump water through the pipeline to the treatment plant on the east side of Y-12. The treated water will then flow into the creek.

We awarded APTIM-North Wind Construction JV, LLC a $91.7 million contract to build the facility. Since the last update, construction is underway on the treatment facility, and workers have conducted extensive soil excavation and foundation preparation for the headworks facility.

Objective 3: Begin addressing mercury contaminated buildings

PERFORMANCE MEASURE:

- ☑ Begin pre-demolition activities for the mercury source buildings

We have developed an integrated cleanup plan to begin addressing the excess, contaminated facilities at Y-12. Preparations to decontaminate and decommission the site's large mercury-use facilities includes characterizing the buildings and equipment, identifying treatment methods for demolition debris to meet regulatory disposal restrictions, and conducting risk reduction activities.

Our crews removed all of the old, rusted, mercury-contaminated Column Exchange (COLEX) equipment on the west side of Alpha-4. Crews also drained and cleaned out the equipment on the east end of Alpha-4. This project retrieved more than 10,000 pounds of mercury, prevented a large environmental release, and moved Alpha-4 closer to deactivation.

Employees also tested decontamination methods to clean old mercury process piping, and they field tested a newly developed fogging fixative and application process aimed at controlling mercury vapors during future deactivation and demolition projects at Y-12's mercury-contaminated buildings.

Since the last update, workers began deactivating the COLEX equipment on the east side of Alpha-4 and are planning efforts to remove equipment on the south side of the building. Planning is also taking place for deactivation activities required in the high-risk facility that spans 13 acres.

Two pivotal projects are already underway that will enable Alpha-4's eventual demolition. The construction of the Mercury Treatment Facility to prevent mercury releases, and the West End Protected Area Reduction Project. The second effort is rerouting portions of the high-security area around Y-12's mercury-contaminated buildings, allowing enhanced access for cleanup crews and cutting future cleanup costs by more than 40 percent.

GOAL 5: SUPPORT EFFICIENT AND EFFECTIVE CLEANUP OF THE OAK RIDGE RESERVATION

Objective 1: Support efficient disposition of cleanup waste

PERFORMANCE MEASURE:

- [ ] **Construct Phase I of the Environmental Management Disposal Facility**

The Environmental Management Waste Management Facility, Oak Ridge's onsite CERCLA disposal facility, is currently 80% full, and it is expected to reach its full capacity in the late 2020's. OREM needs another low-level onsite disposal facility, known as the Environmental Management Disposal Facility, to provide the disposal capacity required to complete cleanup at Y-12 and ORNL. This project is vital to the future of our program, and it provides essential infrastructure that is necessary to continue cleanup progress that is removing risks and hazards to the community.

We have worked collaboratively with the EPA and the State of Tennessee on a science-driven approach that ensures a safe and protective design for the proposed engineered disposal facility.

Working cooperatively with the EPA and State of Tennessee, we have produced a number of documents throughout the regulatory process. First, the Remedial Investigation/Feasibility Study is a detailed report that examines the justification for a disposal facility. Next, we submitted a Proposed Plan that documents the recommended site for the facility. The document was available for public comments, which are addressed along with additional details about the project, in the draft Record of Decision.

To get to the current phase of the project, OREM completed numerous phases of the regulatory process, including a community education and outreach campaign, releasing a Proposed Plan, and implementing a 120-day public comment period to receive comments on that plan. Since the conclusion of the public comment period in 2019, we have worked with our regulators to develop a draft Record of Decision, which we formally submitted in July 2021. If the draft Record of Decision is approved by regulators, it allows us to finalize the design and begin planning construction.

Objective 2: Conduct cost efficient base operations at ETTP, Y-12, and ORNL

PERFORMANCE MEASURE:

- ☑ Reduce UCOR's costs of base operations by 5%

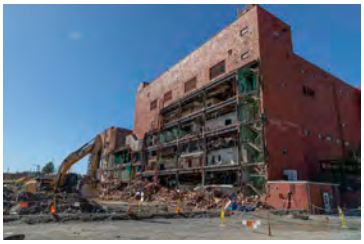
We use contract structures that incentivize contractors to continually search for opportunities to perform their work at the best value. This reduces the cost of base operations and allows more funds to be directed toward environmental cleanup. This requirement was added to the EM Annual Performance Agreement, and our cleanup program developed a plan with our contractor, UCOR, that allowed us to achieve this objective over the lifetime of their contract.

