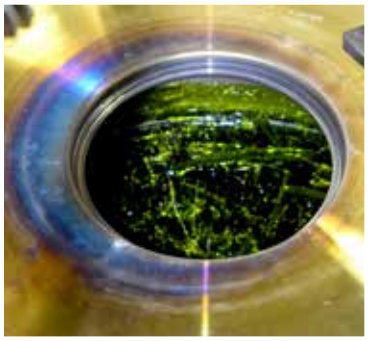
U.S. DEPARTMENT OF ENERGY | OFFICE OF ENVIRONMENTAL MANAGEMENT

EM Strategic Vision: 2024–2034

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FLUOR


PREVENTATIVE MAINTENANCE


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Introductory Message from EM-1

In 2020 EM issued our first Strategic Vision, chartering a path for the coming decade, the 2020 vision plotted out planned accomplishments, including major skyline changes and game changing tank waste treatment capabilities, as well as strategic initiatives to best position EM for the future.

As we approach the halfway point of the decade, EM has delivered on the priorities outlined in that initial plan, which has transformed the environmental cleanup mission. Since hitting an inflection point in 2020, EM has accomplished a remarkable set of planned priorities. World War II and Cold War era facilities in Tennessee, Ohio, California and Washington have been safely demolished. New capabilities to address EM's largest environmental liability are up and running in South Carolina, Idaho and Washington – where we are treating radioactive tank waste. Infrastructure upgrades are underway to EM's geological repository in New Mexico where record shipments of waste have been safely disposed.

In addition to progress on the ground, initiatives laid out in the first Strategic Vision have been successfully implemented to best position EM for the future. Tools are in place to strengthen project management, leverage end state contracting to enable accelerated progress and shift to a science driven risk informed approach to completing the cleanup mission. EM has partnered with industry, communities, Tribes and academia to expand workforce development and ensure we have the right people in place now and for years to come. We have achieved a greater degree of alignment with regulators, Tribes and stakeholders, recognizing that more can be achieved when we have a shared vision for success.

With these foundational tools in place, the fifth iteration of the Strategic Vision charts a steady beat of progress for 2024 2034 at every EM site. No longer mapping out how to achieve the cleanup mission, we are now focused on successfully executing remaining work while encouraging innovation and driving continuous improvement along the way.

Along with the Annual Priorities, the latest Strategic Vision rounds out a trio of planning tools to guide EM in safely executing the mission, fulfilling cleanup obligations and making steady progress across the EM enterprise.

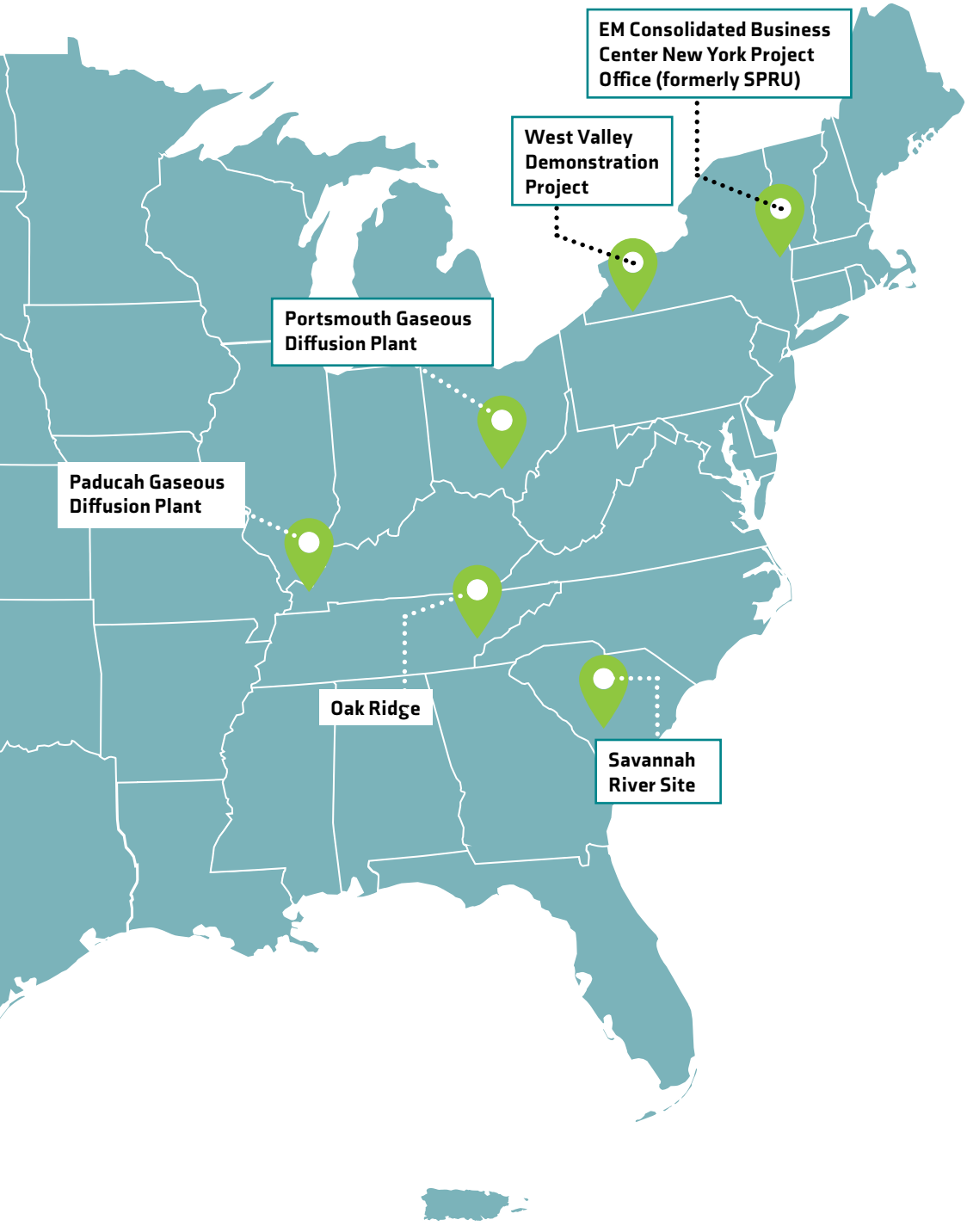
Benefitting from input provided by a diverse set of cleanup partners, the updated Strategic Vision illustrates a continued focus on safety, sustainability, smart R&D investments, workforce development and engagement with those most impacted by the environmental legacy of the past. It also reflects the fact that EM is increasingly able to consider broader benefits of the cleanup mission. EM progress opens up historic opportunities for clean energy development, supports national security priorities, enables scientific research and boosts community and Tribal efforts to build strong economies, grow jobs and preserve our natural resources.

These opportunities would not be possible without the people whose steadfast commitment to the cleanup mission has gotten EM to its 35th Anniversary coming up in October. In 1989, EM was entrusted with the largest environmental cleanup effort in the world – addressing the substantial environmental liability from decades of nuclear weapons production and nuclear energy research. Back then, we had 107 sites on our cleanup list, some dating back to the Manhattan Project Era and the birth of the Atomic Age. Since then, we have cleaned up 92 sites, leaving 15 to go. With decades yet to go at some sites, we will continue to count on the same commitment that got EM to this point as we work to achieve the goals outlined in the Strategic Vision, and much more.

William "Ike" White
Senior Advisor for the Office of Environmental Management

EM Sites


Hanford
Idaho National Laboratory
Lawrence Livermore National Laboratory
Moab Uranium Mill Tailings Remedial Action Project
Nevada National Security Sites
Energy Technology Engineering Center
Los Alamos National Laboratory
Sandia National Laboratories
Waste Isolation Pilot Plant


EM Consolidated Business Center New York Project Office (formerly SPRU)
West Valley Demonstration Project
Portsmouth Gaseous Diffusion Plant
Paducah Gaseous Diffusion Plant
Oak Ridge
Savannah River Site


UCOR
WE HAVE A VOICE

EM Strategic Vision: 2024–2034

Introduction

The U.S. Department of Energy (DOE) Office of Environmental Management (EM) has its roots in the Manhattan Project and the development of the first atomic weapon. EM's mission is to complete the safe cleanup of the environmental legacy brought about from decades of nuclear weapons development and government-sponsored nuclear energy research.

At its inception in 1989, the EM program faced a daunting task. The production of more than 1,000 metric tons of weapons-grade uranium and more than 100 metric tons of plutonium resulted in environmental contamination at 107 sites throughout the United States — covering an area equal to the combined size of Delaware and Rhode Island. This contamination included more than 90 million gallons of liquid radioactive waste resulting from the separation of plutonium and uranium from spent nuclear fuel (SNF); more than 700,000 metric tons of depleted uranium produced as a byproduct of uranium enrichment activities; more than 5,000 contaminated facilities; millions of cubic meters of contaminated soil; and billions of gallons of contaminated groundwater. In addition, host communities, Tribal Nations, regulators, and others had little information about the extent and complexity of contamination at most DOE sites.

More Than Three Decades of Progress

During the past three decades, the EM program has made considerable progress in tackling this environmental legacy and building relationships with state and federal partners, Tribal Nations, communities, regulators and stakeholders. EM has eliminated, or mitigated, at most sites the environmental, safety, and health risks from the most dangerous legacy wastes and contaminated facilities. In addition, measures have been taken to control contaminant migration in groundwater and soils to mitigate potential future risks. EM continues to ensure physical protection of its assets while in transit.

The program's combined active remediation footprint has been reduced by 90 percent, from approximately 3,300-square-miles to fewer than 300-square-miles.

Significant legacy cleanup work remains at the following locations:

- Energy Technology Engineering Center (ETEC)
- Hanford
- Idaho National Laboratory (INL)
- Lawrence Livermore National Laboratory (LLNL)
- Los Alamos National Laboratory (LANL)
- Moab Uranium Mill Tailings Remedial Action Project
- Nevada National Security Sites (NNSS)
- Oak Ridge
- Paducah Gaseous Diffusion Plant (GDP)
- Portsmouth Gaseous Diffusion Plant (GDP)
- Sandia National Laboratories (SNL)
- Savannah River Site (SRS)
- Waste Isolation Pilot Plant (WIPP)
- West Valley Demonstration Project (WVDP)

Highlights of EM's significant accomplishments to date have included:

- Initiated the first large scale treatment of radioactive and chemical waste from large underground tanks at the Hanford Site via the Tank Side Cesium Removal (TSCR) System
- Completed demolition of the Hanford Site's iconic Plutonium Finishing Plant, a facility that produced two thirds of the nation's Cold War era plutonium metal
- Opened the world's first geological repository at WIPP in New Mexico for transuranic (TRU) waste resulting from atomic energy defense activities
- Completed the bulk of cleanup activities along the 220 square mile Columbia River corridor at the Hanford Site in the State of Washington, including placing seven of the nine former plutonium producing reactors into long term safe storage
- Completed the removal of the former uranium enrichment complex at Oak Ridge in Tennessee, including Building K 25, at one time the largest building in the world under one roof
- Completed the construction of all parts of the tank waste treatment system at SRS in South Carolina, including 27 years of successful operations at the Defense Waste Processing Facility, as well as the construction and startup of the Salt Waste Processing Facility (SWPF)
- Completed the Advanced Mixed Waste Treatment Project at INL, where 65,000 cubic meters of legacy TRU waste were processed
- Completed construction and initiated operation of two depleted uranium hexafluoride (DUF6) conversion plants at the Paducah Site in Kentucky and the Portsmouth Site in Ohio
- Completed waste vitrification activities and subsequent demolition of the Vitrification Facility at WVDP in New York — this was the first time EM has built, operated, and successfully decommissioned one of its major waste treatment facilities
- Transferred more than 25,365 acres of land to local communities for beneficial reuse

EM Priorities

EM pursues its cleanup objectives safely within a risk-informed framework of regulatory compliance commitments, best business practices, and community engagement. Taking many variables into account, EM's programmatic priorities are as follows:

- Protection of the workforce, the public, and the environment
- Radioactive tank waste stabilization, treatment, and disposal
- Spent (used) nuclear fuel storage, receipt, and disposition
- Nuclear material consolidation, stabilization, and disposition
- Transuranic and mixed/low-level waste disposition
- Soil and groundwater remediation
- Excess facility deactivation and decommissioning

Intent of the Strategic Vision

The intent of the Strategic Vision is to provide a concise high-level summary of the progress EM anticipates over the coming decade. The Strategic Vision is not intended to document all planned cleanup projects at EM sites, nor all actions necessary to meet administration goals. Instead, it is one of a set of integrated planning activities and tools EM uses that includes more detailed site-specific planning documents and periodic strategic alternatives analyses.

2024: Risk Reduction and Strengthening Local Communities

Based on years of successful performance and progress, EM is empowered in 2024 to not only continue its focus on achieving tangible risk reduction, but to do so with an increased eye toward strengthening the local communities near DOE sites that have done so much for the country.

At Hanford, EM is treating tank waste though the TSCR and advancing towards start-up of the Direct Feed Low-Activity Waste System (DFLAW) that, once operational, will stabilize that waste in glass.

At Idaho, EM began operation of the Integrated Waste Treatment Unit, which is key to addressing the remaining tank waste at the site. At Savannah River, efforts to address tank waste will continue to ramp up, with the SWPF projected to process a total of 4 million gallons of waste and construction set to be complete on Saltstone Disposal Unit (SDU) 9 to provide additional capacity to safely and effectively dispose of treated waste. The Savannah River liquid waste program has processed more than 15 million gallons of radioactive salt waste since 2008.

Along with continuing efforts to address tank waste, EM will pursue a number of significant risk reduction efforts across the DOE complex. At Los Alamos, EM will continue to focus on shipping legacy transuranic waste to WIPP for disposal. At Paducah, another 1 million tons of hazardous refrigerant will be dispositioned, not only advancing cleanup but providing emission reduction benefits as well. Finally at Moab, EM will continue successful remediation efforts to disposition another 1 million tons of uranium mill tailings material, bringing the final amount disposed to 14 million out of an initial 16 million tons.

EM's efforts are not just about addressing the environmental legacies of the past, but helping other DOE programs prepare for today and the future. To aid with modernization efforts, EM assists with performing deactivation and decommissioning activities on excess facilities for other organizations within DOE, such as the National Nuclear Security Administration (NNSA) and the Office of Science.

EM also accomplished several priorities in 2023, including completing demolition of four buildings at Test Cell C at the NNSS, completed the Old Town Demolition Phase VI Project at Lawrence Berkeley National Laboratory, initiated demolition of Building 8251 at Lawrence Livermore National Laboratory, complete above-ground demolition of the Q-Complex buildings at Knolls Atomic Power Laboratory, and completed demolition of the Low Intensity Test Reactor at Oak Ridge.

As EM works to achieve its environmental remediation mission, the program can provide additional follow-on benefits to local communities. Given the length of time remaining in the EM mission, the development of the next generation of dedicated, talented and diverse workers will be essential.

To a large degree, preparing the workforce of tomorrow begins with our local communities through Science, Technology, Engineering, and Math (STEM) education and recruitment tools.

Some of EM's strategies include:

- **Investing in internships where college students can explore federal careers. Each student who successfully completes the internship program may be eligible for a permanent job**
- **Extending recruiting outreach via social media to reach more qualified candidates**
- **Fostering ties with targeted high schools to broaden faculty awareness of DOE's mission**
- **Mentoring and training minority engineers to take on mission-critical roles within DOE**

The EM Minority-Serving Institutions Partnership Program (EM MSIPP) addresses the need for building and maintaining a well-trained, technically skilled, and diverse workforce by promoting the education and development of the next generation in critical STEM disciplines.

EM is continuing to utilize the EM MSIPP to attract and support students who may be interested in the cleanup mission. EM is working towards awarding additional financial assistance to MSIs. The $56 million appropriation from Congress in FY 2023 has supported competitive research awards, internships, Savannah River Environmental Sciences Field Station, EM MSIPP grants, Postdoctoral Fellows Program, Graduate Fellowship Program, and its newest program, Success Through Academic Research Program.

In addition, EM contractors use a variety of regional partnerships to ensure a qualified workforce pipeline. As one example, at Los Alamos, the cleanup contractor works with Northern New Mexico institutions to run a Nuclear Operators Apprenticeship Program, a Radiological Control Technician Boot Camp and a Waste Processing Operator Boot Camp.

