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This report is an update to a 2000 edition. It is intended to provide states with a status report on the U.S. Department of Energy (DOE) sites in their jurisdictions and across the complex. It updates the earlier edition with a summary of recent accomplishments complex-wide and at each major site. Finally, the report identifies leading issues that are critical to further progress.

This report focuses solely on the cleanup of America’s nuclear weapons complex — that is, sites currently or previously owned and operated by DOE. It does not directly address the disposal of waste from current or future privately owned nuclear power facilities.¹

¹ There is some overlap with privately-owned nuclear power facilities and DOE waste as high-level waste from any source will be disposed of in a geological repository along with DOE-generated waste. See “What Are the Main Issues of Interest to States?” later in this report for more information.
This report was researched and written by David Borak of the National Governors Association (NGA) Center for Best Practices (NGA Center) and Jerry Boese and Andy Chinn of Ross & Associates (under a subcontract with the NGA Center).

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Executive Summary

The creation of atomic weapons and the buildup of the Cold War nuclear arsenal in America has left an environmental cleanup legacy of enormous cost and scope—it is the largest environment cleanup program in the world. The U.S. Department of Energy (DOE), which is responsible for the cleanup of America’s nuclear weapons complex, estimates the total cost of the cleanup over several decades at $264 billion. DOE’s recent annual budgets for the cleanup have averaged about $6 billion—four times the size of the U.S. Environmental Protection Agency’s Superfund program. The program involves more than 100 sites, although about 16 large sites in 13 states are of primary concern. Over the past 16 years, states have been working jointly with DOE to complete cleanup of the nuclear weapons complex in a way that protects the citizens, workforce, and environment in and around the sites. However, despite some notable accomplishments and successes, a number of issues between the states and DOE persist, and hurdles to timely and effective cleanup remain.

Before 1992, states had very little say in how waste resulting from the development and production of nuclear weapons was stored, treated, or disposed of in their jurisdictions. However, since passage of the Federal Facility Compliance Act (FFCA) in 1992, many cleanup decisions have been determined jointly by DOE and the affected states—resulting in a new dynamic whereby state agencies have played an active role in shaping treatment and disposal plans, negotiating and enforcing cleanup milestone agreements, working with congressional delegations to support adequate funding levels, and providing regulatory oversight. During this period, states and DOE have achieved some significant accomplishments, including:

- The development of site treatment plans for all sites;
- The accelerated cleanup and successful closure of three major sites;
- The creation of a transuranic waste disposal facility; and,
- The creation of a waste tracking system.

The first major accomplishment of the post FFCA-era was the creation of a treatment plan for each site in the complex, as mandated by Congress. These site treatment plans were developed and approved over a three-year period, with the assistance of a Federal Facilities Task Force (FFTF) established by the National Governors Association Center for Best Practices (NGA Center) and supported by DOE. The process was aided by a high degree of transparency and cooperation, whereby states had access to the data they needed to evaluate the cleanup goals. The resulting plans created a framework that allowed cleanup efforts to move forward and established a model for ongoing collaboration between the states and DOE.

Another leading accomplishment was the accelerated cleanup and closure of three major sites: Rocky Flats in Colorado and Fernald Feed Materials Production Center and the Mound Site in Ohio. The cleanup at Rocky Flats, which produced plutonium triggers for nuclear weapons from 1952 to 1994, constituted the largest environmental cleanup project in the United States at that time. All three of these formerly radioactive sites are now back in productive use. Two of the sites, Fernald and Rocky Flats, are now recreation and wildlife areas, while Mound is an active industrial and technology park.

States and DOE have made other important strides with respect to physical waste disposal and tracking. This includes creating a disposal facility for transuranic (TRU) waste at the Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico, and creating an accurate waste inventory management system known as the Waste Information Management System (WIMS). This tool provides states and DOE the ability to visualize and understand the volumes, categories, and problems of forecasted streams of waste.

Other site-specific accomplishments have been achieved throughout the nuclear weapons complex. For example:
• The WIPP in New Mexico received its 100,000th container of TRU waste, which was safely disposed of 2,150 feet underground in April 2008. The volume of containers now underground at WIPP is an area roughly the size of a football field and five stories high;

• The Savannah River Site (SRS) in South Carolina has created a more efficient cleanup process in recent years by addressing cleanup of an entire area rather than smaller sections, resulting in cleanup decisions at 60 percent of the 500 potentially contaminated sites at SRS; and

• The Hanford site in Washington state has cleaned up and disposed of more than seven million tons of contaminated soil from liquid waste sites and burial grounds along the Columbia River Corridor.

Despite the accomplishments and progress achieved since 1992, when states became partners in the nuclear weapons cleanup process, a number of unresolved areas of tension remain between the states and DOE, as do challenges to timely and effective cleanup. Leading issues identified by the participants in the FFTF include:

• Securing federal funding to meet agreed-upon, enforceable cleanup milestones;

• Getting sites to meet both federal and state cleanup standards;

• Ensuring a safe transport and disposal system for radioactive waste;

• Establishing a robust program whereby DOE will provide assured funding to care for sites where cleanup to unrestricted levels is not possible; and

• Assessing and compensating states for damages to natural resources.

A top concern for the FFTF states is the continuing gap between the projected cleanup needs and the annual DOE budget appropriation for this task. Since DOE Environmental Management funding peaked in 2005, DOE has not received enough funding to meet its environmental responsibilities. Moreover, some states are concerned that the dividends from the accelerated cleanup program (i.e., concentrating funds to speed cleanup at one site) are not being carried forward and reinvested in accelerated cleanup at other sites. In 2007, DOE estimated an $8 billion cumulative shortfall between the projected cleanup budgets for FFTF states and the amount needed for them to stay in compliance over the following five years.

Furthermore, FFTF states want to ensure a safe transportation and disposal system is maintained for all types of radioactive waste. These states are especially concerned that the only designated place that exists to dispose of tens of thousands of tons of high-level waste is the controversial Yucca Mountain site. Yucca Mountain is statutorily directed to receive up to 77,000 tons of high-level waste and spent nuclear fuel, which must be shipped from various sites around the country via truck, rail, and barge. The amount of spent nuclear fuel currently in interim storage at U.S. nuclear reactors, combined with DOE’s high-level waste from the nuclear weapons complex, would fill Yucca Mountain to capacity immediately, according to the Academy of Engineering. An additional national geologic repository, an expansion of Yucca Mountain, or some other solution may therefore be required for the spent nuclear fuel still being created by civilian nuclear reactors.

Finally, at some of the sites in the nuclear weapons complex, damage from radionuclide or other toxic contamination is so extensive that the technical and financial barriers to achieving total cleanup are insurmountable. In such cases, DOE and FFTF states agree that cleanup to an agreed-upon restricted future use – converting a site to an industrial park, for example – is acceptable. However, states seek assurance that DOE will provide long-term care for sites where complete cleanup to unrestricted levels is not possible. Furthermore, pursuant to federal law, states strongly believe that DOE should provide compensation for damages to natural resources (e.g., land, air, water, fish, wildlife) that resulted from site activities.

Considering the accomplishments to date, alongside the significant challenges facing continued progress, states must continue to be highly engaged with DOE in cleanup of our nuclear weapons complex. Moreover, as cleanup of the nuclear weapons complex proceeds and sites transition into long-term stewardship, it will be essential to continue the information exchange between states and DOE. This will ensure that both parties are equipped with complete and current information to ensure ongoing protection of citizens and the environment for as long as the radioactive hazard remains.
Workers conduct survey following surface restoration activities and revegetation at the Gasbuggy offsite location near Farmington, New Mexico

PHOTO COURTESY OF NATIONAL NUCLEAR SECURITY ADMINISTRATION / NEVADA SITE OFFICE
The creation of the nuclear weapons complex has left an enduring environmental cleanup legacy huge in scope and effort. The establishment of the Federal Facilities Cleanup Act (FFCA) and, subsequently, the NGA Center’s Federal Facilities Task Force (FFTF) has provided states an opportunity to collaborate with the U.S. Department of Energy (DOE) on the cleanup of the nuclear weapons complex.

