



CLEANING UP AMERICA'S NUCLEAR WEAPONS COMPLEX

2015 UPDATE FOR GOVERNORS

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EXECUTIVE SUMMARY

America's nuclear arsenal, developed during the Cold War, has created significant contamination that is now the focus of the largest environmental cleanup effort in the world. Governors play an important role in that effort by ensuring that the U.S. Department of Energy (DOE), their partner in overseeing the cleanup, adopts responsible disposal decisions that are coordinated with states. The cleanup effort, expected to continue into at least 2070, has led to several important achievements, including the closure of nearly 100 sites and a significant reduction in risks to public health and the environment. Completing the cleanup, however, will cost as much as \$340 billion (in 2015 dollars) and take an additional 55 years, assuming that technical, regulatory, and funding challenges can be overcome. Moreover, recent setbacks in waste treatment and cleanup at the Hanford site in **Washington**, and the radiological release at the Waste Isolation Pilot Plant (WIPP) in **New Mexico** have revealed gaps in DOE's oversight, delayed completion of cleanup projects in multiple states, and strained available financial resources for cleanup. Nevertheless, governors are committed to the cleanup and to ensuring that DOE completes that mission.

Coordination and collaboration between the states and DOE have produced many cleanup and management successes over the past two decades. Those include:

- Developing treatment plans for all sites;
- Closing three large sites and 91 of 107 smaller sites;
- Establishing a long-term stewardship (LTS) office for closed sites;
- Creating waste inventory and disposal paths for various waste types;
- Accelerating cleanup under the American Recovery and Reinvestment Act; and
- Improving collaboration and communication between states and DOE.

In addition to complex-wide successes, significant cleanup progress has been made at sites in **Idaho, Kentucky, Missouri, Nevada, New Mexico, New York, Ohio, South Carolina, Tennessee, Texas, and Washington**. Although each site has unique environmental and regulatory challenges, states and DOE have transferred lessons learned across the complex or made decisions that facilitate cleanup at multiple sites. Those include establishing legal frameworks and agreements for cleanup, decommissioning and demolishing contaminated buildings, and treating and disposing of low-level and transuranic waste (material containing artificial, radioactive elements).

Despite those successes, several serious challenges remain that are of particular importance to states. As identified by the National Governors Association Center for Best Practices Federal Facilities Task Force (FFTF), they include:¹

- **Setting priorities for federal funding to meet agreed-on, enforceable cleanup milestones.** Governors have worked with DOE to ensure that funding for DOE is sufficient to complete cleanup requirements and that budget decisions are made transparently and in consultation with states. As the funding for cleanup has decreased in

¹ The NGA Center created the FFTF in 1993 to serve as a forum for continued dialogue and coordination between governors and DOE, which work together to protect public health, safety, and the environment in the areas surrounding weapons complex sites. The FFTF's members are designated by the governors of the 12 states affected by the ongoing major cleanup activities.

recent years because of federal budget constraints, it is important for DOE to communicate to states how it sets priorities for cleanup projects and how deferred cleanup in the short term will affect the ultimate cost and timeline for completing cleanup. The FFTF encourages states and DOE to use the principles it developed in 2012 to help set funding priorities.

- **Ensuring that sites comply with federal and state cleanup standards.** Compliance agreements between states and DOE (and in many cases the U.S. Environmental Protection Agency) are critical for establishing milestones for cleanup and providing states with legal recourse when cleanup is not progressing. DOE's failure to meet the cleanup milestones increases health and environmental risks, raises cleanup costs, and strains the partnership between states and DOE. DOE's ability to meet compliance milestones is directly tied to the issue of funding. To help meet compliance goals, the FFTF:

- + Encourages DOE to clean sites to allow for various land uses, including public reuse of the site. If contamination must remain in place, DOE must maintain and fund controls to restrict land use and monitor contamination over the long term.
- + Supports resumed publication of five-year plans that represent realistic funding expectations to help states with their oversight role.
- + Supports a continued effort by DOE to maintain risk-informed decision-making, outlined in the Keystone Report that respects the primacy of compliance agreements.
- + Encourages DOE to fulfill its obligations as a responsible party under the natural resource damage assessment process while appropriately engaging in the process as a trustee.

- **Managing radioactive waste safely, including transportation, disposal, and Long-Term Stewardship (LTS).** Governors and DOE have worked to make decisions about the treatment,

transportation, and disposal of waste that are transparent and do not place unnecessary or inequitable burdens on states. The FFTF continues to work with DOE to make sure all parties manage all the waste types found across the complex according to DOE's internal management guidelines, transport waste safely, uneventfully, and securely, and appropriately monitor sites with long-term contamination. The FFTF:

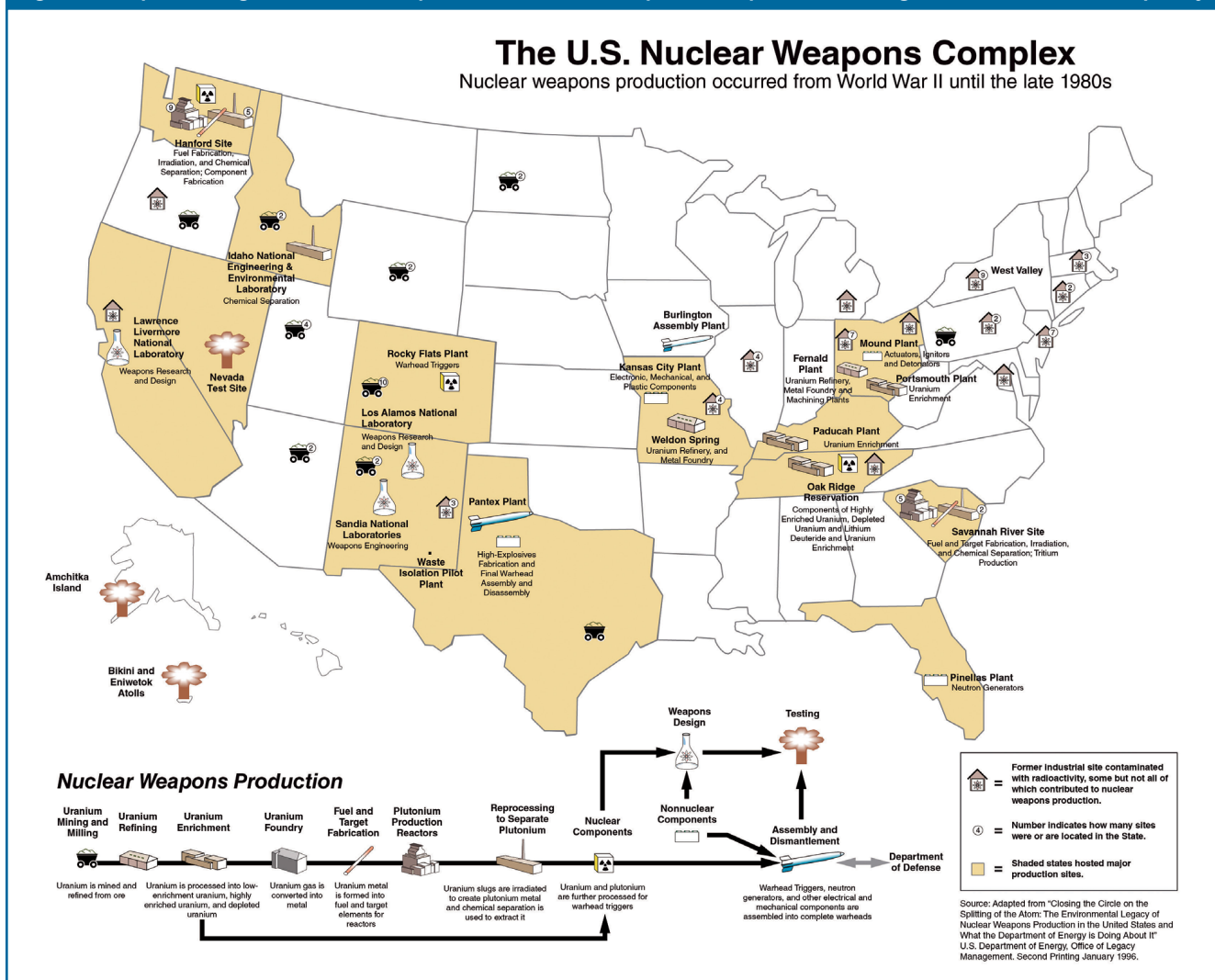
- + Encourages DOE to release the draft revisions to its internal waste management order in a timely fashion and consider the effect of the revisions on environmental risks in individual states and state compliance agreements;
- + Encourages DOE to make a final decision on a disposal location for greater-than-Class C waste in consultation with the state that will host the disposal site, which will allow removal of this high-risk waste from cleanup sites;
- + Supports DOE's efforts to develop interim storage or permanent disposal options for high-level waste (HLW) that have the consent of the host state, and to accept defense HLW as those options are available, without supporting any specific site or method;
- + Encourages DOE, when WIPP reopens, to adopt an appropriate pace and sequence in which transuranic waste is removed from sites and transported to WIPP and to operate WIPP at the highest levels of safety;
- + Encourages DOE to continue its efforts to plan and coordinate transportation activities in full consultation with affected states; and
- + Supports DOE in carrying out its responsibility to fund LTS activities and supports efforts by DOE and others to determine which funding mechanisms to pursue, such that funding is commensurate to the certainty of the residual risk at sites where LTS is required.

INTRODUCTION

America's nuclear weapons complex, developed during the Cold War, created a significant environmental cleanup legacy that the U.S. Department of Energy (DOE) oversees in coordination with the states. The cleanup effort has led to many important achievements, including the closure of nearly 100 sites and a significant reduction in risks to public health

and the environment. However, the remaining cleanup challenge is estimated at \$341 billion (in 2015 dollars) and could take an additional 55 years to complete.² In addition, the effort faces a variety of technical, regulatory, and funding challenges. Governors can play an important leadership role in ensuring the adoption of responsible, coordinated disposal decisions.

Figure 1. Map Showing the Historic Scope of the Nuclear Weapons Complex at the Height of Its Production Capacity



² Office of the Chief Financial Officer, U.S. Department of Energy, *Department of Energy FY 2016 Congressional Budget Request*, Volume V (Washington, DC: U.S. Department of Energy, 2015), http://energy.gov/sites/prod/files/2015/02/f19/FY16EM_Budget_Request_to_Congress.pdf (accessed November 5, 2015).

THE HISTORY OF THE NUCLEAR WEAPONS COMPLEX AND ITS ENVIRONMENTAL LEGACY

In 1942, the United States began to develop nuclear weapons technology under the U.S. Army Corps of Engineers' Manhattan Engineer District, known as the *Manhattan Project*. During the subsequent Cold War period, the United States significantly expanded its nuclear weapons program. The program led to the development of a vast research, production, and testing network that, at its height between 1945 and 1990, spanned 107 sites and 35 states and came to be known as the nuclear weapons complex (see Figure 1 on page 5). The nuclear weapons complex would eventually produce more than 70,000 nuclear warheads of 65 different types.

With the end of the Cold War and the subsequent collapse of the Soviet Union, the mission at many of the weapons complex sites shifted from production to cleanup. Most sites in the complex were contaminated with radioactive or other hazardous materials, such as solvents or heavy metals. The contamination can be found in buildings as well as in the soil, groundwater, and surface water within and surrounding the sites. Most sites have sizable and complicated problems that have been compounded over several decades. Today, the DOE Office of Environmental Management (EM) oversees the cleanup effort.

What was once an employment boon to state and local economies during the years of the nuclear weapons buildup has become an environmental burden, and states now bear some of the responsibility for the long-term cleanup of that radioactive waste. That effort is the largest environmental cleanup program in the world and presents the 12 states most directly involved with numerous technical, financial, and policy challenges.³ The federal budget for the weapons cleanup program is currently about \$6.2 billion per year—one of the largest amounts for any federal program and about four times the size of recent annual Superfund environmental expenditures.⁴ The total estimated price tag for cleanup of all DOE's environmental liabilities is

estimated between \$308 billion and \$341 billion (in 2015 dollars), with cleanup anticipated to last into 2070.⁵

Figure 2 (on page 7) shows the remaining major cleanup sites, with DOE's estimated completion date for cleanup and closure. Following closure, each site will need long-term stewardship (LTS), including surveillance and maintenance.

The cleanup effort entered a new phase in 1992 with passage of the Federal Facilities Compliance Act (FFCA). The FFCA gave states additional regulatory and oversight authority and required that DOE's cleanup adhere to federal environmental laws. To help achieve the FFCA's goals, the National Governors Association Center for Best Practices (NGA Center) established the Federal Facilities Task Force (FFTF) to help governors address those challenges and improve coordination with DOE. The FFTF includes one or two governor-appointed members from each state who have technical, regulatory, or policy expertise. One of the FFTF's first activities was to coordinate the development of the initial site treatment plans under the FFCA. That process included discussions of equity among the states, as some waste would need to be disposed of in other states. Based on the successful collaboration that immediately followed the FFCA site treatment plan process, the FFTF has continued to interact regularly to discuss cleanup progress, identify ongoing common concerns, and explore new technical and policy issues.