EM launched the Community Capacity Building Grant Program to support disadvantaged communities near cleanup sites that traditionally haven't benefited from EM's economic impact. This program includes a variety of activities with broad benefits to local communities including reindustrialization, community restoration and Tribal nation infrastructure projects.

EM is also working to support DOE's broader goals concerning climate sustainability. Work will continue to update vulnerability assessments for EM sites to help mitigate or prevent impacts from extreme weather events. EM is also pursuing options that will enable a net-zero approach, such as the utilization of electric vehicles and installation of charging infrastructure. Cleanup progress to date at sites such as Oak Ridge has also made resources available for use by companies pursuing clean energy and advanced nuclear development.

The EM cleanup mission is in line with President Biden's Justice40 Initiative. The Justice40 Initiative establishes a goal that 40 percent of the overall benefits from certain Federal investments flow to disadvantaged communities. EM is proud to have 10 covered programs under the Justice40 Initiative which includes eight cleanup sites. EM has been interacting with Tribes and stakeholders on the Justice40 Initiative through presentations, listening sessions, conference calls, in-person and virtual meetings, and workshops. EM will continue to work on the next steps of the Justice40 Initiative and its application at EM cleanup sites.

Alignment: EM's Key to Success

To best inform this latest iteration of the Strategic Vision, EM engaged in a concerted outreach effort with Tribes, regulators and stakeholder organizations that included dialogue with EM senior leadership. In parallel, EM sites routinely engage with stakeholders to solicit input and feedback on site-level cleanup plans.

More broadly, EM has numerous formal and informal interactions with Tribal Nations and our regulatory and stakeholder partners. These interactions are used to communicate cleanup status, raise technical and policy issues, and support timely and sustainable cleanup decisions that have implications across the program. These decisions are made through complex and highly collaborative processes. Cleanup successes to date illustrate what can be achieved when alignment is realized among EM, state and local officials, Tribal representatives and stakeholders.

EM remains committed to strengthening government-to-government relationships with Tribal Nations and

supporting the Administration's commitment to the sovereignty of Tribal Nations. EM will continue to seek opportunities for Tribal leaders, staff, and scientific experts to collaborate on cleanup priorities, facilitate meaningful discussions to assess traditional Tribal natural resources, and protect cultural resources. Additionally, EM is supporting sites in improving access to and protection of sacred sites by facilitating a one-of-a-kind intergovernmental sacred sites' workshop to review all relevant federal guidance and discuss opportunities for improvement. Consistent with a Memorandum of Understanding with the Department of the Interior, EM will continue working collaboratively to improve the protection of, and Tribal access to, the federal portion of the Rattlesnake Mountain, (called "Laliik" in the Native Sahaptin language) as a sacred site at Hanford.

Better Contracting, Better Cleanup

Approximately 95 percent of EM's annual budget is utilized through contracting with a contractor workforce of over 25,000 and an array of industry partners. The contract is one of our most important enabling tools to execute our mission as it defines the mission requirements and performance expectations of stakeholders between the government and EM contractors. EM will continue to be a demanding client, expecting contractors to perform in a safe, efficient, and cost-effective manner and with the highest ethical standards.

Over the coming decade, EM will continue to refine its acquisition processes and contracts to enable risk reduction and end-state achievement.

A key initiative for EM is attracting new entrants to the cleanup market that ensures diversity of experience and solutions from commercial marketplaces, as well as relevant experience. It remains critical that EM has a healthy industry base, including a growing pool of qualified small businesses performing meaningful work throughout EM sites across the country. In addition, it is critical that EM has a highly qualified pool of key personnel to manage these very large facility contracts.

EM will continue implementation of the End-State Contracting Model (ESCM) which allows EM to negotiate scope, technical approach, cost, and schedule on specific elements of work from the federal life-cycle baseline that have a defined end-state and associated risk reduction through task orders under an indefinite delivery/indefinite quantity contract, rather than assumed scope of work and technical approach under a 10+ year cost-based contract. The ESCM provides EM the ability to group work under the contract into specific end-state task orders to allow better defined scopes of work and shorter time horizons, as well as to provide more accurate cost and schedule targets. Associated risk reduction and fiscal environmental liability retirement is tracked to demonstrate tangible progress. Currently, EM is executing seven end-state contracts (Hanford Central Plateau Cleanup, Nevada Environmental Program Services, Idaho Cleanup Project, Oak Ridge Reservation Cleanup Contract, Savannah River Integrated Mission Completion Contract, Moab Remedial Action Contract, and Portsmouth Decontamination & Decommissioning).

The next two planned end-state contracts are the Hanford Integrated Tank Disposition Contract and the WVDP 1B Contract.

Addressing PFAS

An emerging global issue and concern throughout the DOE complex, including at some EM sites, centers on per- and polyfluoroalkyl substances, or chemicals commonly known as PFAS. PFAS are a group of manufactured chemicals that have been used in industry and consumer products since the 1940s because of their useful properties. PFAS can be present in water, soil, air, and food, as well as in materials found in homes or workplaces. In the DOE complex, they were utilized in uranium separation activities during the Manhattan Project and later in a variety of commercial products, including firefighting foam. The Agency for Toxic Substances and Disease Registration has designated PFAS chemicals a public health concern. DOE is engaged in a concerted effort, led by the Department's Office of Environment, Health, Safety and Security, to fully assess and address the presence of PFAS chemicals at DOE sites. Over the coming decade, EM will be actively involved in this Departmental effort to help address PFAS concerns at cleanup sites.

Improving Waste Disposition

Disposal of radioactive waste is a core function of the EM program. Without waste disposal capabilities, cleanup cannot proceed. EM uses a combination of DOE and commercial disposal facilities, that are vital to the EM cleanup mission. EM's safety culture and well-established statutory and regulatory regime ensure waste is disposed in a manner that protects the public, workers, and the environment and is in accordance with the applicable requirements.

Waste disposal decisions are made at the local level based on waste characteristics, permitting/licensing, suitability of the DOE site for disposal and future use, transportation and packaging options, schedules, and costs. These factors support EM decisions that are in the best interest of taxpayers and stakeholders. EM keeps waste disposal decision-making transparent. Input from the public, Tribal Nations, regulators, and stakeholders is received within the framework of the National Environmental Policy Act and appropriate regulatory process (e.g., Resource Conservation and Recovery Act and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Over the coming decade, EM will continue to apply integrated radioactive waste disposal strategies that consider environmental justice, climate change, and site equities to maintain the current, and develop additional, disposal options, ensuring a sustainable EM cleanup mission while fully protecting the public, workers, and the environment.

EM is also partnering with private companies to find alternative uses for radioactive material slated for disposal. In Oak Ridge, a partnership with Zeno Power in 2024 removed a source of strontium-90 stored at Oak Ridge National Laboratory measuring 500,000 curies, and it is being recycled to support new and emerging technologies for other federal agencies.

Innovation and Acceleration

Given the scale and scope of the remaining EM mission, it is critical to develop new and innovative cleanup approaches so that EM can conduct its work in a more efficient and more cost-effective manner.

One such approach is the Department's interpretation of the statutory definition of High-Level waste (HLW) that makes clear that both source and risk are essential elements of the definition, and also identifies science-based criteria for evaluating risk. EM has applied the HLW interpretation for two waste streams at SRS.

EM is also seeking to enhance its technology research and development (R&D) efforts to better identify and demonstrate new and innovative approaches for tackling cleanup challenges that offer a significant return on investment, and to effectively adapt commercially available technologies to EM cleanup needs. EM's past R&D efforts have led to innovations such as solvent extraction and ion exchange technologies implemented with Savannah River's SWPF to increase waste processing. EM has also supported R&D tied to deployment of robotics and use of artificial intelligence for remote operation.

EM commissioned the Network of National Laboratories for Environmental Management and Stewardship (NNLEMS) to conduct an evaluation of the Hanford tank waste mission and develop an R&D Roadmap for accelerating the Hanford tank waste mission. In partnership with the Office of Science and Advanced Research Projects Agency-Energy, EM is using the Roadmap to continually identify opportunities for R&D investment to develop and deploy game changing strategies and technologies that could help improve efficiency, along with cost savings and schedule acceleration, for the Hanford tank waste cleanup program.

Similarly, with the help of NNLEMS, EM is developing a national strategy for addressing the remaining challenges in soil and groundwater contamination at complex sites. This strategy will evaluate the needs for technology development, regulatory compliance, and stakeholder engagement.

Also, in partnership with the national laboratories, DOE is conducting a holistic EM technology review to evaluate technology development programs throughout the complex to ensure they have overall unity of effort, are efficient, and provide maximum value. This assessment will be used to identify technology strengths, weaknesses, and gaps, and prioritize EM and DOE complex-wide issues, challenges, and risks for maximum potential value.

As part of a robust and integrated strategic planning process, EM conducts regular analyses of alternatives

that support innovation and reducing cleanup schedules. Opportunities and alternate risk-based cleanup approaches continue to be identified and evaluated that could significantly shorten site cleanup and closure schedules, thereby reducing residual long-term environmental, safety, and health risks and ultimately saving billions in lifecycle costs. These opportunities will be considered regularly as part of long-term planning activities.

EM is also working with its regulatory partners to look at issues related to the equitable application of regulations. Finding parity in regulatory response actions coordinated under the Environmental Protection Agency and the Nuclear Regulatory Commission could ensure cost efficient cleanup and risk reduction activities.

The Decade to Come

Building on these anticipated successes, this Strategic Vision outlines the coming decade of transformational progress across the EM program, including:

- **Treating and stabilizing radioactive tank waste in glass at Hanford through the DFLAW System, ramping up the site's high-level tank waste treatment capabilities, completing significant risk reduction activities such as transferring cesium and strontium capsules to dry storage and placing the last of the former production reactors, K West Reactor, in interim safe storage**
- **Emptying and closing up to 19 of 51 underground waste tanks and completing disposal of remaining legacy TRU waste at SRS**
- **Completing the new Safety Significant Confinement Ventilation System, the new Utility Shaft Project, and other key infrastructure upgrades at WIPP**
- **Completing disposal of uranium-233 at Oak Ridge, along with completing construction of the site's new Mercury Treatment Facility**
- **Completing the treatment of remaining liquid sodium-bearing waste at INL**
- **Finalizing and implementing long-term treatment approaches for contaminated groundwater at LANL**
- **Completing the demolition of former uranium enrichment process buildings at Portsmouth**
- **Completing deactivation activities at the C-333 former uranium enrichment process building and beginning fieldwork for the C-400 remedial action at Paducah**
- **Completing Phase 1 demolition activities at WVDP**
- **Initiating soil remediation and final groundwater treatment approaches at ETEC**
- **Completing legacy cleanup activities at Moab**
- **Completing legacy cleanup activities at the NNSS**

Decade Timeline

2024

Complete commissioning of the Waste Isolation Pilot Plant Safety Significant Confinement Ventilation System, and initiate the readiness review process

2024

Complete construction of Savannah River Site (SRS) Saltstone Disposal Unit 9

2025

Initiate immobilization of Hanford tank waste in glass via DFLAW

2025

Transfer radioactive capsules from Hanford's Waste Encapsulation Storage Facility to dry storage

2025

Complete construction of the Advanced Manufacturing Collaborative facility in Aiken, South Carolina

2025

Begin operation of the Mercury Treatment Facility at Oak Ridge

2026

Complete additional cell at the CERCLA Disposal Facility at Idaho

2027

Complete the relocation and disposal of the tailings pile at Moab

2028
Complete disposition of uranium-233 at Oak Ridge

2029
Complete cleanup activities at Moab

2029
Complete treatment and disposition of remaining original volume TRU waste at Idaho

2030
Complete disposal of legacy TRU waste from SRS

2030
Complete sodium-bearing waste operations at Idaho

2031
Begin fieldwork for C-400 remedial action at Paducah

2031
Complete demolition of 2 out of 3 former uranium enrichment process buildings at Portsmouth

2031
Complete legacy cleanup activities at LLNL and SNL

2032
Complete first phase construction of the new Environmental Management Disposal Facility at Oak Ridge

2034
Convert approximately 95,000 metric tons of DUF6 and recycle 148.5 million gallons of hydrogen fluoride at Portsmouth

2034

Energy Technology Engineering Center

Overview

The Energy Technology Engineering Center (ETEC) site is located at the Santa Susana Field Laboratory (SSFL), approximately 30 miles northwest of downtown Los Angeles, California. From the 1950s until 1988, DOE and its predecessor agencies conducted nuclear and liquid metals research on a portion of the site. While DOE does not own any land at the SSFL (today owned by The Boeing Company), the Department is responsible for demolition of the DOE-owned buildings and remediation of Area IV (290 acres and the adjoining Northern Buffer Zone).

The lead regulatory agency for cleanup of ETEC is the State of California Department of Toxic Substances Control (DTSC). However, the cleanup at ETEC is governed by many laws and regulations, and other federal, state, and local regulatory agencies.

Calendar Year 2023 Accomplishments

- **Significantly reduced volatile organic compound impacted groundwater concentrations from 10,000 parts-per-billion (ppb) in 2017 to less than 500 ppb through ongoing groundwater interim measures**
- **Participated in the Santa Susana Field Laboratory Sacred Sites Council meeting with area Tribal leaders as part of continued engagement with Tribal representatives to provide guidance on protecting areas of cultural importance that could be impacted by the cleanup**
- **Commenced a collaborative study with DTSC, Boeing, and NASA to assess laboratory capabilities and local backfill availability to support final soils cleanup plans**

Planned Cleanup Scope 2024–2034

Over the coming decade, EM will work with the state of California to make progress on both groundwater and soil remediation at SSFL. The State of California issued and certified a Final Program Environmental Impact Report for SSFL in 2023, which is a necessary step for the state to approve DOE's remediation plans. DOE is resolving some final comments from the state on groundwater treatment approaches as work continues on groundwater remediation. An automated pumping system is being installed at the Former Sodium Disposal Facility expected to start operations in 2024 and a pilot test for in-situ treatment has been approved for the Hazardous Waste Storage Area. DOE and the state are actively working towards reaching a timely resolution on remaining issues to allow EM to publish a Record of Decision needed to begin soil cleanup activities.

Key Regulatory Milestones 2024-2034

In 2010, DOE signed an Administrative Order on Consent with California regulators that required soil remediation to background. EM remains committed to meeting this obligation and is engaging with California regulators on a path forward.

The Santa Susana Field Laboratory Sacred Sites Council meeting involved senior leaders from the State of California and the parties managing the cleanup at SSFL. The council is comprised of Tribal leaders from the Santa Ynez Band of Chumash Indians; Feranadeño Tataviam Band of Mission Indians; Kizh Nation, Gabrieleño Band of Mission Indians; and Barbareño/Ventureño Band of Mission Indians.

Post-2034 Cleanup Scope

Remaining cleanup activities at ETEC post 2034 will depend on progress made on soil and groundwater remediation during the next 10 years. The envisioned end state for the ETEC site is an open space for the surrounding community to enjoy and to provide habitat for the wildlife of the Santa Susana Mountains. The land's future as an open space habitat will preserve the land as a wildlife corridor; benefit the unique and critical habitat of local plants and animals, many of which are threatened; and preserve its many Tribal and cultural resources.

Debris is removed following the Sodium Pump Test Facility demolition.