Objective 3: Routinely evaluate surveillance and maintenance plans to ensure risks are identified and addressed

PERFORMANCE MEASURES:

- ☑ Partner with contractor to identify new/emerging risks from excess facilities
- ☑ Ensure OREM baseline reflects balanced priorities between surveillance and maintenance and cleanup scope
- ☑ Identify and abate hazards and stabilize excess facilities awaiting demolition
- ☑ Begin D&D on high-risk excess contaminated facilities

Oak Ridge has more than 200 excess, contaminated facilities at Y-12 and ORNL. Conducting surveillance and maintenance at these facilities requires significant attention and resources. As part of this process, our employees identify potential or emerging risks so plans are in place to conduct essential projects before critical failures occur.



Through strong support from Congress, we have been able to address numerous excess contaminated facilities years ahead of schedule and accelerate cleanup at those sites.

Since the last update, we have finished demolition on the Biology Complex at Y-12. This involved removing the six-story, 255,000 square foot Building 9207 and the three-story, 65,000 square foot Building 9210. Removing these high-risk structures eliminates significant risks and environmental liabilities, and it opens land for the future Lithium Processing Facility. At ORNL, we removed the West Cell Bank of the former Radioisotope Development Lab. This project removed a high-risk, radiologically contaminated structure in the heart of the site.

With major cleanup complete at ETTP, our skilled, trained workforce has transitioned to begin large-scale cleanup at Y-12 and ORNL. Deactivation and demolition preparation activities are underway at four major facilities at Y-12 and 16 inactive research reactor and isotope research facilities at ORNL. These projects are reducing risks, placing buildings in a safe configuration, and preparing for the next wave of demolitions.

GOAL 6: FOCUS ON CONTINUOUS IMPROVEMENT IN SAFETY, SECURITY, ENVIRONMENTAL COMPLIANCE, AND QUALITY PERFORMANCE

Objective 1: Integrate safety, security, and quality into all work aspects through more focused activities

PERFORMANCE MEASURES:

- ☑ Complete the annual Integrated Safety Management System Declaration
- ☑ Complete key documentation to support organization standup
- ☑ Execute/manage annual integrated assessment schedule

We completed a Safety Conscious Work Environment (SCWE) self-assessment in 2013, and the organization conducted follow-ups in 2015 and 2018. Surveys revealed that our organization has an environment and culture where workers feel free to raise safety concerns to management without fear of retaliation. While this is a positive outcome, feedback also identified areas for improvement, and we have worked to implement new measures to strengthen our organization and empower our employees.

We not only expect a safe workplace for our employees, but we also hold our contractors to the same standards. We emphasize those expectations regularly, realizing that high performing culture requires constant attention. Through strong partnerships and diligent federal oversight, we are pleased with the safety record and culture within Oak Ridge's EM portfolio.

Objective 2: Foster a Safety Conscious Work Environment

PERFORMANCE MEASURES:

- ☑ Complete a safety conscious work environment self-assessment, evaluate results, and identify follow-on actions
- ☑ Ensure contractors maintain an average Total Recordable Case (TRC) rate of < 1.1 and a Days Away from Work, Restricted Work, or Transfer Case (DART) rate of < 0.6

We completed a Safety Conscious Work Environment (SCWE) self-assessment in 2013, and the organization conducted a follow-up in 2015. Both surveys revealed that our organization has a work environment where workers feel free to raise safety concerns to management without fear of retaliation. While this is a positive outcome, it also identified areas for improvement. We developed a SCWE Plan of Action to address the results of the 2013 and 2015 survey and strengthen our organization.

We not only expect a safe workplace for our employees, but we also hold our contractors to the same standards. We emphasize those expectations regularly, realizing that high performing culture requires constant attention. Through strong partnerships and diligent federal oversight, we are pleased with the safety record and culture within Oak Ridge's EM portfolio. To date, all of our contractors are achieving our TRC and DART goals.

