

# 2022

YEAR IN REVIEW



U.S. DEPARTMENT OF  
**ENERGY**

OFFICE OF  
ENVIRONMENTAL  
MANAGEMENT

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# OFFICE OF ENVIRONMENTAL MANAGEMENT (EM)



*EM Senior Advisor Ike White thanks Idaho Cleanup Project employees on the safe and successful completion of targeted buried waste exhumations from the Idaho National Laboratory Site's Subsurface Disposal Area.*

For more than three decades, the Department of Energy's (DOE) Office of Environmental Management has remained focused on addressing the environmental legacy of nuclear weapons development and nuclear energy research that helped end World War II, win the Cold War and position the United States as a leader in clean nuclear energy.

*“DOE's environmental management mission is about so much more than just knocking down buildings and cleaning waste out of tanks. It's about keeping promises we have made to the American people by addressing the remnants of our nuclear programs. EM's work this year is helping meet DOE's obligation to ensure the air, the water, and the communities surrounding our programs are safe, and that the families in those communities can thrive.”*

- U.S. Secretary of Energy Jennifer Granholm

*“I am proud of all the work done this year across EM to begin clearing the decks of some of the last longstanding challenges facing the program. The progress realized in 2022 positions EM for even greater success in the future as cleanup progress sets the stage for stewardship, restoration, and enduring economic growth.”*

- EM Senior Advisor William “Ike” White

Today, the EM program is at a crossroads. After more than 30 years of mitigating the most pressing environmental risks, the program is now shifting to the remaining work that involves some of the toughest and most expensive challenges. At EM, this has led to a set of strategic initiatives to ensure the program is ready for the future. Chief among these is work underway to recruit, develop and maintain the next-generation workforce EM will rely on for years to come. EM achieved a 2022 priority with the development of a program-wide succession plan to help identify and develop the next generation of program leaders.



*DOE Secretary Granholm visits the Volpentest HAMMER Federal Training Center at the Hanford Site.*

EM also expanded the Minority Serving Institutions Partnership Program to include more internships, a new technology curriculum, enhanced research activities and training for future scientists and engineers at schools like the Northwest Indian College in Washington state. One of the highlights of the National Cleanup Workshop was a productive dialogue among DOE, industry, academia, and local communities on a holistic approach to workforce solutions, and the Department has asked the Energy Facility Contractors Group (EFCOG) to develop a best practice guide on the creative way industry is recruiting and hiring. EM will continue to explore other options to get qualified men and women on the job earlier.

*“As industry works to recruit, develop and retain the right people to enable future missions, the Energy Facility Contractors Group was pleased to partner with EM to launch an inaugural Workforce Summit this year to bring together federal, industry and community leaders to identify holistic approaches to prepare the next generation.”*

- EFCOG chair Michael Lempke

In looking to the future of cleanup, EM is committed to close collaboration with a diverse set of communities, tribes, regulators, stakeholders, advisory boards, industry partners, labor and others. EM is building strong relationships that will achieve alignment on shared goals, address remaining challenges, and enable sustained progress. The Justice40 Initiative, an EM 2022 priority, has provided a new opportunity to boost engagement with stakeholders, ensure the voice of those most impacted is heard, and help underserved communities.

Given the challenges that remain, EM is enhancing technology research and development efforts. A network of national labs and Savannah River National Laboratory are developing a roadmap for accelerating the tank waste mission at Hanford. Investments have been made to further protect groundwater,

accelerate tank waste treatment, and enhance worker safety through the development of wearable robotic devices. EM continues to consider ways to improve on approaches that address remaining cleanup challenges, accelerate cleanup, and offer a significant return on investment.

To help further, EM now has a trio of outwardly facing planning tools in place to evaluate innovative opportunities to meet remaining challenges and achieve more in the coming decades. This year, EM issued a new Program Plan to provide a long-range baseline for the entire cleanup. EM's calendar year priorities list drives focus on near-term objectives. The Strategic Vision gives us an outline of the intermediate term that guides our priorities over the next decade.

In the field, EM realized a set of accomplishments in 2022, some years in the making, that not only have immediate risk reduction benefits but help position sites for more progress. This year, EM reached a milestone by completing legacy cleanup activities at the Brookhaven National Laboratory. Brookhaven marks the 92nd site where legacy cleanup has been completed, leaving just 15 to go in the EM program.

*“As we reopened after pandemic shutdowns, EM engagement with communities has been stronger than ever. EM updated its budget policies to emphasize the need to reach out to local governments and our communities, next came several discussions on community input into the Strategic Vision, as well as workforce solutions, and we ended the year meeting with intergovernmental groups about prioritizing our community issues in the cleanup program, progress to date, and the large task ahead. 2022 showed that engagement with communities is a priority DOE shares and we look forward to our continued partnership with the EM program.”*

- Energy Communities Alliance chair Brent Gerry



*EM Senior Advisor Ike White and other DOE EM officials toured the Portsmouth Site with U.S. Representatives Marcy Kaptur and Tim Ryan in July.*

The Hanford Site began large-scale treatment of tank waste for the first time, a new game-changing tank waste treatment capability is nearly operational in Idaho, and record amounts of tank waste are being treated at the Savannah River Site.

Other risk reduction priorities were achieved in 2022, including increased shipments of legacy transuranic, or TRU, waste from Los Alamos, surpassing an EM priority; a transuranic waste retrieval effort in Idaho finished 18 months ahead of schedule; a seventh former plutonium reactor at Hanford cocooned,



*Deputy Energy Secretary David Turk signs his name on concrete next to a shielded container to mark Hanford Site's progress in treating waste from underground tanks with the Tank-Side Cesium Removal System.*

leaving just one more to go; and another million tons of uranium mill tailings moved away from the Colorado River at Moab. Processing of the remaining inventory of uranium-233 got underway at Oak Ridge reducing risks, while eliminating future costs and boosting cancer research.