Hanford

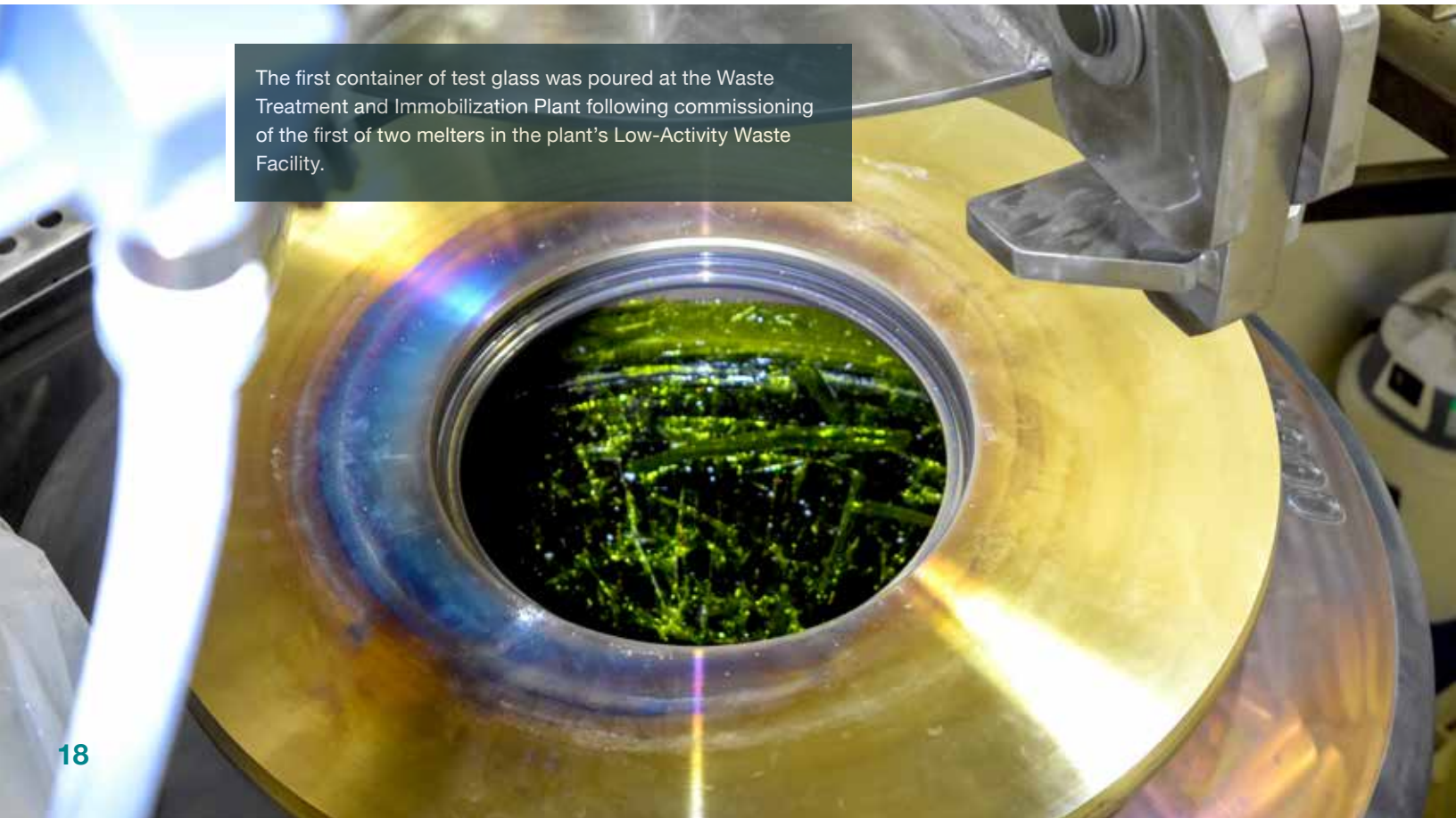
Overview

The Hanford Site, a 580-square-mile section of semi-arid desert in southeast Washington, was established in 1943 as part of the Manhattan Project to produce plutonium for national defense. Construction began in October 1943 on the first industrial-scale nuclear reactor, B Reactor, which produced plutonium for the Trinity test and one of the atomic bombs used to help end World War II. During a national security mission that lasted nearly five decades, nine nuclear reactors were built along the banks of the Columbia River to provide materials for five processing facilities that operated throughout the Cold War era. Hanford produced nearly two-thirds of the plutonium used in the U.S. nuclear weapons stockpile.

With the signing of the Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement) in 1989 by the DOE, the Washington State Department of Ecology, and the Environmental Protection Agency (EPA), the primary mission of the Hanford Site shifted from national security to environmental cleanup. Hanford's current mission focuses on treating millions of gallons of waste in large underground tanks and reducing risks through remediation of contaminated areas, deactivation and decommissioning of facilities, groundwater treatment, and waste management (i.e., waste storage, treatment, and disposal).

Cleanup of the Hanford Site is managed by two DOE offices, the Richland Operations Office (DOE-RL) and the Office of River Protection (DOE-ORP), in an integrated approach commonly referred to as One Hanford. DOE executes the cleanup and risk-reduction efforts at the site through several prime contractors and their subcontractors. DOE-RL serves as the Hanford Site property owner and oversees cleanup along the Columbia River and in Hanford's Central Plateau, including groundwater and waste site cleanup, facility deactivation and decommissioning, management of solid waste and nuclear materials, and all site support services.

Congress established DOE-ORP in 1998 as a field office to manage the retrieval, treatment, and disposal of approximately 56 million gallons of radioactive tank waste stored in 177 underground tanks in the Central Plateau. The tank waste is material left over from nearly 50 years of plutonium production. In support of this mission, DOE-ORP is responsible for the safe operation of the tank farms and associated 200 Area facilities



The first container of test glass was poured at the Waste Treatment and Immobilization Plant following commissioning of the first of two melters in the plant's Low-Activity Waste Facility.

along with construction and operation of waste transfer systems and treatment facilities, including the Waste Treatment and Immobilization Plant (WTP) located in the Central Plateau.

EM leadership regularly engages a variety of stakeholders and consults with Tribal Nations regarding the cleanup vision for the Hanford Site. These include regional elected officials, business leaders, and advisory board members representing more than 30 individual interests and the public at large. Through engagement during development of the Strategic Vision, stakeholders and Tribal Nations identified several areas in which the Strategic Vision for Hanford could be strengthened, including identifying established dates for noted milestones and completion dates for planned work, as well as goals that could allow quantifiable assessment of results.

Workers move ion exchange columns filled with radioactive cesium and solids at the Tank Side Cesium Removal System storage pad.

Calendar Year 2023 Accomplishments

- **Continued tank waste treatment through Tank-Side Cesium Removal (TSCR) System operations, with more than 800,000 gallons of waste treated in preparation for feed for the start of DFLAW activities — an EM 2023 priority**
- **Completed heat up of the first tank-waste vitrification melter in the WTP, producing its first container of test glass in October**
- **Completed more than 40 upgrades to the Effluent Treatment Facility, boosting its capacity and efficiency to support Direct Feed Low-Activity Waste System (DFLAW) operations**
- **Completed the Integrated Disposal Facility where vitrified waste from DFLAW will be taken for disposal**
- **Treated more than 2 billion gallons of contaminated groundwater for the ninth consecutive year — an EM 2023 priority**
- **Completed a 144,000 square-foot interim surface barrier over the U Tank Farm to protect groundwater**
- **Completed demolition of the K West Reactor Annex**
- **Continued upgrades at the Waste Encapsulation Storage Facility to prepare to transfer 1,936 radioactive capsules to dry-storage casks**

Planned Cleanup Scope 2024–2034

The successful launch of one of EM's largest and most significant cleanup activities — the start of tank waste vitrification at Hanford through the DFLAW program — is expected in 2025. This is a goal EM has been pursuing for more than two decades at Hanford and will address one of the largest environmental challenges in the EM complex.

TANK WASTE TREATMENT

In 2024, DOE will continue to advance DFLAW commissioning activities for the Low Activity Waste (LAW) Facility by heating up and commissioning the second of the facility's two large melters. Transitioning the remaining DFLAW facilities to operational status will commence the treatment of the most mobile form of

tank waste, beginning an important new phase of the Hanford Site cleanup effort.

Recent DFLAW successes illustrate what is possible when there is unified alignment around an achievable goal. Building on that success, DOE, the EPA and the state of Washington reached a conceptual agreement on a safe and viable path forward for Hanford's high-level tank waste. In addition, DOE has developed an R&D Roadmap to guide investments in additional technology options to accelerate the Hanford high-level tank waste mission. EM will ramp up engineering, design and low-risk construction on the WTP High-Level Waste (HLW) Facility to maintain progress towards treating the remaining Hanford tank waste in the mid-2030s.

In parallel with the DFLAW Program, EM is evaluating additional technology options to potentially accelerate removal and disposal of the remaining portion of Hanford low-activity tank waste. As part of that effort, EM is advancing the Test Bed Initiative Demonstration, which will involve treatment and off-site disposal of 2,000 gallons of Hanford's low-activity tank waste.

RISK REDUCTION

By the end of the decade, DOE will address the risks and contamination at the 324 Building, beginning with deactivation of the facility which is already underway. Additionally, the K West Reactor Fuel Storage Basin will be deactivated and demolished, allowing the K-West reactor to be placed in interim safe storage. Active groundwater remediation systems will continue operating along the Columbia River and on the Hanford Central Plateau, reducing the risk that contaminated groundwater will leave the site.

DOE will complete the transfer of cesium and strontium capsules, currently housed in water pools at the Waste Encapsulation and Storage Facility, to safer and stable dry storage at a nearby Capsule Storage Area. Stabilization activities at the Reduction-Oxidation Plant (REDOX), the Plutonium Uranium Extraction Plant (PUREX), and B Plant will place these facilities in a low-risk and low-cost surveillance and maintenance configuration. Several high-risk facilities involved in plutonium production at Hanford will be demolished, and waste site remediation efforts will continue throughout the Central Plateau with the waste disposed at the Environmental Restoration Disposal Facility.

Later in the decade, transuranic (TRU) waste shipments to WIPP are set to resume.

Key Regulatory Milestones 2024–2034*

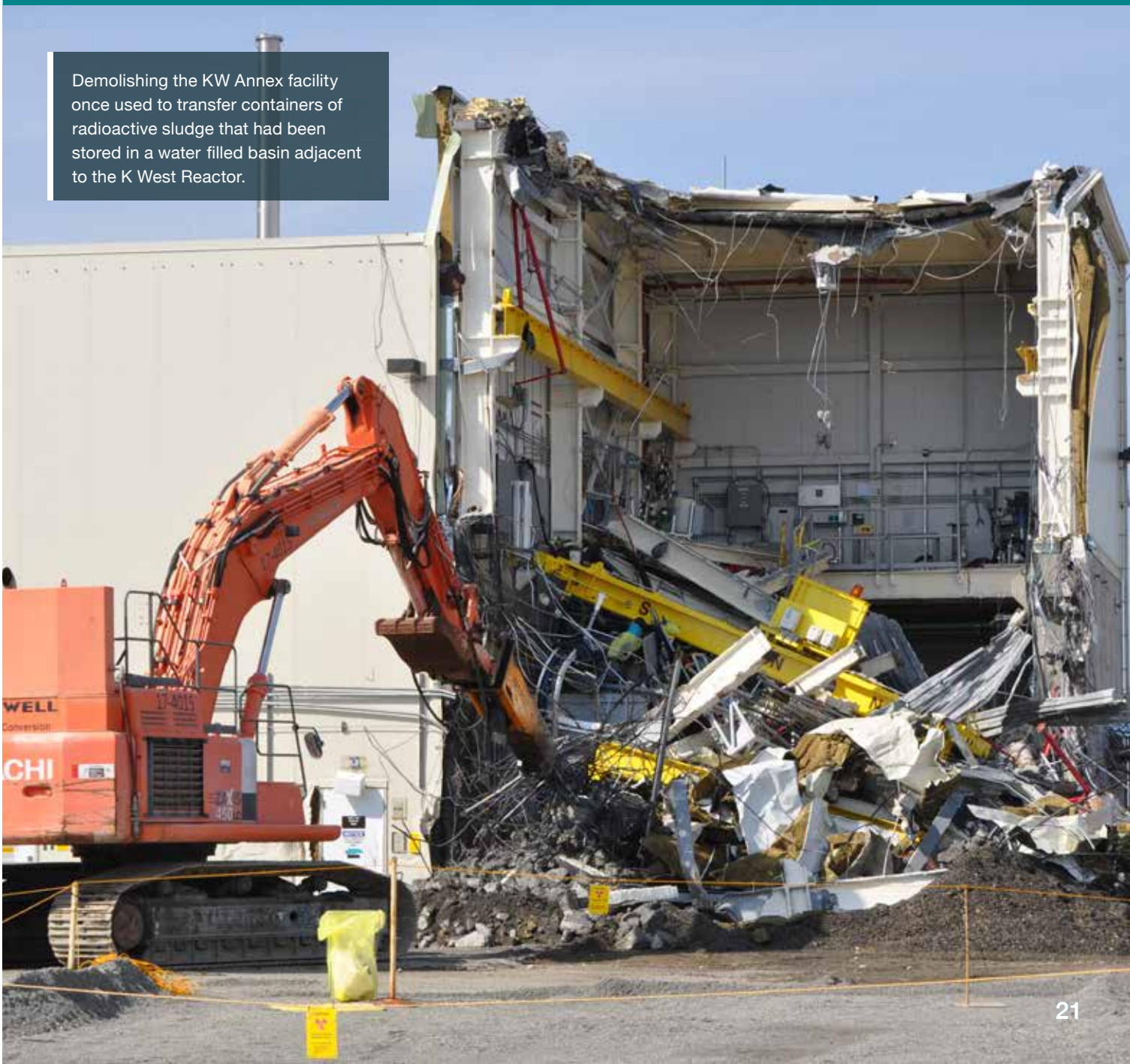
Cleanup activities at Hanford are governed by the Tri-Party Agreement. Some cleanup activities are also governed by a Consent Decree between DOE and the State of Washington.

- **Transfer cesium/strontium capsules to dry storage — 2025**
- **Complete LAW Facility hot commissioning and begin production-scale tank waste disposition — 2025**
- **Remove all mixed waste containers currently located at the Central Waste Storage Complex from outside Storage Areas A and B — 2026**
- **Initiate certification activities by processing TRU waste containers — 2026**
- **Complete single-shell tank retrievals in A/AX Farms — 2028**
- **Complete remedial actions for contaminated soil beneath the 324 Building — 2030**
- **Substantially complete construction of the WTP HLW Facility — 2030**
- **Start cold commissioning of the HLW Facility — 2032**

**Some scheduled milestones have been revised due to COVID. DOE will continue to work with regulators to revise milestones, as needed.*

Post-2034 Cleanup Scope

Post 2034, cleanup activities at Hanford are expected to include continued tank waste retrieval and treatment, along with tank closure activities; construction of additional waste treatment facilities; TRU waste treatment and shipments for disposal; and extensive facility demolition and waste site remediation activities. Most of the River Corridor and significant portions of the Central Plateau Outer Area remediation activities, including active groundwater treatment, will be nearly completed, allowing for a greater focus on the extensive waste sites and facilities surrounding the B Plant, PUREX, REDOX, U Plant, and T Plant processing canyons on the Central Plateau. The Hanford Site infrastructure will consistently be right sized and reconfigured to support the focused efforts on the Central Plateau. DOE currently anticipates completing cleanup activities at Hanford in the 2078 2091 timeframe.



Demolishing the KW Annex facility once used to transfer containers of radioactive sludge that had been stored in a water filled basin adjacent to the K West Reactor.

Idaho Cleanup Project

Overview

The Idaho National Laboratory (INL) site was established in 1949 as the National Reactor Testing Station. The original mission of the INL site was to develop and test civilian and defense nuclear reactor technologies and manage Spent Nuclear Fuel (SNF). Fifty-two reactors — most of them first-of-a-kind — were built at the site, including the Navy's first prototype nuclear propulsion plant. Of the 52 reactors, four remain in operation.

In 1951, the INL site achieved one of the most significant scientific accomplishments of the century — the first use of nuclear fission to produce a usable quantity of electricity at the Experimental Breeder Reactor No. 1 (EBR-I). The EBR-I is now a registered National Historic Landmark open to the public.

The Idaho Cleanup Project (ICP) at the INL Site is responsible for treating, storing, and dispositioning a variety of radioactive and hazardous wastes; removing and dispositioning targeted buried waste; removing or deactivating unneeded facilities; and managing — and ultimately removing — SNF and High-Level Waste (HLW) from Idaho. Activities are primarily performed at the Radioactive Waste Management Complex (RWMC) and the Idaho Nuclear Technology and Engineering Center (INTEC) facilities.

ICP consistently provides updates about cleanup activities to the Shoshone-Bannock Tribes, the Idaho Department of Environmental Quality, the Idaho Cleanup Project Citizen's Advisory Board, and the Idaho congressional delegation's regional staff.

