



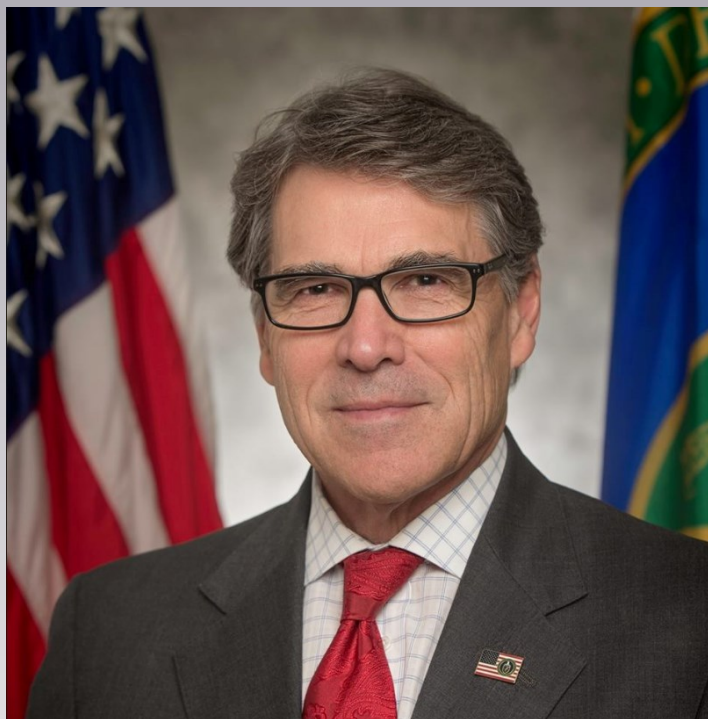
U.S. DEPARTMENT OF  
**ENERGY**

OFFICE OF  
ENVIRONMENTAL  
MANAGEMENT



# Year in Review 2018

# 2018 Year in Review



*“As the Department of Energy continues to open new horizons in innovation and secure energy production, we remember our responsibility to address the environmental liabilities we accrued while winning World War II, and keeping the fraught peace in the Cold War. The Office of Environmental Management is making great progress toward reducing and eliminating that legacy by using the funds entrusted to them by the American taxpayers to make steady and sustained progress on the cleanup in a safe, efficient and cost-effective manner.”*

– U.S. Secretary of Energy Rick Perry



*“The Office of Environmental Management has built great momentum over the last year and we are well on our way to reinvigorating the completion mindset and clean up mission. I am proud of our accomplishments and I credit the entire EM workforce—both federal and contractor—with these successes and I look forward to many more. We have a unique opportunity, tremendous spirit, and great support from the Department of Energy to get work done at our sites and this year proves we are well on our way.”*

– Assistant Secretary Anne White, Office of Environmental Management



# Office of Environmental Management

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*Energy Secretary Perry with (from right) Assistant Secretary White, Senator McConnell, Assistant Secretary Burnison and others touring the Paducah site.*

## Progress Through Action

The federal government has an obligation to clean up the environmental legacy of the national defense programs that helped end World War II and the Cold War. Progress through action is being made at every site across the Office of Environmental Management (EM) complex. The men and women on the ground at EM sites – field managers, staff and contractors alike – are moving the ball forward, safely and effectively executing their work.

In 2018, demolition of the 50-foot-tall, 10,000-square-foot vitrification facility at the West Valley Demonstration Project in New York was completed. The facility was used to solidify 600,000 gallons of high-level liquid radioactive waste from 1996 to 2002. At the Waste Isolation Pilot Plant (WIPP), work began on a new safety significant ventilation system that will enable more efficient work while protecting the health and safety of workers.

Energy Secretary Perry was on hand at the Savannah River Site (SRS) earlier this year to break ground on the second 32-million-gallon Saltstone Disposal Unit that is key to closing the underground waste tanks at the site. Also at Savannah River, consolidation of more than 400,000 cubic yards of coal ash and ash-contaminated soil was completed 14 months ahead of schedule, saving \$9 million, and resulting in the SRS management and operations contractor receiving the Project Management Institute Award for Project Excellence.

After many years of planning, workers at Hanford began moving radioactive sludge to T Plant. Once completed, this work will allow the Department to remove a reactor basin and place the last two Hanford reactors into interim safe storage – reducing risks to the environment, as well as approximately \$23 million annually in costs.

### Reinvigorating EM's Completion Mindset

EM faces significant challenges with environmental liabilities and costs growing each year. Recognizing these challenges, EM is focused on modernizing the program so that cleanup is reflective of the latest science in the areas of waste composition and risks, lessons learned over decades of cleanup, accurate and up-to-date liability and cost data, and attainable end-states that are protective of human health and the environment.

In 2018, EM took steps to drive cleanup not only towards progress, but to propel it towards completion. Improvements have been made to procurement processes, contract management and oversight performance with a focus towards end-state contracting to create a culture of completion.

EM has also taken steps to get the best value out of every cleanup dollar through progress on smart regulatory reform and alignment, efforts to drive down operating costs to free up resources for actual cleanup work, and improved liability, cost and schedule information that will lead to better decision-making.

### Increasing Options for Acceleration

There are opportunities to streamline and accelerate cleanup by pursuing strategies that are faster, more cost effective, and will reduce risk to human health and the environment by addressing challenges sooner.

In 2018, EM began taking a hard look at potential barriers to success and how they could be mitigated to drive to completion faster. Development of a site-by-site options analysis is being conducted to identify opportunities to complete cleanup work through more efficient and innovative approaches over the next decade.

These approaches include examining possible options to better manage and dispose of waste that has been stored at sites for decades with no near-term path forward. For example, the Department opened a public conversation about defining waste based on its constituents instead of solely on how it was generated. An initiative at Hanford at the end of 2017 successfully demonstrated pre-treating a small volume of tank waste, and the ability to treat, stabilize and dispose of it at off-site commercial facilities. In 2018, this initiative helped EM evaluate additional options for getting waste out of underground tanks, and treated and disposed of sooner—driving down liability, as well as risks to workers, the public and the environment.