A major skyline change was achieved at Portsmouth where the site's first former gaseous diffusion process building was demolished ahead of schedule. After decades of preparations, demolition of the Main Plant at the West Valley Demonstration Project got underway. Following successful demolition last year, the Oak Ridge Y-12 Biology Complex was transferred out of EM to be utilized by the National Nuclear Security Administration (NNSA) for national security purposes.

*“Environmental cleanup progress at the Y-12 National Security Complex helps to support NNSA’s critical national security missions. Other EM work now underway will help address the environmental legacies of Cold War-era production and will facilitate future modernization efforts.”*

*- NNSA Administrator Jill Hruby*

Collectively, EM delivered a set of results in 2022 that are protecting the environment, supporting communities, and enabling a concerted focus on safely completing the mission sooner and more efficiently.

# WASTE ISOLATION PILOT PLANT (WIPP)

“WIPP continues to make history every day that we are in operation, supporting our nation’s critical defense mission by permanently disposing of defense transuranic waste. We continued to improve WIPP’s infrastructure in 2022, ensuring that we can safely continue our mission for decades to come. WIPP employees are among the best of the best, and I’m proud to lead this team.”

*– Reinhard Knerr, Manager, Carlsbad Field Office*

## HIGHLIGHTS

- Received 235 transuranic waste shipments from five generator sites.
- **Completed 50 percent of the West Access Drift mining—an EM 2022 priority.**
- Reached a depth of more than 700 feet for the new Utility Shaft towards the targeted depth of 2,275 feet.
- Completed more than 60 percent of the new permanent ventilation system project.
- Received Nuclear Regulatory Commission approval for shielded container designs.
- Increased stakeholder engagement activities in northern New Mexico.

## PROGRESS ON MULTIPLE FRONTS

Workers at WIPP continued making progress on a number of projects in 2022, led by the Safety Significant Confinement Ventilation System (SSCVS).



*A worker inside the 14-foot ductwork of the SSCVS Project's Salt Reduction Building.*



*The shadows of construction employees are visible as they look down the new Utility Shaft, which will be the largest diameter shaft at WIPP when completed.*

The SSCVS will be the largest containment fan system in the DOE complex and will significantly increase airflow underground, enabling increased waste emplacement and facility mining operations.

The skyline for the SSCVS Project's New Filter Building, where 1,000-horsepower fans will pull air through HEPA filtration, changed dramatically in 2022 with the construction of the building's walls.

Changes to the interior of the SSCVS Project's Salt Reduction Building could also be seen as the structure was outfitted with electrical, fire protection and utility systems. Construction crews also initiated the installation of several major systems, including salt reduction units, de-misters, de-dusters, and booster fans.

Progress also continued on another key project, the new Utility Shaft, which will serve as the massive air intake for the new ventilation system. Excavation of the shaft has now surpassed 700 feet of its projected 2,275-foot depth. It will be WIPP's largest shaft at 26 feet in finished diameter.

## PREPARING FOR FUTURE WASTE EMPLACEMENT

As Panel 7 neared capacity, crews outfitted Panel 8 with power, communications, and air monitors. Panel 7 was officially filled in October. Now that Panel 7 has been sealed, waste emplacement has begun in Panel 8 and can move at a faster pace since workers are no longer required to wear respirators and protective clothing due to contamination issues. Mining at WIPP is timed so that a disposal panel is only ready when it is needed. This is because the natural movement of salt causes mined openings to close at a rate of two to four inches yearly. This closure is attributed to salt rock movement, which eventually permanently encapsulates the waste.



*Waste handlers in WIPP's Panel 7 use a push-pull device on a forklift to lift and slide a container into place.*



*Mining activities continue in the WIPP underground as new pathways are mined toward the west.*

### **MINING TO THE WEST**

After completing mining activities in Panel 8, workers turned west to begin cutting access drifts (called the West Mains) for the new Utility Shaft and possible future waste disposal panels. WIPP mining crews were running at a rapid pace, grinding out a record 4,823 tons of salt in a single week in the West Mains area. Since work began on the West Mains project, crews have mined more than 79,000 tons of salt.

### **UPGRADING AGING INFRASTRUCTURE**

WIPP's aging infrastructure continues to receive a massive upgrade, ensuring the facility can continue to operate safely and compliantly over the next several decades. The Central Monitoring Room, which is the brain for all WIPP operational systems, received a major upgrade. Phases 1 and 2 of the fire loop system were completed and tied into the new Utility Shaft. Once completed, the system will provide another reliable water supply that will ensure the safety of the workforce should a fire break out. Additionally, the replacement of a critical underground electrical substation provides much needed electricity to power underground mining machines, fabrication workshops, and numerous booster fans.



# EM LOS ALAMOS FIELD OFFICE (EM-LA)

“This year, the EM Los Alamos Field Office and our cleanup contractor continued steady progress on key Los Alamos National Laboratory legacy cleanup campaigns. We completed all of our fiscal year 2022 milestones under the 2016 Compliance Order on Consent early or on time. Additionally, we exceeded our fiscal year 2022 goal for transuranic waste shipments to the Waste Isolation Pilot Plant by more than 70 percent. In 2022, EM-LA began two key initiatives that reinforce our dedication to increase meaningful stakeholder engagement—the Justice40 Initiative and the development of an EM-LA strategic vision. These initiatives will help ensure the communities that have been impacted by contamination and waste from legacy operations at Los Alamos have a say in the future cleanup.”

- Michael Mikolanis, Manager, Environmental Management Los Alamos Field Office

## HIGHLIGHTS

- Continued successful operations of the Chromium Interim Measures system to control and characterize the hexavalent chromium plume while developing a strategy to transition to a final remedy.
- **Completed 52 transuranic waste shipments to the Waste Isolation Pilot Plant—surpassing an EM 2022 priority.**
- Initiated the first corrugated metal pipe retrieval from Technical Area 54, Area G.
- Completed 18 of 18 2016 Consent Order Appendix B milestones with the New Mexico Environment Department for fiscal year 2022.
- **Implemented Justice40 Initiative efforts—an EM 2022 priority**, and conducted more than 30 engagements with Pueblos, stakeholders, and the public.
- Began an EM-LA strategic vision plan with stakeholder input for remaining legacy cleanup campaigns at the Los Alamos National Laboratory site.