Calendar Year 2023 Accomplishments

- **Completed ahead of a regulatory milestone the transfer of all SNF from a storage basin at INTEC to dry storage — an EM 2023 priority**
- **Began operation of the Integrated Waste Treatment Unit (IWTU) — an EM 2023 priority — and treated 68,000 gallons of liquid waste**
- **Began construction of a new disposal cell at the Idaho CERCLA Disposal Facility (ICDF), which will extend the facility's operational life by 25 years and increase the disposal capacity three-fold**
- **Conducted 7,000th shipment of transuranic (TRU) waste to the Waste Isolation Pilot Plant (WIPP)**

Planned Cleanup Scope 2024–2034

Over the course of the next decade, cleanup activities at the INL Site will focus on completing treatment of remaining liquid sodium-bearing waste, facility decontamination and demolition at Naval Reactors Facility (NRF), shipping the remaining balance of TRU waste, and demolition and closure of facilities at RWMC and INTEC.

Work to demolish the last remaining waste processing facilities at the Subsurface Disposal Area (SDA) will be completed in 2024. Closure of the SDA and the construction of a permanent cap will follow.

At INTEC, activities for sodium-bearing waste processing, calcine, and SNF will increase in the coming decade. Sodium-bearing waste processing will continue at the IWTU, which is expected to finish by the end of 2030. Additionally, tank farm closure operations will commence. The calcine retrieval and processing systems needed to make the waste road-ready are in their early stages of development. Mockups of the waste retrieval and bin set cleaning systems are being tested and prepared for installation. The capabilities for calcine waste processing will be developed, installed, and placed into operation. For SNF, fuel packaging capabilities will be developed and installed, and packaging operations to make the fuel ready for shipment out of Idaho will commence.

EM will continue to support the DOE Office of Naval Reactors by demolishing the S1W, A1W, and S5G reactor prototypes and associated buildings, freeing up several acres at the NRF.

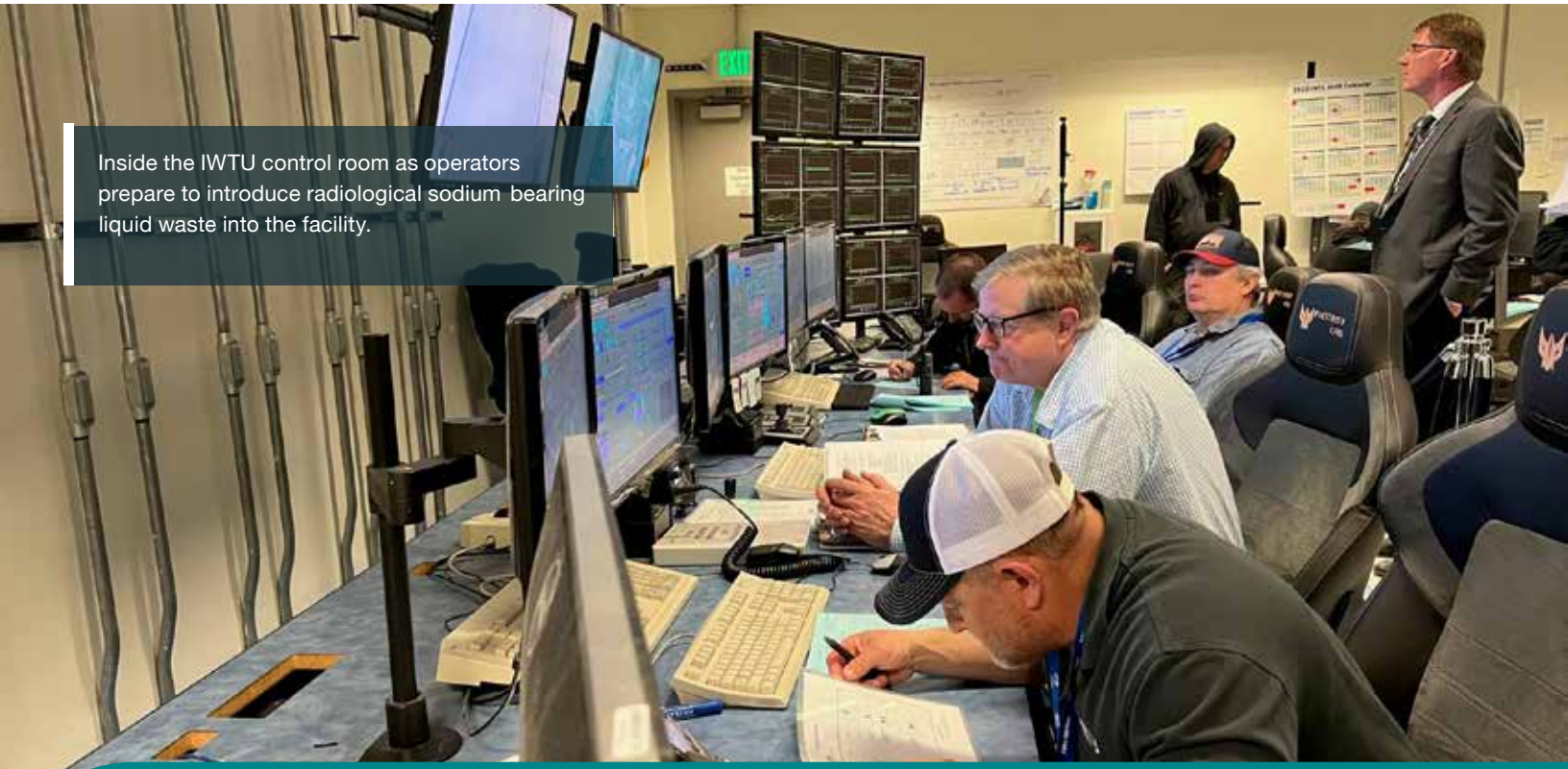
Lastly, EM will complete the additional cell at the ICDF, an on-site low-level waste disposal facility by 2026. The additional cell will allow for safe, cost-effective disposal

activities of contaminated soil and debris generated from D&D of facilities until 2050.

Key Regulatory Milestones 2024–2034

The regulatory milestones are contained in the 1995 Idaho Settlement Agreement (ISA), 2019 Supplemental Agreement (SA), the Agreement to Implement the ISA, the Site Treatment Plan (STP), and the Federal Facility Agreement and Compliance Order. The milestones include:

- Idaho provides at least 55 percent of transuranic waste shipments to WIPP, based on an annual three-year average — 2031 (SA)
- Calcine waste milestones:
  - Define project – approve mission needs statement — 2025 (STP)
  - Identify and develop treatment technology — 2027 (STP)
  - Issue record of decision amendment identifying treatment technology — 2028 (STP)
  - Schedule for remaining milestones — 1 year after CD-1 project approval (STP)
- Complete certification of over 1,900 cubic meters original volume TRU waste — 2026 (STP)
- Complete treatment and disposition of remaining original volume TRU waste (over 400 cubic meters) — 2029 (STP)
- Complete sodium-bearing waste operations — 2030 (STP)
- Complete SDA cap — 2028



Inside the IWTU control room as operators prepare to introduce radiological sodium bearing liquid waste into the facility.

Post-2034 Cleanup Scope

At INTEC, HLW processing and SNF packaging are expected to be completed in the 2030s. In support of the Office of Nuclear Energy, processing and shipping remote handled TRU, mixed low level waste, and low level waste will continue into the 2040s. After closure of the RWMC and INTEC facilities, the area will continue to be monitored and assessed for any further needed remediation as part of DOE's long term stewardship. DOE currently anticipates completing cleanup work at the INL Site between 2049 and 2060.

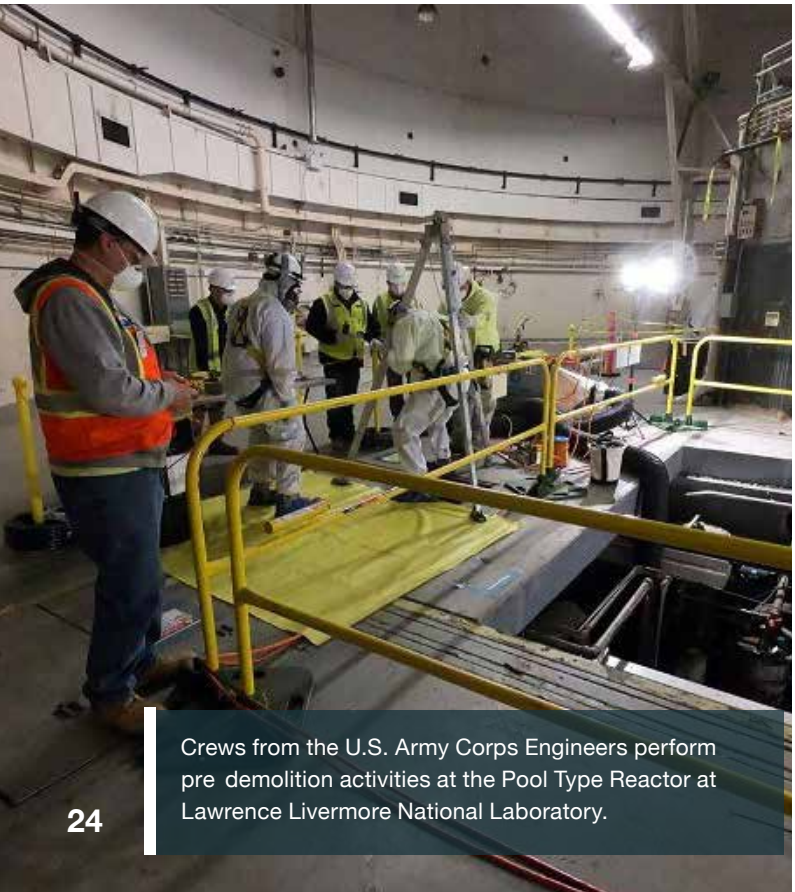
Lawrence Livermore National Laboratory

Overview

Located in California, the Lawrence Livermore National Laboratory (LLNL) was established in 1952 as a multidisciplinary R&D center focusing on weapons development and stewardship and homeland security. At the LLNL main site, EM has been tasked by Congress to demolish several excess facilities. LLNL Site 300 is a remote experimental testing facility where the Department conducts research, development, and testing of high explosives and integrated non-nuclear weapons components. EM is responsible for addressing the remaining groundwater contamination issues at Buildings 812, 850 and 865 at Site 300.

Calendar Year 2023 Accomplishments

- **Commenced abatement and hazard removal activities at Building 251, a high-risk excess facility — an EM 2023 priority**
- **Initiated the Building 280 demolition project**
- **Commenced the LS412 slab and soil removal project**



Crews from the U.S. Army Corps Engineers perform pre demolition activities at the Pool Type Reactor at Lawrence Livermore National Laboratory.

Planned Cleanup Scope 2024–2034

At Site 300, EM will address the remaining legacy cleanup scope by moving forward with selecting and implementing remedial actions for Building 812, Building 865, and Building 850 groundwater. An amended Record of Decision (ROD) documenting the selected treatment path forward is expected to be issued in 2028. Implementation of the selected path forward is anticipated to be initiated in 2031, and responsibility for the completed actions are anticipated to be transferred to the National Nuclear Security Administration (NNSA) in 2033.

Over the next decade, based on NNSA mission needs, EM anticipates continuing to perform demolition work on remaining higher risk excess facilities. These facilities include Building 251 (Heavy Elements Facility), Building 292 (Rotating Target Neutron Source), Building 241 (Pluto Project Testing and Fabrication Facility), Building 343 (Explosives and High-Pressure Testing Facility), LS212/Building 212 (Accelerator Facility), and other process-contaminated facilities.

Key Regulatory Milestones 2024–2034

The key regulatory milestones listed below for soil and water remediation are required by the Lawrence Livermore National Laboratory Site 300 Federal Facility Agreement and the Comprehensive Environmental Response, Compensation, and Liability Act.

- **Final remedial investigation/feasibility study (RI/FS) for Building 865 part 2 — 2025**
- **Final RI/FS for Building 812 — 2025**
- **Final proposed plan for Building 812, Building 865, Building 850 perchlorate in groundwater — 2027**
- **Final ROD amendment for Building 812, Building 865, and perchlorate in Building 850 groundwater — 2028**
- **Final remedial design for Building 812, Building 865, and perchlorate in Building 850 groundwater — 2029**

The Livermore Pool Type Reactor, which was deactivated and decommissioned in 1981.

Post-2034 Cleanup Scope

None identified at this time, although there may be more work if additional excess facilities are identified and transferred to EM for demolition.

Los Alamos National Laboratory

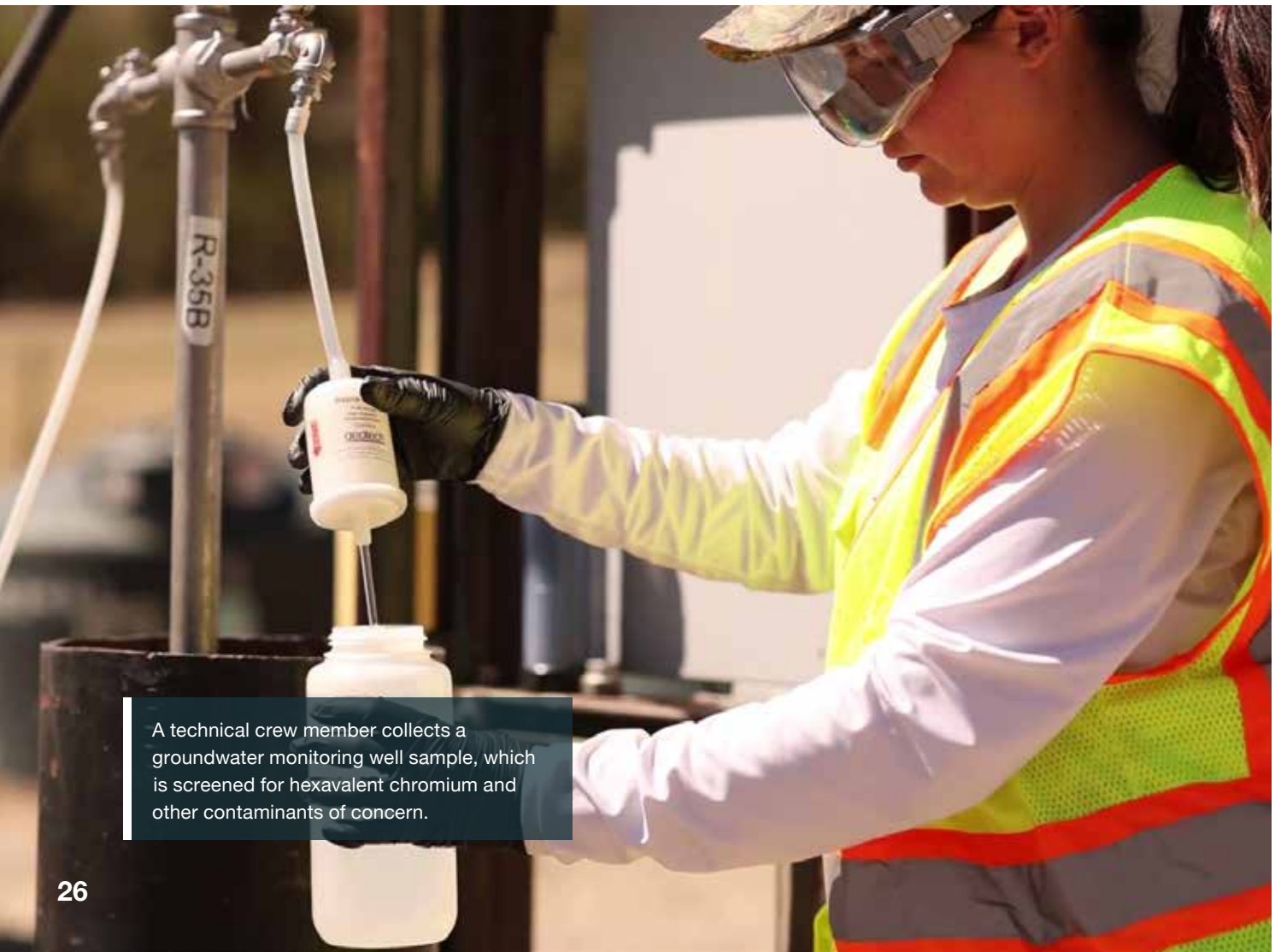
Overview

The EM Los Alamos Field Office (EM-LA) is dedicated to the cleanup of legacy contamination left behind by nuclear weapons production and research during the Manhattan Project and Cold War era at Los Alamos National Laboratory (LANL) in New Mexico. EM-LA's cleanup mission includes legacy waste remediation and disposition, soil and groundwater remediation, and the deactivation and decommissioning of excess buildings and facilities. Waste generated after 1999 is the responsibility of the National Nuclear Security Administration (NNSA) Los Alamos Field Office.