*Assistant Secretary White touring facilities at the Hanford Site.*



*Jeremy Hampton of Fluor Idaho shows EM Assistant Secretary White a "bubble suit".*

### Enduring Economic Opportunities

With a drive toward completion, attention naturally turns to the future of communities that host EM sites. The year marked the first transfer of land back to the local community surrounding the Portsmouth Gaseous Diffusion Plant. The 80-acre parcel is being managed by the Southern Ohio Diversity Initiative for economic redevelopment. At Oak Ridge, demolition of the Toxic Substances Control Act (TSCA) incinerator and its 100-foot stack was completed. This is but one of 80 structures, totaling more than 142,000 square feet, taken down at the East Tennessee Technology Park in 2018 as Oak Ridge approaches its "Vision 2020" goal to complete major cleanup at the ETPP site – paving the way for long-term economic growth and diversification.

Through progress like this, as well as the Department's participation in Science, Technology, Engineering and Math (STEM) initiatives, utilization of the national labs and close collaboration with the cleanup community – progress is being made towards the shared goals of safe, clean sites and a robust economy for generations to come.



# Richland Operations Office

*"This was a year of great progress, as we completed the majority of the 220-square-mile River Corridor cleanup and continued major risk-reduction on the Central Plateau. Completing these projects not only reduces risks but sets the stage for significantly reducing our annual operating costs in the coming years."*

*– Doug Shoop, Manager, Richland Operations Office*

## Highlights

- Began moving radioactive sludge to T Plant from K-Basin
- Continued hot cell cleanup, began installing equipment to excavate highly contaminated soil under the 324 Building
- Significant progress toward moving radioactive capsules to safer, lower-cost storage
- Began stabilizing second waste storage tunnel at risk of collapse
- Resumed demolition at the Plutonium Finishing Plant, the most hazardous facility at Hanford
- Treated record 2.3 billion gallons of contaminated groundwater at lowest cost in Hanford's history



*A record 2.3 billion gallons of groundwater treated at the lowest cost in the Site's history.*



*Workers began filling PUREX No.2 waste storage tunnel with engineered grout.*

## Sludge Progress Reduces Risks, Will Lead to Elimination of Substantial Costs

Workers began moving 35 cubic yards of radioactive sludge out of the K West Reactor Basin. The sludge is loaded into large, shielded casks and transported to T Plant, located in the center of the Site on the Central Plateau. Transferring the sludge will enable the Department to remove the reactor basin, place the last two Hanford reactors into Interim Safe Storage, and eliminate annual operating costs of approximately \$23 million.

## Forward Progress on Safe, Cost-Effective Cesium, Strontium Storage

Significant progress is being made toward moving 1,936 capsules of highly radioactive cesium and strontium safely out of a water storage pool in the Waste Encapsulation Storage Facility (WESF) and into dry storage casks. The cesium and strontium were removed from the waste in Hanford's underground storage tanks in the 1970s and represent about one-third of the cesium and strontium inventory on-site. Moving the capsules to dry storage eliminates the potential for exposing workers and the public to radiation hazards in the event of a major earthquake and also reduces annual storage costs by approximately \$5 million.

### Demolition Resumes at PFP with New Safety Controls

A new approach for demolition work at the Plutonium Finishing Plant (PFP) has been put in place over the course of the year, culminating in lower-risk demolition work moving forward. The Department, its contractor team, regulators and expert panels collaborated to ensure safe demolition at a steady pace following a 2017 spread of contamination. Armed with a thorough understanding of root causes of the spread, and new safety controls in place, lower-risk demolition work resumed at PFP in September.



*Workers training in a mock-up facility prepare to dig highly contaminated soil out from under the 324 Building.*



*Workers maintain and upgrade infrastructure systems across the site.*

### Record Treatment of Groundwater at Lowest Cost in Site History

Workers met a key performance goal of treating 2.2 billion gallons of groundwater seven weeks ahead of schedule, and removed more than 90 tons of contaminants. The keys to this year's success in treating groundwater have been putting worker innovations into practice and improving treatment systems while keeping them running well. For example, reusing containers of activated carbon that filter volatile organic compounds out of the air in treatment tanks decreased potential waste and helped save money.



# Office of River Protection

*"I am encouraged every day by the meaningful and visible progress being made toward the safe startup of Hanford tank waste treatment just a few years away. We are working daily to transition our government/industry team dynamic and culture to support safe, efficient and effective tank waste treatment operations at the Waste Treatment Plant to realize the incredible work done by many for a long time at the Hanford Site."*

– Brian Vance, Field Manager, Office of River Protection

## Highlights

- Successful demonstration of vitrification of tank waste
- Tank farms contractor wins fourth consecutive Voluntary Protection Program Innovation Award
- Remote technology used to inspect bottom of double-shell tank for first time
- Post-retrieval equipment dismantling changing Hanford's C Tank Farm footprint
- ORP approves safety basis for Hanford Waste Treatment and Immobilization Plant
- Five WTP support buildings move into commissioning phase
- Key construction, operating permits approved for Effluent Management Facility and Analytical Lab



*WTP's Analytical Laboratory operating permit marked first major WTP facility to complete all phases of state's mandated permit lifecycle.*

## Tank Waste Successfully Vitrified in Lab Demonstration

In a first-of-a-kind demonstration, the Office of River Protection (ORP) and its contractors, in partnership with Pacific Northwest National Laboratory (PNNL), vitrified low-activity waste from underground storage tanks at Hanford, immobilizing the radioactive and chemical materials within a durable glass waste form. This marked an important step in the Hanford tank waste mission which involves treating millions of gallons of hazardous waste generated during past plutonium production. The test was the most recent in a series using the PNNL-designed test platform and actual tank waste to mimic key processes to be used in the Direct Feed Low-Activity Waste (DFLAW) approach. The DFLAW approach will enable treatment of low activity Hanford tank waste to begin.