Objective 3: Implement all program activities in an environmentally sound manner

PERFORMANCE MEASURES:

- ☑ Meet all required environmental reporting requirements within required timeframes
- ☑ Receive zero Notices of Violation or other non-compliance notifications for all gaseous, liquid, and solid waste treatment and disposal facilities
- ☑ Maintain an active pollution prevention and waste minimization program

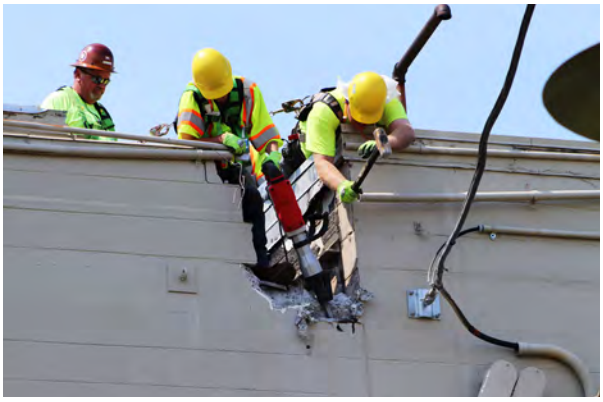
Our most important responsibility is the protection of human health and the environment. The organization places a primary focus on accelerating cleanup when possible and reducing the generation and subsequent release of hazardous substances into the environment. Performing this work in accordance with requirements is an important component of our work, and we are committed to continue our focus on environmental compliance.

Objective 4: Maintain a qualified workforce to ensure federal oversight of work performed

PERFORMANCE MEASURES:

- ☑ Develop annual workforce and succession plans
- ☑ Ensure Federal Project Directors and their deputies are certified at the correct level and all project managers are certified at level one as a minimum
- ☑ Maintain 100% completion of information technology, technical qualifications, and site security training
- ☑ Participate in team building activities that promote collaboration and communication

Our federal workforce is the organization's most important asset. Employees must have the training and experience required to successfully manage projects and provide effective oversight to the contractors performing work in Oak Ridge. Our organization will continue to find and develop employees to ensure that we do not lose capability when retirements occur. We will also work to strengthen the EM program in Oak Ridge by fostering a professional environment that promotes collaboration and communication among each of our business units.



GOAL 7: ACHIEVE EXCELLENCE IN PROJECT AND CONTRACT MANAGEMENT

Objective 1: Complete projects on time and within budget

PERFORMANCE MEASURES:

- ☑ Maintain alignment between baselines and contracts by approving baseline change proposals soon after contract modifications
- ☑ Evaluate and update project documentation (Project Execution Plans, Integrated Project Team Charters, etc.) on at least an annual basis
- ☑ Complete 90% of projects within 10% of the original cost and schedule in the Performance Baseline and address root cause of 110% cost/schedule performance index variances promptly

Our primary objective is to successfully complete all of our cleanup projects despite challenges often inherent with this type of work, including fiscal constraints. We emphasize balancing contract and project management with financial management to ensure we are good stewards of the taxpayer dollars entrusted to us. We strive to accomplish the maximum amount of work possible with the funds Congress provides. With this in mind, one of the core values for our organization is to perform extensive, strategic planning and complete our projects on time and within budget.

Objective 2: Continue to hold contractors accountable for delivering results and ensure contractors' performance is fairly evaluated and documented

PERFORMANCE MEASURES:

- ☑ 90% of Contractor Performance Assessment Reporting System evaluations are completed within 120 days of the end of the evaluation period
- ☑ Average number of days for disposition of contract change proposals/requests for equitable adjustment are less than 180 days
- ☑ 100% of all Performance Evaluation Management Plans are issued in accordance with the contract terms
- ☑ 90% of fee determinations/decisions are provided within contractual requirement or the established target for each contract
- ☑ Establish partnering agreements with prime contractors and hold partnering meetings per agreement

We rely heavily on contractors to perform the majority of environmental cleanup work across the Oak Ridge Reservation. Effectively managing those contracts and fostering a cooperative culture is a critical responsibility of the organization. We must ensure that contractors remain focused on results, using the basic principles of contract management. Those principles include monitoring performance, efficiently managing contract changes, and maintaining strong and productive relationships.