Of the more than 2,100 areas of potential contamination originally identified at LANL, more than 650 sites have been investigated and remediated. These areas range from small spill sites with a few cubic feet of contaminated soil to large landfills encompassing several acres.

EM-LA is working to characterize and address two groundwater plumes. One plume contains hexavalent chromium and is being hydraulically controlled by a pump-and-treat and injection system on an interim basis while alternatives for remediating the plume are evaluated and implemented. The second plume contains chemical constituents, including explosives constituent Royal Demolition Explosives, which were used widely in World War II and the Cold War.

Approximately 500,000 cubic meters of legacy hazardous and radioactive waste is located at LANL. Most of this waste is buried in 26 material disposal areas (MDAs). Eight of these MDAs have been remediated. There are approximately 3,200 cubic meters of legacy transuranic (TRU) waste stored at



A technical crew member collects a groundwater monitoring well sample, which is screened for hexavalent chromium and other contaminants of concern.

Technical Area (TA) 54 destined for disposal at the Waste Isolation Pilot Plant (WIPP). The waste is stored in configurations protective of the environment, workers, and the public.

As part of an ongoing commitment to transparency and dialogue, EM-LA frequently participates in discussions on its mission at stakeholder-led events, such as Northern New Mexico Citizens' Advisory Board meetings, Accord Technical Exchange meetings, and Los Alamos County Council meetings. EM-LA also hosts quarterly public Environmental Management Cleanup Forums and meets monthly with LANL Legacy Cleanup Technical Working Group stakeholders.

EM-LA continues engagement and efforts to support the Justice40 Initiative. Justice40 Initiative engagements have been 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.

Calendar Year 2023 Accomplishments

- Exceeded the TRU waste shipment goal for planned shipments to WIPP
- Initiated size-reduction activities for 158 buried Corrugated Metal Pipes (CMP) containing cemented TRU waste at Technical Area 54, Area G
- Finished investigation and remediation of contaminated soils at North Ancho Canyon and Threemile Canyon Aggregate Areas
- Awarded a deactivation and decommissioning contract for the Ion Beam Facility and initiated phase one of the project
- Completed field work at the Middle DP Road Site, a project critical to the economic development of Los Alamos County
- Met all fiscal year 2023 milestones under the 2016 Compliance Order on Consent with the New Mexico Environment Department (NMED) early or on time

Environmental crew members conduct excavation to clean up contamination in Lower Water Canyon near one of Los Alamos National Laboratory's Cold War era underground explosives firing chambers.

Planned Cleanup Scope 2024–2034

Over the coming decade, DOE will focus on addressing the groundwater contamination plumes, processing TRU waste stored aboveground, and retrieving below-ground TRU waste for disposal. DOE will continue work to complete disposition of LANL TRU waste currently in storage at the Waste Control Specialists Inc. commercial disposal site in Texas.

Work is underway at TA-54 Area G to retrieve, size-reduce, and characterize 158 CMPs containing cemented waste from a former LANL radioactive liquid waste treatment facility. Following retrieval, size-reduction, and characterization, the CMPs sections will be shipped to WIPP for disposition.

In 2024, site investigations will continue and, where required, contaminated soil will be removed from the site and transported for off-site disposal. EM-LA will continue to work with NMED to operate interim measures to control migration of the hexavalent chromium plume while further characterization is conducted to evaluate the effectiveness and feasibility of implementing a remedy. An Independent Technical Review team is being convened to bring in world-class scientific experts to conduct a review of current chromium interim measures and plume characterization, and provide recommendations to EM-LA and NMED related to continued interim measures activities and path to remedial actions.

As part of the legacy cleanup mission, EM-LA has initiated a project to deactivate, decommission and remove (DD&R) the Ion Beam Facility, an excess NNSA facility built to support post-World War II nuclear research. The facility houses two original Van de Graaff accelerators. The project will be conducted in phases starting with facility characterization, deactivation, and demolition of the administration area in 2024. DD&R includes associated ancillary facilities; slab and foundation removal, and waste disposition.

Deactivation and decommissioning of Building 257, industrial waste lines, and DP West slabs in TA-21 is anticipated in 2026. This will be followed by the investigation and remediation of the DP Site Aggregate Area (TA-21) Solid Waste Management Units and Areas of Concern and closures of MDA A (including the Generals Tanks) and MDA T.

By 2026, investigation and remediation will have been conducted on over 200 legacy contamination sites in the Southern External Boundary and Pajarito Watershed Campaigns. The latter part of the decade will see considerable focus on remediating the MDAs.

Over the next decade, work at TA-54 will center on processing and disposal of above-ground waste inventories, and processing of retrievably stored below-grade TRU waste. Waste treatment processing lines are currently active but will be modified to address the range of materials requiring treatment. Retrieval processes will be developed for below-ground legacy waste, as necessary, to exhume waste containers of various sizes and content. Some waste items will require size reduction to facilitate packaging for transport.

Key Regulatory Milestones 2024–2034

The 2016 Compliance Order on Consent (2016 Consent Order) between DOE and NMED establishes an annual process by which both agencies jointly agree to between 10 to 20 enforceable milestones to be completed during the fiscal year. DOE and NMED also mutually established between 10 and 20 targets for each of the next two fiscal years. In addition to enforceable annual milestones, there are a significant number of other deliverables that DOE completes during the fiscal year per the 2016 Consent Order.

With the mobile loading unit, Newport News Nuclear BWXT Los Alamos operators secure the TRUPACT lid prior to shipping transuranic waste at TA-54.

Post-2034 Cleanup Scope

Activities associated with the deactivation and decommissioning of TA 54 structures and subsequent remediation of MDA G and MDA L are expected to extend beyond 2034. This work will require additional facility infrastructure to safely excavate and process waste for shipment to WIPP.

Input received during the EM LA Strategic Vision process will be considered in developing EM LA's remedy proposals for remaining legacy cleanup work. The remedies selected by NMED may change the current estimated completion dates.

Moab

Overview

The Moab Uranium Mill Tailings Remedial Action Project is located in southeastern Utah. The site's 480 acres includes a former uranium-ore processing facility that operated under private ownership from 1956 to 1984. The Projects scope includes relocation of the estimated 16-million-ton pile of uranium mill tailings and other contaminated material near the Colorado River to an engineered disposal cell constructed 30 miles north near Crescent Junction, Utah. The scope also includes remediation of contaminated groundwater at the Moab Site. After contaminated soil, tailings, debris, and vicinity properties are remediated and interim groundwater actions are complete, a portion of the Moab site will be transferred to the Office of Legacy Management (LM) for continued groundwater monitoring and implementation of the final groundwater strategy. The Crescent Junction site will also be transferred to LM for long-term surveillance and maintenance of the disposal cell.

Calendar Year 2023 Accomplishments

- **Disposed of a cumulative total of 14 million tons of uranium mill tailings out of the original total of the estimated 16 million tons — an EM 2023 priority**
- **Removed a cumulative total of more than 983,000 pounds of ammonia and 5,600 pounds of uranium from groundwater, diverting those constituents from the Colorado River**
- **Completed the final expansion of the Crescent Junction disposal cell**
- **Remediated and removed 14 autoclaves from the Moab site**
- **Completed demolition of the legacy Atlas Building**

Planned Cleanup Scope 2024–2034

DOE will continue shipping nearly one million tons of uranium mill tailings annually to the Crescent Junction disposal site. As a result, DOE expects to complete the relocation and disposal of the pile by 2027. It will take an additional two years to complete the restoration of the Moab Site, dispose of potentially contaminated equipment and intermodal containers, and install the cover on the disposal cell.

In the immediate future, the Network of National Laboratories for Environmental Management and Stewardship is working with DOE-EM to complete field studies related to the development of the Groundwater Compliance Action Plan. Also at the Moab site, staff will be developing a design for realignment of the Moab Wash.

Key Regulatory Milestones 2024–2034

- None

This sealed steel container of uranium mill tailings brought the Moab Uranium Mill Tailings Remedial Action Project's cumulative total to 13 million tons of the material removed from the Moab Site for disposal at the Crescent Junction, Utah, disposal cell.

Post-2034 Cleanup Scope

The Moab mission is tentatively scheduled to be completed in 2029. Following closure, EM plans to transfer the site to Grand County, Utah, for beneficial reuse. The Crescent Junction site will be transferred to LM for long term surveillance and maintenance.

A volunteer group of stakeholders made up of representatives from Grand County, the City of Moab, the Bureau of Land Management, the Utah Division of Forestry, Fire and State Lands, the National Park Service, and local citizens updated their "Community Vision" plan in 2023. Their reuse plan is for an outdoor park and recreation area that includes an amphitheater, event center, boat ramp, transit center and outdoor play and exercise areas.

Nevada National Security Sites

Overview

From 1951 to 1992 a total of 100 atmospheric and 828 underground nuclear weapons tests were conducted at the Nevada National Security Sites (NNSS). As a result, some groundwater, surface soils, and industrial-type facilities were contaminated at the NNSS and the surrounding Nevada Test and Training Range. The EM Nevada Program is responsible for cleanup of these historic nuclear testing locations and support facilities. In addition to its remediation mission, the EM Nevada Program manages the safe and secure disposal of waste on the NNSS in support of cleanup and activities at federal sites across the United States involved in nuclear research, development, testing, and ongoing national security and science missions.

Calendar Year 2023 Accomplishments

- **Completed the safe demolition of four ancillary structures at the Test Cell C (TCC) facility that were part of the former Nuclear Rocket Development Station — an EM 2023 priority**
- **Advanced to the "model evaluation" stage at Pahute Mesa, the final of four groundwater regions on the NNSS, marking a major step towards achieving regulatory closure**
- **Supported the safe and secure disposal of more than 600,000 cubic feet of low-level waste (LLW), mixed low-level waste (MLLW), and classified waste**

A look at a slice of the Pahute Mesa groundwater region from a distance.

Planned Cleanup Scope 2024–2034

The EM Nevada Program continues to work towards the completion of the model evaluation phase for Pahute Mesa, including groundwater well drilling, and transition of the groundwater corrective action area into long-term monitoring. This action will complete the EM Nevada Program's groundwater mission at the NNSS and will culminate in the transfer of oversight responsibilities for closed groundwater corrective action areas to a long-term steward.

The Engine Maintenance, Assembly and Disassembly facility (EMAD) and TCC represent the last major demolition and closure efforts currently identified in EM Nevada's environmental remediation mission. Demolition of EMAD and TCC at the NNSS will be addressed in phases, including full demolition of TCC and EMAD ancillary structures; demolition of the "cold," or non-radiologically contaminated portion of Building 3900 at EMAD; and demolition of the "hot" portion of Building 3900 with expected closure in 2031.

Long-term monitoring of sites closed with contamination left in place will remain the responsibility of the EM Nevada Program until completion of its NNSS environmental restoration mission. At that time, responsibility for closed sites will be transferred to a long-term steward.

The EM Nevada Program will continue to support cleanup and activities at federal sites across the United States involved in nuclear research, development, testing, and ongoing national security and science missions by disposing of up to 750,000 cubic feet annually of LLW, MLLW, and classified waste.

Key Regulatory Milestones 2024–2034

EM Nevada Program environmental restoration activities are regulated by the Federal Facility Agreement and Consent Order, an agreement between the State of Nevada and the DOE governing environmental corrective actions at sites impacted by historical nuclear activities. Additionally, an Agreement in Principle between the Department and the state exists to define the Nevada Division of Environmental Protection's role in oversight of NNSS LLW disposal operations. The federal Resource Conservation and Recovery Act,

An overhead view of Test Cell C Facility on the second day of Building 3220 demolition.

which regulates hazardous waste management, also governs certain aspects of MLLW disposal at the NNSS.

Key Regulatory Milestones remaining for the EM Nevada Program include:

- Closure of Corrective Action Unit (CAU) 578 Miscellaneous Inactive Sites — 2024
- Closure of CAU 572 at TCC — 2026
- Approval of CAU 101/102 Pahute Mesa Model Evaluation Report "Acceptance to Move to Closure" — 2028
- Submittal of Pahute Mesa Groundwater Corrective Action Units Closure Reports — 2029
- Submittal of the EMAD Facility Closure Report — 2031
- Transition of site to Long-Term Stewardship — 2032

Post-2034 Cleanup Scope

The EM Nevada Program is currently scheduled to finish its cleanup mission by 2035, with the legacy cleanup scheduled for completion in 2032. This will ultimately involve the completion of all active environmental restoration activities and the conveyance of remediated sites for long term stewardship.

Oak Ridge

Overview

The Oak Ridge Site, located in eastern Tennessee, is one of the three original sites in the Manhattan Project. The U.S. Army Corps of Engineers began acquiring land in the area in October 1942. By March 1943, 56,000 acres were sealed behind fences and major industrial facilities were under construction. The K-25 and Y-12 plants were 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 methods for the production of plutonium.

Throughout the following decades, the three sites — K-25 (present day East Tennessee Technology Park (ETTP)), X-10 (present day Oak Ridge National Laboratory (ORNL)), and Y-12 — purified isotopes, conducted advanced research, manufactured weapons components, and enriched uranium. These activities created environmental legacies that placed the Oak Ridge Reservation on the Environmental Protection Agency's (EPA) National Priorities List in 1989.

The Oak Ridge Office of Environmental Management (OREM) is the responsible for of ETTP, and it is also responsible for the CERCLA cleanup at Y-12 and ORNL. OREM has achieved significant risk reduction across the Oak Ridge Reservation, including the removal of all facilities at ETTP. Now, the next chapter of cleanup is underway in Oak Ridge.

With demolition complete at ETTP, OREM transitioned the skilled, experienced workforce from there to address the many high-risk facilities at ORNL and Y-12. Demolition prep and deactivation work is underway at numerous buildings at those sites. OREM's work will address DOE's largest inventory of high-risk, excess contaminated facilities (former research reactors, isotope production facilities, and former process buildings); eliminate the site's remaining inventory of uranium-233; remediate areas with dense mercury contamination; and provide valuable real estate for the National Nuclear Security Administration (NNSA) and the Office of Science (SC) missions.

Throughout all this work, OREM works to keep the surrounding communities in Anderson and Roane counties and the city of Oak Ridge safe and informed. The program also fosters and maintains strong partnerships focused on economic opportunities including the East Tennessee Economic Council, Energy Technology and Environmental Business Association, Chamber of Commerce, and the Community Reuse Organization of East Tennessee. OREM airs a news program to raise awareness about the full scope of its mission and impact. This program airs weekly in 24 counties across Tennessee, and it is also available on OREM's YouTube channel. Additionally,

OREM achieved another EM priority in 2023 by beginning early site preparation for the Environmental Management Disposal Facility.

OREM leadership provides updates and is available to answer the public's questions at monthly Oak Ridge Site Specific Advisory Board meetings and at other organized public events. OREM representatives also regularly correspond with local city and county officials.

Calendar Year 2023 Accomplishments

- Completed demolition of the Low Intensity Test Reactor — an EM 2023 priority
- Began early site preparation for the Environmental Management Disposal Facility (EMDF) — an EM 2023 priority
- Released two draft Records of Decision about groundwater for public comment
- Broke ground on the K-25 Viewing Platform at ETTP
- Forged new partnerships to aid workforce development

Planned Cleanup Scope 2024–2034

Over the next 10 years, OREM expects to make significant progress on cleanup activities at Y-12 and ORNL. These projects will enable important ongoing NNSA and SC missions and eliminate one of the largest remaining security risks at ORNL.

OREM successfully completed demolition at ETTP in 2020. OREM has made significant progress addressing areas with impacted soil at ETTP, and it is slated to complete that in 2024. By 2028, OREM plans to implement all required groundwater treatment remedies, transfer all economically viable parcels of land to the community for reuse, and transfer conservation areas to the Tennessee Wildlife Resources Agency. By 2029, all remaining portions of ETTP will transition to long-term stewardship.