## Tank Waste Pretreatment Capability Gets a Boost

In support of the DFLAW approach, design is underway on a system to separate both cesium and solid materials from Hanford's tank waste, providing a low-activity waste stream that will be sent to the Waste Treatment and Immobilization Plant (WTP) Low Activity Waste (LAW) Facility for vitrification. The Tank-Side Cesium Removal (TSCR) project relies on technology successfully deployed at several locations worldwide, including EM's Oak Ridge Site and the Fukushima nuclear cleanup in Japan. This efficient and cost-effective technology is a key step toward enabling ORP to begin pretreating Hanford's tank waste as soon as possible.



*Ben Harp, ORP deputy manager, signs a Safety Evaluation Report recommending approval of the Hanford Low-Activity Waste vitrification facility Documented Safety Analysis.*

### Forward Progress at WTP

In May, ORP approved a critical safety basis report needed before WTP can begin vitrifying low-activity tank waste. The report, known as a Documented Safety Analysis, outlines the ways operators will address potential hazards to protect workers, the public, and the environment when the plant comes online.

Five major WTP utility systems were brought online as the facility continues the transition from construction to startup and commissioning in support of DFLAW. The focus is now on completing the commissioning phase for each building — the final step before operations of the DFLAW facility.

In addition to these efforts, ORP worked closely with the State of Washington to secure key permits for the Effluent Management Facility (EMF) and Analytical Laboratory. EMF is the final WTP support building required to deliver the DFLAW approach. In June, the Analytical Lab became the first major WTP facility to complete all phases of the state's mandated permit lifecycle — from initial design, through groundbreaking and construction, and finally the issuance of an approved operating permit. The key function of the laboratory is to confirm the glass produced by the WTP LAW Facility meets regulatory requirements.



*Scientists melt radioactive waste into glass in test platform designed to mimic DFLAW process.*



*The Water Treatment Building is one of five WTP support facilities that have been handed over for commissioning.*

### Tank Farm Innovations

This past year, Hanford's tank farms contractor received its fourth consecutive Voluntary Protection Program Innovation Award for developing and implementing innovative tools to reduce radiological and industrial hazards to workers. In addition, two new "crawlers" designed to inspect the bottom of Hanford's double-shell tanks were recently deployed. With tank waste retrievals completed in C Tank Farm, the landscape has significantly changed as workers have made significant progress in dismantling site infrastructure including electrical skids, power units, water systems, cameras, heating structures and more — all used during retrieval activities. This removes many potential hazards to crews conducting ongoing or future work in C Tank Farm.



# Savannah River Site

*"SRS continues to maintain its strong safety culture, meet its regulatory commitments and deliver results for the nation. We want to build on that performance in 2019 and seek opportunities for improvement, ensuring we have the right people, doing the right things, at the right time."*

– Mike Budney, Manager, DOE Savannah River Operations Office

## Highlights

- Secretary Perry broke ground on second Saltstone Disposal Unit
- Completed the D Area Powerhouse Ash Basin cleanup project
- Installed new dissolver in H Canyon
- Removed the first Material at Risk from the 235-F Plutonium Fuel Form Facility
- Achieved Category III security status
- Grouted four H Area solvent storage tanks
- Management and operations contractor surpassed 18 million safe hours
- Liquid waste contractor set a company record of over 10 million operational hours without an injury resulting in a missed day of work
- Tank Closure Cesium Removal progressed well in 2018

## Bringing Innovation to Cleanup and Materials Management

The Savannah River Site (SRS) and its management and operations contractor built on its record of mission-delivery excellence in 2018 by developing innovative approaches to environmental stewardship and nuclear materials challenges. Phase 1 of the now-completed D Area Powerhouse Ash Basin cleanup project was 14 months ahead of schedule and \$9 million under budget. A new dissolver was installed in H Canyon, allowing for the processing of three uranium streams for the first time in the Site's history and helping to transform nuclear materials into assets and stable waste forms.

The Site also removed the first Material at Risk from the 235-F Plutonium Fuel Form (PuFF) Facility as part of the risk reduction campaign; improved security status for HB Line more than 11 months ahead of the original due date in the Layup Plan; grouted four H Area solvent storage tanks ahead of schedule; and contractor, Savannah River Nuclear Solutions, surpassed 18 million safe hours without a lost work day due to an injury.



*Before-and-after photos of the Savannah River Site D Area Powerhouse Ash Basin cleanup project.*



*SRS 235-F operators prepare for Material at Risk removal.*

### Advancing the Liquid Waste Mission

The Savannah River Site liquid waste contractor began 2018 in an outage, allowing for employee development and technology upgrades to improve operations. The liquid waste facilities restarted operations in the summer of 2018 and advanced the liquid waste mission safely and successfully.

Energy Secretary Rick Perry broke ground on the second 32-million-gallon Saltstone Disposal Unit (SDU) in February 2018. SDU 7 will safely store decontaminated salt waste solution – key to closing underground waste tanks at SRS.

Savannah River Remediation, the liquid waste contractor, received South Carolina's Palmetto Shining Star Safety Award, three safety awards from the National Safety Council, and the Voluntary Protection Program Legacy of Stars Award. Employees set a company record of over 10 million operational hours without an injury resulting in a missed day of work.

Tank Closure Cesium Removal (TCCR), a pioneer project in waste removal, progressed well in 2018. TCCR features self-shielded ion exchange columns and a specialty resin designed to remove cesium from waste. The groundbreaking process will be the first-of-a-kind in the DOE complex and opens new opportunities for accelerated radioactive waste disposition.



*Workers install an ion exchange column on the Tank Closure Cesium Removal process enclosure in the H Tank Farm.*



*Savannah River Remediation employee safely completes welding work at the Defense Waste Processing Facility.*



*Saltstone Disposal Unit (SDU) 7 is being constructed next to SDU 6.*



## Highlights

- On-line monitoring to increase H Canyon processing rate
- Working to recover valuable, irreplaceable nuclear materials
- Providing preventative radiological-nuclear detection and commodities training
- Technologies facilitate cleanup of building that produced Pu-238 fuel for U.S. space program

## On-line monitoring to increase H Canyon processing rate

The Savannah River National Laboratory (SRNL) developed and deployed tools to measure on-line uranium and acid concentrations in H Canyon saving days of process time. With expansion of these and other monitoring tools, H Canyon will move closer to achieving a 50 percent increase of the yearly baseline process rate for Spent Nuclear Fuel bundles. H Canyon is the only operating, production-scale, radiologically-shielded chemical separations facility in the U.S.