## MOVING TOWARD GROUNDWATER CONTAMINANT PLUME FINAL REMEDY

Sustained operations of the Chromium Interim Measures system—a combination of extraction, treatment, and injection—to control the hexavalent chromium plume remained a top priority in 2022. EM-LA submitted an updated Chromium Interim Measures and Characterization Campaign Work Plan to the New Mexico Environment Department to meet three primary objectives: (1) prevent migration of the plume beyond the Los Alamos National Laboratory (LANL) site boundary; (2) close data gaps to conduct a corrective measures evaluation; and (3) propose a strategy for the transition to a more full-scale extraction solution. To date, more than 400 million gallons of water has been treated (about 600 Olympic size swimming pools), and 682 pounds of hexavalent chromium has been removed from the regional aquifer.



A crew member checks an Ion Exchange Unit where groundwater contaminated with hexavalent chromium is treated as part of the Interim Measures operations.



A TRU waste shipment departs for WIPP in Carlsbad, New Mexico, for permanent disposal. Comingling shipments with Triad/National Nuclear Security Administration, which is supported by the Defense Nuclear Facilities Safety Board, has enabled EM-LA to maximize legacy waste shipments as well as minimize the number of trucks on the roads to WIPP.

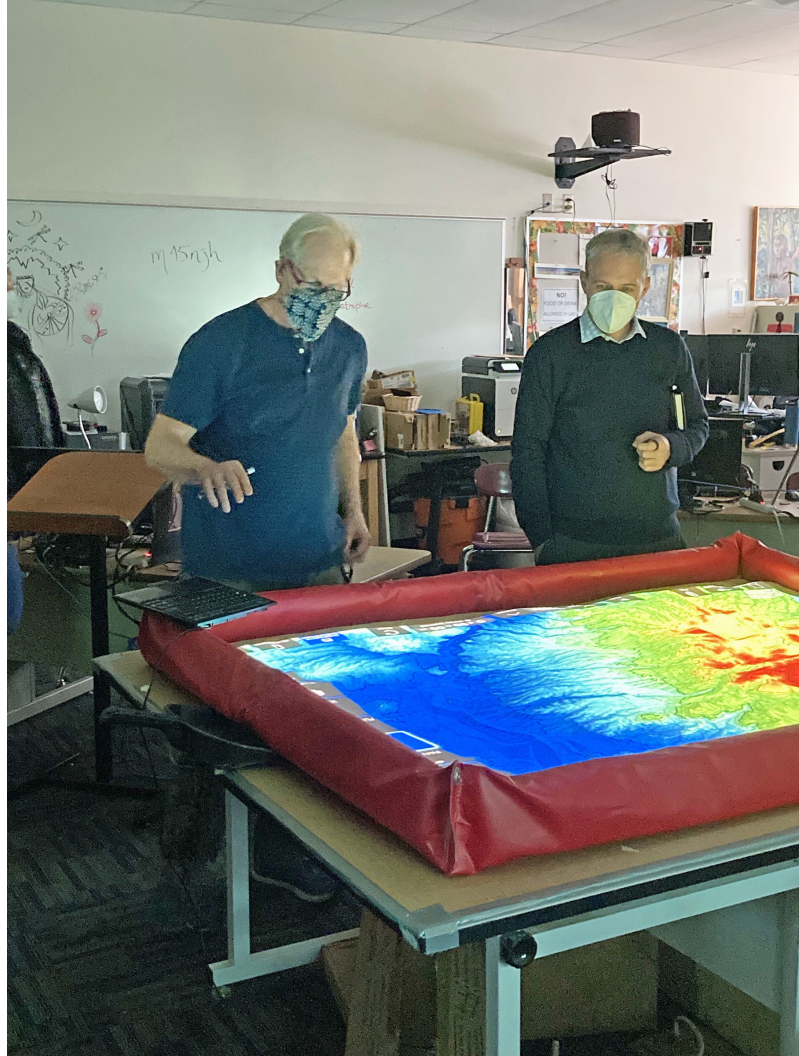
### EXCEEDING LEGACY WASTE SHIPMENT GOALS

EM-LA and its cleanup contractor exceeded the 2022 fiscal year transuranic (TRU) waste goal of 30 shipments to the Waste Isolation Pilot Plant (WIPP) by over 70 percent. The TRU waste shipments included more than 130 cubic meters of waste. EM-LA topped an additional goal by shipping 350 containers of mixed low-level and low-level radioactive waste off-site—outpacing the fiscal year 2022 goal by 100 containers.

EM-LA commenced retrievals of the 158 corrugated metal pipes (CMPs)—containing cemented waste from a former LANL radioactive liquid waste treatment facility—at Technical Area-54, Area G. After retrieval, the CMPs will be characterized and resized for shipment to WIPP.



Crews at Technical Area-54, Area G use a mobile-loading unit to place containers of legacy TRU waste at LANL into casks for transport to WIPP.



While visiting the Santa Fe Indian School, EM Senior Advisor Ike White (right) receives a demonstration on how an augmented reality sand table uses Graphical Information Systems for modeling wildfire behavior and watershed locations.

### ADVANCING JUSTICE40 INITIATIVE EFFORTS

In January, EM-LA began implementing its Justice40 Initiative efforts as part of the Biden-Harris Administration’s commitment to environmental justice. Inaugural Justice40 Initiative engagements were conducted with stakeholders, Pueblos in northern New Mexico, local community organizations, and the public to develop a deeper understanding of how EM-LA could further support disadvantaged communities. These engagements led to strengthening the Los Alamos Pueblos’ Project by collaborating with the four Accord Pueblos (Cochiti, Jemez, San Ildefonso, and Santa Clara) to build capacity within their environment departments to perform additional sampling and monitoring. EM-LA is also actively pursuing new opportunities under its current grant with the Santa Fe Indian School.