Large scale cleanup operations are firmly underway at ORNL and Y-12. In 2023, crews tore down the Low Intensity Test Reactor at ORNL. That project marked the second reactor demolition within the span of a year in ORNL's central campus. OREM also continued deactivation at numerous high-risk facilities, including multiple former enrichment facilities at Y-12 and former reactors and isotope labs at ORNL.

In 2024, OREM is scheduled to begin demolition of Alpha-2 at Y-12. That project is an important milestone because it is the first former enrichment facility crews will take down at Y-12. OREM will also continue removing inventories of nuclear and transuranic waste this year. Teams are actively processing and dispositioning the inventory of high-dose uranium-233 and shipping Oak Ridge's inventory of transuranic (TRU) debris waste.

In 2025, the Outfall 200 Mercury Treatment Facility is planned to be operational at Y-12. The facility will be able to treat 3,000 gallons of water per minute, and it will include a two-million-gallon storage tank to collect stormwater. It is a key piece of infrastructure that will enable OREM to begin large-scale mercury cleanup at Y-12.

By 2027, OREM expects to complete several other demolition projects in ORNL's central campus, including the East Cell Bank at the former Radioisotope Development Lab and the Isotope Row facilities. Additionally, demolition will be complete at the former Manhattan Project-era Alpha-2 facility.

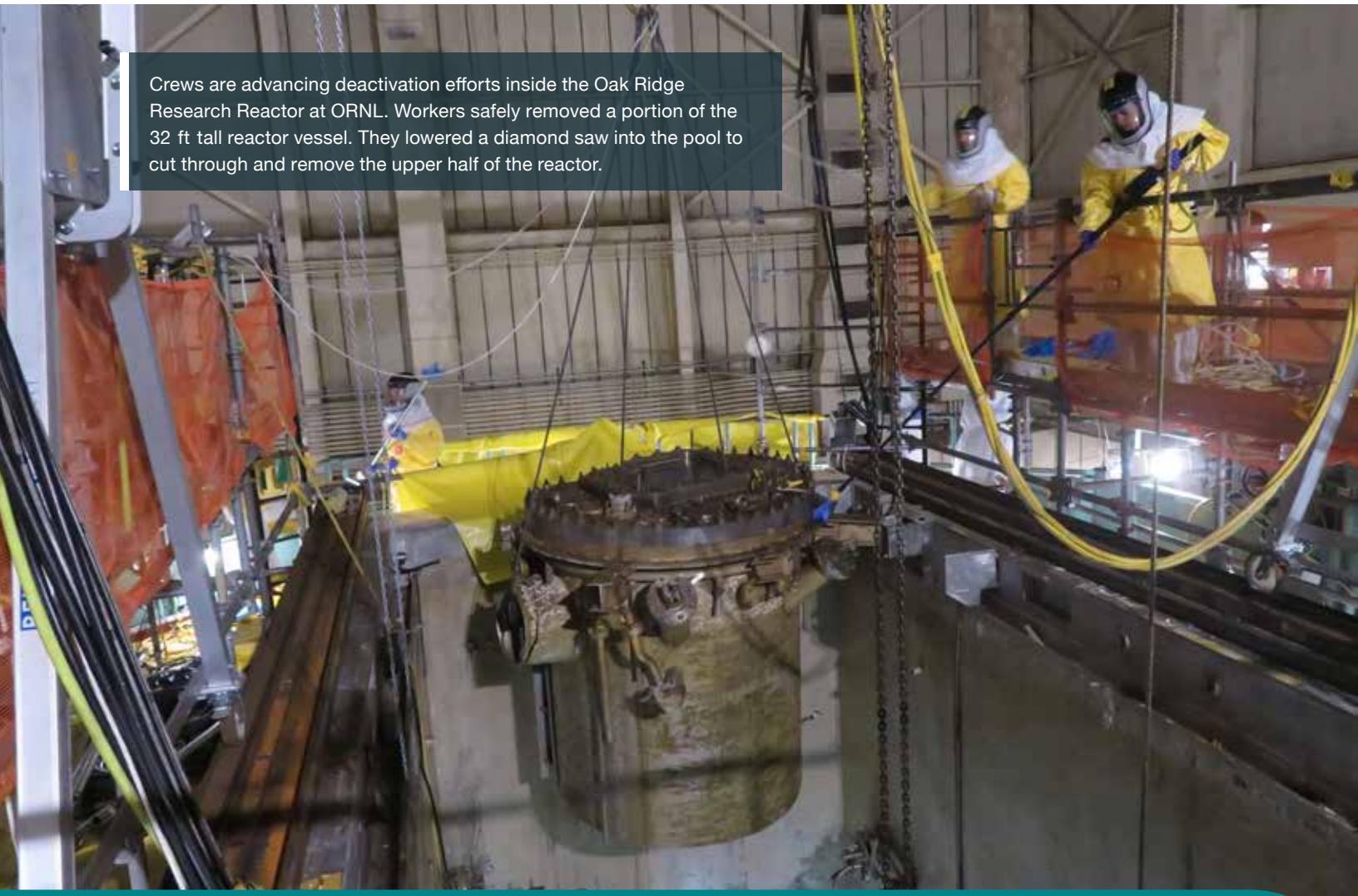
OREM is expected to finish processing, downblending, and disposing the remaining inventory of uranium-233 stored at ORNL by 2028. This is EM's highest priority at ORNL because it drives the security posture of the site. The completion of this project will significantly reduce risks and security costs, and it will enable deactivation of the world's oldest operating nuclear facility located in the heart of ORNL. All of the processing and shipments of Oak Ridge's inventory of legacy TRU debris waste will also be completed that year. This inventory includes both contact-handled and remote-handled waste.

In 2032, OREM expects to complete construction on the first phase of the new EMDF. This crucial facility will provide the on-site waste disposal capacity for low-level waste generated from completing cleanup at ORNL and Y-12.

Key Regulatory Milestones 2024–2034

Cleanup of the Oak Ridge Reservation is governed by a Federal Facility Agreement between DOE, EPA, and the Tennessee Department of Environment and Conservation. This agreement establishes the guidelines and milestones for cleanup in Oak Ridge in accordance with CERCLA and other laws.

- Complete Bulk Shielding Reactor demolition at ORNL — 2024
- Completion Low Intensity Test Reactor demolition at ORNL — 2024
- Complete Graphite Reactor support facilities demolition at ORNL — 2025
- Complete Isotope Row facilities demolition at ORNL — 2025
- Complete Building 3038 demolition at ORNL — 2026
- Complete the Record of Decision (ROD) for Zone 1 groundwater plumes at ETTP — 2026
- Complete the ROD for remaining ecology, surface water, sediment at ETTP — 2026



Crews are advancing deactivation efforts inside the Oak Ridge Research Reactor at ORNL. Workers safely removed a portion of the 32 ft tall reactor vessel. They lowered a diamond saw into the pool to cut through and remove the upper half of the reactor.

Post-2034 Cleanup Scope

At Oak Ridge, the remaining work will focus on completing cleanup at ORNL and Y 12. This will include deactivating and demolishing the remaining excess contaminated facilities, remediating soil and groundwater, and addressing source contamination. OREM will also work to address the 400,000 gallons of TRU sludge stored on site and operate the program's waste treatment and disposal facilities.

Crews will begin demolition on the 325,000 sqaure foot Alpha 2 facility in 2024. It marks the first teardown of a former uranium enrichment facility at Y 12.

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Paducah

Overview

In 1950, the Atomic Energy Commission (AEC), a predecessor agency to DOE, selected a 3,556-acre tract of government-owned land near Paducah, Kentucky, in McCracken County, as the location to construct a second Gaseous Diffusion Uranium Enrichment Plant (GDP) to support U.S. national security needs. The Paducah GDP enriched uranium from 1952 to 2013 and was the last government-owned enrichment facility to operate in the United States. The Paducah GDP produced low-enriched uranium originally as feedstock for nuclear weapons materials and later for commercial nuclear power plants.

Environmental cleanup of the Paducah GDP began in 1988 when groundwater contamination resulting from plant operations was discovered outside of the DOE property. Environmental cleanup includes remediation of groundwater, surface water, soil, lagoons, and burial grounds. All of the more than 500 facilities and buildings will be evaluated for removal and/or remediation, including four process buildings measuring more than 74 acres under roof.

The Paducah Site is also home to one of DOE's two depleted uranium hexafluoride (DUF6) conversion plants. DUF6 was a byproduct from uranium enrichment operations at Oak Ridge, Tennessee; Portsmouth, Ohio; and Paducah, Kentucky. DOE is safely converting the DUF6 material from approximately 67,000 steel cylinders at the Portsmouth and Paducah sites to more stable and usable compounds.

Calendar Year 2023 Accomplishments

- **Removed an additional 1 million pounds of hazardous R-114 refrigerant — an EM 2023 priority**
- **Completed demolition on 16 excess facilities**
- **Completed the C-209 Protective Forces facility and the C-105 Emergency Operations Center**
- **Deployed the Large Item Neutron Assay System, advancing C-333 Process Building deactivation**
- **Began the first off-site shipping of depleted uranium oxide from Paducah's DUF6 conversion plants via multi-car rail shipments for disposal at a licensed facility**

Non Destructive Assay technicians prepare to lift a robot pipe crawler onto a specially designed lifting fixture to scan the C 333 Unit 6 bypass piping.

Planned Cleanup Scope 2024–2034

In 2024, the Paducah site will dispose of another 1 million pounds of R-114 refrigerant, complete construction of the C-211 Training Facility, finalize disposition of 11 associated trailers/sheds/tanks and other structures/equipment, and complete LED street lighting upgrades — a DOE sustainability initiative.

In 2024, through an agreement with Region 4 and the Commonwealth of Kentucky to implement a strategy which will accelerate cleanup and integrate the project portfolio to make land available for future economic development — DOE will address groundwater contamination in the Northwest Plume followed by Records of Decisions for Environmental Media, deactivation and demolition, and waste disposal options in the coming years.

Over the next decade, DOE plans to complete deactivation work at the C-333 Process Building, one of the four large process buildings on the site. These activities include hazard removal (including refrigerant, chemicals, fire hazards, etc.), characterization of the components within the facility, and other actions to prepare the C-333 Process Building for demolition.

Within the next two years, the primary focus of the deactivation activity is the segmentation of large components in the facility. The Paducah Site expects the segmentation/downsizing of all converters from C-333, as well as characterization and deactivation of the process gas equipment contained in the unit bypass.

At the DUF6 facility in Paducah, DOE plans to continue steady state conversion operations, complete plant improvement modifications and process infrastructure upgrades supporting uranium oxide disposal.

In 2024, the Paducah DUF6 conversion facility expects to convert more than 7,000 metric tons of DUF6. By the end of 2034, approximately 110,000 metric tons of DUF6 material will be converted and approximately 16 million gallons of hydrogen fluoride will be recycled into commerce.

Key Regulatory Milestones 2024–2034

Cleanup activities at Paducah are covered by the Federal Facilities Agreement between DOE, the Commonwealth of Kentucky, and the EPA. Upcoming regulatory deliverables include:

- **Northwest Plume Technical Memorandum or Explanation of Significant Differences — 2024**
- **C-400 Complex Operable Unit Work Plan Addendum — 2024**
- **C-400 Complex Remedial Investigation Addendum — 2025**

Post-2034 Cleanup Scope

Beyond 2034, site activities will include implementation of the selected remedy for waste disposal and continued demolition of the more than 500 site facilities. The remaining environmental cleanup activities related to groundwater, surface water, soils, lagoons, and burial grounds are expected to also be completed. DOE expects to complete disposition of the entire inventory of DUF6 located at Paducah by 2057. DOE currently projects completing cleanup activities at Paducah in 2065 - 2070.

As future cleanup progresses, the planned Paducah end state is intended to allow the site to be used for light/heavy industrial purposes. This end state was developed in 2011 through a process conducted by the University of Kentucky that captured stakeholder input through a series of community meetings and integration of input from public, stakeholder, regulatory, and local community leaders. In 2023, DOE awarded a grant to the Paducah Area Chamber of Commerce to explore options for future development of the site. DOE continues to solicit and obtain stakeholder input through monthly meetings with the Paducah Citizens Advisory Board and community leaders.

Portsmouth

Overview

In August 1952, the Atomic Energy Commission selected a tract of land in the Ohio Valley along the Scioto River in Pike County, Ohio, for the site of the Portsmouth Gaseous Diffusion Plant (GDP), the third of three GDPs in the United States. In 1956, construction of the plant was completed, and the plant began enriching uranium for nuclear weapons. In the 1960s, Portsmouth's mission changed to focus on producing fuel for commercial nuclear power plants and other national security applications.

An extensive environmental cleanup program began at the 3,777-acre site in 1989, with deactivation and decommissioning activities initiated in 2011. The DOE's near-term focus is the deactivation and decommissioning of 415 facilities, including the three former uranium enrichment process buildings (X 326, X-333, and X-330), each measuring more than 50 acres of floor area. The site also continues to maintain utility operations, monitor air and water emissions, and operate several groundwater treatment facilities to address legacy groundwater contamination caused by former plant operations.

The Portsmouth Site is also home to one of DOE's two depleted uranium hexafluoride (DUF6) conversion plants. DUF6 was a byproduct from uranium enrichment operations at Oak Ridge, Tennessee; Portsmouth, Ohio; and Paducah, Kentucky. DOE is safely converting the DUF6 material from approximately 67,000 steel cylinders at the Portsmouth and Paducah sites to more stable and usable compounds.

Calendar Year 2023 Accomplishments

- **Completed disposal of debris from X-326 Process Building demolition at the On-Site Waste Disposal Facility (OSWDF)**
- **Completed excavation of 180,000 cubic yards of, and initiated backfill at, the X-231A Oil biodegradation Plot landfill for use at the OSWDF**
- **Completed structural demolition of the X-626 Recirculation Water Pump House and Cooling Tower**

Planned Cleanup Scope 2024–2034

DOE expects to complete the demolition of the two remaining process buildings over the next decade.

In 2024, deactivation work will be completed on the second process building to be addressed, the X-333 Process Building. This will include disposal of deactivation debris in the OSWDF and removal of bulk asbestos containing material. The X-333 Process Building is scheduled to be demolished by 2031. Also, by 2031, DOE expects to complete deactivation of the third and final process building, the X-330 Process Building, followed by demolition by 2034.

The first of three new cells at the OSWDF will be ready to accept waste in the 2025 timeframe to support demolition of the X-333 Process Building. The 5th and 6th cells of the OSWDF will begin accepting X-333 Process Building waste in the 2026 timeframe. Based on capacity needs to support the demolition of the X-330 Process Building and other remaining site facilities, four-to-six additional OSWDF cells will be constructed. Additionally, over the next decade, two landfills and an additional plume will be excavated and disposed of at the OSWDF.

At the DUF6 facility in Portsmouth, DOE plans to continue steady state conversion operations, complete plant improvement modifications and process infrastructure upgrades supporting uranium oxide disposal.

In 2024, the DUF6 conversion facility will reach a total of 52,000 metric tons converted to date. DOE will also complete shipments of railcars and continue progress on infrastructure upgrades supporting uranium oxide disposal. By the end of 2034, approximately 95,000 metric tons of DUF6 will be converted and approximately 148.5 million gallons of hydrogen fluoride will be recycled into commerce.

Key Regulatory Milestones 2024–2034

- **None**

The X 326 Process Building slab (top), now tinted blue with fixative, has been cleared at the Portsmouth Site with all building debris placed in the On Site Waste Disposal Facility. Crews continue to work the 5 unit soil excavation (bottom left) both remediating a groundwater plume and providing fill for the On Site Waste Disposal Facility.

Post-2034 Cleanup Scope

Beyond 2034, the last three OSWDF cells are expected to be constructed to support demolition of the X 330 Process Building and remaining balance of plant facilities. In addition, a Resource Conservation and Recovery Act decision will be made regarding final soil remediation. Cleanup activities are anticipated to be completed in the 2039 2043 timeframe, including the disposition of the entire inventory of DUF6 located at Portsmouth.