## Facilitating cleanup of PuFF building that produced fuel for space program

Decontamination technologies and approaches developed by SRNL—including remote radiation mapping devices, custom tools to overcome physical impediments, equipment to mitigate radiological hazards, and non-destructive assay of removed Material at Risk—are facilitating the cleanup and disposition of long-lived plutonium-238 (Pu-238) from the Plutonium Fuel Form (PuFF) facility at SRS. The PuFF facility was designed and operated to manufacture spheres and pellets of Pu-238 to power deep-space missions for the National Aeronautics and Space Administration (NASA) in the 1970s and 1980s.

## Recovering valuable, irreplaceable nuclear materials

SRNL is working to preserve the rare plutonium-244 and heavy curium used in nuclear forensics, medical research, and non-destructive testing that were produced in the unique high flux reactors that operated at SRS during the Cold War. SRNL has developed the flow sheet and invented equipment to extract and chemically separate the materials in the SRNL Shielded Cells.

## Providing world class training

During 2018, SRNL trained U.S. officers in 15 states and 11 Coast Guard Sectors on how to use radiological-nuclear detectors and how to respond when they discover radiological-nuclear material in the field. SRNL was funded by multiple U.S. government agencies, including the National Nuclear Security Administration, Department of State, and Department of Homeland Security, to train customs agents and other officials in 10 foreign countries in how to look for suspicious items that could be used for adverse purposes.



**Spectrophotometer**



**Results**



**Installed instrumentation**

*Installation and operation of spectrophotometers in H Canyon River Site D Area Powerhouse Ash Basin cleanup project.*



*SRNL Shielded Cell layout configured for Pu-244 recovery from Mark-18A targets.*

# Waste Isolation Pilot Plant

*“WIPP continued to move forward in 2018. With an eye on the future, we resumed mining a new waste panel, broke ground on a critical new mine ventilation system, and saw progress on infrastructure improvements that will ensure WIPP is ready for the years to come as TRU shipments come our way with more EM sites moving toward completion. Still, the most important day at WIPP is always today, as we keep a constant eye on safety – our No. 1 priority.”*

*– Todd Shrader, Manager, Carlsbad Field Office*

## Highlights

- Resumed mining of Panel 8
- Broke ground for Safety Significant Confinement Ventilation System
- Completed vital infrastructure improvement projects
- Safely increased shipments
- Completed closure of south end of mine

### Breaking Ground for Safety Significant Confinement Ventilation System

EM Assistant Secretary Anne White participated in the June groundbreaking for the Safety Significant Confinement Ventilation System, the largest containment fan system in the DOE complex and the largest capital project at WIPP in nearly 30 years. The system will significantly increase airflow in the WIPP underground, allowing for simultaneous mining, rock bolting, waste emplacement, maintenance and experimental scientific operations, while protecting the health and safety of workers.

### Completing Vital Infrastructure Improvements

Infrastructure improvements at the WIPP site are critical for the continuation of WIPP’s important national mission, as most site infrastructure is now more than 30 years old. Improvements in 2018 included replacement of a salt switch for backup power to the salt hoist, preparations for the installation of new air compressors used for airlock doors, instrumentation, and roof replacements.

## Resuming Mining

Full operations resumed at the Waste Isolation Pilot Plant with the restart of mining in Panel 8 in January. Mining is done on a continual basis so that waste panels are ready only when needed because the natural movement of salt closes the panels. Waste emplacement is currently conducted in Panel 7, and more than 19,000 tons of salt have been removed from Panel 8 to date.



*EM Assistant Secretary Anne White, fourth from left, participates in the June 14 groundbreaking for the Safety Significant Confinement Ventilation System.*



*Roof bolts are installed in the underground to secure openings and control salt creep to ensure a safe working environment.*



*Assistant Secretary White touring the underground with 2016 National Mine Rescue Contest Winners.*



### Safely Increasing Shipments

Shipments of transuranic waste to WIPP, critical to cleanup and closure of EM sites across the complex, are carefully and safely ramping up after the resumption of shipments in 2017. WIPP is now averaging between five and 10 shipments per week, with more than 310 shipments received in 2018.



*A shipment of transuranic waste arrives at the WIPP facility for permanent safe disposal.*

### Completing Closure of South End of Mine

The closure of the south end of the mine increases worker safety and allows WIPP crews to focus ground control operations and resources on active areas of the mine. Ground control, which has been reduced in the far south end of the mine since 2014, includes the installation of steel bolts in the roof and walls of the mine to slow the natural movement occurring in the salt formation. Ground control continues to be a priority at WIPP, with much of the catch-up bolting since 2014 completed throughout the mine.



*WIPP's Red and Blue Team members were top contenders in this year's National Mine Rescue Contest.*

# Idaho Cleanup Project

*"Protecting the Snake River Plain Aquifer remains our primary goal, and we made significant strides in several areas. Highlights include removing transuranic and mixed low-level waste for out of state disposal; exhumation of buried waste from the Subsurface Disposal Area; and continued transfer of spent nuclear fuel to dry storage."*

*– Jack Zimmerman, Deputy Manager, Idaho Cleanup Project, DOE Idaho Operations Office*

## Highlights

- Conducted a successful simulant run at the Integrated Waste Treatment Unit
- Progress exhuming buried waste at the Subsurface Disposal Area
- Continued leading complex in TRU waste shipments to WIPP
- Ahead of schedule transferring spent nuclear fuel to dry storage

## Progressing Toward Waste Processing

The Integrated Waste Treatment Unit (IWTU), a steam reforming unit constructed to treat 900,000 gallons of radioactive liquid waste, completed a 30-day demonstration run and successfully converted more than 53,000 gallons of liquid simulant into a dry, granular solid. Following process gas filter improvements, the IWTU ended the year in preparations for a 50-day demonstration run, a significant step forward to beginning waste processing.