RECENT CHALLENGES

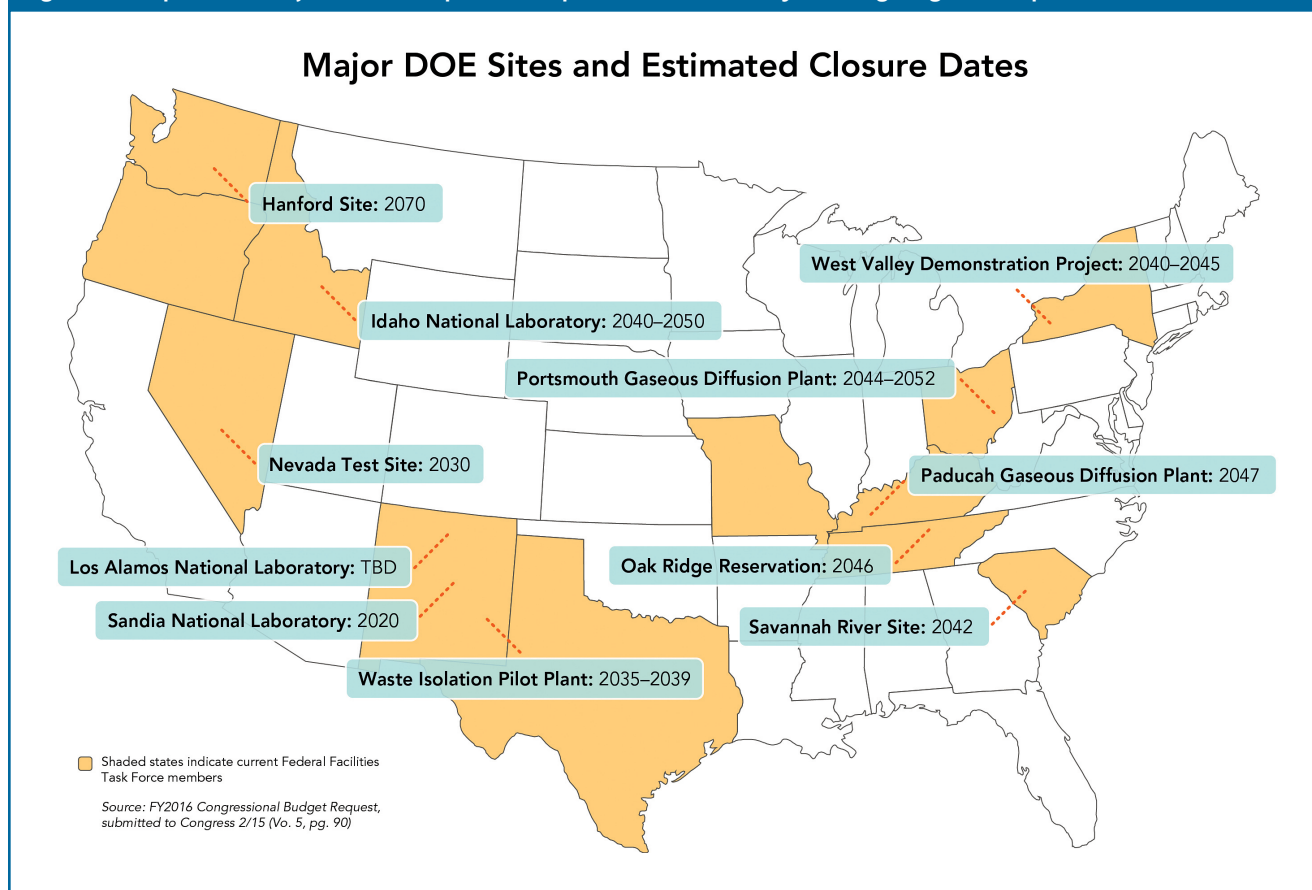
Over the past three decades, the FFTF states and DOE have worked together to achieve significant progress in cleaning up and reducing the footprint of the nuclear weapons complex. However, recent events and the current budget climate are slowing that progress. Challenges include an unexpected three-year shutdown of the Waste Isolation Pilot Plant (WIPP) in **New Mexico** after a radiological release; delays in treating high-level waste (HLW) at the Hanford site in **Washington**; and budget shortfalls across the complex.

³ See Appendix G of this report for a list of the National Governors Association Center for Best Practices' Federal Facilities Task Force members in the 12 states.

⁴ U.S. Department of Energy Office of Environmental Management, "Acquisition," <http://energy.gov/em/services/program-management/acquisition> (accessed March 15, 2016).

⁵ *FY 2016 Congressional Budget*, Volume V, 89.

Figure 2. Map of the Major DOE Weapons Complex Sites Currently Undergoing Cleanup⁶



Radioactive Release at the Waste Isolation Pilot Plant

The WIPP facility, located in southeastern New Mexico, is the nation's only deep repository for disposal of radioactive waste. Congress authorized the site in 1992 to dispose of defense transuranic (TRU) waste (see the glossary in Appendix C on page 37 for a definition). WIPP began disposal operations in 1999 and, as of early 2014, had received more than 11,000 shipments of waste without a significant incident. However, two events in February 2014 resulted in a facility shutdown that is expected to last at least three years. First, an underground truck fire created smoke and required emergency evacuation of the workers in the mine. Second, a more serious incident—unrelated to the truck fire—occurred nine days later wherein a single drum of waste ruptured and released

radioactive material into the air. The underground ventilation system spread the contamination into other areas of the mine, and some contamination reached the surface and was released into the environment. DOE convened accident investigation boards for each incident, and the subsequent reports uncovered numerous safety-related problems that DOE is now addressing. Meanwhile, WIPP remains closed to new waste, and sites around the complex that expected to ship TRU waste to WIPP must store the waste for much longer than expected, creating unanticipated storage and security expenses and cascading effects at sites throughout the complex.

Technical Challenges at Hanford

The Hanford site in southeastern Washington is the most contaminated site in the complex. It has the

⁶ The closure dates shown in this figure are DOE estimates for the completion of cleanup at the major sites shown, as reported in DOE's budget request to Congress in February 2015. Several caveats apply to these estimates: (1) Some sites have ongoing missions, so the site as a whole will not close, but the dates shown reflect completion of cleanup. (2) In the case of the Waste Isolation Pilot Plant, the facility is currently functioning as a disposal facility and is not undergoing cleanup. However, it is expected to fulfill its mission and close within the range of dates shown. (3) In other cases, closure dates are interim estimates, with final closure dates yet to be defined pending forthcoming Records of Decision. (4) In several cases, these projected closure dates do not match dates in current compliance agreements with states for completion of all required cleanups.

largest cleanup budget and will take the longest to complete. Hanford hosts 57 percent of all the HLW in the complex, most of which is contained in 177 underground storage tanks that collectively contain about 56 million gallons of waste. Many of those tanks are far beyond their design lives, several are actively leaking, and several are known to be emitting vapors hazardous to workers.⁷ To remove the waste from the leaking tanks and treat it for ultimate disposal, DOE is building a facility known as the Waste Treatment Plant (WTP). The success of the Hanford cleanup mission hinges on the successful completion and operation of the WTP and preparing the site's HLW for disposal in a geologic repository, which will allow the underground tanks to be emptied and closed and eliminate the risk to human health and the environment. Hanford, however, is a technically challenging cleanup project, and the design and construction of the one-of-a-kind WTP facility have experienced many delays and cost increases. The initial cost estimate developed in 2000 was \$4.3 billion, with completion scheduled for 2011. In 2006, DOE increased that estimate nearly threefold to \$12.3 billion and set a 2019 completion date. In 2011, DOE indicated to the state of Washington that it would not meet its interim progress milestones. DOE and Washington are now involved in a legal dispute over new deadlines and when and how WTP operations will begin.⁸

Funding Shortfalls

Shortfalls in the federal cleanup budget have slowed progress across the complex in recent years. Budget appropriations for the ongoing cleanup peaked in 2007 at \$7.3 billion (equivalent to \$8.2 billion in 2015 dollars) and have decreased to about \$5.7 billion annually since then.⁹ Although 2009 brought a one-time influx of new funding from the American Recovery and Reinvestment Act (ARRA) and resulted in additional progress and a net reduction in life-cycle costs, DOE now anticipates that the cleanup budget will be “flat-lined” at about \$5.7 billion (plus inflation adjustments in future years) for the foreseeable future. Based on that flat-lined budget, in June 2014 DOE estimated that it would face a cumulative shortfall in the funding needed to meet its compliance obligations to the states over the next 15 years of between \$21 billion and \$39 billion.¹⁰ Significantly roughly \$3 billion per year out of the annual budget is required to cover maintenance, safety, and security (minimum safety, or so-called min-safe) expenses across the complex. Only the funding above the min-safe level is available for actual cleanup. Because opportunities to reduce min-safe costs for the weapons complex are limited, budget cuts disproportionately reduce waste cleanup progress.

⁷ Savannah River National Laboratory, *Hanford Tank Vapor Assessment Report* (Aikin, SC: Savannah River National Laboratory, 2014), http://srnl.doe.gov/documents/Hanford_TVAT_Report_2014-10-30-FINAL.pdf (accessed November 5, 2015).

⁸ U.S. Government Accountability Office, *Hanford Waste Treatment: DOE Needs to Evaluate Alternatives to Recently Proposed Projects and Address Technical and Management Challenges. Report to the Committee on Armed Services, U.S. Senate* (Washington, DC: Government Accountability Office, 2015), <http://gao.gov/assets/680/670080.pdf> (accessed November 5, 2015).

⁹ Budget numbers in this report refer to the federal fiscal year, which is October 1–September 30.

¹⁰ Presentation by Dennis Deziel, DOE Office of Environmental Management, at a June 4, 2014, Santa Fe, New Mexico, meeting with the FFTF.

SUCCESSES AROUND THE COMPLEX

Since the enactment in 1992 of the FFCA, DOE and states have worked together to clean up the nuclear weapons complex. To date, they have completed cleanup at 91 sites in 30 states.¹¹ Examples of successful efforts from DOE and the states across the nuclear weapons complex include:

- Developing treatment plans for all sites;
- Closing 3 large sites and 91 of 107 smaller sites;
- Establishing an LTS office for closed sites;
- Creating a waste inventory and disposal paths for various waste types;
- Accelerating cleanup under ARRA; and
- Improving collaboration and communication between states and DOE.

DEVELOPMENT OF SITE TREATMENT PLANS FOR ALL SITES

Immediately following enactment of the FFCA, both the states and DOE saw the need for close policy and technical collaboration to understand the scope of the cleanup and the types and amounts of waste involved. The parties also needed to develop implementable, legally binding plans to guide DOE's waste management. Little data had been available on the types and amounts of waste, but DOE helped organize the information it had and made it available to the states (see Table 1 above). At the same time, the states, through the FFTE, developed a set of principles for explaining to DOE the "equity" issues across states. As a result of that collaboration, states and DOE approved the required Site Treatment Plans

Table 1. The Nuclear Weapons Complex: Then and Now

	1988	1996	2015
Number of sites	107	102	16
Number of states	35	35	11
Estimated completion year	Not estimated	2055	2070
Estimated completion cost (2015 dollars)	\$130 billion to \$216 billion	\$280 billion to \$394 billion	\$308 billion to \$341 billion
<small>Sources: Congressional Budget Office, <i>Cleaning Up the Department of Energy's Nuclear Weapons Complex</i> (1994), 9, citing U.S. Department of Energy, <i>Environmental Safety and Health for the DOE Defense Complex</i> (1988), 35; DOE, <i>Baseline Environmental Management Report</i> (1996); and DOE, <i>FY 2016 Congressional Budget Request</i>, Volume V, p. 89.</small>			

by October 1995, the date Congress had mandated. That framework continues to be a model for state-DOE collaboration on cleanup.

SITE CLOSURE

The states and DOE share the ultimate goal of safely closing all sites in the nuclear weapons complex. Site closure is defined as the completion of cleanup to safe and acceptable levels so that only long-term monitoring and stewardship are required rather than active cleanup operations. As of the end of 2015, three large sites had been successfully closed: Rocky Flats in Colorado and Fernald and Mound in **Ohio**.

Rocky Flats (Colorado)

Rocky Flats is the leading example of successful accelerated cleanup. From 1952 to 1994, the

¹¹ FY 2016 Congressional Budget, Volume V.

Rocky Flats facility, 16 miles from downtown Denver, Colorado, produced components for the U.S. nuclear arsenal. The site primarily produced the plutonium pit or trigger for nuclear weapons, generating substantial environmental contamination and considerable cleanup challenges. DOE initially predicted closure of the site in 2070, with \$35 billion in cleanup costs. Beginning in 1996, DOE, its contractor, and the state of Colorado worked together to develop a more cooperative cleanup agreement that streamlined the regulatory process and included a performance- and incentive-based contract that set an aggressive target closure date of 2006. With an infusion of additional funding to accelerate cleanup (funding that came at the expense of funding for other sites), DOE completed physical cleanup nearly a year ahead of the accelerated schedule and under budget (at \$7.4 billion). That success prompted the General Accounting Office (now known as the Government Accountability Office) to issue a report recommending that the lessons learned at Rocky Flats be applied at other DOE sites. After consultation with state and local government and relevant stakeholders, the majority of the site was transferred to the U.S. Fish & Wildlife Service in 2007. The approximately 10-square-mile site has been turned from an environmental liability into an environmental asset.

Fernald (Ohio)

Like Rocky Flats, the Fernald Closure Project is a successful example of an accelerated cleanup process. The Fernald site, 18 miles from Cincinnati, produced approximately 500 million pounds of low enriched uranium for use at other government facilities involved in the production of nuclear weapons from the early 1950s through the late 1980s. A 1992 report forecasted completion of cleanup in 2019 at a cost of \$12.2 billion; accelerated cleanup, including the removal of more than a million tons of radioactive material and the demolition of 323 buildings, reduced the final cost to \$4.4 billion.¹² DOE completed the closure and transition from EM to the DOE Office of Legacy Management (LM) in 2006. Following soil cleanup, restoration ecologists developed nearly

400 acres of woodlots, 327 acres of prairie, more than 140 acres of open water and wetlands, and 33 acres of savanna, restoring the area to an undeveloped park with an emphasis on wildlife and education.

Mound (Ohio)

The Mound site, located in Miamisburg, Ohio, approximately 10 miles from Dayton, produced polonium—beryllium initiators used in atomic weapons and conducted research related to radio-nuclides and detonators. The 1990 Federal Facilities Agreement (amended in 1993 to include the state of Ohio) established a procedural framework and schedule for developing appropriate responses and facilitated cooperation and exchange of information among the agencies. By September 30, 2006, all nuclear material had been shipped off site, facilities had been demolished or decontaminated, and most environmental remediation activities were complete.

Closure of Small Sites

In addition to the three large site closures described above, DOE and the states have made substantial progress cleaning up and closing small sites. For example, EM, was created in 1989 and was charged with the cleanup of 107 sites across the country, had as of November 2015 cleaned up 91 of those sites (including the three mentioned above).