As cleanup reaches its end state at the Portsmouth Site, DOE will continue to transfer land for economic development. Through a grant with Ohio University, a multi faceted community outreach program was conducted to understand the community's future use vision for the Portsmouth Site, which led to community interest in an industrial style future use of the site. A consensus vision to reindustrialize appropriate portions of the Portsmouth Site property has been created through the PORTS Future Project in coordination with the Southern Ohio Diversification Initiative, and with input from the Portsmouth Site Specific Advisory Board, elected officials, economic development professionals, and others.

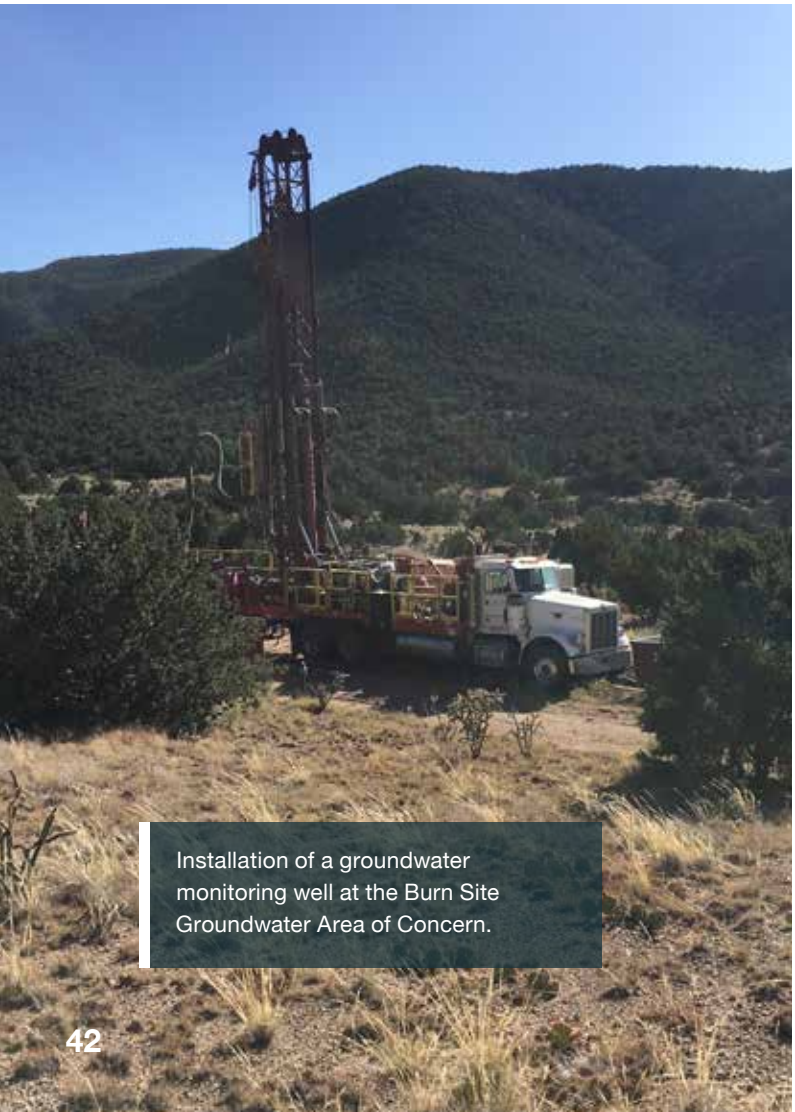
Sandia National Laboratories

Overview

EM's cleanup activities at Sandia National Laboratories (SNL) take place at the SNL section located on Kirtland Air Force Base, adjacent to Albuquerque, New Mexico. The Sandia National Laboratories-New Mexico Environmental Restoration (ER) Operations Project scope includes the remediation of inactive waste disposal and release sites, along with the characterization and remediation of three plumes of contaminated groundwater.

The regulatory driver for completing this work is the Compliance Order on Consent signed in 2004 by DOE, the Sandia Corporation, and the New Mexico Environment Department (NMED). DOE's approach is to work closely with NMED to complete Resource Conservation and Recovery Act corrective actions at the last three ER sites using cost-effective approaches that meet regulatory requirements.

The remaining cleanup scope includes three areas with contaminated groundwater in various stages with contaminated groundwater in various stages of characterization and remedy selection — the Tijeras Arroyo Groundwater Investigation Area of Concern (AOC), the Burn Site Groundwater Investigation AOC, and the Technical Area-V Groundwater AOC. All soil sites in SNL's baseline have received Corrective Action Complete status from NMED and have been transferred to the laboratory's landlord, the National Nuclear Security Administration (NNSA).



Installation of a groundwater monitoring well at the Burn Site Groundwater Area of Concern.

Calendar Year 2023 Accomplishments

- **NMED approved the Final Remedy Monitoring Natural Attenuation (MNA) and the Corrective Measures Implementation Plan for the Tijeras Arroyo Groundwater Area of Concern**

Planned Cleanup Scope 2024–2034

EM's work scope at Sandia entails the continued semi-annual sampling of the Perched Groundwater System monitoring wells and annual sampling of the Regional Aquifer wells. EM will continue to manage the long-term monitoring requirements until the work is transitioned to NNSA, which is expected to occur by 2031.

Key Regulatory Milestones 2024–2034

- None

Post-2034 Cleanup Scope

EM work is expected to be completed by this timeframe. Long term monitoring requirements are expected to transition to NNSA by 2031.

Savannah River Site

Overview

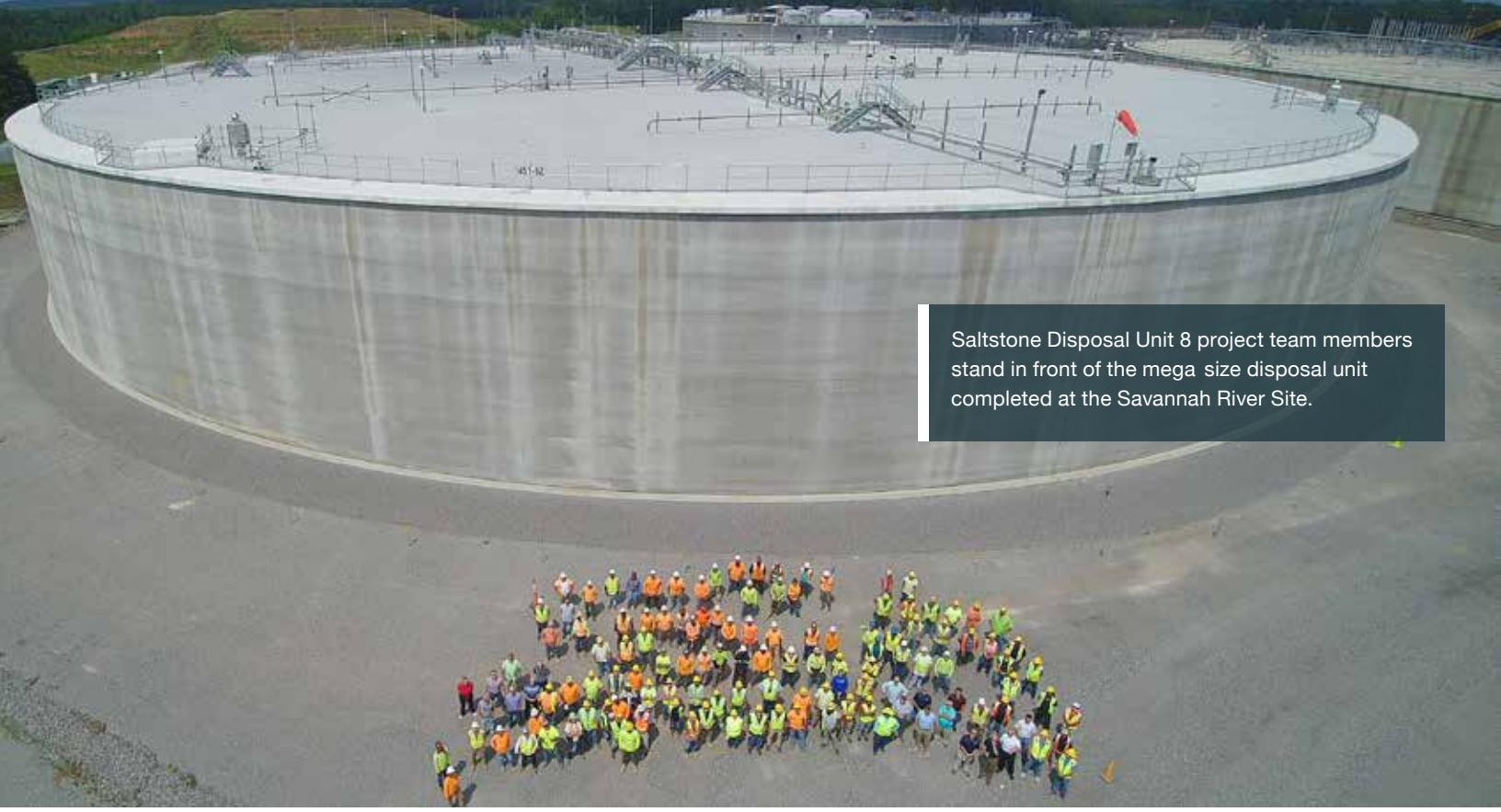
The Savannah River Site (SRS), a 310-square-mile site in Aiken, South Carolina, focused on the production of plutonium and tritium for use in the manufacture of nuclear weapons from its inception in the early 1950s until the end of the Cold War. In 1992, the focus at SRS turned to environmental cleanup, nuclear materials management, and research and development (R&D) activities.

Today, SRS is run by EM and host to National Nuclear Security Administration (NNSA) and the U.S. Forest Service. The DOE Savannah River Operations Office (DOE-SR) works in partnership with multiple contractors in technically sophisticated nuclear and non-nuclear facilities. Cleanup activities at SRS include addressing 33.2 million gallons of radioactive liquid waste stored in 43 underground tanks; surplus plutonium downblending with eventual disposition as transuranic waste at the Waste Isolation Pilot Plant (WIPP); disposition of highly enriched uranium and receipt/storage/processing of foreign and domestic research reactor spent nuclear fuel; facility deactivation and decommissioning (D&D); and soil and groundwater remediation.

To date, 317 of 1,126 facilities have undergone D&D; 412 of 515 waste units across multiple industrial areas have been remediated; and 40 remediation systems are in operation addressing 14 groundwater contamination areas. Notably, collaboration among SRS stakeholders and state and federal regulators resulted in the in-situ decommissioning of P- and R-Area Reactors in 2011 — the first in the DOE complex. Finally, the operational footprint of SRS has been reduced by 85 percent.

SRS processes and stores nuclear materials in support of national defense and U.S. nuclear nonproliferation efforts. SRS is also responsible for operational oversight of the Savannah River National Laboratory (SRNL), EM's only national laboratory. SRNL assists EM in achieving the nation's legacy nuclear waste cleanup objectives and plays an equally important role supporting NNSA through its work in tritium R&D, operations support,

Operators check readings in the H Canyon Control Room.



Saltstone Disposal Unit 8 project team members stand in front of the mega size disposal unit completed at the Savannah River Site.

stockpile stewardship, nuclear nonproliferation, and other critical national security programs.

SRS leadership is dedicated to meaningful engagement with stakeholders and the citizens of the Central Savannah River Area. DOE-SR and contractor managers meet regularly with federal and state regulators, business and community leaders, and citizen groups to provide updates on SRS operations and to solicit input regarding the missions and budget priorities. SRS enjoys a positive working relationship with stakeholders who support the vision for the coming decade. SRS stakeholders include the Environmental Protection Agency (EPA), South Carolina Department of Health and Environmental Control (SCDHEC), the Savannah River Site Community Reuse Organization, the SRS Citizens Advisory Board, and a host of state and local elected officials.

Calendar Year 2023 Accomplishments

- **Reached a milestone of more than 2,000 canisters double stacked at Glass Waste Storage Building 1**
- **Achieved record production of treating nearly 2.6 million gallons of waste at the Salt Waste Processing Facility (SWPF)**
- **Completed construction of Saltstone Disposal Unit 8 — an EM 2023 priority**
- **Received 114 electric vehicles as part of the EM-wide fleet goals — an EM 2023 priority**
- **Began preparations for High Assay Low Enriched Uranium production in H Canyon**
- **Completed implementation of the accelerated remedial strategy for the Lower Three Runs watershed, the first watershed closed on SRS**
- **Received Secretary of Energy Achievement Award for the Lower Three Runs Remediation Project**
- **Gained CD-0/1 approval for 235-F Facility Demolition**
- **Placed the last piece of structural steel for the Advanced Manufacturing Collaborative (AMC) — an EM 2023 priority**

Planned Cleanup Scope 2024–2034

Over the coming decade, DOE expects to significantly enhance its ability to tackle the largest remaining environmental risk at SRS — radioactive tank waste — with continued operational improvements within waste treatment facilities. DOE will also make continued progress in addressing nuclear materials stored at SRS and complete disposition of the remaining TRU waste.

The liquid waste program will achieve significant risk reduction through continued stabilization and immobilization of the high-activity fraction of the waste in a glass form and immobilization of the low-level fraction of the waste as a saltstone form. The SWPF has processed more than 7.6 million gallons of tank waste since radioactive operations began in January 2021. EM expects to process up to 9 million gallons of waste per year following several planned process and facility optimizations over the next year. In total, the Savannah River liquid waste program has processed more than 15 million gallons of radioactive salt waste since 2008.

In 2023, DOE-SR and its liquid waste contractor released Revision 23 of the SRS Liquid Waste System Plan. This plan integrates and outlines the activities required for the disposition of existing and future high-level radioactive waste and the removal from service of radioactive liquid waste tanks and facilities belonging to EM. It records a planning basis for waste processing in the liquid waste system through the end of the program mission.

With the startup and operation of SWPF and its integration with the liquid waste system, there has been substantial progress toward tank closure. While 8 of 51 underground waste tanks have been operationally closed, work continues with 11 of the remaining 43 tanks set to be operationally closed in the next decade. By 2034, the Defense Waste Processing Facility (DWPF) is forecast to have produced more than 7,400 canisters of vitrified radioactive waste. More than 4,400 canisters have been poured so far. The liquid waste program will continue to support receipt of waste from H-Canyon operations.

The nuclear material disposition program's near-term strategic objectives are to continue disposition of legacy material stored in L- and K-Areas, as well as continued surveillance and maintenance of excess, non-operating nuclear facilities awaiting decommissioning. Over the next 10 years, the K-Area facilities will continue to downblend and disposition both EM and NNSA surplus plutonium to produce TRU waste for disposal at WIPP. In 2023, Savannah River began shipping downblended plutonium to WIPP from K-Area. The NNSA capital

An aerial photograph of Building 235 F at the Savannah River Site.

project for Surplus Plutonium Disposition is underway and will expand the existing downblending capability by installing three new gloveboxes and support systems.

The K-Area facilities will continue to provide long-term storage of special nuclear material owned by both EM and NNSA.

The L-Area facilities will continue to provide wet storage of spent nuclear fuel received as part of the domestic and foreign research reactor fuel receipt programs. The Receiving Basin for Off-Site Fuels and F/H Analytical Laboratories will complete deactivation activities, enabling transfer to the decommissioning program.

The SRS environmental remediation program employs an approach to address remediation of waste units and facility D&D per the various site areas. The program will continue to clean up contaminated soils, groundwater, streams and associated wetlands, and legacy waste units, which include ash basins and coal yards. EM is committed to reducing risk and protecting groundwater aquifers and surface waters from the spread of contamination by addressing sources of contamination and employing innovative technologies such as the in-ground reactive barrier wall in P-Area to treat solvent-contaminated groundwater. In addition, an integral part of the cleanup mission is the D&D of legacy facilities constructed in support of industrial operations, common infrastructure systems, and past nuclear materials production, such as the 235-F Plutonium Processing Facility, C/K/L Reactors, and F-Area Tank Farm. SRS will continue to operate and maintain soil and groundwater remedial systems, and conduct post-closure and post Record of Decision care, surveillance, and maintenance of 73 closed areas (approximately 1,000 acres).

EM TO NNSA TRANSFER

EM will transfer site responsibilities to NNSA in fiscal year 2024. This transfer is in recognition of the increasing role Savannah River will play in NNSA's ongoing nuclear security missions. EM will remain focused on completing the remaining legacy cleanup activities at the site. A transition plan defines the responsibilities and management of functions and capabilities for each organization.