HISTORY OF THE NUCLEAR WEAPONS COMPLEX

In 1942, the United States began to develop technology capable of producing nuclear weapons under the U.S. Army Corps of Engineers’ Manhattan Engineer District (known as the Manhattan Project). The Manhattan Project successfully developed and detonated three nuclear weapons in 1945: a test detonation of a plutonium bomb on July 16 at the Trinity Site near Alamogordo, New Mexico; an enriched uranium bomb on August 6 over Hiroshima, Japan; and a plutonium bomb, on August 9 over Nagasaki, Japan. With the enactment of the Atomic Energy Act of 1946, nuclear weapons development and production were transferred to the newly created Atomic Energy Commission (AEC). Congress abolished the AEC in 1975, and its nuclear weapons production mission was incorporated into the Energy Research and Development Administration (ERDA), which was subsumed into DOE in 1977.

The success of the Manhattan Project left the United States as the sole nuclear power in the world until August 1949, when the Soviet Union successfully conducted its initial nuclear test. This test gave new focus and urgency to the ongoing debate over the future of the American nuclear program within the developing Cold War, and in 1950, President Harry S. Truman ordered the AEC to develop the hydrogen bomb. That same year, Congress authorized significant expansion of the nuclear weapons program, leading to the development of a vast research, production, and testing network that came to be known as “the nuclear weapons complex” (see Figure 1). The nuclear weapons complex is made up of dozens of industrial facilities and laboratories across the country and would eventually produce more than 70,000 nuclear warheads of 65 different types. At its peak, this complex consisted of 16 major facilities, including vast reservations of land in Idaho, Nevada, South Carolina, and Washington. Its national laboratories in California and New Mexico designed weapons for production in Colorado, Florida, Missouri, Ohio, Tennessee, and Washington. DOE currently manages the complex.

THE ENVIRONMENTAL LEGACY AND SCOPE OF THE EFFORT

The United States spent billions of dollars to produce nuclear weapons and commercialize nuclear power in the 1950s and 1960s, while spending only a few hundred million dollars to research disposal processes. In the late 1970s, this trend began to change when Congress enacted a series of environmental protection laws that empowered both federal and state regulatory agencies to oversee federal activities affecting the environment. Growing awareness of environmental and safety problems caused DOE to temporarily suspend various operations throughout the nuclear weapons complex in the 1980s and early 1990s. With the end of the Cold War and the subsequent collapse of the Soviet Union, many of these temporary shutdowns became permanent. However, because the shutdowns were viewed as temporary at the time, the department did not make the necessary long-term waste disposition plans before suspending operations. Almost every site in the complex is contaminated to some extent with radioactive or other hazardous materials such as solvents or heavy metals. The contamination can be found not only in buildings, but also in the soil, groundwater, and surface water within and surrounding the sites. Most sites have considerable and complicated problems that have been compounded over several decades.

The United States spent more than $300 billion (1995 dollars) on nuclear weapons research and development from the Manhattan Project in 1942 through 1995. What was once an employment boon to states and local economies has
uranium is processed into low-enrichment uranium, highly enriched uranium, and depleted uranium. Uranium is mined and refined from or uranium gas is converted into metal. Uranium metal is formed into fuel and target elements for reactors. Uranium slugs are irradiated to create plutonium metal and chemical separation is used to extract it. Uranium and plutonium are further processed for warhead triggers, neutron generators, and other electrical and mechanical components are assembled into complete warheads.

now become a responsibility in overseeing the long-term cleanup of radioactive wastes whose half-lives range from 12 years to 4.4 billion years. The budget for DOE's cleanup program is now about $6 billion per year. This is larger than the entire U.S. Environmental Protection Agency (EPA) operating budget, and is about four times the size of recent annual Superfund expenditures. At the end of fiscal year (FY) 2007, DOE estimated the total overall cost of its environmental liabilities at $264 billion. 4 This ongoing remediation effort is the largest environmental cleanup program in the world5 and presents the 13 states6 most directly involved with numerous technical, financial, and policy challenges.

Restoring the environmental balance at federal facilities requires a coordinated effort at the state and federal levels. Changing global strategic conditions, a decrease in the priority placed on nuclear weapons production, and the public's increasing concerns about protecting human health and the environment highlight the need for states and DOE to work together to make responsible disposal decisions and to meet the environmental challenges inherited from the Cold War.

Figure 2 shows the remaining major cleanup sites, with DOE's estimated date for completion of cleanup and closure. Following closure, long-term stewardship (surveillance and maintenance) will need to continue at each of these sites.

**HISTORY OF THE FEDERAL FACILITY COMPLIANCE ACT AND THE FEDERAL FACILITIES TASK FORCE**

The Federal Facility Compliance Act (FFCA) was signed into law on October 6, 1992, establishing a three-year period during which DOE facilities storing mixed waste (i.e., waste that is both radioactive and chemically hazardous) were required to negotiate "site treatment plans" for the management of the waste. Congress mandated that these plans be approved and enforceable by the respective host states. The FFCA explicitly waived any immunity previously applicable to the federal government with regard to both the substantive and procedural requirements of the Resource Conservation and Recovery Act (RCRA), which is, in most states, implemented and enforced by the state.

Immediately following passage of the FFCA, the states and DOE saw the need for a high level of collaboration with each other to be able to understand the scope of cleanup needs and the types and amounts of waste involved, then to develop implementable, legally binding site treatment plans to guide DOE’s waste management. States realized they would need to understand not only the situation within their state, but also their state’s role in the overall nationwide cleanup. Based on this need to understand the larger picture, the National Governors Association Center for Best Practices (NGA Center) established the Federal Facilities Task Force (FFTF) to work with DOE. The FFTF’s members were designated by the governors of the respective states and included two members from each state, a technical/regulatory representative and a policy representative.

The states and DOE worked cooperatively and intensively over the three-year period specified by Congress to develop site treatment plans. Based on this successful collaboration, the FFTF has continued its existence and interacts regularly to discuss cleanup progress, identify ongoing common concerns, and explore new technical and policy issues.

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6 See Appendix D for a list of the NGA Federal Facilities Task Force (FFTF) members in the 13 states.

7 The closure dates shown in this figure are DOE estimates for the completion of cleanup at the major sites shown, as reported in their budget request to Congress in February 2008. Several caveats apply to these estimates: (1) some sites have ongoing missions, hence the site as a whole will not close; the dates shown reflect completion of cleanup; (2) in the case of the Waste Isolation Pilot Plant (WIPP), the facility is currently functioning as a disposal facility and is not undergoing cleanup, but 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 (ROD); (4) finally, in several cases these projected closure dates do not match dates in current compliance agreements with states for completion of all required cleanups.
How Are Cleanup Decisions Being Made?

With the exception of certain environmental remediation issues, DOE had been self-regulated since the enactment of the Atomic Energy Act in 1946. Because of the urgency and nature of the mission at hand, the federal government deemed total self-regulation of weapons production activities necessary. During the 1980s, however, DOE found it increasingly difficult to continue complete self-regulation, and several court rulings granted authority to the EPA to regulate certain DOE activities to ensure compliance with environmental laws. Many states now have similar authority as well, through federal laws for clean water and hazardous waste. Cleanup decisions generally revolve around two main issues: 1) the treatment of waste (through site treatment plans) and 2) the disposal of waste (through processes determined by federal regulations).

SITE TREATMENT PLANS

In 1992, Congress passed the FFCA, which requires DOE to prepare site treatment plans for approval by the appropriate state. These plans only apply to the treatment of that portion of DOE’s waste known as “mixed” waste. Mixed waste contains hazardous constituents regulated by states under the delegated federal hazardous waste program and radioactive constituents self-regulated by DOE. DOE, in close consultation with the states, developed the site treatment plans and completed them in 1995. They are now being implemented under regulatory orders between DOE and the states. These plans do not directly address disposal of radioactive waste.