ESTABLISHMENT OF AN OFFICE FOR LONG-TERM STEWARDSHIP OF CLOSED SITES¹³

Ideally, waste and other hazards are fully removed from a contaminated site so that the land can be released for unrestricted use. That approach avoids engineered or institutional controls that require ongoing funding and are vulnerable to failure over many decades (or longer). However, it is not always feasible to restore sites to unrestricted use because the associated high costs or risks to cleanup workers would outweigh the marginal reduction in risk of such an approach. The residual contamination of those sites presents a danger to human health and the environment that requires long-term management.

¹² Fluor Corporation, “Fluor Receives Formal Acceptance from U.S. Department of Energy; Fernald Clean-Up Is Complete,” Press Release, January 29, 2007, http://www.lm.doe.gov/land/sites/oh/ferald_orig/NewsUpdate/pdfs%5CFluor%20Fernald%20Receives%20Formal%20DOE%20Acceptance.pdf (accessed November 5, 2015).

¹³ Most states were supportive of the establishment of the LM as a way to provide greater visibility into the important but easily forgotten functions of LTS. Some states are dissatisfied with the current implementation of LM because they see its broad range of functions as diminishing the visibility and priority of the LTS program.

With the support of the states, DOE established LM in 2003 to manage responsibilities after sites are closed and ensure the future protection of human health and the environment. As of 2015, LM is responsible for 90 sites, with the number projected to increase to 129 by fiscal year 2023.¹⁴ LM activities include maintaining all engineered and institutional controls designed to contain or prevent exposure to residual contamination and waste, record-keeping activities, groundwater and surface water monitoring, and emergency response. Although some of the smaller sites LM now manages did not require complicated or lengthy closure plans, several sites were notable for the technical and funding hurdles LM had to overcome to achieve closure.

CLEANUP SUCCESS UNDER THE AMERICAN RECOVERY AND REINVESTMENT ACT

In 2008, Congress passed ARRA. The DOE environmental management program received an appropriation of \$6 billion, doubling the typical annual cleanup budget. To justify those funds, DOE provided a catalog of needed cleanup projects that were not yet funded and made a clear business case that completing those projects sooner would reduce life-cycle costs.

Following enactment of ARRA, DOE moved forward with “shovel-ready” projects quickly while details of other projects were finalized. At its peak, the EM Recovery Act program employed more than 11,000 full-time equivalents in addition to the approximately 40,000 workers that EM regularly employs. Highlights of EM’s accomplishments include:¹⁵

- **Footprint reduction.** DOE reduced the footprint for which EM is responsible by 74 percent, from 931 square miles to 241 square miles;
- **Debris and soil disposal.** EM permanently disposed of more than 2.2 million cubic meters of debris and soil;
- **Facility demolition and cleanup.** EM completed demolition or cleanup of 299 facilities (buildings, other structures, and related infrastructure);
- **TRU waste.** EM treated, packaged, and disposed of 7,666 cubic meters of TRU waste;

- **Low-level waste (LLW)/mixed low-level waste (MLLW).** EM disposed 98,215 cubic meters of LLW and MLLW;
- **Groundwater wells.** EM installed 517 remediation and monitoring wells; and
- **Mill tailings.** EM removed more than 2.6 million tons of uranium mill tailings from the Moab, **Utah** site and safely transported the uranium mill tailings to a nearby, dedicated disposal facility.

EM also took advantage of ARRA funding to accelerate the completion of regulatory milestones. Of the 46 milestones it expected to complete in advance of the regulatory deadline, DOE completed 91 percent within the targeted period. Overall, EM estimates that the \$6 billion ARRA investment enabled completion of work that would have cost approximately \$13 billion had it been done in future years as originally anticipated.

WASTE INVENTORY AND DISPOSAL SUCCESSSES

DOE uses the Waste Information Management System (WIMS), an online tool for the identification of waste forecast volumes, material classes, disposition pathways, and potential choke points and barriers to final disposition. The WIMS data sets are updated annually. WIMS provides states and DOE with the ability to visualize and understand the volumes, categories, and problems of forecasted waste streams.

States and DOE have also made great strides in physical waste disposal—specifically, the disposal of TRU waste, LLW, and MLLW:

- As of February 2014, the WIPP facility in New Mexico had received more than 11,800 shipments of defense TRU waste amounting to more than 90,900 cubic meters of waste disposed in WIPP’s underground salt vaults. WIPP began receiving shipments of remote-handled TRU waste in 2007 and had been receiving waste until the incidents in February 2014.
- As of the end of calendar year 2013, approximately 15.1 million cubic meters of LLW and MLLW had been disposed of in multiple facilities across the complex.

¹⁴ This number differs from the total number of completed EM sites because DOE LM manages sites from programs other than EM and has not yet taken over at some cleaned-up EM sites.

¹⁵ All statistics in this section from U.S. Department of Energy, Office of Environmental Management, “EM Recovery Act Top Line Messages”, Fact Sheet, April 30, 2013. http://energy.gov/sites/prod/files/2013/05/f0/April_30_2013%20EM%20Recovery%20Top%20Line%20Messages%20FINAL.pdf (accessed rch 15, 2016).

IMPROVED COLLABORATION AND COMMUNICATION BETWEEN STATES AND THE DEPARTMENT OF ENERGY

Increased collaboration among DOE, states, and other stakeholders as well as enhanced communication and openness have been critical to cleanup success. Two examples show where cooperation has provided tangible results: the waste incidental to the reprocessing program and intergovernmental dialogue.

Waste Incidental to Reprocessing

After Congress established a new process in 2004 to address residual waste left when HLW tanks were emptied, **Idaho** and **South Carolina** worked with DOE to reach an agreement on the cleanup, referred to as waste incidental to reprocessing (WIR).¹⁶ As a result, several HLW tanks in those states have been successfully closed. (It should be noted that Washington was not included in the original congressional language which resulted in the WIR decision agreements. At the time, Washington

was focused on retrieval of tank waste and closure decisions were not imminent.)

Intergovernmental Dialogue

Since 2001, the NGA Center's FFTF and five other intergovernmental groups—the Energy Communities Alliance, the Environmental Council of the States, the National Association of Attorneys General, the National Conference of State Legislatures, and the State and Tribal Government Working Group—have met annually with DOE to discuss topics of interest and exchange ideas about how to improve cleanup of the nuclear weapons complex. Before the initiation of intergovernmental meetings, each organization had met separately with DOE and did not collaborate on areas of joint concern. The meetings continue to be an important component of the communications link among states, tribes, stakeholders, and DOE and serve as an efficient forum for communicating information and identifying and discussing critical issues.

¹⁶ *National Defense Authorization Act for Fiscal Year 2005*, sec. 3116, Public Law 108-375.

WHAT ARE THE MAIN ISSUES OF CONCERN FOR STATES?

The FFTF currently consists of governor-appointed policy and technical representatives from 12 states (**Idaho, Kentucky, Missouri, Nevada, New Mexico, New York, Ohio, Oregon, South Carolina, Tennessee, Texas, and Washington**). Since 1993, the FFTF has worked with DOE to address individual site concerns as well as issues of common interest throughout the nuclear weapons complex.¹⁷ The FFTF states have consistently identified three main issues of concern:

- **Setting priorities for federal funding** to meet agreed-on, enforceable cleanup milestones;
- **Ensuring that sites comply** with federal and state cleanup standards; and
- **Managing radioactive waste safely**, including transportation, disposal, and LTS.

SETTING FUNDING PRIORITIES

Ensuring that sufficient funding to clean up the nuclear weapons complex is a top priority for states. The funding must appropriately balance short- and long-term needs. Recent budget reductions mean that less funding is available for allocation among and within sites.

Because funding for cleanup is allocated through the federal budget process, DOE and the President must request and Congress must appropriate sufficient annual funding to keep pace with all cleanup commitments and avoid higher future costs. Per Executive Order (EO) 12088, DOE is required to request a budget that complies with environmental requirements, but that order applies only to DOE's

initial budget request.¹⁸ Neither the Administration's budget request to Congress nor the budgets congressional appropriators develop are subject to the requirement and therefore could be insufficient to meet all compliance commitments, potentially slowing the pace of remediation for environmental risks in the short term and likely contributing to an increase in the total costs associated with cleanup.¹⁹

States and DOE now expect that funding levels will remain flat for the foreseeable future. As a result, all parties will have to set priorities for projects within a site and across the complex. In 2012, the FFTF developed, with input from DOE, a set of principles to guide the process by which states and DOE would jointly set priorities for cleanup projects (see Appendix E on page 40). The principles provide a framework for state—DOE interaction and coordination when compliance milestones will not be met in a given year because of budget shortfalls. Those principles provide an approach that recognizes the significance and legal standing of state—DOE agreements and provide a path forward that uses environmental risk and other factors important to states in determining which cleanup projects to complete. The FFTF states encourage use of the 2012 principles to help set funding priorities.

ENSURING COMPLIANCE

Since the FFCA, state compliance agreements have been an important tool for achieving cleanup. Specific state concerns include determining cleanup levels that are protective over the long run, enabling effective state oversight, ensuring an appropriate role for risk in cleanup decision-making, and making progress in assessing damage to natural resources.

¹⁷ See Appendix G for a list of the FFTF members who identified the issues discussed in this section. Also, visit fftf.nga.org for more information.

¹⁸ EO 12088 states: "Each Executive agency shall submit to the Director of the Office of Management and Budget, through the Administrator, an annual plan for the control of environmental pollution. The plan shall provide for any necessary improvement in the design, construction, management, operation, and maintenance of Federal facilities and activities, and shall include annual cost estimates. The Administrator shall establish guidelines for developing such plans....In preparing its plan, each Executive agency shall ensure that the plan provides for compliance with all applicable pollution control standards" (emphasis added).

¹⁹ FY 2016 *Congressional Budget*, Volume V, 71 and 89.

Cleanup Levels

States are concerned about the quality of cleanup efforts—or, as it is often said, determining “how clean is clean.” Ideally, sites are cleaned to a level that requires no further restrictions on land use, but cleanup to unrestricted levels is often not technically or financially feasible. At most sites, some level of waste will remain after cleanup, and the amount and type can vary greatly, even within a site. States want to ensure that waste left in landfills, underneath caps, or remaining in the soil or groundwater will not eventually threaten the public or the environment. The FFTF states encourage DOE to clean sites so that they can serve various land uses, including public reuse of the site. If contamination must be left in place, DOE must maintain and fund controls to restrict land use and perform sampling and surveillance of remaining contamination over the long term.

State Oversight and Compliance Agreements

Meeting compliance milestones is extremely important to states. Under the FFCA, states have the ability to oversee the treatment of DOE’s waste and some aspects of shipment and disposal to ensure the health and safety of their citizens as well as the integrity of the environment. States are co-regulators with equitable consideration in the cleanup process, and DOE must comply with a variety of statutes, regulations, directives, and guidance for cleanup and disposal.²⁰ Compliance agreements are mandatory and intended to force action, yet states recognize that changing information and circumstances at cleanup sites might warrant adjustments. Complex-wide, since 1995, states have modified compliance agreements hundreds of times to make appropriate changes in light of new information.

Understanding whether and how DOE is going to meet its compliance requirements and how it will respond if it cannot is a crucial element of state oversight. Therefore, states must receive estimates of future funding levels. In the past, DOE prepared “five-year plans” that contained estimates of future

budgets, helping states understand how cleanup likely would progress from year to year and where and when compliance schedules were at risk. DOE has released only one five-year plan (known as a Future Years Defense Environmental Management Plan) since February 2007, despite requirements from Congress. However, because that plan was based on unrealistic straight-line budget assumptions, it did not provide useful information for states. With no useful five-year plans issued since 2007, states have had a harder time predicting whether DOE will be able to meet its compliance requirements until it is in jeopardy of missing them. The FFTF states support continued publication of five-year plans that represent realistic funding expectations to help states with their oversight role.

The Role of Risk in Cleanup Decisions

Risks to public health and the environment are one of several factors that can influence cleanup decisions. States support setting priorities to balance environmental risk with regulatory obligations and other factors. That approach, known as risk plus other factors, stems from the consensus report of the 1996 Federal Facilities Environmental Restoration Dialogue Committee, a group that consisted of federal agency representatives (including the Environmental Protection Agency, DOE, and the U.S. Department of Defense), state agencies, local governments, tribal governments, and nongovernmental organizations (developed with assistance from the Keystone Center in Colorado and known as the Keystone Report).²¹ States have a strong interest in EM succeeding in the cleanup in a timely and efficient manner, thereby reducing the risk to public health and the environment. State oversight and compliance agreements are *risk-informed*—that is, they take into account both risk and the many other relevant factors. State decision-making is not *risk-based*—a term that implies that risk is the *only* consideration used to set priorities. As recognized in the Keystone Report, such decisions, based solely on risk, would be both unwise and contrary to law. Moreover, the process

²⁰ Office of Environmental Management, U.S. Department of Energy, “Regulatory Compliance,” <http://energy.gov/em/services/program-management/regulatory-compliance> (accessed February 27, 2015).

²¹ National Service Center for Environmental Publications, Environmental Protection Agency, Final Report of the Federal Facilities Environmental Restoration Dialogue Committee: Consensus Principles and Recommendations for Improving Federal Facilities Cleanup, April 1996, <http://nepis.epa.gov/Exe/ZyNET.exe/20012GLI.txt?ZyActionD=ZyDocument&Client=EPA&Index=1995%20Thru%201999&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&UseQField=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5CZYFILES%5CINDEX%20DATA%5C95THRU99%5CTXT%5C00000018%5C20012GLI.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=p%7C&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1> (accessed November 7, 2015). For a full list of the “other factors” included in the report, see Appendix F.

of measuring and comparing risks is fraught with technical problems and is not well accepted by the public. The FFTF states support DOE's continued effort to maintain risk-informed decision-making, as laid out in the Keystone Report, that respects the primacy of compliance agreements.