SAVANNAH RIVER NATIONAL LABORATORY

In 2024, SRNL begins its third year under an independent management-and-operating contract, to grow and modernize to assure it meets DOE's mission needs. SRNL's core missions are to provide innovative and practical solutions to address complex environmental cleanup, long-term stewardship, and nuclear security problems in EM, the DOE Office of Legacy Management, and NNSA missions.

To support the SRNL mission, EM is building the AMC facility on the campus of University of South Carolina, Aiken. Once constructed, the AMC will provide SRNL with an accessible, modern facility for R&D that brings government, industry, and academia together to develop and share advanced manufacturing technology. It will also support STEM education to train the next generation of advanced manufacturing workers to support both DOE missions and U.S. industry that will increase manufacturing competitiveness across the state, region and nation. Construction of the AMC facility is expected to be completed in 2025.

Following the completion of the transfer of overall site responsibility from EM to NNSA, EM will retain management of SRNL.

Key Regulatory Milestones 2024–2034

Cleanup work at Savannah River is governed by a Federal Facility Agreement among the DOE, SCDHEC, and the EPA. In addition, the Dispute Resolution Agreement with SCDHEC governs salt waste processing quantities for the liquid waste program.

- **Continue accelerated D-Area closure activities**
- **Remedial Action start for Ash Program Beneficial Reuse for 6 units — 2028**
- **Remedial action for C-Area groundwater — 2031**
- **Remedial action for L-Area rubble pits — 2032**
- **Remedial action for P-Area groundwater — 2032**
- **Remedial action for D-Area groundwater — 2033**

The Advanced Manufacturing Collaborative continues to take shape in Aiken, SC. The last piece of structural steel was placed in November 2023 and crews are on track to have the facility completed in summer 2025.

Post-2034 Cleanup Scope

The liquid waste program will start shutting down its operations after DWPF completes treatment operations for the remaining sludge and salt waste and operational closure of the tank farms is completed. Once the liquid waste program cleanup mission is completed, the surveillance and maintenance of the vitrification canisters in storage will be transferred to the solid waste program before eventual disposition at a federal repository yet to be determined. The remaining non operational nuclear material facilities (e.g., F Canyon/FB Line, H Canyon/HB Line) will complete deactivation and be turned over for decommissioning. Operations in K Area will continue to support the disposition of surplus plutonium with a significant downblending mission, with the facility deactivated after the special nuclear material is dispositioned.

Newly generated wastes resulting from the EM cleanup program will continue to be disposed of in accordance with the EM mission as the waste is generated. As the nuclear materials and liquid waste programs complete their missions, the environmental remediation and D&D programs will ramp up to provide for remediation of approximately 100 legacy waste units and D&D of over 800 industrial, nuclear, and radioactive facilities. DOE currently expects to complete legacy cleanup activities at Savannah River by 2065.

Waste Isolation Pilot Plant

Overview

The Waste Isolation Pilot Plant (WIPP) is the nation's only deep geologic repository for the disposal of transuranic (TRU) waste generated by atomic defense activities. WIPP is located 33 miles southeast of Carlsbad, New Mexico, in the Chihuahuan Desert. Waste is disposed of in a set of panels located nearly one-half mile below the surface (2,150 feet) in a deep geologic salt bed formed 250 million years ago. Construction of WIPP started in the early 1980s. The facility began emplacing TRU waste in 1999 and celebrates 25 years of operations in 2024. To date, WIPP has received more than 13,400 shipments. Those shipments were safely transported more than 16 million cumulative miles.

The Waste Isolation Pilot Plant Land Withdrawal Act (LWA), Public Law 102-579 as amended by Public Law 104-201, limits the amount of TRU waste which can be disposed of in the repository to 6.2 million cubic feet (about 176,000 cubic meters). WIPP is currently anticipated to operate beyond 2050.

A number of diverse Tribes and stakeholder groups closely monitor all aspects of WIPP and the National TRU Program. WIPP has pursued significant engagement with stakeholders across New Mexico with an interest in WIPP events, progress, and the role WIPP has in the overall cleanup of the DOE complex. WIPP engages routinely with state and federal regulators, and advocacy groups that tend to serve a watchdog role in their interest in WIPP. DOE provides technical, training, logistical, and funding support to six Tribal Nations and state regional groups that focus on the safe transport of TRU waste through their jurisdictions. The Carlsbad Field Office continues to work with its stakeholders and foster the ongoing collaborative relationships developed since the inception of WIPP.

Ribbon cutting for the start of mining Panel 11.

Calendar Year 2023 Accomplishments

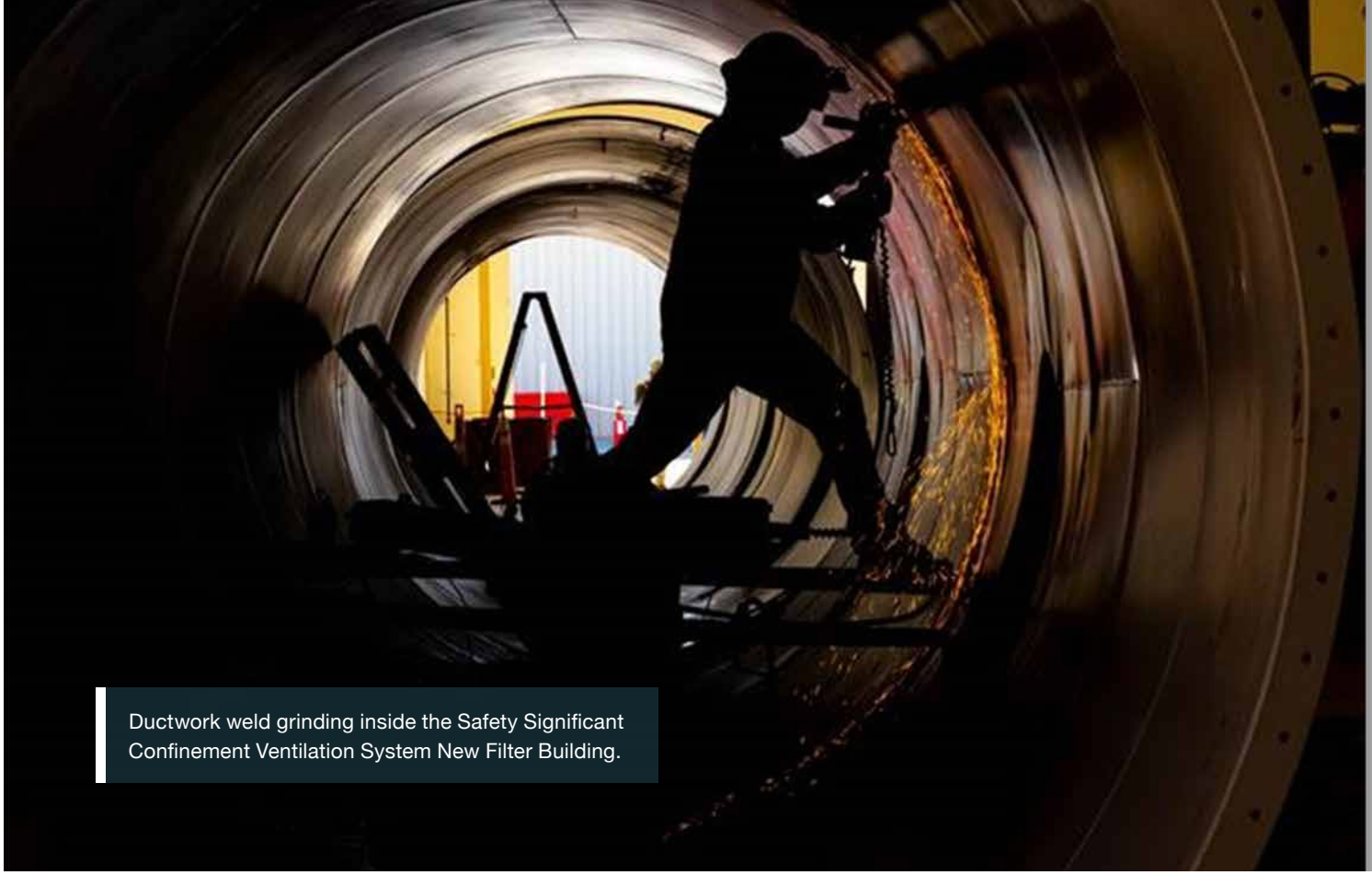
- Began TRU waste emplacement in Panel 8 of the WIPP Underground
- Received 473 waste shipments from generator sites
- Completed sinking the Utility Shaft to reach the final depth of 2,275 feet
- Began commissioning the new Safety Significant Confinement Ventilation System (SSCVS) — an EM 2023 priority
- Received New Mexico Environment Department approval for a new 10-year operating permit
- Successfully completed the transition to a new management-and-operations contract

Planned Cleanup Scope 2024–2034

It is anticipated during the next 10 years, approximately 883,000 cubic feet (25,000 cubic meters) of TRU waste from EM, the National Nuclear Security Site, and small quantity sites will be emplaced at WIPP. WIPP will continue to work closely with the EM Los Alamos Field Office (EM-LA) to expedite the shipping of its legacy waste. EM-LA will remain the only EM site with an "at-ready" arrangement with WIPP, meaning when EM-LA has waste ready to ship, WIPP will accept it.

To support planned waste emplacement activities, much of the work to be performed at WIPP over the next decade focuses on necessary infrastructure improvements to ensure the facility can continue to play its important role in the EM complex.

By the end of 2026, a set of key infrastructure projects will be completed, improving WIPP's capabilities in mining and waste emplacement. These include the new SSCVS, which will provide 540,000 cubic-feet-per-minute of ventilation to the underground, allowing



Ductwork weld grinding inside the Safety Significant Confinement Ventilation System New Filter Building.

concurrent mining, waste emplacement, and ground control operations throughout the life of the facility. The new Utility Shaft will serve as an air intake entry point to support the mine and meet SSCVS volumes. The Utility Shaft is proposed to house a new, larger capacity hoisting capability to transport materials in and out of the repository.

WIPP will also work to replace disposal capability that was lost following a radiological incident that occurred in 2014. WIPP has applied to the state of New Mexico for approval to mine two new panels (Panels 11 and 12). Panels 11 and 12 will be replacement panels for space lost in Panels 1-7 and from the abandonment of Panel 9.

Additional site infrastructure improvements scheduled for completion during the next decade include:

- Recapitalization of key safety systems
- Replacement/refurbishment of shaft and hoist systems
- Upgrades to monitoring systems
- Replacement of electrical substations
- Installation of additional backup generators
- Modernization of underground equipment to zero-emission, battery-electric vehicles, or very low-emission Tier IV diesel-powered equipment
- Replacement of underground electrical system switch stations
- Installation of a new digitally based geotechnical monitoring system in the WIPP underground

Regulatory Milestones 2024–2034

- None

Post-2034 Cleanup Scope

DOE expects to operate WIPP until its full capacity limit is met, as defined by the LWA. The expected life of the project is limited by the volume of waste allowed under the LWA, which does not specify an operating period for WIPP. Before taking any actions outside the scope of DOE's existing National Environmental Policy Act (NEPA) analysis and decisions, DOE will determine the need for and conduct, as appropriate, further NEPA analyses.

West Valley Demonstration Project

Overview

The West Valley Demonstration Project (WVDP) is an approximate 150-acre area located within the Western New York Nuclear Service Center (WNYNSC), which is a 3,338-acre site located 35 miles south of Buffalo, New York. The site is owned by the New York State Energy Research and Development Authority (NYSERDA) and is home to the only commercial spent nuclear fuel (SNF) reprocessing facility to operate in the United States. In 1962, Nuclear Fuel Services, Inc., entered into agreements with the Atomic Energy Commission and the state of New York to construct, license, and operate the commercial reprocessing plant, along with two associated waste burial grounds and an underground set of four tanks for reprocessing waste. The fuel reprocessing plant operated from 1966 to 1972, processing 640 metric tons of SNF and generating over 600,000 gallons of liquid High-Level Waste (HLW).

In 1980, Congress passed the West Valley Demonstration Project Act, which required DOE to conduct a HLW management demonstration project at the WNYNSC and transport the HLW to a federal repository for disposal. The WVDP Act directed DOE to:

- **Solidify the HLW in a suitable form for transportation and disposal**
- **Develop containers suitable for the HLW's disposal**
- **Transport the solidified waste to a federal repository for disposal as soon as feasible**
- **Dispose of low-level waste (LLW) and transuranic (TRU) waste produced by the HLW solidification process***

** WVDP TRU waste was derived from commercial nuclear fuel reprocessing. DOE refers to this waste stream as Greater than Class C TRU waste in Environmental Impact Statement (EIS)-0375: Final EIS (Volume I, Chapters 1-8); 2016.*

- **Decontaminate and decommission the tanks and other facilities used at the WNYNSC in which the was solidified, the facilities used in the waste's solidification, and any material and hardware used in connection with the WVDP**

DOE chose vitrification as the technology for solidifying the HLW, and DOE completed vitrifying the HLW in 2002. The resulting 278 canisters of vitrified HLW

An operator uses an excavator with a hydraulic hammer to deconstruct the Acid Recovery Cell to prepare for the removal of reinforced concrete floor blocks as part of the deconstruction of the Main Plant Process Building.

are currently stored on-site. Since 1997, DOE has been disposing of LLW at off-site disposal facilities; processing and packaging both contact-handled and remote-handled WVDP-TRU waste; and deactivating, decontaminating, and removing unneeded facilities.

In 2010, DOE and NYSERDA published, in compliance with the National Environmental Policy Act, a joint final EIS that addressed both DOE's completion of the WVDP and NYSERDA's decommissioning and/or long-term stewardship of the WNYNSC. The same year, DOE issued a Record of Decision and NYSERDA issued a Statement of Finding to proceed with a phased decision-making approach for remaining cleanup activities. Phase 1 covers soil remediation and disposition of the remaining facilities. Phase 2 will address the four underground waste tanks, the two on-site disposal areas, the non-source area of a groundwater plume, and several other minor facilities. DOE and NYSERDA intend to complete the remaining decision-making with its Phase 2 decision in a supplemental EIS.

DOE has a strong public outreach program at WVDP including conducting Quarterly Public Meetings and participating in eight monthly meetings with the West Valley Citizen Task Force. DOE provides updates of the status of ongoing Phase 1 decommissioning activities at both these meetings. DOE also provides a status of site progress at the monthly Ashford Town Board meetings.

Calendar Year 2023 Accomplishments

- **Demolished and disposed of 9,000 tons of Main Plant Process Building (MPPB) waste — an EM 2023 priority**
- **Completed the construction of the new guard house facility**
- **Shipped two of seven Chemical Process Cell degraded containers**

Planned Cleanup Scope 2024–2034

Work underway at West Valley is now focused on completing demolition of the MPPB. By 2025, DOE expects to complete the removal of the above grade portion of the MPPB.

By 2025, DOE and NYSERDA intend to make an integrated decision on the path forward for the Phase 2 decommissioning activities and/or long-term stewardship of the WNYNSC. Phase 2 decommissioning decisions will address the four underground tanks, the two waste disposal areas, the non-source area of the groundwater plume, and several other facilities.

By the end of 2032, DOE expects to complete the decommissioning of the below-grade portions of the MPPB and the Vitrification Facility, where above ground demolition was completed in 2019. DOE will also complete the decommissioning of the site's radioactive water treatment system, including four active lagoons and one closed lagoon. By the end of 2036, DOE will complete soil remediation efforts in Waste Management Area-1 and Waste Management Area-2.

If a disposal option for WVDP-TRU waste is available, DOE could, by the end of 2037, complete the processing, packaging, shipment, and disposal of WVDP-TRU waste and removal of remaining waste processing facilities, such as the Remote-Handled Waste Facility, once TRU waste shipping and disposal is complete.

Key Regulatory Milestones 2024–2034

- **None**

Post-2034 Cleanup Scope

Remaining work at West Valley post 2034 will focus on disposal of "orphan" waste (waste which currently does not have a pathway for disposal) and completion of Phase 2 decommissioning activities. DOE currently anticipates completing cleanup activities at West Valley by 2043.

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