DISPOSAL DECISIONS

While the FFCA brought DOE and the states together to agree on the treatment of some types of waste, decisions about the disposal of waste are made under either the National Environmental Policy Act (NEPA) process, or the Superfund (CERCLA) process, described below.

National Environmental Policy Act

The framework for many of DOE’s waste management decisions is governed by NEPA. Within the NEPA framework, decisions are considered via Environmental Impact Statements (EIS) and announced via formal Records of Decision (RODs). Most decisions about the location for treatment and disposal of DOE’s various types of nuclear waste have been made. These waste types include high-level waste (HLW), transuranic waste (TRU), a low-level waste (LLW), and mixed low-level waste (MLLW). See Appendix A for definitions of these waste types. Some states are concerned about the disposition of all nuclear materials as well as the disposition of those materials classified as “wastes.” RODs governing the management of high-level waste and transuranic waste were issued in the late 1990s: High-level waste is intended to be disposed in a national geological repository (currently expected to be at Yucca Mountain, Nevada), and transuranic waste is being actively disposed at the Waste Isolation Pilot Plant (WIPP) in New Mexico.

In 2000, DOE announced its final ROD for LLW and MLLW treatment and disposal sites. For LLW treatment, DOE decided to continue the practice of having each major site treat its own waste. For LLW disposal, DOE will continue (consistent with current practice and to the extent practicable) disposal of on-site waste at sites that already have LLW disposal facilities (Hanford, Idaho National Laboratory, Los Alamos, Nevada Test Site, Oak Ridge, and Savannah River) and will use the Hanford Site and the Nevada Test Site as regional disposal sites for LLW from DOE sites that do not have disposal capacity or an appropriate waste acceptance criteria. DOE also has the option of sending LLW to commercial, NRC-licensed LLW disposal facilities.

For MLLW treatment, DOE decided to continue to use Hanford, Idaho National Laboratory, and Oak Ridge to treat waste from other DOE sites and will begin to use the Savannah River Site to treat waste from other DOE sites. For MLLW disposal, DOE will use the disposal facilities at the Hanford Site and at the Nevada Test Site as regional disposal facilities for DOE waste from off-site locations. Under the federal hazardous waste law, DOE must secure permits from the state to operate MLLW facilities. As of August 2008, 6 Transuranic waste (TRU) is waste that has been contaminated with alpha-emitting transuranic radionuclides. Elements having atomic numbers greater than that of uranium are called transuranic (beyond uranium). Because of the elements’ long half-lives, TRU is disposed 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).
the Hanford Site is unavailable for off-site LLW and MLLW disposal pending DOE’s completion of an EIS process at the Hanford Site. The MLLW facility at the Nevada Test Site is currently operating. It will stop receiving MLLW waste in 2010 or when it reaches a volume limit specified by the State of Nevada, whichever comes first.

Figure 3 outlines the starting inventories of LLW and MLLW for states. Appendix B describes this waste in greater detail. Estimates of high-level waste and transuranic waste disposition were not available at the time of writing of this guide.

In accordance with congressional direction, DOE is preparing a draft EIS for Greater Than Class C (GTCC) waste with several suggested disposal options: Deep geologic disposal, intermediate borehole placement, and “enhanced” near-surface disposal. According to DOE’s 2007 Notice of Intent for the EIS, the proposed disposal sites include the Waste Isolation Pilot Plant (WIPP), the proposed Yucca Mountain Repository, the Hanford Site, Idaho National Laboratory, Los Alamos National Laboratory, Nevada Test Site, Oak Ridge Reservation, Savannah River Site, and the WIPP vicinity. During scoping comments, several FFTF members opposed selection of their respective sites for GTCC disposal.

**Superfund Wastes Are Subject to a Different Decisionmaking Process**

The disposal of LLW and MLLW contaminated soil, groundwater, and buildings is addressed in various site-specific decisions under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, also known as Superfund). 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.

<table>
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<tr>
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<th>% of Total FY 2008 Starting Inventory</th>
<th>MLLW</th>
<th>% of Total FY 2008 Starting Inventory</th>
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<td>FY 2008 Starting Inventory (m³)</td>
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<tr>
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<td>322</td>
<td>Other States*</td>
<td>104</td>
</tr>
</tbody>
</table>

| * Hawaii, Iowa, Maine, Missouri, New Jersey, New Mexico, Pennsylvania, South Carolina, Texas, Virginia | * Illinois, Missouri, Nevada, New Mexico, Pennsylvania | Other States* | 104 | 1.3 |

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9 Currently, most, but not all, MLLW goes to the Nevada Test Site (NTS) disposal facility. Some goes to commercial sites, some the TSCA incinerator at Oak Ridge, and some on-site waste to a special CERCLA cell at Idaho National Laboratory.

10 The waste volumes quoted are from DOE’s Waste Information Management System (WIMS). Note that this table reflects only the starting inventory of waste as of the beginning of FY 2008. Projections of future waste volumes are included in the state-by-state descriptions and in Appendix B.

11 At the time this document went to press, the schedule for release of the draft EIS was uncertain.
What Are the Main Issues of Interest to States?

The NGA Center’s Federal Facilities Task Force (FFTF), a group comprised of governor-appointed policy and technical representatives from 13 states, has met since 1993, in an effort to work with DOE on their individual site concerns as well as issues of common interest throughout the nuclear weapons complex. The overarching area of interest to the FFTF—an interest in common with DOE—is to complete the cleanup of the nuclear weapons complex in a manner that provides protection to the citizens, workforce, and environment that surround the DOE sites. Since the passage of the FFCA, the FFTF has worked with DOE to meet this goal. Over the years, a number of areas of interest have arisen that members of the FFTF have continuously identified as important, including:

• Funding (securing federal funding to meet agreed-upon, enforceable cleanup milestones);
• Cleanup (getting sites to meet both federal and state cleanup standards);
• Disposal and transport (ensuring a safe transport and disposal system for radioactive waste); and
• Land use (establishing a robust program whereby DOE will provide assured funding to care for sites where cleanup to unrestricted levels is not possible and assessing and compensating states for damages to natural resources).

FUNDING

Having the proper funding for the cleanup of the nuclear weapons complex has always been a top priority for both FFTF states and DOE. Generally, this topic can be broken into two specific issue areas: securing sufficient funding for DOE by Congress and ensuring that this funding is prioritized appropriately.

Sufficient Funding

Cleanup of the waste that is the legacy of decades of nuclear weapons production is a monumental task. If progress is to be made, it is imperative that all cleanup funding is used wisely, that sufficient funding be requested from Congress to achieve compliance with all state-DOE agreements, and that the funds appropriated are enough to meet all cleanup commitments. DOE is required by Executive Order 12088 to request a budget that complies with environmental requirements. The FFTF has strongly supported DOE in its efforts to secure sufficient, stable funding from Congress to keep this major, long-term effort on track. Members of the FFTF have worked directly with their congressional delegations to add funding to the EM cleanup program when the President’s request has fallen far short of what is needed. Since its peak in FY2005 of $7.3 billion, funding for the cleanup program has decreased, and in October 2007, DOE estimated it would face a cumulative shortfall over the next five years of $8 billion between projected budgets and funding needed to stay in compliance (see Figure 4). In addition, some members of the FFTF believe that delays in cleanup can result in an increase in the overall cost of cleanup, prolonging the risk to human health and the environment.

Accelerated Cleanup

During the late 1990s through 2006, DOE focused on “accelerated cleanup” at specific sites, an approach that emphasized rapidly reducing environmental risks, decreasing the time to complete the cleanup of sites, and reducing the overall cost of the cleanup program. Experience at Rocky Flats shows that greater near-term investment in cleanup funding can pay huge dividends in reducing life-cycle clean-up costs. Yet recent DOE budgets have not embraced the accelerated cleanup approach, resulting in extended closure dates (see Figure 2) and high life-cycle costs (as reflected by overall environmental liabilities that have increased over the past three years). Some members of the FFTF believe the savings realized from the accelerated cleanup of sites like Rocky Flats and Fernald should be reinvested in accelerated cleanup at other sites, maximizing the savings to DOE and the taxpayer. Without seeing the benefits of the long-term cost-savings from accelerated cleanup, some states are unlikely to support such initiatives in the future.