Natural Resource Damage Assessments

In addition to compliance agreements, states can help ensure that DOE's cleanup adequately protects public health and the environment by using a Natural Resources Damage Assessment (NRDA)—the process of collecting and analyzing information to determine the likelihood of the occurrence and extent of harm to natural resources (injury), and then the cost for restoration (damages). Under the Comprehensive Environmental Response, Compensation, and Liability Act, the public has a right to compensation to restore, replace, or acquire the equivalent of injured natural resources and associated loss of services from the release of hazardous substances or from the removal and remedial actions taken to respond to a release. DOE is responsible for injuries to natural resources (for example, land, fish, water, and wildlife) that occur on or near DOE sites as a result of contaminant release. States help assess the extent of injury to a natural resource and determine appropriate ways to restore the resource and compensate for its injury. The level of cooperation among trustees can vary widely among sites. Disagreements among the responsible party and trustees about the assessments or even when to begin the assessment phase have led to lawsuits. DOE is both a trustee of and the responsible party for NRDA at weapons complex sites, creating unique challenges for ensuring that assessment and restoration occur. The FFTF states encourage DOE to fulfill its obligations as a responsible party under the NRDA while appropriately engaging in the process as a trustee.

MANAGING WASTE SAFELY

Some waste developed at the nuclear weapons complex will persist in the environment for hundreds, thousands, or even millions of years. As such, the proper transportation and disposal of waste are critical to reducing risks to public health and the environment and are a key element of cleanup that meets compli-

ance agreements. Key aspects of that effort include disposal of HLW in a geologic repository, the disposal of TRU waste at WIPP, and the safe transportation of all radioactive wastes.

Changes to Federal Waste Management Strategy

DOE uses an internal order (Order 435.1) to outline processes for waste management at DOE sites.²² Order 435.1 currently classifies wastes by the source and method of production (such as high-level liquid waste from plutonium production), certain technical criteria (including overall radioactivity levels), or some combination of those factors. DOE began a complex-wide review of waste management practices and policies in 2010 that is expected to result in revisions to Order 435.1. The goal of those revisions is to remove inconsistencies and gaps in the way waste is classified and managed, including management of waste that appears to fit within multiple classifications or disposal decisions. Such waste streams, known as orphan wastes, do not easily fall into existing classifications and therefore have either no existing or few potential disposal locations, despite having risk profiles similar to those waste streams already managed for disposal. The FFTF encourages DOE to release the draft revisions in a timely fashion and to consider the effect of the revisions on environmental risks in individual states and state compliance agreements.

Low-Level and Mixed Low-Level Waste Disposal

Low-level waste is any waste that is not HLW, TRU, or spent nuclear fuel (SNF). LLW designated as greater than Class C (GTCC) lacks a decision on how and where it will be disposed of. In accordance with congressional direction, DOE completed a draft Environmental Impact Statement (EIS) in 2011 that analyzed alternatives for disposal of GTCC waste. The draft EIS considered three approaches to disposal: deep geologic disposal, intermediate borehole placement, and "enhanced" near-surface disposal. The EIS evaluated several sites, including the Hanford site in Washington; the Idaho National Laboratory in Idaho; the Los Alamos National Laboratory, WIPP, and the WIPP vicinity in New Mexico; the Nevada National Security Site (formerly the Nevada Test Site); and the Savannah River Site (SRS) in South Carolina. DOE did not identify a

²² Office of Environmental Management, U.S. Department of Energy, "Revision to DOE Order 435.1," <http://energy.gov/em/revision-doe-order-4351> (accessed January 27, 2015).

preferred alternative in the draft EIS, with the final EIS likely to be released in the first quarter of 2016.²³ The FFTF states encourage DOE to make a final decision on a disposal location in consultation with the state that will host the site, which will allow the removal of this high-risk waste from cleanup sites.

Disposal of High-Level Waste

A permanent solution for the disposal of HLW and SNF is of great concern for sites and to states that hold such materials. Although Yucca Mountain, Nevada, was designated as the United States' national geologic repository for nuclear waste, it is not clear whether the site will ever be available as a repository. At the same time, the policy of the federal government since 1985 has been that SNF and defense HLW would be disposed of in the same repository once available. DOE announced in March 2015 that it would be moving ahead with a strategy to separate the disposal path for defense-generated HLW and SNF and develop repository facilities.²⁴ That announcement stemmed from the 2012 final report of a federal advisory commission that studied the issue of how the United States could change disposal of commercial SNF and defense HLW.²⁵ Timely implementation of that strategy would potentially allow placement of already-treated HLW (such as vitrified HLW from the SRS in **South Carolina**) and SNF from **Idaho** in a repository earlier, if a site can be established before a repository for commercial SNF is made available. The FFTF states support DOE's effort to develop permanent disposal options that have the consent of the host state and accept defense HLW as it is available; they do not support any specific site or method.

Disposal of Transuranic Waste (Waste Isolation Pilot Plant, New Mexico)

WIPP is the only licensed deep geologic repository for any type of radioactive waste and as such is critically important to the states in which such waste is stored. Since the accidents of February 2014, WIPP has been closed to new waste. DOE currently estimates that it will have corrective actions in place by early 2016 and that WIPP will be ready to

receive new waste shipments by 2017. The FFTF encourages DOE, when WIPP is reopened, to adopt an appropriate pace and sequence for removing TRU waste from sites and transporting it to WIPP, and to operate WIPP at the highest levels of safety.

Transportation of Radioactive Waste

DOE has a responsibility to design and operate a safe nuclear waste transportation system. In their role as first-line regulators charged with protecting public safety and health, states (along with local governments) provide emergency response and other services to ensure safe shipment within their borders. DOE has generally worked cooperatively with states to plan major waste-transportation efforts. The FFTF states encourage DOE to continue its efforts to plan and coordinate transportation activities in full consultation with affected states.

Long-Term Stewardship

Even when DOE considers cleanup at DOE sites complete, additional measures will be needed at most major sites to ensure adequate protection of human health and the environment. Few sites will be cleaned to unrestricted use; therefore, additional LTS activities include varying degrees of surveillance, inspection, restrictions on public access and future uses of land and water, maintenance of relevant information, monitoring the migration of residual contamination and the effectiveness of remedies, and responsible long-term care of the site. A reliable LTS program should be implemented at each site, with roles and responsibilities shared appropriately among DOE offices, states, and local governments; tribal nations; and other federal agencies as needed. The program must follow state laws governing institutional controls. To adequately protect human health and the environment, LTS activities must continue, uninterrupted, for decades or centuries. The FFTF states support DOE in carrying out its long-term responsibility to fund LTS activities and will work with DOE and others to determine the funding mechanisms they can pursue to make the certainty of funding commensurate with the certainty of residual risk at sites where LTS is required.

²³ Office of Environmental Management, U.S. Department of Energy, "Greater-Than-Class-C Low-Level Radioactive Waste EIS Information Center," <http://www.gtcccis.anl.gov> (accessed January 27, 2015).

²⁴ U.S. Department of Emergency, "The Path Forward on Nuclear Waste Disposal," Fact Sheet (Washington, DC: U.S. Department of Energy, 2015), <http://energy.gov/sites/prod/files/2015/03/f20/Defense%20Repository%20Fact%20Sheet.pdf> (accessed November 7, 2015).

²⁵ Blue Ribbon Commission on America's Nuclear Future, *Report to the Secretary of Energy* (Washington, DC: Blue Ribbon Commission on America's Nuclear Future, 2012), <http://energy.gov/ne/downloads/blue-ribbon-commission-americas-nuclear-future-report-secretary-energy> (accessed January 27, 2015).

CONCLUSION

States affected by nuclear weapons complex cleanup have made a sustained commitment to achieving that cleanup over the coming years and even decades. States and DOE must work together to address challenges that affect multiple states in a holistic manner. The three major issues for states—sufficient cleanup budgets, compliance with regulatory agreements, and the transparent management of radioactive waste—are interdependent: Budgets affect DOE’s ability to meet its compliance obligations, waste management decisions drive costs, and an inability to meet milestones or manage waste in the short term affects budgets and compliance in the long term. At the

same time, a waste-disposal or budget decision at one site can affect cleanup progress at other sites across the complex. The FFTF supports the idea that complex-wide decisions should have complex-wide input from states and other stakeholders, such as tribes and local communities, and be made with a clear understanding and transparent communication of the complex-wide effects. It is important that states and DOE continue to address those issues simultaneously and in coordination so that cleanup can be accomplished safely, efficiently, and as fully as possible. Governors will continue to lead state efforts to achieve cleanup in coordination with DOE.

APPENDICES

APPENDIX A. How Are Cleanup Decisions Made?

Since the 1980s, the U.S. Department of Energy's (DOE) cleanup efforts have been subject to federal environmental laws and the regulatory authority of the U.S. Environmental Protection Agency (EPA) for certain activities. Many states have similar authority, partly through federal laws for clean water and hazardous waste that bestow oversight to the states. Cleanup decisions generally involve two main issues: the treatment of waste (through site treatment plans) and the disposal of waste (through processes that federal regulations determine). The following list provides an overview of the type of cleanup decisions made under each cleanup law:

- **Federal Facilities Compliance Act site treatment plans.** DOE, in close consultation with the states, completed treatment plans for each site in 1995. The plans are implemented under regulatory orders between DOE and the states and address only the treatment of radioactive waste. They do not directly address waste disposal. The development of the site treatment plans demonstrates the successful collaboration between states and DOE.
- **National Environmental Policy Act (NEPA).** NEPA governs the framework for many of DOE's waste management decisions. Within the NEPA framework, DOE uses environmental impact statements to make decisions and announces them in formal records of decision (RODs). DOE has made final RODs for its most common waste types, including high-level waste (HLW), transuranic (TRU) waste, low-level waste (LLW), and mixed low-level waste (MLLW); those RODs are still in effect today (See Appendix C on page 35 for definitions of waste types).²⁶
 - + RODs governing the management of HLW and TRU were issued in the late 1990s: HLW is intended to be disposed of in a yet-to-be-sited national geological repository, and TRU waste is being disposed of at the Waste Isolation Pilot Plant in **New Mexico**.
 - + In 2000, DOE announced its final ROD for LLW and MLLW treatment and disposal sites. Each major site will treat its own LLW while DOE continues (consistent with current practice and to the extent practicable) to dispose of on-site waste at sites that already have LLW disposal facilities (Hanford, the Idaho National Laboratory [INL], the Los Alamos National Laboratory [LANL], the Nevada National Security Site [NNSS], the Oak Ridge National Laboratory [ORNL], and the Savannah River Site [SRS]). In cases where a site does not have on-site disposal capability or where specific waste does not meet waste acceptance criteria at the on-site disposal facility, DOE uses the NNSS for disposal of LLW. DOE also has the option of sending LLW to commercial, U.S. Nuclear Regulatory Commission—or Agreement State-licensed LLW disposal facilities.
 - + DOE uses Hanford, INL, ORNL, and the SRS to treat MLLW from other DOE sites. DOE uses the NNSS for disposal of waste from off-site locations.²⁷ Under the federal hazardous waste law, DOE must secure permits from the state to operate MLLW facilities.

²⁶ *Transuranic* waste is waste that has been contaminated with alpha-emitting TRU radionuclides. Elements that have atomic numbers greater than that of uranium are called *transuranic* (that is, *beyond uranium*). Because of the elements' long half-lives, TRU is disposed of more cautiously than LLW. TRU waste is generally a byproduct of weapons production and consists of protective gear, tools, residue, debris, and other items contaminated with small amounts of radioactive elements (mainly plutonium).

²⁷ Currently, most MLLW goes to the NNSS disposal facility. Some also goes to commercial sites and some on-site waste goes to a special Comprehensive Environmental Response, Compensation, and Liability Act cell at INL.

- **Corrective actions and hazardous waste management at still-operating facilities under the Resource Conservation and Recovery Act (RCRA).** The Federal Facility Compliance Act of 1992 reaffirmed the principle that federal facilities are required to comply with all federal and state hazardous waste requirements. DOE manages waste defined as hazardous or mixed (that is, waste that has both hazardous and radioactive components) under RCRA rules, and such waste requires ongoing safe management as well as corrective action to address release into the environment. Most states are authorized to carry out the federal RCRA program and their own state-specific requirements in their states. States make site-specific decisions about cleanup under RCRA corrective action authority in consultation with DOE, EPA, and the public.

Waste disposal decisions based on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Various site-specific decisions under CERCLA, also known as the Superfund law, address the disposal of contaminated soil, groundwater, and buildings. Such decisions are made at the local site level in conjunction with state regulators and EPA based on land uses that reflect local conditions and, to the extent possible, the preferences of local stakeholders. CERCLA decisions must analyze, as appropriate, the tradeoffs of disposal on site, off site at a DOE disposal facility, and off site at a commercial disposal facility.

APPENDIX B. The Major U.S. Department of Energy Nuclear Weapons Sites: A State-by-State Overview of Cleanup Status

This appendix provides an overview of U.S. Department of Energy (DOE) nuclear weapons sites located in the states that participate in the National Governors Association Center for Best Practices Federal Facilities Task Force (FFTF). Each section contains background information about the tasks each site performed and the types of waste it generates as well as any specific waste disposal functions, cleanup accomplishments, current site-specific issues, and the site's relationship to other sites in the nuclear weapons complex.²⁸ The accomplishments discussed here are distinct from the major complex-wide successes that the report covers.