*A simulant run successfully demonstrated the design of the Integrated Waste Treatment Unit.*

## Getting Waste Out of Idaho

The Waste Management Program had several notable accomplishments during the year, successfully retrieving, treating, packaging, certifying, and shipping transuranic (TRU) waste out of the State of Idaho, and continuing as the largest shipper of TRU waste to the Waste Isolation Pilot Plant (WIPP) in New Mexico.

Per the Idaho Settlement Agreement, workers are treating the remaining TRU waste at the site, and are down to the last 2,200 cubic meters. Shipments of contact-handled transuranic waste to WIPP increased during the year to as many as seven per week.



*Workers load transuranic waste for shipment to WIPP.*



*A specially-fitted backhoe exhumes targeted buried waste.*



### Reducing Risks, Protecting the Snake River Plain Aquifer

Exhumation of buried TRU waste continued at the Accelerated Retrieval Project (ARP) VIII facility, with just .08 acres left to remediate. Once exhumation is complete, Waste Management crews will move to ARP IX to begin targeted waste retrieval, which will satisfy a major requirement of the 2008 Record of Decision (ROD) for remediation of the site's Subsurface Disposal Area (SDA) landfill. The Environmental Restoration Program has been working on the second major requirement of the ROD, construction of a cap over the entire 97-acre SDA to protect the underlying Snake River Plain Aquifer. Engineers received approval on the 30-percent design package from DOE, the Environmental Protection Agency, and the State of Idaho, and have submitted the 90-percent design for review ahead of a contractual milestone.

With significant modifications to a large hot cell at the Idaho Nuclear Technology and Engineering Center (INTEC) complete, Waste Management personnel were able to double their efforts to inspect, treat (if necessary), and repackage remote-handled transuranic waste.

Spent nuclear fuel handlers continued to make progress transferring fuel from wet to dry storage. Transfers of all spent nuclear fuel received from Naval Reactors is scheduled for completion in 2019. The spent nuclear fuel storage basin at INTEC is 91 percent emptied.



*Workers extract spent nuclear fuel from the CPP-666 spent fuel basin as part of a project to move all spent fuel from wet to dry storage.*

# Oak Ridge

*"Our workforce has remained focused on completing cleanup at the East Tennessee Technology Park, and preparing for major cleanup to begin at the Y-12 National Security Complex and Oak Ridge National Laboratory. Our progress is providing new economic opportunities for the community, removing risks to the region, and clearing the way for the next generation of scientific research and national security missions."*

*— Jay Mullis, Manager, Oak Ridge Office of Environmental Management*

## Highlights

- Significant advancements toward achieving Vision 2020 at ETPP
- Addressing DOE's largest inventory of high risk facilities
- Completed site preparation for construction of the Mercury Treatment Facility
- Ramping up next major phase of cleanup at ORNL and Y-12

## Advancing Toward Vision 2020

Work performed by Oak Ridge's EM program in 2018 brought the site closer to its ambitious goal to complete major cleanup at the East Tennessee Technology Park (ETTP) in 2020. Crews made progress demolishing Poplar Creek facilities, an area that contains the most contaminated buildings remaining at ETPP. They also removed the site's former wastewater treatment plant, and a renowned waste incinerator that treated more than 35 million pounds of waste during its operations.

EM's vision for ETPP as a privately-owned industrial park is already being realized. The Department of Energy has transferred more than 1,200 acres from government ownership to the local community for economic redevelopment.



*Crews demolish Building K-633 in the Poplar Creek area.*

## Addressing High Risk Facilities and Waste Inventory

Oak Ridge's EM program has been able to remove risks and stabilize a portion of the 220 excess, contaminated, and deteriorating facilities at the Y-12 National Security Complex (Y-12) and Oak Ridge National Laboratory (ORNL).

While Oak Ridge has more high-risk excess contaminated facilities than any other site, crews continued addressing this issue in 2018 by tearing down two high-risk buildings, preventing more than 6,000 pounds of mercury from entering the environment, completed characterization for future demolition projects, and immobilizing contamination in hot cell facilities.

Oak Ridge continued to safely ship transuranic waste to the Waste Isolation Pilot Plant. Employees have prepared almost 50 shipments, sending 1,540 drums of transuranic waste for permanent disposal. These shipments are helping the site move closer to fulfilling its regulatory commitments.



*Removal of two high-risk excess contaminated facilities in Y-12's Biology Complex.*



### Beginning the Next Major Phase of Cleanup

As EM nears completion at ETPP, it is ramping up efforts and projects that enable the next major phase of cleanup to begin at ORNL and Y-12. EM took another significant step towards large-scale cleanup at Y-12 by completing all of the site preparation required to begin construction on the new Mercury Treatment Facility.

The Mercury Treatment Facility is a vital piece of infrastructure; it allows EM to begin demolishing Y-12's large, deteriorated, mercury-contaminated facilities and perform subsequent soil remediation by providing a mechanism to limit potential mercury releases into the nearby Upper East Fork Poplar Creek. The facility will help EM fulfill a longtime commitment with the U.S. Environmental Protection Agency and the State of Tennessee to reduce mercury levels leaving Y-12.

While EM stabilized two buildings at ORNL during the year, bigger things are in store. Planning and preparation activities are underway to begin major deactivation in the old research reactors surrounding the historic Graphite Reactor. This is a crucial first step toward removing these contaminated facilities and enhancing accessibility to this Manhattan Project National Historical Park site.