# IDAHO CLEANUP PROJECT

“I am proud of the achievements made by Idaho Cleanup Project crews in the past year. In 2022, we completed numerous accomplishments, including the completion of targeted waste exhumation from the Subsurface Disposal Area and retrieval of the remaining Advanced Test Reactor’s spent nuclear fuel elements from the storage basin at the Idaho Nuclear Technology Engineering Center. I am very appreciative of the efforts of my team and our contractor partners.”

– Connie Flohr, Manager, Idaho Cleanup Project

## HIGHLIGHTS

- **Completed exhumation of 5.69 acres of the Radioactive Waste Management Complex Subsurface Disposal Area—an E 2022 priority.**
- Retrieved the last of the Advanced Test Reactor’s spent nuclear fuel elements from a storage basin and transferred them to a nearby dry-storage facility.
- Completed demolition of the S1W reactor support buildings B608/625 at the Naval Reactors Facility.

## EXHUMING TRANSURANIC WASTE AND PROTECTING THE SNAKE RIVER PLAIN AQUIFER

Crews completed the Accelerated Retrieval Project (ARP) ahead of schedule to remove targeted waste from the Radioactive Waste Management Complex, waste. The retrievals took place within nine areas totaling 5.69 acres of the Subsurface Disposal Area, a 97-acre landfill, and involved more than 10,000 cubic meters (about 48,000 55-gallon drums) of targeted, buried transuranic waste. The work protects the underlying Snake River Plain Aquifer and supports a 2008 Record of Decision between EM, the Environmental Protection Agency, and state of Idaho.

## TRANSFERRING SPENT NUCLEAR FUEL

A key milestone with the state of Idaho—the transfer of all spent nuclear fuel (SNF) from wet to dry storage by December 2023—is in sight.

EM’s contractor retrieved the last of the Advanced Test Reactor’s (ATR) SNF elements from Chemical Processing Plant (CPP)-666’s basin at the Idaho Nuclear Technology and Engineering Complex and transferred them to a nearby dry-storage facility. Another milestone was met in August as crews completed the 100th shipment of Experimental Breeder Reactor-II (EBR-II) fuel to the Radioactive and Scrap Waste Facility at the Materials and Fuels Complex (MFC). Fewer than 20 shipments of EBR-II to MFC remain to empty the CPP-666 basin and complete the 1995 Idaho Settlement Agreement milestone.



An ARP employee displays a drum containing the last exhumed waste from the ARP IX facility.



*SNF handlers remove the last ATR fuel element from the CPP-666 storage basin.*

## **DECONTAMINATION AND DEMOLITION**

After a nearly decade-long hiatus from decontamination and demolition work, crews completed the demolition of buildings B608/625 at the Naval Reactors Facility (NRF). The 10,000-square-foot, single-story buildings were used for training and maintenance activities in support of the S1W reactor mission. The S1W reactor was the prototype power system for the USS Nautilus, the world's first nuclear-powered submarine. It was shut down in 1989.



*Crews demolish buildings B608/625 at the NRF.*

# HANFORD SITE

“This is an exciting new era in our cleanup mission as we prepare for 24/7 operations to treat waste from our large underground tanks through the Direct-Feed Low-Activity Waste Program. For the first time in our site’s history, we are treating a significant amount of tank waste on an industrial scale in our cesium removal system. In addition, our team continued to deliver taxpayer value in 2022 by safely progressing projects and conducting operations that reduce risks to our workforce, our community, and the environment of the Pacific Northwest. Given the exceptional accomplishments over the last few years, and especially this last year, I am very optimistic about our site’s future.”

*–Brian Vance, Manager, Office of River Protection and Richland Operations Office*

## HIGHLIGHTS

- **Began the first large-scale treatment of waste from large underground storage tanks with the start of Tank-Side Cesium Removal System operations—an EM 2022 priority.**
- Initiated heat up of the first tank-waste vitrification melter in the Waste Treatment and Immobilization Plant.
- **Completed construction of a protective enclosure, or “cocoon,” around K East Reactor—an EM 2022 priority.**
- Treated more than two billion gallons of contaminated groundwater for the eighth consecutive year.

## PREPARING FOR TRANSFORMATIONAL TANK WASTE TREATMENT ERA

In 2022, the Hanford Site made history by treating radioactive tank waste for the first time on an industrial scale.

The newly operational Tank-Side Cesium Removal (TSCR) System removes radioactive cesium and solids from tank waste. Under the Direct-Feed Low-Activity Waste Program, the treated waste will be fed directly

to the nearby Waste Treatment and Immobilization Plant (WTP) for immobilization in glass when the plant comes online.

Throughout the year, crews at the WTP continued commissioning major systems and building operator proficiency on systems that will immobilize tank waste in glass in two large melters in the plant’s Low-Activity Waste (LAW) Facility.



*To mark Hanford Site’s progress in treating waste from underground tanks with the TSCR System, U.S. Representative Dan Newhouse signs his name on the base of the TSCR Ion Exchange Column Storage Pad.*



*A Vit Plant electrician assembles temporary heaters that started up the first melter inside the plant's Low-Activity Waste Facility at the Hanford Site.*

Hanford took another major step toward the start of tank waste vitrification when workers initiated heat up of the first melter in the LAW Facility. The detailed and methodical process for melter heat up has been planned in a way that allows for issues identified during the complex startup to be effectively and safely addressed.