- **Idaho:** Idaho National Laboratory (INL)
- **Kentucky:** Paducah Gaseous Diffusion Plant (PGDP)
- **Missouri:** Kansas City Plant (KCP), Weldon Spring
- **Nevada:** Nevada National Security Site (NNSS)
- **New Mexico:** Los Alamos National Laboratory (LANL), Sandia National Laboratories (SNL), the Waste Isolation Pilot Plant (WIPP)
- **New York:** West Valley Demonstration Project (WVDP)
- **Ohio:** Portsmouth, Mound, Fernald
- **South Carolina:** Savannah River site (SRS)
- **Tennessee:** Oak Ridge Reservation (ORR)
- **Texas:** Pantex
- **Washington:** Hanford

Idaho: Idaho National Laboratory

Background

The Idaho National Laboratory (INL), located in southeastern Idaho and with additional research and support facilities in Idaho Falls, was established in 1949 as the National Reactor Testing Station. For many years, INL housed the largest concentration of nuclear reactors in the world. Fifty-two reactors were built at INL, including the U.S. Navy's first prototype nuclear propulsion plant. Three agreements form the regulatory framework at INL: the Federal Facilities Agreement Compliance Order (FFACO), which mandates milestones for cleanup under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); the Site Treatment Plan and associated regulatory orders, which govern certain waste management activities; and the 1995 Settlement Agreement, which settled a lawsuit between the state of Idaho, the Navy, and DOE and requires that waste be removed from Idaho by specific dates.

²⁸ The members of the FFTF provided the information in this chapter (see Appendix G on page 43 for a list of the FFTF's members). The authors derived the waste volume numbers in this chapter from the DOE Waste Information Management System.

Accomplishments

DOE has worked with Idaho to achieve the following outcomes:

- DOE transitioned 11 of 15 tanks that previously stored high-level waste (HLW). The remaining four tanks will continue to store waste until the sodium-bearing waste liquid treatment system, which is part of the Integrated Waste Treatment Unit (IWTU), becomes operational. Construction of the IWTU is complete, but issues encountered during testing have delayed waste treatment (see “Site-Specific Issues” for details).
- The Advanced Mixed Waste Treatment Project (AMWTP) has successfully treated transuranic (TRU) waste from Idaho and other states.
- DOE excavated and repackaged solvent, TRU, and depleted uranium waste for eventual shipment to WIPP in New Mexico from more than half of the required acres at INL.
- DOE treated and repackaged approximately 7,000 sludge drums for disposal at WIPP.
- DOE treated and shipped 124 cubic meters of remotely handled TRU waste for disposal at WIPP.

Site-Specific Issues

Leading challenges at INL include defining the future mission of the INL site and implementation of the 1995 Settlement Agreement and other legal agreements between DOE and the state. Among other things, the agreements require disposal of TRU waste at WIPP and treatment of liquid HLW (including sodium-bearing waste) in tanks above the Snake River Plain Aquifer, the sole source of drinking water for much of eastern Idaho. DOE has completed construction of the IWTU to treat the liquid HLW but has struggled to achieve full facility operation. Under a Resource Conservation and Recovery Act of 1976 (RCRA) agreement, DOE must complete treatment of the waste by December 31, 2018.

Relationship to Other Sites in the Complex

INL's relationships with other DOE sites are critical to completing the requirements of the 1995 Settlement Agreement, including the WIPP site for disposal of TRU waste. In addition to HLW and spent nuclear fuel (SNF) stored and generated on site, INL stores the damaged reactor from Three Mile Island and SNF from Navy vessels and foreign research reactors. Disposal of HLW and SNF from INL depend on future decisions about permanent geologic disposal. The AMWTP at the INL plays a key role in treating mixed low-level waste (MLLW) and TRU waste from around the complex.

LLW and MLLW cleanup at INL depends on access to both the NNSS and commercial sites around the country. According to DOE estimates, more than 20,000 cubic meters of LLW and 3,000 cubic meters of MLLW will be sent from Idaho to the NNSS for disposal between 2015 and 2050. Meanwhile, DOE will dispose of approximately 6,000 cubic meters of LLW and 3,000 cubic meters of MLLW at commercial facilities.²⁹

²⁹ Applied Research Center, Florida International University, “Waste Information Management System (WIMS): Forecast Data 2014–2050,” <http://www.emwims.org> (accessed November 8, 2015).

Kentucky: Paducah Gaseous Diffusion Plant

Background

The Paducah Gaseous Diffusion Plant (PGDP) is in rural western Kentucky, 10 miles west of Paducah. For more than 60 years, the PGDP enriched uranium, first supporting the nation's nuclear weapons program, then producing fuel for commercial nuclear power plants. PGDP enrichment operations ended in 2013, and the facility's ownership officially transitioned back to DOE's Office of Environmental Management (EM) in 2014, signaling the start of a long-term PGDP deactivation project.³⁰

The cleanup framework for addressing contamination at the PGDP is outlined in the 1998 Federal Facilities Agreement (FFA) between DOE, EPA, and the Kentucky Energy and Environment Cabinet. Cleanup schedules are updated annually in revisions of the site management plan. The current site management plan has enforceable milestones for remediation of contaminated burial grounds, soil units, and groundwater through 2032. The FFA parties are currently in discussions to incorporate decontamination and demolition of the entire gaseous diffusion plant into the site management plan, along with investigation of areas previously deemed inaccessible when the plant was in operation.

Accomplishments

DOE has worked with Kentucky to achieve the following outcomes:

- Electrical resistance heating (ERH) has accounted for the removal of 3,752 gallons of dense, nonaqueous-phase liquids—primarily trichloroethylene (TCE)—in the shallow subsurface water
- Two pump and treat systems have been in operation for nearly two decades and have collectively treated 3.6 billion gallons of groundwater, extracting approximately 4,200 gallons of TCE. One system was optimized in 2010 and the other system is currently undergoing optimization activities.
- A depleted uranium hexafluoride (DUF₆) conversion facility was built on site and began operation in 2011 to convert an estimated 46,000 of DOE's surplus DUF₆ inventory stored at Paducah into a more stable chemical form—uranium oxide and aqueous hydrofluoric acid.³¹ Approximately 2,300 cylinders have been processed with an estimated 30 years of operations to complete the remaining inventory at the facility's process design rate.
- Successful D&D of thirty-two inactive facilities between 2002 and 2015. The total amount of material dispositioned from these activities exceeded 336,000 gross square feet (GSF).
- Disposal of 33,000 tons of contaminated scrap metal, 420,000 square feet of legacy waste, and 866,000 square feet of debris from material storage areas.
- Removal of 22,677 square yards of targeted sediment to address higher levels of contamination at plant ditches.

³⁰ Portsmouth/Paducah Project Office, U.S. Department of Energy, "Paducah Environmental Remediation," <http://energy.gov/pppo/paducah-site/paducah-environmental-remediation> (accessed April 16, 2015).

³¹ A similar facility was built in Ohio.

Site-Specific Issues

The FFA parties are currently engaged in the CERCLA decision process for potential construction of a disposal facility designed for receipt of RCRA-regulated waste and other low-level radioactive waste. Such a facility could accept much of the demolition and construction debris generated during the plant teardown as well as remediation waste from burial grounds and other cleanup projects. If approved, the landfill will require large portions of the site's budget to construct but it would cost nearly 40 percent less than off-site disposal alternatives. DOE estimates that an off-site alternative would involve estimated 30,000 rail cars of waste shipped to Utah and another 10,000 truckloads of waste going to the NNSS. Waste disposition is estimated to cost \$1.3 billion without the construction of the cell compared to \$800 million if the on-site disposal option is approved.

Pump-and-treat systems have been in operation since the 1990s to control off-site migration of the higher concentration portions of the groundwater plumes. ERH has only been successful in the uppermost portions of the aquifer. Removal of the primary groundwater source contaminant (TCE) has proven to be a challenge within the lower portions of the sites primary drinking water aquifer. DOE recently conducted a treatability study where steam enhanced extraction was tested in an attempt to find an alternative technology for treating contamination within the lower reaches of the primary drinking water aquifer. DOE will share the findings of the Treatability Study with regulators on December 28, 2015.

DOE's Office of Environmental Management resumed control of the PGDP in October of 2014. Resources are being realigned to support deactivation and decommissioning (D&D) activities, and more than 500 structures and systems will eventually undergo D&D. The estimated volume of waste material requiring disposal from D&D operations is 3.6 million square yards. As D&D operations progress, it is anticipated that opportunities will arise for addressing contamination previously considered inaccessible (underneath buildings and infrastructure). Access to such areas should greatly assist characterization efforts. Other environmental and remedial actions, such as the removal and capping of multiple burial grounds, will compete for limited resources with D&D activities as DOE begins the process of stabilizing and then demolishing the PGDP.

Missouri: Kansas City Plant and Weldon Spring Site

Background

Missouri is home to one active site—the Kansas City Plant (KCP)—as well as one long-term stewardship (LTS) site—Weldon Spring. The KCP occupies 136 acres of the 300-acre Bannister Federal Complex (BFC) in Kansas City, Missouri. KCP's mission—to manufacture non-nuclear components for defense purposes—ended in August 2014, and the facility was relocated to a new National Security Campus in south Kansas City. Naval and DOE operations at the BFC released hazardous materials, primarily chlorinated solvents and polychlorinated biphenyls (PCBs), into the environment. Some radioactive contamination has been identified and is undergoing characterization and remediation.

DOE's Office of Legacy Management (LM) currently manages the Weldon Spring site and as such is in LTS. Thirty miles west of St. Louis, from 1941 to 1984 the site served a variety of missions for the U.S. Army and DOE's parent agencies (the Atomic Energy Commission and others) that involved both explosive ordnance and nuclear materials. The DOE portion of the operations, listed on the National Priority List in 1987, was a plant that converted processed uranium ore concentrates to pure uranium trioxide and other products.

Accomplishments

DOE has worked with Missouri to achieve the following outcomes:

- At KCP, DOE carried out environmental restoration activities at 43 release sites or areas of concern that posed a potential threat to human health and the environment. Operational oversight was accomplished through an agreement in principle (AIP). The AIP allows for a day-to-day state presence at the site, enabling the state to serve as an independent party that can assist in answering the public's questions about the operation without causing security concerns. In 2014, the RCRA postclosure permit for KCP was expanded to include the entire BFC, which the General Services Administration (GSA) and DOE/NNSA jointly own and manage.
- Cleanup at Weldon Spring began in 1984 and continued in phases until the completion in 2001 of a 45-acre disposal cell in an area formerly occupied by chemical plant production buildings. The disposal cell contains approximately 1.48 million cubic yards of contaminated materials. Leachate from the disposal cell is collected, treated, and discharged off site. A native prairie has been established around the disposal cell that provides erosion control and educational opportunities through a viewing platform at the peak of the disposal cell. The site also offers public trails and an interpretive center that preserves the site's history.

Site-Specific Issues

The KCP and the majority of the BFC, other than a portion that GSA will continue to own, are currently being investigated for early transfer to a private developer. The process will require a finding of suitability for early transfer for submission to the governor for approval. The transfer to a private developer is expected to occur by the end of 2016 or early 2017.

At the Weldon Spring site, a long-term surveillance plan details a groundwater monitoring program, a sitewide inspection process, and institutional controls that must be maintained in perpetuity. The presence of residual contamination requires institutional and engineering controls that must be inspected at regular intervals and maintained.

Relationship with Other Sites in the Complex

KCP previously provided all the non-nuclear components for the nuclear complex's weaponry. As a result, although KCP/BFC is targeted for release from federal control in the early transfer process, the NNSA will maintain its mission at the National Security Campus.

Nevada: Nevada National Security Site

Background

The Nevada National Security Site (NNSS)—formerly known as the Nevada Test Site—occupies approximately 1,350 square miles in southeastern Nye County, about 65 miles northwest of Las Vegas. The NNSS is larger than Rhode Island and comprises more than 40 percent of all DOE land holdings. As a DOE defense program site, the primary mission of the NNSS is to maintain the capability to resume underground nuclear testing. The site also has a role in NNSA nuclear nonproliferation programs, nuclear emergency response capabilities, and other federal projects.

Several regulatory agreements currently guide cleanup and disposal activities at the site. A 1999 AIP identified activities that Nevada and DOE would undertake to work cooperatively to assure citizens of Nevada that the public's health and safety as well as the environment are protected. The AIP and its later revisions afford Nevada

the opportunity to provide input into the evaluation of the waste sent to the NNSS for disposal. Nevada is also engaged with DOE on the review of LLW transportation protocols and notifications, emergency planning, and response exercises.

The 1996 FFACO governs remediation of historical contamination and stipulates a process to ensure that DOE and the U.S. Department of Defense thoroughly investigate and complete corrective actions for contaminated sites on the NNSS and the nearby Nellis Air Force Base (AFB). The NNSS also has a RCRA Part B permit that includes authorization to dispose of MLLW generated at the NNSS and other DOE sites. The permit is effective until December 2015 but is in the process of being reviewed to run through 2020 or until the site reaches disposal capacity.

Accomplishments

Since the FFACO was signed in 1996, DOE has made significant progress addressing the remediation process in several categories of contaminated sites:

- Industrial site restoration addresses facility D&D; historical infrastructure remediation efforts; and conventional weapons cleanup, including unexploded ordnance. The FFACO identified more than 2,000 such sites; to date, all but 2 have been clean-closed or closed in place, meeting specific protective closure criteria that allow DOE to close the site with use restrictions.
- At the underground test areas, where underground nuclear tests contaminated groundwater, Nevada recently approved one corrective action unit, Frenchman Flat, to move into the closure stage so that Nevada and DOE can formally establish use restrictions, regulatory boundaries, and a long-term monitoring strategy. That is the first of five units to move to the closure stage since the FFACO was signed in 1996.
- Soil sites contain contamination from historic nuclear detonations, safety experiments, nuclear reactor development, nuclear rocket development, and hydronuclear experiments. To date, 24 soil sites have either been clean-closed or closed in place with monitoring and use restrictions through a process to which the state and DOE have agreed.
- The two Nevada off-site areas—Project Shoal and the Central Nevada Test Area (CNTA)—were transferred to DOE LM in 2006. The surface unit at Project Shoal was clean-closed and has no monitoring requirements. Postclosure monitoring is required for the CNTA surface unit. The groundwater unit at Project Shoal is undergoing further characterization; a closure report for the CNTA groundwater is in the process of being finalized.

Site-Specific Issues

Although the NNSS has a relatively small DOE EM cleanup budget (approximately \$65 million in 2015, or just over 1 percent of all DOE cleanup funds), the site contains significant contamination in surface soils and groundwater.³² Contamination of groundwater is an area of focus for the state of Nevada at both the NNSS and the Nevada off-site locations; nearly 30 percent of more than 828 underground nuclear tests conducted at the site were performed in the vicinity of groundwater. Nevada will establish regulatory boundaries for each groundwater unit based on model-generated contaminant boundaries. If radionuclide levels exceed established levels at those boundaries, Nevada will require DOE to submit a plan to meet specific groundwater unit objectives.