12 See Appendix D for a list of the NGA Federal Facilities Task Force (FFTF) members who identified the issues discussed in this section. Also visit www.FFTFCleanupNews.org for more information.

13 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)
CLEANUP

Since the FFCA was enacted, states and the FFTF have focused on their role in the cleanup of the nuclear weapons complex. The following are some of the areas related to cleanup that are of interest to the FFTF: determining cleanup levels, equity (i.e., sharing the cleanup burden), and state oversight.

Cleanup Levels

States have a strong interest in quality of the cleanup, or as it is often called, determining “how clean is clean?” While states prefer that sites are cleaned up to a level that requires no further restrictions on land use, this level of cleanup is often not technically or financially feasible. Therefore, at most sites, some level of waste will remain after cleanup, and the amount and type can vary greatly—even within a specific DOE site. States want to be assured that waste left in landfills, underneath caps, or remaining in the soil or groundwater will not eventually threaten the public or environment. Therefore, the FFTF encourages DOE to clean sites to allow for a wide variety of land uses. If contamination must be left in place, states need assurance that controls to restrict land use are maintained (and funded) by DOE over the long-term.

State Oversight

DOE’s facilities are almost entirely self-regulated. However, FFTF members feel strongly that states have the ability to oversee the treatment (as well as shipment and disposal) of DOE’s wastes to ensure the health and safety of their citizens as well as the integrity of the environment. States want to be considered co-regulators with equitable consideration in the cleanup process. Many FFTF members believe that DOE should examine options for delegating shared regulatory oversight of waste disposal operations to states, given the long-term stewardship responsibilities disposal will require.

DISPOSAL AND TRANSPORT

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 this waste is of great interest to the FFTF. Specifically, the FFTF has prioritized the following waste disposal issues: disposal of HLW in a geologic repository, the disposal of transuranic waste at the Waste Isolation Pilot Plant (WIPP), and the transportation of waste.

Disposal of High-Level Waste (Yucca Mountain, Nevada)

A permanent solution for the disposal of HLW and spent fuel is of great concern for sites and for states that possess such materials. Spent nuclear fuel from civilian nuclear reactors is currently stored at reactor sites across the country and will remain in interim storage until such time as a national repository becomes available. The NRC has determined that spent nuclear fuel can remain safely stored in this manner for at least 30 years beyond the reactor’s licensed operational life. In 1987, Congress designated Yucca Mountain, Nevada, as the potential site for the nation’s geologic repository for spent fuel and HLW. After detailed investigations of the site’s suitability, in 2002 President George W. Bush signed House Joint Resolution 87 designating Yucca Mountain as the United States’ national geologic repository for nuclear waste. The Office of Civilian Radioactive Waste Management (OCRWM) is tasked with the Yucca Mountain Project and currently estimates the earliest possible opening date of the repository as 2017, with a more likely date being 2020 or 2021. Under the Nuclear Waste Policy Act (NWPA), the amount of waste destined for Yucca Mountain is limited to 70,000 metric tons, of which 63,000 is for waste from commercial reactors and 7,000 is reserved for DOE’s HLW. The National Academy of Engineering estimates that waste from the nation’s 103 nuclear reactors will reach the 63,000 ton quantity by 2014.

Figure 4. Out-Year Targets vs. Current Baseline Requirements

<table>
<thead>
<tr>
<th>5-YEAR SHORTFALL ($ in millions)</th>
<th>Total: $8,074</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY 2008</td>
<td>-$1,520</td>
</tr>
<tr>
<td>FY 2009</td>
<td>-$1,923</td>
</tr>
<tr>
<td>FY 2010</td>
<td>-$1,551</td>
</tr>
<tr>
<td>FY 2011</td>
<td>-$1,684</td>
</tr>
<tr>
<td>FY 2012</td>
<td>-$1,396</td>
</tr>
</tbody>
</table>

14 The information in this figure is taken from a presentation from the Director of Budget, U.S. Department of Energy, Office of Environmental Management at the Intergovernmental Meeting in Snowbird, Utah, on October 17, 2007.


This prompts the question of whether an expanded Yucca Mountain, a second geological repository, or some other solution may be needed. With the state of Nevada strongly opposing the use of Yucca Mountain as the site for the nation’s geologic repository and with Yucca Mountain alone unlikely to be adequate to house all the HLW in the country, the FFTF states urge DOE to develop a comprehensive plan to deal with HLW disposal.

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

Twenty years after its authorization by Congress, the Waste Isolation Pilot Plant (WIPP) received its first shipments of Transuranic (TRU) waste for permanent disposal in March 1999. DOE received its hazardous waste facility permit from the State of New Mexico later that year, which allowed WIPP to receive mixed TRU waste. In 2006, the State of New Mexico approved a modification to the WIPP permit to allow the facility to receive remote-handled TRU waste for permanent disposal. The FFTF would like to ensure the agreed upon pace and sequence in which TRU waste is for permanent disposal. The FFTF would like to ensure the agreed upon pace and sequence in which TRU waste is for permanent disposal. The FFTF believes it is essential for DOE to continue its efforts to plan and coordinate transportation activities in full consultation with affected states.

Transportation of Radioactive Waste

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

LAND USE

The FFTF is also interested in how DOE site cleanups fit with land use considerations, specifically the long-term stewardship of the land after cleanup is complete and natural resource damage assessments to determine the appropriate compensation for injuries to trust resources, such as ground water, surface water, biota, etc.

Long-Term Stewardship

Even when DOE completes its cleanup efforts, additional measures will be needed to ensure adequate long-term protection of human health and the environment. As stated previously, few of these sites will be cleaned up to unrestricted use. These additional measures—referred to as long-term stewardship (LTS) activities—can include:

- Varying degrees of surveillance;
- Monitoring the migration of residual contamination and the effectiveness of remedies;
- Inspection;
- Restrictions on public access;
- Limitations on future uses of land and water;
- Maintenance of relevant information; and
- Responsible long-term care of the site.

A reliable LTS program should be integrated, with roles and responsibilities shared appropriately among DOE offices, states, local governments, tribal nations, and other federal agencies as needed. It should also work in cooperation with state laws governing institutional controls.

To adequately protect human health and the environment, LTS activities must continue, uninterrupted, for decades or centuries. The FFTF supports DOE in carrying out its enduring responsibility to fund LTS activities and wants to work with DOE and others to determine what funding mechanisms can be pursued to make the certainty of funding commensurate to the certainty of the residual risk at sites where LTS is required.

Natural Resource Damage Assessments

Under CERCLA, or Superfund, DOE is responsible for injuries to natural resources (e.g., land, fish, wildlife, biota, air, water, ground water, drinking water supplies) that occur on or near DOE sites as a result of contaminant releases. The law gives the public a right to compensation to restore, replace, or acquire the equivalent of injured natural resources and associated loss of services that result from the release of hazardous substances or from the removal and remedial actions taken to respond to such releases. CERCLA requires that compensation be used exclusively for restoration of the resource or for acquisition of comparable resources if the site cannot be restored.

Under CERCLA, natural resource trustees are responsible for assessing the extent of injury to a natural resource and for determining appropriate ways of restoring and compensating for that injury. DOE is the lead federal trustee for all natural resources located on DOE property. Other federal agencies, states and tribal entities are also trustees at the various DOE sites. A natural resource damage assessment (NRDA) is the process of collecting and analyzing information to determine the occurrence and extent of harm to natural resources (injury) and the cost for restoration (damages). Calculating the monetary compensation from these injured resources can be complex and time-consuming.