*Workers retrieved more than 6,000 pounds of mercury from the COLEX equipment's tanks and pipes.*



*Workers finished removing all four miles of tie lines at ETPP.*



*Teams took down the Central Neutralization Facility.*



*Workers demolished the TSCA Incinerator.*



*EM is completing cleanup and transitioning ETPP into a privately owned industrial park.*



# Los Alamos National Laboratory

*"We were determined to continue making significant and safe strides with our cleanup mission throughout the transition to the Los Alamos Legacy Cleanup Contract, and those efforts proved successful. We have laid the foundation to make sustained progress as we clean up and manage legacy waste at LANL. We will continue to focus on safety, efficiency, and transparency as we execute our mission."*

*— Doug Hintze, Manager, EM-Los Alamos*

## Highlights

- Transitioned successfully to the Los Alamos Legacy Cleanup Contract
- Completed 13 Fiscal Year 2018 Consent Order milestones
- Implemented the Interim Measure for the chromium plume
- Broadened network of RDX monitoring wells
- Completed the first shipment of waste from Area G to the WIPP in over four years

The Environmental Management Los Alamos Field Office (EM-LA) mission at Los Alamos National Laboratory (LANL) marked several significant milestones in the past year. While maintaining focus on safely ramping up operations during the initial months of the new legacy cleanup contract, work progressed on the campaigns governed by the 2016 Compliance on Consent Order (Consent Order) that provides a framework for cleanup of legacy wastes at LANL. EM-LA successfully completed 13 Fiscal Year 2018 milestones set under the Consent Order with the New Mexico Environment Department.

## Progress on Priority Cleanup

The year was a pivotal one for the Chromium Interim Measure and Characterization Campaign, EM-LA's priority cleanup activity. To continue addressing the hexavalent chromium plume in the regional aquifer beneath Sandia and Mortandad canyons, the project team implemented the Interim Measure (IM), which involves extracting contaminated water and injecting treated water to control plume advancement and shrink its footprint. The IM campaign is underway along the plume's southern boundary. In the coming year it will be fully implemented, while field and laboratory studies progress in pursuit of determining a final remedy for the plume.



N3B waste management staff prepare waste shipment for transport.



Over three miles of pipeline were installed in 2018 for Chromium Interim Measure and Characterization Campaign.



Workers review safety procedures prior to groundwater sampling system installation.



### Understanding RDX Contamination

In Technical Area 16, in the southwestern portion of the Los Alamos National Laboratory, the focus was on further understanding the extent of Royal Demolition Explosives (RDX) contamination. The latest of nine monitoring wells in the RDX Characterization Campaign was drilled to refine a conceptual model for RDX pathways into the regional aquifer.

### Completing Treatment of UNS Drums

In March, EM-LA completed treatment of 27 unremediated nitrate salt (UNS) drums at the Waste Characterization, Reduction, and Repackaging Facility. The treated UNS was repackaged in drums that will eventually be shipped to the Waste Isolation Pilot Plant (WIPP) for disposal.

To further enable waste shipments to WIPP, mobile loading capabilities were stood up at Technical Area 54's Area G several months ahead of schedule. In October a shipment of waste from Area G to WIPP was completed, the first since the disposal facility was reopened.



*Drum liners containing UNS waste were repackaged prior to treatment.*

# Portsmouth/Paducah Project Office

*"This past year, PPPO employees were resolute in reaching critical pivot points to set the stage for the final cleanup of the Portsmouth site, comprehensive cleanup of the Paducah site, and sustained operations at the DUF6 conversion plants."*

— Robert Edwards, Field Manager, Portsmouth and Paducah Project Office

## Highlights

- At Portsmouth, completed the first DOE land transfer for economic development
- Deployed pipe-crawling RadPiper robot to measure uranium deposits
- Finalized Portsmouth's Natural Resources Damages agreement with Ohio EPA
- Achieved simultaneous operation of all seven DUF6 Conversion lines



EM Assistant Secretary White, PPPO Manager Edwards and SODI officials at land transfer ceremony.

## Portsmouth

### Community Land Transfer

The integration of future use and cleanup made great strides. In July, Assistant Secretary Anne White joined PPPO Manager Robert Edwards and the Southern Ohio Diversification Initiative (SODI) in a ceremony to transfer the first 80 acres of DOE land to SODI for economic development purposes.

### Success through Partnerships

To facilitate cleanup, DOE and the Ohio Environmental Protection Agency finalized a Natural Resources Damages agreement that will allow for excavation of contaminated material from an existing on-site landfill and plume. The agreement also paves the way for excavation of other landfills and plumes within Perimeter Road to be used as fill in the On-Site Waste Disposal Facility (OSWDF) currently under construction. Removal of contaminated material from landfills and plumes will open more than 1,000 acres of contiguous land for future use.



RadPiper, a pipe-crawling robot specialized for autonomous measurement of U-235 deposits, deployed in July.

### Progress on Critical D&D

Progress continued on the deactivation of the X-326 process building. With the deactivation of the cell floor complete, the site focused deactivation activities on the operations floor and final waste and material transfers, progressing to anticipated commencement of demolition in Fiscal Year 2019.

There was significant deactivation progress in the X-333 Process Building, including the large component assay system fabrication and construction completion in March, the material sizing area construction completion in April, and the deployment of the RadPiper system in July. RadPiper is a pipe-crawling robot specialized for autonomous measurement of uranium deposits within enrichment piping.



### Paducah

#### Complete Lifecycle Baseline

At Paducah, the first complete lifecycle baseline was approved, allowing implementation of a new strategy to clean up the largest source of Trichloroethylene (TCE) at the site. Under the plan, DOE will complete the deactivation and demolition of the C-400 Cleaning Building, as well as the characterization and remediation of a full “city block” around the C-400 complex, removal of the TCE source under the building and remediation of all known contaminants.

#### Progress on Critical D&D

Deactivation of the C-400 Cleaning Building began to move quickly, achieving 100-percent deactivation of equipment from the operating floor, 100-percent equipment characterization, and Nuclear Criticality Safety basis revisions to allow for deactivation of all equipment.

At the C-360 building, deactivation activities provide workers with training needed for the large process buildings in the future. The new deactivation and remediation contractor completed 100 percent of Non-Destructive Assay characterization activities and removed 80 percent of uranium deposits.



*Deactivation of the C-400 Cleaning Building moving quickly.*



*The DUF6 project converted 5,392 metric tons of material during Fiscal Year 2018.*

#### DUF6

PPPO's project to convert depleted uranium hexafluoride (DUF6) to a more stable form returned all seven of its production lines to simultaneous operation at both the Kentucky and Ohio conversion facilities for the first time in more than three years. The project also completed facility and process improvements to advance safety, efficiency, and plant longevity.