³² Office of the Chief Financial Officer, *U.S. Department of Energy, Department of Energy FY 2016 Congressional Budget Request*, Volume V (Washington, DC: U.S. Department of Energy, 2015), http://energy.gov/sites/prod/files/2015/02/f19/FY16EM_Budget_Request_to_Congress.pdf (accessed November 8, 2015).

Relationship to Other Sites in the Complex

The NNSS is currently the only DOE-owned disposal site DOE has identified for off-site disposal of DOE-generated waste. DOE designated the NNSS and Hanford as the two regional disposal sites for off-site LLW and MLLW from throughout the complex in 2000; however, a moratorium is in place on most new waste shipments to Hanford until the Waste Treatment Plant is in full operation. NNSS receipt of waste is conducted in accordance with the facility waste acceptance criteria and a waste profile review process that includes review by the state.

Nevada and DOE have agreed to engage in discussions on any potential future changes to the NNSS Waste Acceptance Criteria or LLW classification in general. In May 2015, DOE and Nevada reached an agreement to allow shipments of roughly 400 containers of uranium-233 material from Oak Ridge National Laboratory (ORNL) to the state.³³

The NNSS will continue to generate LLW into the future. DOE will manage and dispose of the vast majority of waste on site, with the exception of a small quantity of TRU waste generated and currently stored at the site that will ultimately be shipped to WIPP in New Mexico.

New Mexico: Los Alamos National Laboratory, Sandia National Laboratories, the Waste Isolation Pilot Plant

Background

New Mexico hosts three major DOE sites: Los Alamos National Laboratory (LANL), Sandia National Laboratories (SNL), and Waste Isolation Pilot Plant (WIPP). Established in 1942 to develop the first atomic bomb, LANL still serves as a key center for weapons and basic science research. LANL is located approximately 20 miles northwest of Santa Fe and situated on more than 40 square miles of the Pajarito Plateau. Canyons several hundred feet deep dissect the laboratory property and drain into the Rio Grande River, a few miles to the southeast. The regional aquifer beneath the plateau, in some areas more than 1,000 feet below the surface, is the sole water supply for the laboratory and the communities of Los Alamos and White Rock. In recent years, LANL-derived chemical and radioactive contaminants have been detected in the regional aquifer as well as in sediments and surface waters that periodically flow into the Rio Grande.

SNL began operating in 1945 on Sandia Base in Albuquerque to support LANL's efforts to build the first atomic bomb. SNL is located within Kirtland AFB and shares its northern boundary with the City of Albuquerque. The regional aquifer in the Albuquerque Basin serves the nearly 1 million people who live in Albuquerque and its surrounding communities. Like LANL, SNL has contributed to groundwater contamination of its regional aquifer, with at least four groundwater plumes identified.

In 1979, Congress authorized the creation of WIPP, 26 miles east of Carlsbad, New Mexico. WIPP became the nation's first and remains the only underground repository for the permanent disposal of the nation's defense-related TRU waste. WIPP is operated under a repository certification from EPA and a hazardous waste facility permit issued by the New Mexico Environment Department (NMED). The latter document requires that DOE use robust characterization procedures at each generator site across the complex before WIPP can receive waste. DOE requires strict compliance with the waste analysis plan and waste acceptance criteria in the WIPP permit.

³³ Frank Munger, "Oak Ridge Uranium Shipments Bound for Nevada After Long Delay," *Knoxville News Sentinel* (Knoxville, NV), May 6, 2015, http://www.knoxnews.com/news/local-news/oak-ridge-uranium-shipments-bound-for-nevada-after-long-delay_18734023 (accessed June 19, 2015).

Accomplishments

DOE has worked with New Mexico to achieve the following outcomes:

- LANL completed excavation of Material Disposal Area B (MDA B) in 2014. Following review and approval from NMED, MDA B received a certificate of completion in May 2015 under the March 2005 Consent Order for achieving residential cleanup standards. MDA B was a Manhattan Project-era disposal site located adjacent to the Los Alamos town site.
- SNL submitted a permit modification in autumn 2014 proposing that the mixed-waste landfill no longer requires corrective action and should proceed to long-term monitoring and maintenance. As of mid-2015, NMED's consideration was in progress.
- WIPP is the only site permitted to dispose of the nation's defense-related TRU waste. As of February 2014, a total of 90,627 cubic meters of contact-handled waste and an additional 357 cubic meters of remote-handled waste have been disposed of at WIPP, which translates to 11,894 waste shipments to the facility since it first began receiving waste in 1999.

Site-Specific Issues

Los Alamos National Laboratory and the Waste Isolation Pilot Plant

The regulatory framework for LANL has changed considerably in recent years. The Consent Order requires DOE to investigate, propose, and implement remedies as well as monitor all RCRA-regulated sites. In January 2011, DOE, NNSA, and NMED finalized the LANL Framework Agreement to realign environmental priorities. The agreement committed DOE and NNSA to accelerating the removal of above-ground TRU waste located at Technical Area 54, Area G. An element of the agreement committed NNSA to completing removal of all noncemented, above-ground TRU waste inventory—a total of 3,706 cubic meters—by June 30, 2014. Because of the February 14, 2014, radiological incident at WIPP, DOE did not meet the agreement's commitments. Since the incident, investigations have determined that the radiation release originated from a waste drum packed at LANL.

NMED and DOE reached an agreement on April 30, 2015, to resolve Compliance Orders related to the incident. The agreement sets forth terms under which NMED and DOE will continue settlement discussions for the purpose of resuming normal operations at WIPP and LANL and outlines several supplemental environmental projects that will benefit New Mexico.

Waste Isolation Pilot Plant Incidents and Department of Energy Investigations

Two incidents in February 2014 resulted in a temporary closure of WIPP that is expected to last at least three years. During that period, DOE has suspended packaging and shipment of TRU waste at other sites. All investigations of those incidents concluded that they were preventable.

TRUCK FIRE, FEBRUARY 5, 2014

Accident Investigation Board (AIB). The DOE AIB was appointed to investigate the salt haul truck fire in the WIPP underground. The AIB released a fire report in March 2014 identifying contributing causes of the truck fire and 35 Judgments of Need. The report identified a failure to perform preventative maintenance as the root cause of the fire.

RADIOLOGICAL RELEASE INCIDENT, FEBRUARY 14, 2014

AIB Phase 1. On March 4, 2014, a second AIB was appointed to investigate the February 14, 2014, radiological release in the WIPP underground. The AIB Phase 1 Report identified the contributing causes, root cause, and 39 Judgments of Need. The report did not determine whether the release resulted from one or multiple containers underground.

AIB Phase 2. The AIB effort continued with Phase 2 of the radiological release investigation, which focused on the release from container 68660 in the WIPP underground. The Phase 2 Report identified the contributing causes, root cause, and 40 Judgments of Need, concluding that an exothermic reaction between a mixture of organic materials and nitrate salts in one drum (container 68660) caused the release at WIPP. It also concluded that the underground salt haul truck fire on February 5, 2014, was not related to the radiological release nine days later.³⁴

Technical Assessment Team (TAT). To complement the AIB investigation, on May 27, 2014, DOE established the TAT to determine, to the extent feasible, what caused the chemical reaction that resulted in the waste drum's failure and release of radioactive material. The team included a panel of experts from Savannah River National Laboratory, Lawrence Livermore National Laboratory, ORNL, Pacific Northwest National Laboratory, and SNL.

Sandia National Laboratories Cleanup

SNL has a fence-to-fence consent order, issued in 2004, that governs the pace and priority of cleanup. SNL has only a handful of sites left to clean up, but several involve groundwater plumes, which will be more challenging.

Relationship to Other Sites in the Complex

Although LANL and SNL sites in New Mexico have continuing missions associated with national defense, Los Alamos still has significant quantities of legacy waste that require disposition. Most of the waste will be disposed of or treated on site, but those sites still will require access to other sites in the DOE complex for disposition of specified materials. In addition, New Mexico receives TRU waste from sites across the complex for disposal at the WIPP facility.

New York: West Valley Demonstration Project

Background

The West Valley Demonstration Project (WVDP) is located approximately 40 miles south of Buffalo, New York. Pursuant to the federal West Valley Demonstration Project Act of 1980 and the resulting cooperative agreement between DOE and the New York State Energy Research and Development Authority (NYSERDA), DOE has exclusive use and possession of approximately 165 acres near the center of the larger 3,345-acre Western New York Nuclear Service Center pursuant to the cooperative agreement. From 1966 to 1972, the WVDP facility reprocessed 640 metric tons of SNF to recover uranium and plutonium. As such, it is one of only four sites in the nation that houses HLW (the other sites are INL, Hanford, and the SRS) and the only site for which DOE received a state contribution for an HLW vitrification project.

³⁴ U.S. Department of Energy Office of Environmental Management, *Accident Investigation Board Report. Phase 2: Radiological Release Event at the Waste Isolation Pilot Plant, February 14, 2014*, <http://energy.gov/sites/prod/files/2015/04/t21/WIPP%20Rad%20Event%20Report%20Phase%202%2004.16.2015.pdf> (accessed on June 18, 2015).

Under the West Valley Demonstration Project Act, DOE is responsible for five activities:

- Solidifying the high-level radioactive waste;
- Developing containers suitable for permanent disposal of the solidified HLW;
- D&D of the HLW tanks, facilities used in the solidification, and material and hardware used in connection with the project in accordance with such requirements as the U.S. Nuclear Regulatory Commission may prescribe;
- Disposing of LLW and TRU waste; and
- Transporting the solidified HLW to a federal repository for permanent disposal.

Accomplishments and Site-Specific Issues

In 2002, after completing solidification of the HLW through vitrification, the project shifted its focus to D&D efforts. DOE and NYSERDA jointly issued an Environmental Impact Statement in 2010 and decided to complete the decommissioning work in phases. Phase 1, which will be completed between 2025 and 2030, involves the removal of the main plant process building, the vitrification facility, contaminated lagoons, the source area of a strontium-contaminated groundwater plume, and several ancillary facilities. To remove the main plant process building, the vitrified HLW it stores must be relocated to a new, on-site storage facility. The Phase 2 decision is scheduled to be made in 2020 and will include the approach for addressing the HLW tanks, the nonsource area of the groundwater plume, and two radioactive waste disposal facilities.

Ohio: Portsmouth, Fernald, and Mound

Background

Ohio has three major DOE sites: Portsmouth, Fernald, and Mound. Both Fernald and Mound successfully closed and transitioned to DOE LM in 2006 as a result of the Accelerated Cleanup Program.

Portsmouth, also known as the Portsmouth Gaseous Diffusion Plant, is a 3,700-acre site located in southern Ohio. The facility was used to enrich uranium for fuel and weapons until 2001. A DUF₆ conversion facility, similar to the facility at Paducah, Kentucky, currently operates at the site. Large building complexes remain at the site and will require D&D as well as remediation of soil and groundwater contamination.

Fernald, now named the Fernald Preserve, is a 1,050-acre site located in southwest Ohio. It is a former uranium foundry that produced high-quality uranium metals for the nuclear weapons complex. Following years of cleanup, DOE declared closure at the site in 2006. Ongoing activities at the site include continuing groundwater remediation, surveillance and monitoring of the on-site disposal facility, institutional controls implementation, and other aspects of the remedy. Ohio settled litigation regarding natural resource damages that focuses primarily on contamination and lost use of a portion of the Great Miami Buried Valley Aquifer.

Mound, a 306-acre site located in Miamisburg in southwestern Ohio, operated as an integrated research, development, and production facility performing work in support of DOE's weapons and energy programs. DOE LM manages the site, although DOE EM is conducting ongoing cleanup. Ongoing activities include groundwater remediation, groundwater monitoring, and the implementation and monitoring of institutional controls.

Accomplishments

DOE has worked with Ohio to achieve the following outcomes:

- In 2014, DOE finalized the remedial investigations and feasibility studies for two major projects at **Portsmouth**: the Process Buildings and Complex Facilities D&D Project and the Site-Wide Waste Disposition Evaluation Project. DOE presented proposed remedial alternatives to the public that included D&D of facilities and both off-site and on-site disposition of D&D waste materials, which would require construction of an on-site disposal cell. Following the public comment period, the Record of Decisions (ROD) for both the Waste Disposition Evaluation and the Process Building D&D projects are expected to be finalized with Ohio in 2015.
- Following remediation, DOE restored the **Fernald** site to native habitats, using the post-excavation topography to determine habitat type. The site is now a park focused on wildlife and managed by DOE LM. A visitor center opened in 2008.
- Since the **Mound** site became available for transfer in 2011, more than half of the original 306 acres have been transferred to new ownership. In 2014, DOE implemented an enhanced field demonstration at Mound in an effort to transition the active groundwater pump-and-treat system to a more passive, monitored, natural attenuation remedy. The demonstration involves injections of edible oils to create in-place treatment zones and will occur over a three-year study period.

South Carolina: Savannah River Site

Background

DOE's The Savannah River Site (SRS) complex covers 310 square miles in South Carolina.³⁵ The SRS was constructed during the early 1950s to produce special radioactive isotopes (plutonium-239 and tritium) for the production of nuclear weapons. After the Cold War, emphasis at the SRS shifted from nuclear material production to cleanup. Despite that shift, the SRS remains a major defense installation capable of processing and purifying tritium, uranium, and plutonium. As a result of past operations, more than 500 potentially contaminated sites and 14 groundwater contamination plumes exist at the SRS. Currently, the site's annual cleanup budget is about \$1.4 billion. A consent order between DOE and the state addresses legacy mixed-waste storage and treatment under the Federal Facility Compliance Act (FFCA). An FFA among South Carolina, EPA, and DOE addresses investigation and cleanup of contaminated sites at the SRS. In addition, relevant state statutes and regulations are applied to DOE cleanup activities, including treatment of HLW and waste water.