The level of this cooperation between trustees can vary widely among sites. In some cases, disagreements among the responsible party (DOE in this case) and trustees as to the nature and findings of the assessments and even when to begin the assessment phase have led to lawsuits, which can take many years to resolve. In 1986, the state of Ohio filed a $206 million NRD claim related to damages at the Fernald site as part of a larger lawsuit. Twenty-two years later, in July 2008, the state and DOE reached an agreement for more than $27 million in natural resources restoration work (including a $13.75 million settlement payment to the state) for various habitat enhancements and land protection on or near Fernald to protect and improve water quality. This was the largest natural resource damages settlement made by the federal government to date; only a very small number of other NRD claims against DOE have been settled.
Heavy equipment is used to complete surface remediation activities at the Gasbuggy offsite location near Farmington, New Mexico.

PHOTO COURTESY OF NATIONAL NUCLEAR SECURITY ADMINISTRATION / NEVADA SITE OFFICE
In addition to the accomplishments at specific sites across the country, great cleanup progress has been made nationwide. Since the enactment in 1992 of the FFCA, states and DOE have worked together to make numerous strides forward in the cleanup of the nuclear weapons complex. Continuing dialogue between states and DOE helped make many of these successes possible. The following are some examples of successful policies, programs, and plans of the states and DOE that have had benefits across the nuclear weapons complex:

- Development of site treatment plans for all sites;
- Accelerated cleanup and successful closure of three major sites;
- Creation of a waste inventory and disposal successes;
- Establishment of an office to oversee long-term stewardship of closed sites; and
- Increased collaboration and communication between states and DOE.

**DEVELOPMENT OF SITE TREATMENT PLANS FOR ALL SITES**

Immediately following passage of the FFCA, both the states and DOE saw the need for a high-level of policy and technical collaboration to be able to understand the scope of cleanup needs and the types and amounts of waste involved, as well as to develop implementable, legally binding plans to guide DOE’s waste management. States realized they would need to understand not only the situation within their state, but also their state’s role in the overall nationwide cleanup. Based on this need to understand the larger picture, NGA established the FFTF to work with DOE. The states and DOE worked cooperatively and intensively over the three-year period specified by Congress to develop site treatment plans. Initially lacking data about the types and amounts of waste, DOE helped develop the necessary data and make it available to the states. At the same time, the states, via the FFTF, developed a set of principles for explaining how “equity” issues across states should be understood by DOE. As a result of this collaboration, the required Site Treatment Plans were successfully approved by states and DOE within the time period prescribed by Congress. A framework for the cleanup was thus created that enabled cleanup to go forward in earnest, and a model for collaboration between the states and DOE was demonstrated. Collaboration between the states and DOE continues to this day.

**ACCELERATED CLEANUP AND SUCCESSFUL CLOSURE OF THREE MAJOR SITES**

The states and DOE both have the ultimate goal of successfully closing— that is, cleaning up to a safe and acceptable level—all of the sites in the nuclear weapons complex. To date, three sites have been successfully closed: Rocky Flats in Colorado and Fernald and Mound in Ohio.

**Rocky Flats (Colorado)**

October 2005 marked the end of an important phase in the history of Rocky Flats, as remediation was completed on the largest environmental cleanup project in the United States to date. From 1952 to 1994, the plant’s primary mission was the production of components for the U.S. nuclear arsenal, primarily the plutonium pit or “trigger” for nuclear weapons. During this period, two major fires, poor storage and disposal practices, wind-blown plutonium contamination, and other conditions caused substantial environmental damage at the site, just 16 miles from downtown Denver. By DOE’s count, five of the ten most dangerous buildings in the weapons complex were at Rocky Flats. Nuclear production work ended in 1989 to address environmental and safety issues, and the site was added to the National Priorities List (NPL) under CERCLA. In 1994, nonnuclear production also came to a close as the last defense-related shipment was sent out, and by 1995, the site’s only remaining mission was cleanup. Cleanup challenges at the site were considerable and required the decommissioning, decontamination, demolition, and removal of more than 800 structures, including six plutonium processing and fabrication building complexes; removal of more than 500,000 cubic meters of low-level
radioactive waste; and remediation of more than 360 potentially contaminated environmental sites. DOE predicted a long (2070 closure date) and costly ($35 billion) cleanup.

A new cleanup agreement negotiated with the DOE, EPA, and the state of Colorado in 1996 incorporated an accelerated decisionmaking process based on collaborative consultation among these agencies. A new closure date of 2010 was optimistically set.

In 1999 and 2001, the former General Accounting Office issued status reports listing obstacles to this accelerated closure plan and concluded that meeting the closure date was unlikely and that the budget was underestimated. DOE and its contractor, Kaiser-Hill, responded by moving up the closure date to 2006. When the site completed physical cleanup nearly a year ahead of the accelerated schedule and under budget (at $7.4 billion), the General Accounting Office (now known as the Government Accountability Office) issued a new report recommending that the lesson learned at Rocky Flats be applied at other DOE sites. Among the many factors that came together to allow this remarkable success were the cooperative nature of the cleanup agreement that streamlined the regulatory process, a performance-based and incentive-based contract, and an actively supportive congressional delegation.

In the year after physical cleanup ended at Rocky Flats, there were still numerous tasks to be completed to meet legal requirements. A detailed RCRA Facility Investigation/Remedial Investigation Report was completed, and a site-wide Corrective Action Decision/Record of Decision approved. In March 2007, DOE, EPA, and the state of Colorado signed a Legacy Management Agreement, which designated the state as the lead regulatory agency for post-closure (i.e., long-term stewardship). The agencies still maintain contact with interested stakeholders through the Rocky Flats Stewardship Council, which consists of representatives of local government and stakeholder groups.

The majority of the site was delisted from the NPL, then transferred to the U.S. Fish & Wildlife Service in July 2007. DOE retains control over approximately 1,300 acres of the original 6,200-acre site. In this central area, the Office of Legacy Management maintains 2 closed landfills, 4 passive groundwater treatment systems, more than 120 groundwater wells and surface water monitoring locations, and 12 surface water retention ponds. Currently, tall-grass prairie is being re-established over the sites of environmental restoration projects. Deer and elk herds run across areas where massive production buildings once stood. Natural Resource Damage funds appropriated by Congress will help to continue to restore habitat and other resources in the proximity. The approximately 10-square-mile site has been turned from an environmental liability into an environmental asset for the citizens of Colorado.

Fernald (Ohio)

Like Rocky Flats, the Fernald Closure Project is a successful example of an accelerated cleanup process. The Fernald Site, 18 miles northwest of Cincinnati, produced approximately 500 million pounds of low-enriched uranium metal for use at other government facilities involved in the production of nuclear weapons from the early 1950s through the late 1980s. Nuclear and chemical waste associated with this production totaled nearly five billion pounds, including acids, solvents and oils, uranium shavings, dusts, particulates, and radon gas. In 1991, the mission of the site changed to environmental cleanup under CERCLA. A 1992 government 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 and closure/transition to Legacy Management was completed 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 to restore the property to an undeveloped park with an emphasis on wildlife and education. In 2008, an on-site visitor center was opened in a former supply warehouse.

Mound (Ohio)

The Mound site is another successful example of an accelerated cleanup process that had led to site closure. The Mound Site is located in Miamisburg, Ohio, approximately 10 miles southwest of Dayton and sits atop an elevated area overlooking the city of Miamisburg, the Great Miami River, and the river plain area to the west. Construction of the Mound facility began in 1946 to support the early atomic weapons programs. Early work at the site involved production of polonium-beryllium initiators used in atomic weapons and research related to radionuclides and detonators. In the 1950s, the facility manufactured a variety of nuclear weapons parts, including cable assemblies, explosive detonators, and electronic firing sets that activated them. The Mound Site evolved into an integrated research, development, and production facility performing work in support of DOE’s weapons and energy programs, which included stable isotope separation, fossil fuels research, tritium recovery for reuse in weapons, development of radioisotopic thermoelectric generators that provided electrical power for space exploration, and other nonnuclear research and development.