### **PROTECTING THE ENVIRONMENT, PRIORITIZING RISK REDUCTION, SAFETY, AND SECURITY**

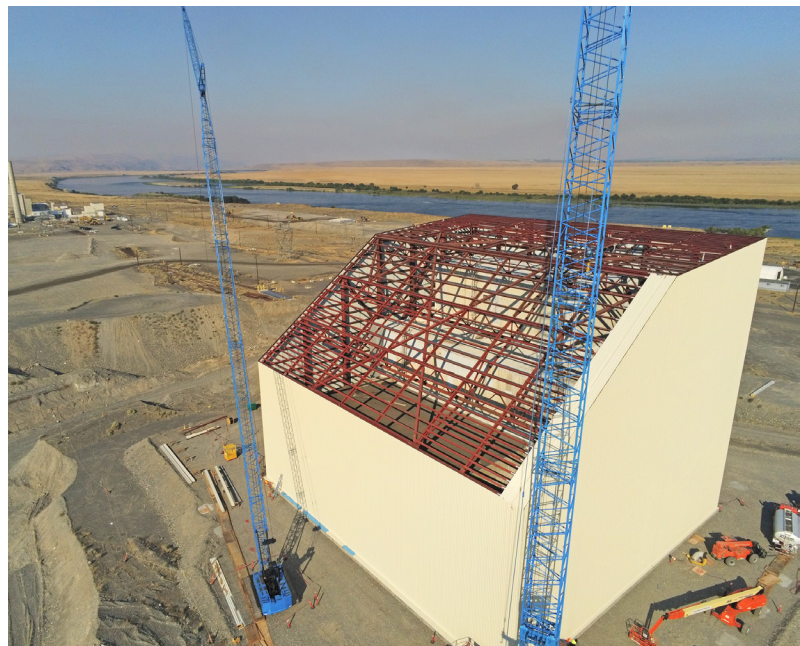
Hanford teams also advanced several important risk-reduction projects in the past year.

Just over a year after breaking ground, crews completed construction of a protective enclosure, or “cocoon,” around another former plutonium production reactor at Hanford, leaving just one more to go. This 2022 EM priority, completed ahead of schedule and under budget, marks a significant accomplishment in the Department’s risk-reduction cleanup mission along the Columbia River. K East is the seventh of eight former plutonium production reactors that will be cocooned, with Hanford’s ninth reactor preserved as part of the Manhattan Project National Historical Park.

In efforts to further safeguard the Columbia River, more than two billion gallons of groundwater was treated at Hanford in 2022. This brings the total to more than 30 billion gallons treated since DOE began removing contamination from groundwater in the mid-1990s.

### **ENSURING FUTURE SUCCESS**

The One Hanford team remains focused on rightsizing and modernizing the site’s infrastructure to ensure Hanford’s electrical distribution system, information technology systems, water and sewer systems, and roads continue to support safe and cost-efficient cleanup progress. Construction of a new water treatment plant got underway in 2022 as part of the overall effort to support sustainable cleanup success into the future.



*Hanford constructed an interim safe storage structure, or “cocoon,” around the K East Reactor.*

# PORTSMOUTH/PADUCAH PROJECT OFFICE (PPPO)

“With the successful X-326 process building demolition at Portsmouth this year, we are on a path to even greater cleanup achievements at both the Portsmouth and Paducah Sites. The site leadership and workforce are dedicated to strengthening a collaborative Gaseous Diffusion Plant cleanup that will drive us towards the next chapter in EM’s cleanup mission.”

- Joel Bradburne, Manager, Portsmouth/Paducah Project Office

## HIGHLIGHTS

- **Completed demolition of the 2.6 million-square-foot X-326 process building at Portsmouth—an EM 2022 priority.**
- Transferred 200 acres of land from the Portsmouth Site to the Southern Ohio Diversification Initiative, reducing the federal footprint and expanding opportunities for reindustrialization.
- Completed excavation of the X-231B biodegradation landfill for use at the Onsite Waste Disposal Facility.
- **Completed the disposition of an additional one million pounds of refrigerant currently stored at the Paducah Site—an EM 2022 priority.**
- Completed the successful restart of the Depleted Uranium Hexafluoride plants at Portsmouth and Paducah Sites.

## PORTSMOUTH DEMOLITION SUCCESS LEADS TO NEXT STAGE OF PORTSMOUTH CLEANUP

In July, PPPO celebrated the most significant cleanup project to date with the completion of demolition of the former X-326 enrichment process building.



Demolition of the X-326 Process Building at the Portsmouth Site.

This building measured 30 acres under roof and represents the first significant step towards final cleanup at the site.

After demolition completion, focus shifted to the disposal of more than 135,000 cubic yards of generated debris to wrap up the X-326 process building deactivation and decommissioning project.

In addition, crews continued preparation of X-333, the next process building slated for demolition. The X-333 process building, measuring 33 acres under roof, is currently being deactivated with demolition anticipated in the next five years.

## PORTSMOUTH LANDFILL AND PLUME EXCAVATION PROVIDES FILL FOR DISPOSAL FACILITY

A unique regulatory agreement with the state of Ohio allows for the excavation of previously closed landfills and plumes within the site's Perimeter Road to provide necessary fill for the Portsmouth Onsite Waste Disposal Facility (OSWDF). This year, crews completed excavation of the X-231B landfill, generating 195,000 cubic yards of fill for the OSWDF. This long-term strategy will leave up to 1,000 contiguous acres available for community reuse.



Wells are installed and grouted on the Solid Waste Management Unit 211-A Bioremediation project at the Paducah Site.



Senator Rob Portman (center) and Representative Brad Wenstrup (bottom right) speak to site employees following the recent Past, Present, Future Celebration at the Portsmouth Site.

## PADUCAH GROUNDWATER CLEANUP CONTINUES TO MAKE STRIDES

At Paducah, groundwater contamination remains the largest environmental concern at the site. Since the 1990s, a number of remedies have been successfully implemented to decrease the reach of the contamination, including the 2021 implementation of a bioremediation action to remove approximately 95 percent of the contaminant mass in the southwest area of the site. The site moved towards elimination of the largest source of groundwater contamination with the ongoing C-400 city block project.



Crews load a non-standard CV-12 cylinder into the Cylinder Transfer System autoclave.



# WEST VALLEY DEMONSTRATION PROJECT (WVDP)

“Our dedicated workforce completed the safe and deliberate deactivation of the remaining cells inside the Main Plant Process Building, which paved the way for the next chapter of cleanup at the site—its controlled demolition. This is the culmination of more than two decades of work that has been performed safely and compliantly by our skilled West Valley Demonstration Project team. I’m proud to be a part of a team that prides itself on delivering results in a safe and compliant manner. Our accomplishments on this project would not be possible without the commitment and talent of our employees; and I look forward to continuing our work together.”