Accomplishments

DOE has worked with South Carolina to achieve the following outcomes:

- Most of the original TRU waste volume and MLLW streams have been disposed of.
- At least 77 percent of 500 potentially contaminated sites at SRS have a cleanup decision in place in accordance with the FFA.

³⁵ The SRS is located on the border between South Carolina and Georgia. Georgia previously had been a member of the FFTF and has an interest in the site's cleanup.

- In 2006, the SRS closed T Area, which included demolition of 28 buildings, off-site disposal of 91 cubic yards of soil, and construction of a 10-acre geosynthetic cap. The project was completed in 36 months—48 months ahead of the original schedule.
- DOE has made progress in the treatment of approximately 36 million gallons of mixed hazardous and radioactive HLW and closure of the aging storage tanks. As of September 2015, seven tanks were operationally closed. The eighth tank will be operationally closed in May 2016. The Defense Waste Processing Facility has produced 4,000 canisters, which is the equivalent of about 156 million pounds of glass.
- The SRS successfully added the Interim Salt Disposition Process in 2008 to augment treatment of the HLW. By February 2015, the SRS had processed 5 million gallons of salt waste. Salt waste processing is an essential step in the closure of the HLW tanks, as 90 percent of this waste is composed of salt waste.³⁶ The salt waste processing facility (SWPF) will complete construction in late spring 2016 and begin operational commission. SWPF is slated to begin radioactive operations in December 2018.

Site-Specific Issues

Several site missions are ongoing at the SRS, and their continuation and expansion are important to South Carolina. State officials are concerned about achieving cleanup and reducing legacy waste for the site to support future missions. Of particular concern for the site is groundwater contamination, because the SRS is in a uniquely humid area in which groundwater contamination can discharge relatively quickly into surface waters and subsequently the Savannah River.

In 1998, DOE designated the SRS as the immobilization or conversion facility for much of the nation's surplus plutonium and began constructing the mixed-oxide (MOX) fuel fabrication facility at the SRS in August 2007. The facility is part of a nuclear nonproliferation agreement with Russia to dispose of 34 metric tons of weapons-grade plutonium by converting it into MOX fuel for use in commercial nuclear power plants. To date, construction is less than 50 percent complete, after cost overruns and a proposal to freeze construction delayed the project. DOE has completed studies of the alternatives to the facility, including fast reactors, immobilization in glass form, dilution and disposal and deep borehole disposal. These reviews all confirmed that there is an alternative option that would be less than half the cost of the MOX fuel approach—the dilute and dispose approach. The President's FY 2017 budget request would commence termination procedures for the MOX project in FY 2017, and the Department will pursue the dilute and dispose approach as the path forward on plutonium disposition.

Relationship to Other Sites in the Complex

The SRS will play a significant role in the processing of nuclear materials for the next several years. While it moves ahead with those missions, significant volumes of waste will continue to require treatment or disposal at other sites in the complex, including transporting TRU waste to WIPP and SNF and vitrified HLW to an HLW repository. The vast majority of LLW (more than 55,000 cubic meters) at the SRS will be disposed of on site between 2015 and 2050, with the remainder destined for the NNSS. Most MLLW remaining at the SRS will be sent to the Toxic Substances Control Act incinerator at ORR (over 1,300 cubic meters).³⁷

³⁶ U.S. Department of Energy, "News from the Savannah River Site," Press Release, March 11, 2015, www.srs.gov/general/news/releases/nr15_srr-salt-5million.pdf (accessed April 16, 2015).

³⁷ Applied Research Center, Waste Information Management System (WIMS).

Tennessee: Oak Ridge Reservation

Background

The Oak Ridge Reservation (ORR), located in eastern Tennessee, consists of three major DOE facilities: ORNL, the Y-12 National Security Complex, and the East Tennessee Technology Park (formerly the K-25 Gaseous Diffusion Plant). A separate DOE office—the Office of Science, the National Nuclear Security Administration (NNSA), and EM, respectively—manages each facility. In the more than 60 years since ORR was established, a variety of production and research activities have generated large quantities of radioactive, hazardous, and mixed wastes. Historical waste management practices contaminated more than 500 locations on and near ORR.

Several agreements embody the regulatory framework at ORR. The 1992 FFA established environmental cleanup as well as restoration procedures and milestones. A 1993 Consent Order issued by the Tennessee Department of Environment and Conservation (TDEC) modified storage and treatment permits for out-of-state waste from DOE-owned facilities. A 1995 TDEC commissioner's order addressed mixed-waste treatment and storage at all DOE facilities at ORR, as established in the FFCA. In addition, relevant state statutes and regulations are applied to DOE waste management and cleanup activities, including incineration of waste and treatment of wastewater.

Accomplishments

DOE's cleanup mission, in coordination with the state, has made progress on several cleanup and disposal activities, including:

- Shipping 5,952 DUF₆ cylinders off site;
- Dispositioning the majority of backlogged LLW by 2005 and completing Melton Valley Interim ROD remedial actions by 2006;
- Dispositioning more than 7,700 containers of industrial, low-level, and PCB-contaminated waste;
- Completing D&D of four out of five former gaseous diffusion buildings at ETTP (buildings K-25, K-29, K-31 and K-33);
- Shipping more than 360 cubic meters of contact-handled TRU waste and 39 cubic meters of remote-handled TRU waste from ORR for disposal at WIPP since September 2008; and
- Establishing a robust ambient environmental monitoring program through the Tennessee Oversight Agreement with DOE for ORR and surrounding areas.

Site-Specific Issues

Tennessee's primary concern is to ensure the protection of the health, safety, and environment for its citizens given that ORR has an abundance of surface water and complex groundwater pathways. Tennessee, DOE, and EPA are working together with stakeholders to address concerns about abundant rainfall, shallow groundwater tables, shallow waste burials, and the proximity of the public to contaminated surface water and DOE facilities. Specific issues for the site include:

- The long-term effectiveness of the hydrologic isolation of the Melton Valley burial grounds;
- One hundred miles of contaminated rivers and streams, contaminated by historical site activities, including 250,000 curies of radioactive waste discharged into surface streams and 339,000 pounds of mercury discharged into East Fork Poplar Creek and the Clinch and Tennessee Rivers;

- Hundreds of acres of buried waste, including deep well injections, containing millions of pounds of uranium and several million curies of radioactivity;
- Hundreds of surplus facilities in deteriorating condition;
- Characterization and evaluation of the extent of groundwater contamination;
- Adequate characterization and segregation of CERCLA waste to maximize the available on-site CERCLA waste disposal capacity; and
- Establishment of CERCLA project milestones that document a steady pace of cleanup.
- In addition to the issues above, current funding levels planned for ORR will extend the projected cleanup completion date from 2047 to 2066.

Relationship to Other Sites in the Complex

A ROD was signed in October 1999 to construct an on-site CERCLA waste disposal cell at ORR, but off-site disposal options are necessary for other waste streams, as well, including TRU waste destined for WIPP. DOE estimates that it will send approximately 150,000 cubic meters of LLW to NNSS between 2008 and 2050 and more than 27,000 cubic meters to commercial facilities. Nearly 1 million cubic meters of LLW and more than 48,000 cubic meters of MLLW will be disposed of on site.

In addition, Tennessee has assisted New York by accepting for treatment and disposal low-level liquid waste from the Separation Process Research Unit (SPRU). The agreement was in place for three years (May 30, 2012–May 30, 2015) while an on-site treatment facility was constructed at the SPRU. The agreement provided additional funding for the ORR remediation projects.

Texas: Pantex Site

The Pantex Plant, located 17 miles northeast of Amarillo in Carson County, Texas, is charged with maintaining the safety, security, and reliability of the nation's nuclear weapons stockpile. It is currently operated by NNSA.

Historical operations at the plant resulted in contamination of the soil and a perched aquifer below the site. Following NNSA's submission of a cleanup plan to the Texas Commission on Environmental Quality and EPA, a comprehensive cleanup program was approved and put into effect.

The results of soil cleanup activities have shown samples indicated that the soil has been cleaned to safe and acceptable levels with site reuse restrictions in place to limit exposure to remaining contaminants.

The operation and maintenance of the groundwater corrective action continues in the perched aquifer in support of NNSA's LTS program and includes two pump and treat systems, two in-situ bioremediation systems, and a monitoring well network designed to track contaminant movement and monitor corrective action effectiveness.

The Agreement in Principle between the State of Texas and DOE supports the cleanup of the site as the mission of the AIP continues to protect human health and safety, and the environment around the Pantex Plant.

Washington (and Oregon): Hanford Site

Background

Located in southeastern Washington along the Columbia River, the 586-square-mile Hanford Nuclear Site was the first and primary plutonium production facility for the United States' nuclear weapons program.³⁸ The site, which began operations in 1944, includes nine shut-down reactors, five chemical separations plants, plutonium processing facilities, and 177 underground HLW tanks that contain 56 million gallons of highly radioactive waste and 190 million curies of radioactivity. Between the start of operations in 1944 and the shutdown of the last reactor in the late 1980s, Hanford produced more than two-thirds of the nation's estimated 111 metric tons of plutonium. The production of plutonium generated large amounts of radioactive and chemically hazardous waste.

Hanford is the world's largest single environmental cleanup project, with an annual cleanup budget of approximately \$2.1 billion. The shift from operations to cleanup was completed in 1989 when DOE, EPA, and the Washington State Department of Ecology signed the Hanford Federal Facility Agreement and Consent Order, commonly known as the Tri-Party Agreement (TPA). The TPA outlines legally enforceable milestones for all aspects of cleanup at Hanford, including tank waste removal and treatment, mixed-waste treatment and disposal, environmental restoration activities, and LLW disposal.

Accomplishments

Over the course of the cleanup efforts to date, DOE has accomplished much:

- Cleanup and disposal of more than 17 million tons of contaminated soil and building debris, much of it from liquid waste sites, burial grounds, and nuclear facilities along the Columbia River Corridor;
- Removal of spent nuclear fuel from basins adjacent to the Columbia River and containment of radioactive sludge, paving the way for the ultimate removal of the basins;
- Shipment of more than 5,000 cubic meters of TRU waste to WIPP;
- Shipment of all weapons-grade plutonium for consolidation to the SRS;
- Installation of extensive pump-and-treat systems and chemical barriers along the Columbia River Corridor and in the Central Plateau to reduce groundwater contamination and prevent contaminated groundwater from entering the river;
- “Cocooning” of six of the nine reactors to allow radiation to decay, with a seventh reactor cleaned up and converted into a museum; and
- Removal of most of the waste from 13 aging single-shell tanks.

Site-Specific Issues

Washington and Oregon officials have sought assurance of adequate and long-term funding (through approximately 2070) to ensure cleanup, especially after DOE has completed work at most other sites. As of early 2016, DOE estimated that the remaining Hanford cleanup would cost \$107 billion, but funding

³⁸ The Hanford site is located completely in Washington State, but Hanford's proximity to Oregon—and especially to the Columbia River—has led Oregon to actively involve itself with the Hanford cleanup. Although Oregon has no official regulatory oversight of activities at the site, it works with DOE, Washington State, and EPA to ensure that its concerns are addressed.

limitations put many cleanup milestones at risk. Hanford holds 60 percent of the nation's defense-related high-level radioactive waste volume.

Both Washington's and neighboring Oregon's primary concern is the threat of Hanford's legacy contamination to the Columbia River, which bisects the site. Much of Hanford's HLW is contained in 177 underground tanks. Approximately half of the 149 single-shell tanks have leaked, posing a threat to groundwater and ultimately the Columbia River if left untreated. Current remediation plans call for construction of a vitrification facility—the Waste Treatment Plant (WTP). Oregon and Washington remain concerned about the construction delays and technical challenges plaguing the WTP facility and the pace of waste retrieval from Hanford's aging tanks.

In November 2008, Washington filed a legal suit when it became clear that DOE would be unable to meet key deadlines to begin operating the WTP by 2011 and complete tank treatment by 2028. Oregon joined the litigation in 2009. A settlement in 2010 established new deadlines, including a hot start (testing of the components that would handle radioactive waste) of the WTP by December 2019 and initial WTP operations no later than December 31, 2022. It also established milestones for retrieval of a certain number of single-shell tanks. The parties amended the TPA to require retrieval of waste from all single-shell tanks no later than 2040 and treatment of all tank waste no later than 2047.

In November 2011, DOE provided the first of several notifications to Washington and Oregon that it was “at risk” of not accomplishing milestones specified in a consent decree. In August 2012, Washington notified DOE that it was considering triggering the dispute resolution process; that announcement prompted personal involvement in the issue by Energy Secretary Steven Chu and his successor, Ernest Moniz. In September 2013, DOE released a “framework” document that identified options under DOE's consideration, including a proposal to bypass the WTP's pretreatment facility and send waste directly to the low-activity waste vitrification facility. After negotiations were unsuccessful in reaching a new agreement, both sides filed proposals in October 2014 with the Federal District Court of Eastern Washington to amend the consent order. As of November 2015, that litigation is still in progress.

In addition, the ongoing pool storage of 1,936 capsules of cesium and strontium, accounting for roughly a third of the radioactivity at the Hanford site, remains a major concern. Oregon and Washington have new concerns that high levels of radiation from the capsules have damaged the concrete walls and floor of the storage basin, putting the facility at risk of rupture in the event of a moderate earthquake. Water in the basins both provides a radiation shield for workers and helps dissipate heat. If the basins were to rupture and the water to leak out, a severe radiation accident could occur. Funding to move the capsules to dry storage is not currently available.

Relationship to Other Sites in the Complex

Although much of Hanford's cleanup activities will occur on site, DOE must still send waste and materials to other sites in the complex, including TRU waste to WIPP and SNF and vitrified HLW to an HLW repository. In 2000, DOE selected Hanford to receive potentially thousands of shipments of LLW and MLLW from other DOE sites for disposal, but litigation initiated by Washington resulted in a moratorium on most new waste shipments to Hanford until the WTP is in full operation. That has effectively removed Hanford as an option for off-site waste disposal for other DOE sites for two decades or more.