In 1984, DOE established the Environmental Restoration Program at the Mound Site. The program collected and assessed environmental data to evaluate the nature and extent of contamination and identified potential exposure pathways and potential human and environmental receptors. Most of the contamination was identified as low-level radioactivity in soil and volatile organic compounds in the ground water. A Federal Facilities Agreement between DOE and EPA was signed in October 1990 and was reissued in 1993 to include the Ohio EPA because of DOE’s decision to close and decommission the site. The agreement established a procedural framework and schedule for developing appropriate response actions and facilitated cooperation and exchange of information among the agencies. By September 2006, all nuclear material had been shipped off site, facilities had been demolished or decontaminated, and environmental remediation activities were complete, except for the sewer system and areas needed to support additional waste excavation in one area of the site under a special congressional appropriation. The DOE Office of Legacy Management is responsible for site management following completion of the cleanup effort.
**CREATION OF A WASTE INVENTORY AND DISPOSAL SUCCESSES**

Throughout the Cold War era, recordkeeping and tracking of waste generated throughout the nuclear weapons complex was haphazard at best, and with the beginning of cleanup operations it soon became clear to all parties involved that a major waste inventory effort was crucial to understand the scope of the task at hand. With strong support from the states, DOE has made great strides in its waste inventory and disposition strategies. DOE now utilizes 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. States and DOE now have the ability to visualize and understand the volumes, categories, and problems of forecasted waste streams.

States and DOE also have made great strides with respect to physical waste disposal, specifically the disposal of TRU waste and LLW. The WIPP in New Mexico has received more than 6,800 shipments of defense TRU waste, amounting to more than 50,000 cubic meters of waste safely stored in WIPP’s salt stone vaults. WIPP also is authorized to receive remote-handled TRU waste (RH-TRU), and at the time of publication, has been receiving multiple shipments of RH-TRU on a weekly basis from INL. In June 2007, the Savannah River Site met its TRU waste-shipping milestones, as negotiated with the state of South Carolina, ahead of schedule. At West Valley, New York, drum cell cleanout is nearly complete, with 20,000 drums of LLW shipped to the Nevada Test Site for disposal. In July 2007, DOE completed the removal of 49,000 waste containers from Building X-7725 at Portsmouth.

**ESTABLISHMENT OF OFFICE TO OVERSEE LONG-TERM STEWARDSHIP OF CLOSED SITES**

DOE activities related to research and production of nuclear weapons created significant amounts of radioactive waste. As a result, many sites are heavily contaminated and cannot be cleaned up to a level of unrestricted use. Furthermore, contamination at these sites presents a danger to human health and the environment that will require management to ensure environmental protection as well as the safety of present and future generations.

With the support of states, DOE established the Office of Legacy Management in December 2003 to manage post-closure responsibilities and ensure the future protection of human health and the environment. This office is responsible for nearly 100 sites, with the number projected to increase to 116 by FY 2012. Office of Legacy Management activities include maintaining all engineered and institutional controls designed to contain or prevent exposure to residual contamination and waste, recordkeeping activities, inspections to evaluate the condition of surface features, groundwater and surface water monitoring, maintenance of other barriers and contained structures, access control, emergency response, and posting signs. While some of the smaller sites under the office’s aegis did not require complicated or lengthy closure plans, several sites were notable for the technical and funding hurdles that were overcome to achieve closure status.

**INCREASED COLLABORATION AND COMMUNICATION BETWEEN STATES AND DOE**

Increasing their collaboration with states and other stakeholders and enhancing their communication and openness has proven to be a great success for DOE. The following are some examples where this cooperation has provided tangible results: DOE’s Top-to-Bottom Review, the Waste Incidental to Reprocessing Program, and the Intergovernmental Dialogue.

**Top-to-Bottom Review**

In 2001, newly-appointed Secretary of Energy Spencer Abraham ordered a review of the EM program, which took the form of the Top-to-Bottom Review. The review team released a report of its findings in February 2002, which included a proposal to form Integrated Project Teams to carry out a number of the Team’s recommendations. While some of the FFTF members did not fully endorse all the findings and recommendations in the report, the FFTF was able to work in partnership with three teams with particular relevance to the states. This process was guided by newly drafted “Ground Rules for Communicating in a Climate of Confidence” that enabled states and DOE staff to engage in “pre-decisional” dialogue to share information and concerns and to discuss what approaches might be most effective in accomplishing the cleanup goals.

As another outcome of the Top-to-Bottom Review, DOE worked with states to prepare “performance management plans,” which laid out site-specific strategies for accelerating cleanup and reducing overall costs. State regulators worked closely with DOE to make the necessary modifications in cleanup agreements to support the accelerated approach.

**Waste Incidental to Reprocessing**

Following establishment by Congress in 2004 of a new process for addressing residual waste left when HLW tanks are emptied, the states of Idaho and South Carolina worked with DOE to reach an agreement on the cleanup of the waste, referred to as waste incidental to reprocessing (WIR). As a result, several HLW tanks in Idaho have been successfully closed. It should be noted that FFTF members in the states of Washington and Oregon support a different process for dealing with residual waste in the HLW tanks at the Hanford site.

**Intergovernmental Dialogue**

Since 2001, the NGA Center’s FFTF and four other intergovernmental groups—the Energy Communities Alliance (ECA), the Environmental Council of the States (ECOS), the National Association of Attorneys General (NAAG), and the State and Tribal Government Working Group (STGWG)—have met annually with DOE to discuss important topics of interest and exchange ideas about how to improve the cleanup process within the nuclear weapons complex. Before the intergovernmental meetings, each organization met separately with DOE and did not collaborate on areas of joint concern. These meetings are an important component of the communications link between states, tribes, stakeholders, and DOE and serve as an efficient forum for communicating information and identifying and discussing critical issues.

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17 Most states were very supportive of the establishment of the Office of Legacy Management as a way to provide greater visibility to the important, but sometimes overlooked, functions of long-term stewardship. Some states are dissatisfied with the current implementation of LM because its duties include a broad range of functions, and the resulting visibility and priority of the long-term stewardship program is less than had been anticipated.

18 The Top-to-Bottom Review was a term coined for a 2002 DOE publication entitled, "A Review of the Environmental Management Program" that was to serve as the agency’s blueprint for how the site cleanup program is to operate. This report substantially influenced DOE’s FY 2003 budget request.

Excavated soil surveyed for radioactive contamination and sampled at the Environmental Protection Agency Farm in Area 15 of the Nevada Test Site (Corrective Action Unit 543)

PHOTO COURTESY OF NATIONAL NUCLEAR SECURITY ADMINISTRATION / NEVADA SITE OFFICE
Each site in the nuclear weapons complex is unique. During the creation of the atomic bomb and throughout the Cold War, individual sites had specific tasks which left particular types of wastes and environmental cleanup issues. In addition, some sites have been designed to dispose of specific types of waste products. Below is a list of major DOE sites, followed by site discussion sections. Site discussions for all but the “Other Major Sites” include a brief description of the site, a summary of accomplishments, a description of current site-specific issues, and the relationship to other sites in the complex. The accomplishments discussed below are distinct from the complex-wide major successes covered in the previous section. Sites covered include:

- Idaho (Idaho National Laboratory)
- Nevada (Nevada Test Site)
- New Mexico (Los Alamos National Laboratory, Sandia National Laboratory, Waste Isolation Pilot Plant)
- Ohio (Fernald, Ashtabula, Columbus, Mound, Portsmouth)
- South Carolina (Savannah River Site)
- Tennessee (Oak Ridge Reservation)
- Washington (and Oregon) (Hanford Site)
- Other major sites (Kentucky, Missouri, New York, and Texas)

**IDAH O: IDAHO NATIONAL LABORATORY**

The Idaho National Laboratory (INL) is located on 890 square miles in the southeastern Idaho desert, with additional INL research and support facilities located in Idaho Falls. The laboratory complex includes nine major applied engineering, interim storage, and research and development facilities. Established in 1949 as the National Reactor Testing Station, for many years, INL was the site of the largest concentration of nuclear reactors in the world. Fifty-two reactors—most of them first of a kind—were built at INL, including the Navy’s first prototype nuclear propulsion plant.