Objective 3: Promote the use of small business contractors

PERFORMANCE MEASURES:

- [x] Award 7.5% of funding to small business contractors to meet EM Headquarters' goals

We understand the importance of creating an environment that maximizes participation by small, HUBZone, veteran-owned, small disadvantaged, service-disabled veteran owned, and woman-owned businesses. Small business firms are critical to the success of the EM program and the broader economy, and we appreciate their significant contributions to the program's successes. Our organization will continue to be a strong advocate for small businesses and will identify contracting opportunities for them while supporting the small business goals of the EM program nationally.

GOAL 8: OPTIMIZE COLLABORATION WITH EXTERNAL STAKEHOLDERS AND OVERSIGHT AGENCIES

Objective 1: Provide public access to program information and opportunity to provide input

PERFORMANCE MEASURES:

- ☑ Hold regular Site Specific Advisory Board meetings throughout the year; provide written responses to all recommendations within 60 days
- ☑ Issue the Cleanup Progress Report to the Oak Ridge Community annually
- ☑ Issue media announcements for all major program events
- ☑ Hold annual public workshop on budget development effort
- ☑ Participate annually in four community events relevant to the OREM mission

The Oak Ridge community is a tremendous asset to the EM program. We provide many opportunities throughout the year for residents and stakeholders to provide input on topics that are important to them. In turn, we are responsible for communicating the program's progress, successes, and challenges to the public. We are committed to identifying additional opportunities to engage those who have an interest in our achievements and current and upcoming projects.

Objective 2: Collaborate effectively with external regulatory agencies

PERFORMANCE MEASURES:

- ☑ Meet or successfully renegotiate 90% of all enforceable regulatory milestones with EPA and TDEC
- ☑ Obtain formal input from EPA and TDEC on the annual budget submittal
- ☑ Conduct routine project team meetings between working level staff on all cleanup projects
- ☑ Conduct at least three meetings annually with senior management from EPA/TDEC/ OREM to coordinate program implementation

The EPA and TDEC are our partners in our mission to complete the cleanup of the Oak Ridge Reservation. We cannot succeed without positive, professional relationships with our environmental regulators. We have committed to collaborate with the regulators by proactively engaging them throughout the planning process, creating "win-win" opportunities for combined success, and enabling a safer, cleaner environment for future generations.

Objective 3: Maintain a proactive relationship with the Defense Nuclear Facilities Safety Board (DNFSB)

PERFORMANCE MEASURES:

- ☑ Work to ensure there are no DNFSB findings on OREM facilities
- ☑ Conduct monthly meetings with the site representatives
- ☑ Respond promptly to DNFSB requests, typically within 30 days

The Defense Nuclear Facilities Safety Board is an independent organization within the executive branch chartered with the responsibility of providing recommendations and advice to the President and the Secretary of Energy regarding public health and safety issues at DOE defense nuclear facilities. We will maintain a positive relationship by regularly communicating project successes and challenges and by promptly responding to their requests for information.

A LOOK TOWARD THE FUTURE

Completing the cleanup goals identified in this plan will make significant portions of our budget available for new goals beginning in FY 2025. Our work will focus on the remaining demolition and environmental remediation projects at Y-12 and ORNL.

At Y-12, we will demolish the large, excess contaminated facilities and address the sources of mercury at the site. Clearing away these deteriorating structures eliminates risks and opens land for new infrastructure to support national security missions. At ORNL, we will continue removing former research reactors and research facilities that contain nuclear and radiological contamination, and we will conduct extensive soil remediation. These projects will enhance safety and enable the site to continue its extraordinary contributions to innovation and scientific research.

Our contributions are transforming the site by removing barriers to economic development, eliminating risks, and opening land for important ongoing missions that are benefiting our nation. Every day, we are working toward our vision of a clean, modernized Oak Ridge that is poised to provide solutions to the nation's pressing needs.

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