APPENDIX C. Waste Types and Definitions

Table C–1. Types of Waste and Current Destination for Disposal		
	Waste Type	Destination
U.S. Department of Energy (DOE) waste	Low-level waste (LLW)	Nevada Test Site (Nevada)
	▶▶ Mixed	Hanford Site (Washington) ³⁹
	▶▶ Not mixed	On-site disposal ⁴⁰
	Transuranic waste	Waste Isolation Pilot Plant (New Mexico)
	▶▶ Mixed	
	▶▶ Not mixed	
	High-level waste	Yucca Mountain Repository (Nevada) ⁴¹
Commercial waste	Spent nuclear fuel	Yucca Mountain Repository
	LLW	State compact system or licensed commercial disposal facility
	▶▶ Class A	
	▶▶ Class B	
	▶▶ Class C	
	▶▶ Greater than Class C (GTCC) LLW	Federal law requires DOE to take title of GTCC waste. DOE released a Programmatic Environmental Impact Statement to determine a disposition location for GTCC in 2015.

Definitions

Note: Definitions for U.S. Department of Energy (DOE) Waste Excerpted from DOE Order 435.1.

Low-level radioactive waste is radioactive waste that is not high-level radioactive waste, spent nuclear fuel, transuranic waste, byproduct material, or naturally occurring radioactive material.⁴² Some DOE facilities dispose of low-level waste on site.

Mixed waste contains source, special nuclear, or by-product material subject to the Atomic Energy Act of 1954, as amended, and a hazardous component subject to the Resource Conservation and Recovery Act of 1976.⁴³

³⁹ Not currently available for disposal of off-site waste

⁴⁰ On-site disposal of DOE LLW (not MLLW) occurs at Hanford, INL, LANL, ORR and the SRS

⁴¹ DOE submitted a license application to the U.S. Nuclear Regulatory Commission in June 2008 but withdrew it in 2010. No current timetable for resolution exists.

⁴² Most low-level waste (LLW) contains small amounts of radioactivity in large volumes of materials. Some LLW, however, can contain significant levels of radioactivity. Low level does not necessarily indicate low hazard.

⁴³ Mixed waste contains both radioactive and chemically hazardous materials.

Transuranic waste is radioactive waste that contains more than 100 nanocuries (3,700 Becquerels) of alpha-emitting transuranic isotopes per gram of waste, with half-lives greater than 20 years, with three exceptions:

- high-level radioactive waste;
- waste that the Secretary of Energy has determined, with the concurrence of the Administrator of the Environmental Protection Agency, does not need the degree of isolation that the 40 Code of Federal Regulations (CFR) Part 191 disposal regulations require; or
- waste that the U.S. Nuclear Regulatory Commission has approved for disposal on a case-by-case basis in accordance with 10 CFR Part 61.⁴⁴

High-level waste is the highly radioactive waste material that results from reprocessing spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations, as well as other highly radioactive material that is determined, consistent with existing law, to require permanent isolation.⁴⁵

Spent nuclear fuel is nuclear fuel that has been irradiated in a nuclear reactor to the point that it is no longer useful in sustaining a nuclear reaction.

Class A (Commercial Waste) is radioactive waste that contains the lowest concentration of radioactive materials, most of which materials have half-lives less than five years.

Class B (Commercial Waste) contains the next-lowest concentration of radioactive materials, a higher proportion of such materials with longer half-lives.

Class C (Commercial Waste) low-level waste has the highest concentration of radioactive material that DOE can legally bury in a low-level waste disposal facility.

Greater-than-Class C (GTCC) waste contains a concentration of radioactive materials that exceeds the limits for Class C waste specified in 10 Code of Federal Regulations Part 61.55. All GTCC waste is the responsibility of the federal government and must be disposed of in a geologic repository.⁴⁶

⁴⁴ Transuranic waste is generated primarily during the research, development, and production of nuclear weapons. Most of the waste consists of such things as laboratory clothing, tools, glove boxes, rubber gloves, and air filters contaminated with small amounts of plutonium and other radioactive elements. Some of these items will remain radioactive for tens of thousands of years.

⁴⁵ High-level waste is highly radioactive and must be isolated from the environment for thousands of years.

⁴⁶ There is currently no disposal facility for GTCC waste.

APPENDIX D: Acronyms

AFB Air Force Base

AIB Accident Investigation Board

AIP Agreement in Principle

AMWTP Advanced Mixed Waste Treatment Project

ARRA American Recovery and Reinvestment Act of 2009

BFC Bannister Federal Complex

CERCLA Comprehensive Environmental Response, Compensation, and Liability Act

D&D Decontamination and decommissioning

DOE U.S. Department of Energy

DUF₆ Depleted uranium hexafluoride

EIS Environmental Impact Statement

EM U.S. Department of Energy Office of Environmental Management

EO Executive Order

EPA U.S. Environmental Protection Agency

ERDA Energy Research and Development Administration

ERH Electrical resistance heating

FFA Federal Facility Agreement

FFACO Federal Facility Agreement and Consent Order

FFCA Federal Facility Compliance Act

FFTF Federal Facilities Task Force

GSA General Services Administration

GTCC Greater-than-Class C low-level radioactive waste

HLW High-level waste

INL Idaho National Laboratory

IWTU Integrated Waste Treatment Unit

KCP Kansas City Plant

LANL Los Alamos National Laboratory

LLW Low-level waste

LM U.S. Department of Energy Office of Legacy Management

LTS Long-term stewardship

MDA B Material Disposal Area B

min-safe Minimum safety

MLLW Mixed low-level waste

MOX Mixed-oxide

NGA National Governors Association

NGA Center National Governors Association Center for Best Practices

NEPA National Environmental Policy Act of 1969

NMED New Mexico Environment Department

NNSA U.S. Department of Energy National Nuclear Security Administration

NNSS Nevada National Security Site

NRDA Natural resources damage assessment

NYSERDA New York State Energy Research and Development Authority

ORNL Oak Ridge National Laboratory

ORR Oak Ridge Reservation

PCB Polychlorinated biphenyl

PGDP Paducah Gaseous Diffusion Plant

RCRA Resource Conservation and Recovery Act of 1976

ROD Record of Decision

SNF Spent nuclear fuel

SNL Sandia National Laboratories

SPRU Separation Process Research Unit

SRS Savannah River Site

TAT Technical Assessment Team

TCE Trichloroethylene

TDEC Tennessee Department of Environment and Conservation

TPA Tri-Party Agreement

TRU transuranic

WIMS Waste Information Management System

WIPP Waste Isolation Pilot Plant

WIR Waste incidental to reprocessing

WTP Waste Treatment Plant

WVDP West Valley Demonstration Project

APPENDIX E. National Governors Association Center for Best Practices Federal Facilities Task Force Principles and Associated Expectations for State–Department of Energy Engagement

The National Governors Association Center for Best Practices Federal Facilities Task Force (FFTF), established in 1993 with support from the U.S. Department of Energy (DOE) Office of Environmental Management, brings together governor-appointed representatives from states affected by the ongoing cleanup of sites used in the production, testing, and assembly of the U.S. nuclear weapons stockpile. Recognizing that cleanup funding is not likely to be sufficient to meet all milestones in state–DOE compliance agreements for the foreseeable future, in December 2011 the FFTF set out to create, in consultation with DOE, a set of principles to guide how state regulators and DOE would jointly approach the planning and prioritization of cleanup work. The FFTF approved the following principles on May 2, 2012, at the FFTF Spring Meeting in Knoxville, Tennessee. FFTF states participating in the meeting were **Idaho, Kentucky, Missouri, Nevada, New Mexico, New York, Ohio, Oregon, South Carolina, Tennessee, Texas, and Washington.**

1. States support a sustained, quality cleanup that protects human health, safety, and the environment and complies with state–DOE agreements.
2. Open and transparent communication between states and DOE is essential for achieving successful cleanup.

Expectations:

- Issues that have U.S. nuclear complex-wide implications should have complex-wide input and planning.
- The FFTF should serve as a forum for discussions of complex-wide issues.

3. State participation is a critical element of the DOE budget process and the establishment of environmental priorities.

Expectations:

- States expect DOE site managers to engage states early in the federal budget process to jointly prioritize projects.
- States expect DOE to provide detailed information about the current planning year and out-year budget plans consistent with each state's existing Federal Facility Agreements (FFAs) and other applicable statutory requirements.
- States support a “risk plus other factors” approach to priority setting, as defined in the Final Report of the Federal Facilities Environmental Restoration Dialogue Committee.
- States expect a role in determining how risk and other factors are considered.
- States expect DOE to provide information about environmental and human health risks posed by DOE sites both individually and complex-wide, together with information to judge the impacts of schedule/milestone changes on risk and life-cycle costs from site to site.

4. Proactive engagement between DOE and states is crucial when milestones or other commitments may be in jeopardy.

Expectations:

- Generally, states expect to be assured, before considering a delay in a cleanup agreement, that DOE requests a fully compliant budget and makes a good-faith effort to meet all milestones or other commitments.
- If DOE foresees any change (budgetary, technical, other) that it believes will adversely affect a milestone or other commitment, states expect DOE to initiate discussion with the host state (and adjacent state, if appropriate) well before failure to meet the commitment becomes unavoidable and in accordance with applicable FFAs.
- In cases where one or more FFAs would be impacted by changes in another state's cleanup agreement, states will seek, with DOE's assistance, to develop a common understanding of the requested change and any positive and negative impacts to both states. Those cases may involve equity discussions between the affected states and between states and DOE.
- States support a framework in which state-DOE discussions occur to determine whether the parties can reach an agreement on modification of milestones or other commitments. During the course of these discussions, states or DOE may also introduce other items for negotiation to offset a proposed altered commitment; such items may not necessarily be related to the proposed altered commitment, but determination of acceptable alternatives will be at the discretion of each state.

APPENDIX F. “Risk Plus Other Factors”

The following list of “other factors” was developed by the 1996 Federal Facilities Environmental Restoration Dialogue Committee and included in the committee’s consensus final report, known as the Keystone Report.

In addition to human health and environmental risk, other factors warrant consideration in setting environmental cleanup priorities and milestones. These factors include:

- Cultural, social, and economic factors, including environmental justice considerations;
- Short-term and long-term ecological effects and environmental impacts in general, including damage to natural resources and lost use;
- Making land available for other uses;
- Acceptability of the action to regulators, tribes, and public stakeholders;
- Statutory requirements and legal agreements;
- Life-cycle costs;
- Pragmatic considerations, such as the ability to execute cleanup projects in a given year, and the feasibility of carrying out the activity in relation to other activities at the facility;
- Overall cost and effectiveness of a proposed activity; and
- Actual and anticipated funding availability.

APPENDIX G. National Governors Association Center for Best Practices Federal Facilities Task Force

The National Governors Association Center for Best Practices (NGA Center) established the Federal Facilities Task Force (FFTF) in 1993 to assist in the development of the initial Federal Facilities Compliance Act site treatment plans. The FFTF continues to provide support to state efforts. The mission of the FFTF is to bring together governor-designated representatives with U.S. Department of Energy (DOE) officials to examine critical technical, policy, and budget issues and improve coordination of major program decisions on a broad range of issues related to radioactive material and waste, including:

- Transparency in the DOE decision-making process, particularly for waste treatment and disposal decisions;
- A safe transportation and disposal system for all types of radioactive waste;
- Sufficient funding for DOE to meet annual milestones in state–DOE compliance agreements; and
- Long-term stewardship at sites where cleanup to unrestricted levels is not possible.

Governors of each participating state designate one or ideally two representatives to serve on the FFTF. Appointments typically include one policy and one technical or regulatory representative, but these selections are at the discretion of each governor. Representatives usually come from one or more state agencies that are responsible for the oversight and regulation of hazardous waste, such as environmental protection, energy, or natural resources departments. In 2015, 12 states participated in the FFTF: **Idaho, Kentucky, Missouri, Nevada, New Mexico, New York, Ohio, Oregon, South Carolina, Tennessee, Texas, and Washington.**

List of Governors' Representatives as of September 2015

Idaho

Robert Bullock
Hazardous Waste Permitting Manager, Idaho
Department of Environmental Quality

Susan Burke
Idaho National Laboratory Coordinator, Idaho
Department of Environmental Quality

Kentucky

Brian Begley
Registered Geologist, Kentucky Division of Waste
Management, Department of Environmental
Protection

Gaye Brewer
Environmental Scientist, Kentucky Division of
Waste Management, Department of Environmental
Protection

Missouri

Branden Doster, P.E.
Federal Facilities Section Chief, Missouri
Department of Natural Resources

Nevada

Christine Andres
Bureau of Federal Facilities Chief, Nevada Division
of Environmental Protection

Greg Lovato
Deputy Administrator, Nevada Division of
Environmental Protection

New Mexico

Ryan Flynn
Cabinet Secretary, New Mexico Environment
Department

New Mexico

David Martin
Cabinet Secretary
New Mexico Department of Energy,
Minerals & Natural Resources

New York

Paul Bemba
West Valley Site Management Program Director
New York State Energy Research and
Development Authority

Ohio

Jim Sferra
Southeast District Office Chief
Ohio Environmental Protection Agency

Cynthia Hafner
Chief Legal Counsel
Ohio Environmental Protection Agency

Oregon

Ken Niles
Assistant Director for Nuclear Safety
Oregon Department of Energy

South Carolina

Michelle Wilson
Federal Facilities Liaison

South Carolina Department of Health
and Environmental Control

David Wilson
Bureau Chief,
South Carolina Department of Health and
Environmental Control

Tennessee

Kristof Czaratoryski
Environmental Restoration Program Manager,
Division of Remediation, DOE Oversight Office,
Tennessee Department of Environment &
Conservation

Christine Thompson
Deputy Director, Division of Remediation
DOE Oversight Office, Tennessee Department
of Environment & Conservation

Texas

Roger Mulder
Pantex Program Director,
Texas State Energy Conservation Office

Washington

Jane Hedges
Nuclear Waste Program Manager,
Washington Department of Ecology



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