Today, INL is helping meet regional, national, and international cleanup needs as a leader in the complex-wide effort to more closely integrate technology development with specific cleanup objectives to get work done faster at a lower cost.

Three agreements embody the regulatory framework at Idaho. First, the Federal Facilities Agreement Compliance Order mandates milestones for cleanup under CERCLA. Second, the Site Treatment Plan and associated regulatory orders govern certain waste management activities. Third, in October 1995, Idaho, the U.S. Navy, and DOE reached an agreement settling a lawsuit filed by the state to prevent shipment of spent nuclear fuel to INL for storage.

**Accomplishments**

DOE met a significant milestone at INL when it began grouting tanks that formerly stored HLW at the Idaho Nuclear Technology and Engineering Center (INTEC), a 1950s-era reprocessing facility that extracted reusable uranium from spent nuclear fuel. Eleven of 15 large tanks have been grouted, while the remaining four tanks will continue to store liquid waste until the Sodium Bearing Waste liquid treatment system becomes operational. DOE’s settlement agreement with Idaho stipulates the removal of the remaining waste from the tank farm by 2012.

Cleanup of the 1950s-era Spent Nuclear Fuel storage basin in the Fuel Receiving and Storage Facility was completed in 2006. Initial cleanup of the basin began in 2003 when storage racks and other equipment were removed. Between August 2005 and April 2006, approximately 110,200 pounds of contaminated sludge were removed from the basin floor. The water was then removed and the basins were filled with grout.

DOE Idaho’s Advanced Mixed Waste Treatment Plant is a permitted mixed waste treatment facility that packages waste for shipment to the Waste Isolation Pilot Plant. The facility allows DOE to meet Settlement Agreement obligations associated with transuranic and remote handled transuranic waste treatment/packaging and shipment.

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**PHOTO COURTESY OF NATIONAL NUCLEAR SECURITY ADMINISTRATION/NEVADA SITE OFFICE**

**Industrial waste pond at the Rulison nuclear test (detonated in 1969) location near Grand Valley, Colorado**
The Accelerated Retrieval Project excavates, identifies, and repackages targeted waste for characterization and shipment to the Waste Isolation Pilot Plant. The project addresses specific waste disposed at the Subsurface Disposal Area during the early 1950s through 1970. Solvent, transuranic, and depleted uranium wastes are currently being exhumed and repackaged from approximately a one-acre area. Additional acreage will be specified in future agreements.

Several complex fuel storage, reprocessing, test reactor, and process facilities have been, or are scheduled to be decommissioned. These include the Power Burst Facility, Experimental Test, Materials Test, and Loss of Fluid Test reactors; the Remote Analytical Facility and INTEC Fuel Reprocessing Facilities; and the Test Area North Fuel Examination Hot Shop.

Site-Specific Issues

The future of the INL site and the implementation of a 1995 court settlement and other legal agreements between DOE and the state, including access to disposal of TRU waste at WIPP, are Idaho’s primary concerns. The court settlement also allows for interim storage, with eventual removal of spent fuel from Idaho.

Relationship to Other Sites in the Complex

INL has relationships with other DOE sites that are critical to completing the requirements of the settlement agreement, including the WIPP site for disposal of TRU waste. In addition to HLW and spent nuclear fuel stored and generated on site, INL stores the damaged reactor from Three Mile Island and spent nuclear fuel from Navy vessels and foreign research reactors. Disposal of HLW and spent nuclear fuel from INL is dependent on future decisions about permanent geologic disposal. INL treatment facilities such as the Sodium Process Facility and the Advanced Mixed Waste Treatment Plant play a key role in treating MLLW and TRU waste from around the complex.

LLW and MLLW cleanup at INL requires access to both NTS and commercial sites around the country:

• According to DOE estimates, more than 52,000 cubic meters of INL LLW will be sent to NTS for disposal between 2008 and 2050. Approximately 20,000 cubic meters of LLW and MLLW will be disposed of at commercial facilities.

• Over 46,000 cubic meters of MLLW/LLW will be disposed of on-site at the INL CERCLA cell from 2008 to 2050, with an additional 4,000 cubic meters of MLLW to be disposed of on-site at a separate INL disposal facility.

NEVADA: NEVADA TEST SITE

The Nevada Test Site (NTS) occupies approximately 1,350 square miles (more than 800,000 acres) in southeastern Nye County, Nevada. NTS is larger than Rhode Island (the site comprises over 40 percent of all DOE land holdings); its features include deserts, playas, and mountainous terrain. NTS is located about 65 miles northwest of Las Vegas, Nevada, which is home to about 2 million residents and one of the fastest-growing metropolitan areas in the nation. NTS is a DOE defense program site; its primary mission is to maintain the capability to resume underground nuclear testing. While NTS has a relatively small Environmental Management (EM) cleanup budget (i.e., $80 million, or 2 percent of all DOE cleanup funds), the site contains significant contamination in surface soils and groundwater. Nearly 30 percent of all underground nuclear tests conducted at the site (more than 250 tests) were performed in the vicinity of groundwater.

The Yucca Mountain site is in the southwest corner of NTS, adjacent to the Nellis Air Force Range and on land currently under the control of DOE, the U.S. Air Force, and the U.S. Bureau of Land Management. The site covers approximately 87 square miles (53,000 acres). DOE is evaluating Yucca Mountain for its suitability as a geologic repository for spent nuclear fuel and high-level radioactive waste. In July 1999, DOE released the Draft Environmental Impact Statement for the Yucca Mountain site. This report was followed by a proposed EPA rule that will eventually set an environmental radiation protection standard for the site. In June 2008, DOE submitted a license application to the Nuclear Regulatory Commission, seeking authorization to construct the repository.

NTS has several agreements dealing with mixed waste storage and remediation issues. The first is a settlement agreement for storage of mixed TRU waste that was signed in June 1992. The waste covered by this agreement was subsequently incorporated into the Federal Facility Compliance Act Site Treatment Plan. NTS also has a mutual consent agreement, signed in January 1994, for managing newly generated, MLLW from DOE environmental restoration activities in Nevada.

In May 1996, DOE and Nevada also signed the Federal Facility Agreement and Consent Order (FFACO). This agreement governs remediation of historical contamination through corrective actions based on public health and environmental considerations. The agreement stipulates a process to ensure that DOE and the U.S. Department of Defense (DoD) thoroughly investigate and complete corrective actions for contaminated sites on NTS and the Nellis Air Force Range.

In June 1993, DOE and Nevada signed an Agreement in Principle (AIP) to identify 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 was protected. The AIP and its later revisions, among other things, afford Nevada the opportunity to provide input into the evaluation of waste being sent to NTS for disposal. This includes LLW and MLLW.

In December 2005, a RCRA Part B permit was issued which included authorization to dispose of off-site generated MLLW at NTS from DOE sites. This authorization is effective until December 2010 or when the disposal capacity of 20,000 cubic meters is reached.

Accomplishments

Since the FFACO was signed in 1996, significant progress has been made in addressing the remediation process in several categories of contaminated sites. These include Industrial Sites, Underground Test Areas (with contaminated groundwater from underground nuclear tests), Soil Sites (contaminated by near surface nuclear tests), and two sites off NTS (where underground nuclear tests were conducted).
The Industrial Sites restoration addresses facility decontamination and decommissioning, historical infrastructure remediation efforts, and conventional weapons cleanup including unexploded ordinance. The FFACO identified more than 1,100 such sites, and to date, more than 900 such sites have either been clean-closed or closed in place, meeting specific protective closure criteria that allow the site to be closed with use restrictions.

The Underground Test Area project has involved geologic and hydrologic characterization, contaminated groundwater transport modeling, contaminant boundary definition and establishment of a monitoring system to protect against the inadvertent use of contaminated groundwater. Nevada and DOE have worked together to define the approach to remediation.