- Bryan C. Bower, Project Director, West Valley Demonstration Project

## HIGHLIGHTS

- **Began Main Plant Process Building demolition—an EM 2022 priority.**
- **Completed demolition of the last ancillary support facility—an EM 2022 priority.**
- Completed Permeable Treatment Wall Soil and Containment Structure removal.

## DEMOLITION BEGINS AT THE MAIN PLANT PROCESS BUILDING

In September, WVDP began the controlled demolition of the Main Plant Process Building (MPPB). The demolition is expected to take approximately 30 months to complete. The MPPB is one of the last remaining major facilities at the site, and the successful demolition of this facility will further reduce environmental risks and position WVDP for the next phase in cleanup.

The workforce conducted significant work over the past two decades to prepare the MPPB for demolition in a manner that is protective of human health and the surrounding environment. This included the reduction



Workers commence Main Plant Process Building demolition on the Solvent Storage Terrace.

of over 98 percent of the contamination through the removal of more than seven miles of contaminated piping and over 50 tons of contaminated equipment.

### DEMOLITION OF THE MAIN PLANT'S LAST ANCILLARY FACILITY

The demolition of the Load-In Facility—the last of seven ancillary support structures that have been demolished—was completed earlier this year. This accomplishment brings DOE's total number of structures removed at the WVDP site to 69.

The 4,500-square-foot, two-level building had been used over the years for several purposes, and was no longer needed for EM's cleanup mission at the site.



*An excavator is used to remove soil, structure debris, and load them into waste containers to be shipped off-site for disposal.*



*Workers complete the demolition of the Load-In Facility.*

### PERMEABLE TREATMENT WALL SOIL AND STRUCTURE REMOVAL PROJECT

Workers completed the restoration of an area where they removed soil and a structure associated with a project to build a unique groundwater treatment system, known as a permeable treatment wall.

An upgraded rail line was used to safely ship 300 containers of soil and 131 containers of debris generated from this project. Both soil and debris containers were shipped from West Valley to EnergySolutions for disposal. These shipments add to a safe transportation record of more than 25,000 rail miles from January through May.

# OAK RIDGE OFFICE OF ENVIRONMENTAL MANAGEMENT (OREM)

“2022 marked another year of significant cleanup progress across the Oak Ridge Reservation. Our teams removed old, contaminated structures at the Oak Ridge National Laboratory and the Y-12 National Security Complex, and they are actively preparing many more for near-term demolition at those sites. These projects are changing the landscape and creating space for DOE to advance important research and national security missions.”

– Laura Wilkerson, Acting Manager, Oak Ridge Office of Environmental Management

## HIGHLIGHTS

- **Completed cleanup and transfer of Biology Complex area—an EM 2022 priority.**
- **Began processing uranium-233 material in hot cells—an EM 2022 priority.**
- Completed demolition of the Bulk Shielding Reactor.
- Completed demolition of the Criticality Experiment Laboratory.
- Finished construction of the Sludge Processing Mock Test Facility.
- Signed the final Record of Decision with the regulators for the Environmental Management Disposal Facility.

## ENHANCING SAFETY AND CLEARING LAND FOR REUSE

OREM completed a 2022 EM priority by completing cleanup and transferring the former Biology Complex area to the National Nuclear Security Administration (NNSA) at the Y-12 National Security Complex (Y-12). This project provides NNSA an 18-acre area they can reuse as the location for its Lithium Processing Facility that will support national security missions at the site.



Soil is brought in to backfill the former Biology Complex area after slab removal.



*A view of crews demolishing the Criticality Experiment Laboratory at Y-12.*

Crews were also busy taking down excess contaminated facilities in 2022 that included the Criticality Experiment Laboratory at Y-12 and the Bulk Shielding Reactor at the Oak Ridge National Laboratory (ORNL). Both of these buildings were more than 70 years old, and their removal eliminates high-risk buildings and opens land for future missions. The Bulk Shielding Reactor project marks the first removal of former reactor facility in ORNL's central campus area.

### **REMOVING OAK RIDGE'S INVENTORY OF NUCLEAR WASTE**

Another EM 2022 priority was achieved at the Oak Ridge site with the start of processing operations in hot cells on the remaining uranium-233 material stored at ORNL. Eliminating this inventory of material is OREM's highest priority at ORNL. Its removal will avoid significant costs annually dedicated to keeping the material safe and secure, reduce the security posture of ORNL, and allow OREM to decommission and deactivate Building 3019, which is the oldest operating nuclear facility in the world. Part of this project also involves extracting medical isotopes that are being used to support next-generation cancer treatment research.

### **INVESTING IN INFRASTRUCTURE TO MAINTAIN PROGRESS**

This year, EM completed construction on the Sludge Processing Mock Test Facility. This facility will play a vital role in maturing technologies needed to begin processing Oak Ridge's 400,000-gallon inventory of transuranic sludge waste. Engineers will gather data from experiments there to determine the best designs and approaches for the Sludge Processing Facility's final design.



*EM Senior Advisor Ike White and U.S. Representative Chuck Fleischmann discuss the EM cleanup mission at the National Cleanup Workshop in September.*



*Workers clean up a contaminated area in the middle of the Building K-25 footprint at ETPP.*

## **PREPARING THE EAST TENNESSEE TECHNOLOGY PARK FOR ITS NEXT CHAPTER**

With all of the buildings demolished at the East Tennessee Technology Park (ETTP), crews are working to remove areas with contaminated soil. Workers initiated a major soil remediation project to clean up a contaminated area in the middle of the Building K-25 footprint. The project spans nearly an acre, and workers are excavating down nearly 40 feet in some areas to remove all the impacted soil. Completing this project, and others like it, will eliminate risks and help EM achieve its ultimate vision to transform the site into a multi-use industrial center, national park, and conservation area.

EM is also working to transfer all cleaned parcels back to the community that can be reused for economic development. These efforts are attracting major industry to the site and bringing in hundreds of millions in new investments at ETPP.