The DUF6 project has converted more than 70,000 metric tons of DOE's more than 700,000 metric-ton inventory of DUF6 since the conversion facilities were commissioned in 2010. They have converted more than 10,500 metric tons of the material since the beginning of Fiscal Year 2018.

# Nevada National Security Site

*“EM Nevada Program successes are rooted in a breadth of communications that occur on a daily basis between federal and contractor staff, intergovernmental partners, and the public. These communications feed into how we conduct our work by considering differing perspectives, past successes, lessons learned, optional approaches, safety, and security.”*

— Rob Boehlecke, Program Manager, Environmental Management Nevada Program

## Highlights

- Completed cleanup at historic Clean Slate II site
- Re-opened the NNSS Area 3 Radioactive Waste Management Complex
- Disposed of more than 1,100,000 ft<sup>3</sup> of waste
- External peer review for Rainier Mesa/Shoshone Mountain groundwater characterization area
- 6 new members on Nevada Site Specific Advisory Board
- Completed construction, readiness reviews, and initiated disposal in a state-of-the-art waste disposal cell



*A radiological control technician surveys a cask lid before workers proceed with removing waste packages for disposal.*

## Site Mission

The EM Nevada Program is responsible for environmental remediation of legacy contamination at the Nevada National Security Site (NNSS) and on the adjacent Nevada Test and Training Range, including the Tonopah Test Range.

The EM Nevada Program is also responsible for ensuring low-level and mixed low-level radioactive waste, classified non-radioactive waste, and classified non-radioactive hazardous waste (generated by legacy cleanup in Nevada and across the nation) are safely disposed at the NNSS.



*Low-level radioactive waste is off-loaded for permanent disposal.*



*Crews collect groundwater samples.*

## Cleanup Progress

Through December 2018, 99 percent of the 1,280 contaminated facilities and soils sites have been successfully cleaned up. This includes completion of cleanup activities at the historic Clean Slate II site.

EM Nevada re-opened the NNSS Area 3 Radioactive Waste Management Complex to support Clean Slate III waste disposal and facilitate cost-effective closure of the facility. More than 1,100,000 cubic feet of waste was safely and efficiently disposed of in 2018.



### Groundwater Characterization Areas

Extensive scientific studies to address groundwater contamination progressed, including completion of an external peer review for the Rainier Mesa/Shoshone Mountain groundwater characterization area and of the model evaluation activities for Yucca Flat/Climax Mine groundwater characterization area, to continue the path toward transitioning groundwater characterization areas into long-term monitoring.

### Additional Achievements

Six new members joined the Nevada Site Specific Advisory Board this year. These new members increase the number of representatives from rural communities and support a more representative Board with greater community engagement and feedback.



*Contaminated soil is packaged at the Clean Slate II site.*



*Members of the Nevada Site Specific Advisory Board at orientation.*

# West Valley Demonstration Project

*"The safe demolition of the Vitrification Facility and Legacy Waste Disposition are important accomplishments demonstrating continued commitment to safe and compliant cleanup that is protective of workers, the public, and the environment. I applaud the West Valley workforce for their tremendous effort in achieving these endeavors."*

— Bryan Bower, Director, West Valley Demonstration Project

## Highlights

- Demolition of the 50-foot-tall, 10,000-square-foot Vitrification Facility
- Removal of two large shield doors, combined weight 160 tons
- Processed and repackaged several large pieces of Main Plant equipment
- Removal of 110 feet of the Main Plant Process Building ventilation stack weighing 20,000 pounds

### Vitrification Facility Demolished

In 2018, the Department of Energy and its contractor partner at the West Valley Demonstration Project completed the demolition of the Vitrification Facility, one of only two operational vitrification plants in the U.S., and the disposition of 3,114 containers of legacy waste.

Demolition of the Vitrification Facility, which was used to solidify 600,000 gallons of high-level liquid radioactive waste from 1996 to 2002, began on September 11, 2017, and was completed in three phases. The demolition was completed in September 2018 and included the removal of four in-cell coolers weighing 7,188 pounds each, two shield doors weighing a combined total of 160 tons, and cranes and equipment.

### Legacy Waste Disposition Completed Ahead of Schedule

The legacy waste project consisted of processing, packaging and shipping more than 180,000 cubic feet of legacy waste (more than 1,700 containers) for disposal off-site and processing transuranic waste for long-term storage pending the availability of a final disposition path. The legacy waste disposition effort also involved the safe preparation, packaging and shipment off-site of several large components used in past waste vitrification activities. This was a significant accomplishment considering some of the waste had been in storage facilities for more than 20 years waiting to be processed. This segment of work was completed more than seven months ahead of schedule.

Other accomplishments include the removal of the ventilation stack from the Main Plant Process Building as part of ongoing efforts to dismantle and remove peripheral structures and facilities in that area. The ventilation stack removal required implementation of extensive planning, engineering controls, and historical best practices. The former 9,520-square-foot administration building was also demolished during the year.



WVDP Vitrification Facility—Before and After.



# Separations Process Research Unit

*"The SPRU project eliminates one of the many historic Cold War legacy facilities across the complex. As we move into the final stages of the project – completing backfilling of the building excavations and restoring the landscape – we are committed to getting to completion safely and efficiently."*

*– Steven Feinberg, Federal Project Director, Separations Process Research Unit*

## Highlights

- Completed H2 Building and Tank Farm D&D
- Nearing completion of site restoration for G2 Building and H2 Building sites
- Achieved nearly 1 million safe hours without a lost time accident

### Building H2 Demolished

Project crews at the Separations Process Research Unit (SPRU) completed the last phase of building demolition with the removal of Building H2. The 2018 achievement followed the demolition of Building G2 in 2016. The SPRU facilities were built in the late 1940s and operated through the early 1950s to conduct pilot tests for recovery of uranium and plutonium.

Decommissioning and decontamination of the Building H2 and associated tank farm involved removal and disposal of nine 10,000-gallon tanks, a 5,000-gallon tank, numerous process vessels, and over 22,700 linear feet of piping. Over 19 million pounds of concrete were removed and disposed of during demolition.