*As part of the national park, this rendering shows a viewing platform overlooking the footprint of the former K-25 building site.*

# SAVANNAH RIVER SITE (SRS)

“The past year has been filled with historically significant efforts in our mission to cleanup legacy waste at SRS. With the Salt Waste Processing Facility continuing to ramp up, we are processing more salt waste and vitrifying more high-level waste than ever before. We’ve begun accelerated de-inventory of L Basin and are poised for more success in environmental cleanup and restoration. I am excited to see the progress in the coming years.”

– Mike Budney, Manager, Savannah River Operations Office

## HIGHLIGHTS

- Received approval for Accelerated Basin De-inventory mission, which will accelerate spent nuclear fuel disposition.
- Treated more than 2.1 million gallons of tank waste and removed over 3.7 million curies from the waste.
- DOE will transition primary management responsibility for Savannah River Site from EM to the National Nuclear Security Administration.
- Completed deactivation work and transitioned the 235-F Facility to cold and dark status to prepare for decommissioning.
- **Completed all concrete placements for Saltstone Disposal Unit 9—an EM 2022 priority.**
- Accelerated closure of D Area by demolishing 15 facilities.
- Broke ground on the Advanced Manufacturing Collaborative to support Savannah River National Laboratory.
- Savannah River National Laboratory launched the Regulatory Center of Excellence.

## INNOVATING CLEANUP WITH ADVANCED MATERIALS MANAGEMENT

SRS safely executed and delivered on its 2022 operational commitments to package, ship, store, process, and disposition nuclear materials. The Accelerated Basin De-inventory mission was approved, allowing for processing of spent nuclear fuel at H-Canyon without recovery of high enriched uranium. This accelerates basin material processing by 20 years, freeing space in L Basin for other uses and saves approximately \$4 billion in lifecycle costs.

An important upgrade project was completed at H Canyon with the installation of an electrolytic dissolver. This new capability will allow for the dissolution of stainless-steel clad fuel from foreign research reactors.



The completed CCO Characterization and Storage pad in SRS’s K Area has the capacity to hold 3,800 CCO drums while awaiting shipment to WIPP.



*An electrolytic dissolver, used to dissolve stainless-steel clad fuel, was installed in H Canyon.*

Workers at the K Area Complex continued making progress in Savannah River's mission to downblend surplus plutonium for disposition. Over the course of 2022, they exceeded downblending expectations ahead of schedule, and achieved readiness to ship the downblended material as transuranic, or TRU, waste to the Waste Isolation Pilot Plant (WIPP).

Workers reduced the footprint in D Area by 30,000 square feet as they continue to make progress in decommissioning and demolition activities. A total of 15 facilities have been demolished and over 100,000 cubic feet of waste removed this year.

The site also reached a significant milestone with the completion of deactivation activities at the legacy 235-F Facility. Completing this work will allow the decommissioning of the facility to proceed. This year, DOE also provided federal and state environmental regulators with its planned in-situ decommissioning end-state for the facility.

### **IMPROVING LIQUID WASTE SYSTEM CAPABILITIES**

The Defense Waste Processing Facility (DWPF) underwent a significant process improvement this year with the implementation of a key processing chemical used in the vitrification plant's flowsheet. Glycolic acid replaced formic acid, allowing for safer and more efficient processing of high-activity radioactive waste at DWPF, leading to more efficient conversion of waste into glass.



*The SWPF laboratory uses manipulators to handle process samples and equipment within its radioactive cell, which help protect workers handling the radioactive materials*



Workers in progress of completing all concrete placements on Saltstone Disposal Unit 9.

This change is a step to ensure the Salt Waste Processing Facility (SWPF) can run at high production rates since DWPF will be able to treat greater quantities of waste due to the stability of the process. In addition, to support the higher production rates coming from SWPF, the Saltstone Production Facility is preparing to move to 24/7 operations in 2023.

This year, EM has operationally closed the first two support structures in the SRS Liquid Waste Program. F Area Diversion Boxes 5 and 6 in the F Tank Farm have been filled with cementitious grout, making both structures operationally closed. A diversion box is an underground concrete structure that holds a series of connection points that allow high-level radioactive waste to be transferred from one tank or facility to another. These closures join the list of the eight high-level waste tank closures at SRS that have similarly been filled with grout.

## ENHANCING SAVANNAH RIVER NATIONAL LABORATORY

Local and congressional officials along with leaders from DOE, the Savannah River National Laboratory (SRNL), and the University of South Carolina (USC) Aiken broke ground on the Advanced Manufacturing Collaborative (AMC) facility on the USC Aiken campus.

The 50,000-square-foot facility will not only provide new laboratory, office and conference space suitable for advanced manufacturing research and development (R&D), but more importantly, it will house collaborative and R&D spaces for spinning innovative technologies into the Department and spinning them out into the commercial sector.

Construction of the AMC facility is expected to be completed in 2024.

SRNL, in its first year as a standalone national laboratory, also established the Regulatory Center of Excellence. This capability brings together a diverse network of experts and researchers charged with helping EM and others manage complex issues involving science, government, and communications.



Officials participate in the groundbreaking of the AMC facility on the USC Aiken campus.



# SMALL SITE PROGRESS

“This year, we made equally important progress and achieved EM priorities at our collection of smaller sites across the DOE complex. By continuing to advance cleanup at these locations, we are achieving significant risk reduction for local communities and moving these sites closer to completion.”

- Nicole Nelson-Jean, Associate Principal Deputy Assistant Secretary for Field Operations,  
EM-Headquarters

## HIGHLIGHTS

- **Disposed a cumulative 13 million tons of the estimated 16 million tons of uranium mill tailings at the Moab Site— an EM 2022 priority.**
- Continued characterization and hazard reduction activities to prepare for demolition and closure of two legacy facilities at the Nevada National Security Site.
- Completed disposal of building demolition debris at the Energy Technology Engineering Center site in California.
- Completed the Building 280 Reactor Removal Project and completed waste disposal from the demolition of Building 175 at Lawrence Livermore National Laboratory.



*The Moab site tailings “pile.” Rows of tailings are dried out before being loaded into specialty train containers, which are carried by haul trucks to the train and then loaded and transported to the disposal cell.*

## 80 PERCENT DONE AT THE MOAB SITE

At the Moab Site in Utah, workers safely removed and disposed of approximately one million tons of former uranium mill tailings material, helping to continue to protect the Colorado River. This brings the total amount disposed of to date to 13 million tons out of an estimated 16 million tons of material at the site. In addition, workers removed 979,000 pounds of ammonia and 5,500 pounds of uranium from project groundwater extraction wells, diverting them from reaching the Colorado River.



*Characterization is underway in preparation for demolition and closure of the TCC facility.*

## **PREPARING LAST MAJOR FACILITIES AT THE NEVADA NATIONAL SECURITY SITE FOR DEMOLITION**

In 2022, the EM Nevada Program and its environmental program services contractor continued to prepare for the upcoming demolition and closure of two large legacy nuclear facilities on the Nevada National Security Site—the Engine Maintenance, Assembly, and Disassembly (EMAD) and Test Cell C (TCC) complexes. Both EMAD and TCC were part of the Nuclear Rocket Development Station, which supported the development and testing of nuclear propulsion rocket engines from 1957 until 1973.

Constructed in 1965, EMAD was once the largest hot cell in the world. The 80-foot-tall building contains 100,000 square feet of floor space and is anticipated to generate 120,000 cubic yards of waste, or about 6,500 truckloads. Test Cell C, built in 1961, was used to ground test nuclear reactors and engines for rockets. Demolition and closure of the facility are anticipated to generate 18,500 cubic yards of waste, or about 1,200 truckloads.

The work at EMAD and TCC represents the last major demolition and closure efforts currently identified in EM Nevada’s environmental remediation mission. The characterization and hazard reduction performed in 2022 will help ensure future demolition and closure activities at EMAD and TCC are conducted safely, securely, and successfully.



*EM's federal project director at ETEC (right) shakes hands with a California Department of Toxic Substances Control Engineering Geologist as the last trucks of demolition waste safely left the site.*

### **WRAPPING UP DEBRIS DISPOSAL AT THE ENERGY TECHNOLOGY ENGINEERING CENTER**

Significant cleanup progress continued in 2022 as the Energy Technology Engineering Center (ETEC) marked another milestone when trucks carried off the last of demolition waste generated from the demolition of the final DOE-owned buildings on the site in October 2021.

The waste from demolition at the former nuclear energy and liquid metals research site was shipped to a licensed facility for disposal out of the state of California.

### **TACKLING EXCESS FACILITIES AT LAWRENCE LIVERMORE NATIONAL LABORATORY**

EM partnered with Lawrence Livermore National Laboratory (LLNL) and the U.S. Army Corps of Engineers (USACE) to complete the removal of a former reactor, and removal of debris waste, helping to make room for new facilities on the lab's one-square-mile footprint.

Building 175, which crews demolished to slab in 2021, played a part in LLNL's Uranium Atomic Vapor Laser Isotope Separation program. This year, workers completed the disposal of the waste generated through the building's demolition.

USACE, under an interagency agreement with EM, completed the removal and demolition of the Livermore Pool Type Reactor in December 2021. The reactor, which was housed in Building 280, was a neutron-producing machine used for fundamental research and to measure and calibrate instruments.



*Before and after views of the demolition of Building 175 at LLNL.*

# ACRONYMS

<b>AMC</b>	Advanced Manufacturing Collaborative	<b>MFC</b>	Materials and Fuels Complex
<b>ARP</b>	Accelerated Retrieval Project	<b>MPPB</b>	Main Plant Process Building
<b>ATR</b>	Advanced Test Reactor	<b>NNSA</b>	National Nuclear Security Administration
<b>CMP</b>	Corrugated Metal Pipes	<b>NRF</b>	Naval Reactors Facility
<b>CPP</b>	Chemical Processing Plant	<b>OREM</b>	Oak Ridge Office of Environmental Management
<b>DOE</b>	Department of Energy	<b>ORNL</b>	Oak Ridge National Laboratory
<b>DUF6</b>	Depleted Uranium Hexafluoride	<b>OSWDF</b>	Onsite Waste Disposal Facility
<b>DWPF</b>	Defense Waste Processing Facility	<b>PPPO</b>	Portsmouth/Paducah Project Office
<b>EBR-II</b>	Experimental Breeder Reactor-II	<b>R&amp;D</b>	Research and Development
<b>EFCOG</b>	Energy Facility Contractors Group	<b>SNF</b>	Spent Nuclear Fuel
<b>EM</b>	Office of Environmental Management	<b>SRNL</b>	Savannah River National Laboratory
<b>EMAD</b>	Engine Maintenance, Assembly, and Disassembly	<b>SRS</b>	Savannah River Site
<b>EM-LA</b>	Environmental Management- Los Alamos Field Office	<b>SSCVS</b>	Safety Significant Ventilation System
<b>ETEC</b>	Energy Technology Engineering Center	<b>SWPF</b>	Salt Waste Processing Facility
<b>ETTP</b>	East Tennessee Technology Park	<b>TCC</b>	Test Cell C
<b>HAMMER</b>	Hazardous Materials Management and Emergency Response	<b>TRU</b>	Transuranic
<b>HEPA</b>	High Efficiency Particulate Air	<b>TSCR</b>	Tank-Side Cesium Removal
<b>ICP</b>	Idaho Cleanup Project	<b>USACE</b>	U.S. Army Corp of Engineers
<b>LANL</b>	Los Alamos National Laboratory	<b>USC</b>	University of South Carolina
<b>LAW</b>	Low-Activity Waste	<b>WIPP</b>	Waste Isolation Pilot Plant
<b>LINAS</b>	Large Item Neutron Assay System	<b>WTP</b>	Waste Treatment and Immobilization Plant
<b>LLNL</b>	Lawrence Livermore National Laboratory	<b>WVDP</b>	West Valley Demonstration Project
		<b>Y-12</b>	Y-12 National Security Complex



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