*Partial demolition under tent enclosure.*



*H2 under tent enclosure for decontamination and demolition preps.*

### Site Restoration

After the G2 Building and H2 Building and associated structures were removed, soil below the excavation was characterized and independently verified to meet clean up criteria by the Oak Ridge Institute for Science and Education (ORISE). SPRU project crews completed the backfilling of the G2 excavation and began backfilling the H2 excavation. The backfill and grading of the H2 excavation requires more than 35,000 tons of imported fill and is expected to be completed in 2019.

### SPRU Safety

From mid-November 2014 through October 2018 project crews worked 1,450 days and 954,921 total safe work hours without a lost time accident.

# Moab Uranium Mill Tailings Remediation Project

*"The workers have done a phenomenal job getting things done safely, finding efficiencies, and using nature to our benefit. With Moab being a small community that hosts a large tourist population, we pride ourselves in working with our stakeholders."*

— Russell McCallister, Federal Cleanup Director, Moab

## Highlights

- Exceeded uranium mill tailings shipment goal by more than 32,200 tons
- Met a project milestone by shipping 9 million tons of tailings
- Increased efficiency in residual radioactive material shipments by rail
- Extracted 7.4 million gallons of contaminated groundwater from wells



*Two new haul trucks were added to maintain worker safety, environmental protection, and project execution.*

## Shipping Goals Exceeded

In 2018, the Moab Uranium Mill Tailings Remedial Action (UMTRA) Project surpassed its planned train shipments of residual radioactive material away from the Moab Site and the Colorado River by more than 30,000 tons. Work was completed safely and project employees have worked more than 800 days without an Occupational Safety and Health Administration recordable injury.

The project successfully hit a milestone of 9 million tons of uranium mill tailings shipped to the disposal cell in Crescent Junction, Utah. Efficiencies were found through increasing the number of containers shipped on each train from 140 to 144 by adding a railcar to each trainload. Overall, the project has removed more than 58 percent of the total material to be relocated.



*Project staff load a train with containers in Moab, departing for the Crescent Junction site.*

## Groundwater Extraction Reduces Risk to River

With dry spring and summer conditions resulting in an increased need for water for dust control, 7.4 million gallons of contaminated groundwater were extracted and repurposed for dust control. This simultaneously reduced the risk from contaminants to the Colorado River.

## New Equipment Replaces Aging Machines

The project continued to focus on mitigating the risk of equipment failure by purchasing two articulated trucks to operate at Crescent Junction. Replacing the equipment was important to keep personnel safe, the environment protected and the project moving forward.

## Future Use Studied

Also of note, the project worked with the Grand County Site Futures Committee, which completed its Community Vision Update during the year to explore potential infrastructure reuse opportunities that are of shared benefit to DOE and the local community.



# Energy Technology Engineering Center

*"ETEC was able to make significant strides in the remediation mission by addressing crucial environmental requirements. The issuance of the Final Environmental Impact Statement and completion of other documents puts the site closer to initiating remediation and a final closure."*

— John Jones, Director, Energy Technology Engineering Center

## Highlights

- Final Environmental Impact Statement issued
- Delivered Biological Assessment to the U.S. Fish and Wildlife Service
- Completed Groundwater Corrective Measures Study
- Progress towards closure

### Final Environmental Impact Statement Issued

The Energy Technology Engineering Center (ETEC) reached a milestone in issuing a Final Environmental Impact Statement (FEIS) for cleanup of Area IV and the Northern Buffer Zone, the DOE portion of the Santa Susana Field Laboratory. ETEC developed a process to complete the review of the FEIS document in a little over four months in conjunction with EM Headquarters, a short time-frame supporting improved process and efficiency priorities.



*Energy Technology Engineering Center — Area IV.*

### Biological Assessment Delivered

After initiating consultation with the U.S. Fish and Wildlife Service (USFW), and ETEC completed its Biological Assessment, ETEC received a Biological Opinion from the USFW confirming that the proposed cleanup at ETEC is not likely to adversely affect critical habitat for the federally threatened California red-legged frog, and would have no effect on a number of other local species. This determination completes DOE's compliance with Section 7 of the Endangered Species Act, in addition to supporting DOE's conservation measures during activities at the site.

### Groundwater Corrective Measures Study Completed

The ETEC groundwater team completed a Corrective Measures Study to develop and evaluate possible corrective action alternatives to address groundwater at the site. This study, a requirement of the Resource Conservation and Recovery Act, was submitted to the State of California, the site regulator.



*Radioactive Materials Handling Facility.*



*Sodium Pump Test Facility.*

# Lawrence Berkeley National Laboratory

## Old Town

*"The Old Town team successfully completed the Phase III and Phase IV projects and was able to begin the Phase V project in the continuing effort to make the land available for future Office of Science mission growth."*

— Kevin Bazzell, Federal Project Director, Lawrence Berkeley National Laboratory

### Highlights

- Completed existing scope of work in Building 5, 16, and 52/52A areas resulting in the area being restored to a clean and stable site
- Commenced Phase V Project to remove Buildings 4 and 14

### Contamination Removal

The Old Town team successfully completed two important environmental cleanup projects at the Lawrence Berkeley National Laboratory in 2018. These projects, Phase III and Phase IV, involved the removal of contaminated soil, abandoned and deactivated utilities, concrete structures, and other debris from the Building 5, 16 and 52/52A areas. The cleanup is focused on an area of the Northern California laboratory that played an active role in groundbreaking science following World War II. At their peak, the site's facilities supported pioneering physics research using the lab's cyclotron particle accelerator. These cleanup efforts are critical steps in preparing the land for future Office of Science use.

### Deactivation and Characterization Progress

A major phase of the overall demolition project has begun with commencement of Phase V of the cleanup. This project addresses two buildings -- Building 4 and Building 14. These buildings are being deactivated in preparation for their removal. This space will support the future needs of the Office of Science once building demolition and any soil remediation is complete.



Old Town—May 2014



Old Town—October 2018

*Before and after photos of the Old Town Area showing progress in site cleanup.*



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