The Soil Sites contain contamination from historic nuclear detonations, safety experiments, nuclear reactor development, nuclear rocket development, and hydronuclear experiments. More than 100 such sites exist, and Nevada and DOE have agreed to the strategy for addressing the remediation.

The two Nevada Off-Sites—Project Shoal (PSA) and the Central Nevada Test Area (CNTA)—have been undergoing characterization for some time and have been transferred to DOE’s Office of Legacy Management.

Since the AIP was signed, NDEP has been a full participant in the LLW disposal activities at NTS. This includes reviewing waste stream data and visiting generator sites to verify waste stream data and operations related to preparing waste for transport to NTS. These activities have continued since Nevada agreed to the acceptance of off-site generated mixed low-level radioactive waste.

DOE has completed construction of the Visual Examination Repackaging Building (VERB) for the repackaging of oversized boxes of TRU waste at NTS. The TRU waste is presently in oversized boxes, which need to be repackaged in the VERB to fit TruPack containers for shipment to WIPP. This is the last step in the process to ultimately dispose the TRU waste at WIPP. Waste shipments of TRU waste are planned for late 2008 which, when completed, will close the TRU project at NTS.

Site-Specific Issues

Contamination of groundwater is of serious concern to the state of Nevada at both NTS and the off-site locations in Nevada. The strategy for identifying the flow and transport of contaminants at each location has been well-defined. The ability to identify the contaminant boundary and agree that the negotiated compliance boundary is protective of public health is considered to be significant challenge in the long-term.

The continued disposal of LLW and MLLW at NTS continues to be of interest to Nevada. NTS is one of two regional disposal sites identified by DOE for disposal of DOE generated wastes. Although it is expected that large volumes of LLW will be shipped to NTS for disposal, Nevada officials are concerned that some LLW may not be suitable for typical shallow land burial at NTS (i.e., high-activity LLW considered equivalent to commercial greater-than-class-C waste).

The state also is seeking shared regulatory oversight over LLW operations at NTS through delegation of authority by DOE under the Atomic Energy Act. Nevada officials believe that DOE should establish and fund a baseline health effects study. The study is needed to establish a baseline of the health effects from past DOE activities in Nevada to determine what, if any, health effects may occur from future DOE activities, such as waste disposal or the creation of a geologic repository at Yucca Mountain. State officials also think that consideration should be given to placement of radiation detection equipment on all trucks shipping to NTS and at strategic locations along transportation routes.

Additionally, the state of Nevada strongly opposes the use of Yucca Mountain as the site for the nation’s geologic repository. This opposition also applies to interim storage of commercial or DOE spent fuel at the site.

Relationship to Other Sites in the Complex

LLW will continue to be generated at NTS into the future and disposed on site. The vast majority of waste at NTS will be managed on site; the exception is a relatively small quantity of TRU waste currently in storage at the site. This waste will be packaged and shipped to the WIPP disposal site in New Mexico.

In 2000, DOE designated the NTS and Hanford as the two regional disposal sites for off-site LLW and MLLW from throughout the complex. Hanford is in the process of resolving legal issues, which leaves NTS as the single DOE regional facility currently available for off-site LLW and MLLW disposal. NTS is currently providing LLW disposal capability. And while it is accepting limited volumes of MLLW, there are unresolved issues with a 1997 settlement agreement relative to the existing land withdrawals for NTS with regard to LLW storage/disposal activities.

LLW and MLLW disposal at NTS includes the following:

- Under the Record of Decision for LLW disposal, NTS is one of two sites (with Hanford) to be designated to receive LLW from off-site for disposal. DOE’s Waste Information Management System indicates that NTS will receive about 330,000 cubic meters of LLW from off site between 2008 and 2050. Actual volumes will be determined through case-by-case evaluations of waste streams.

- NTS has almost no MLLW on site. Under the ROD for MLLW disposal, NTS is one of two sites (with Hanford) to be designated to receive MLLW from off-site for disposal. The permitted disposal facility will be available until December 2010, and it will be able to receive a state-specified maximum of 20,000 cubic meters of MLLW from off site. DOE’s WIMS system indicates that about 12,000 cubic meters is currently targeted to NTS. Actual volumes will be determined through case-by-case evaluations of waste streams.

NEW MEXICO: LOS ALAMOS NATIONAL LABORATORY, SANDIA NATIONAL LABORATORY, WASTE ISOLATION PILOT PLANT

The Los Alamos National Laboratory (LANL) was established in 1942 to develop the first atomic bomb. It still serves as a key center for weapons and basic science research. More recently, DOE has identified LANL as the primary site for the future manufacture of plutonium
triggers, or “pits,” for America’s nuclear arsenal. LANL is approximately 20 miles northeast of Santa Fe and is situated on more than 40 square miles of the Pajarito Plateau. The laboratory property is dissected by canyons several hundred feet deep that drain to the Rio Grande, a few miles to the southeast. The regional aquifer beneath the Plateau, while in some areas over 1,000 feet below the surface, is the sole water supply for the lab 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.

Sandia National Laboratories began in 1945 on Sandia Base in Albuquerque, New Mexico, as part of Z Division to support LANL’s efforts to build the first atomic bomb. Sandia is located wholly within Kirtland Air Force Base, 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 surrounding communities. Like LANL, Sandia has contributed to groundwater contamination of its regional aquifer, with at least four groundwater plumes identified.

In 1979, Congress authorized the building of the Waste Isolation Pilot Plant (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 the EPA, and a hazardous waste facility permit issued by the New Mexico Environment Department. This latter document requires DOE to use robust characterization procedures at each of the DOE generator sites across the complex before waste can be received at WIPP. DOE must require strict compliance of its generator sites concerning meeting the Waste Analysis Plan and Waste Acceptance Criteria in the WIPP permit. In addition, the state feels that DOE must remain focused on its mission of disposing of the nation’s defense-related TRU waste and not seek to expand the potential inventory of waste.

**Accomplishments**

The WIPP is the only place in the world to safely dispose of the nation’s defense-related TRU waste. In April 2008, the 100,000th container of TRU waste was safely disposed 2,150-feet underground. The volume of containers now underground at WIPP is an area roughly the size of a football field and five stories high. DOE has completed the cleanup of legacy TRU waste at 13 sites around the country, resulting in more than 6,500 waste shipments to WIPP since 1999.

**Site-Specific Issues**

The regulatory framework for LANL has changed considerably in recent years. While New Mexico continues to have a strong desire to keep the national laboratories operating, this is predicated on strict compliance with the fence-to-fence cleanup order issued in 2005. The cleanup order requires DOE to investigate, propose and implement remedies, and monitor all its waste sites. Under the order, cleanup facility-wide must be finished by 2015. Unfortunately, DOE has fallen short of its commitment and has been subject to substantial penalties for noncompliance both for missing cleanup milestones and for conducting substandard site work. DOE must ensure both the commitment and funding for its compliance, which will translate to effective and timely cleanup. As the host state for all other states’ TRU waste, New Mexico also expects the cleanup of TRU waste at Los Alamos to receive a very high priority from DOE.

Sandia also has a fence-to-fence cleanup order, issued in 2004, that governs the pace and priority of cleanup. Fortunately, DOE has made a stronger commitment to cleanup at Sandia than it has at LANL, as DOE has only a handful of sites left to clean up. These few sites are nevertheless challenging, as they involve a mixed waste landfill and the aforementioned groundwater plumes. DOE must continue its commitment to see Sandia “across the finish line” and robustly address whatever long-term monitoring requirement will remain.

**Relationship to Other Sites in the Complex**

Although most of the sites in New Mexico will have continuing missions associated with national defense, Los Alamos and Sandia National Labs still have significant quantities of waste that will require disposition. Most of this waste will be disposed of or treated on site, but these sites will still 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.

- More than 200,000 cubic meters of LLW from Los Alamos National Laboratory will be disposed on site. The remaining LLW from Los Alamos and Sandia (approximately 800 cubic meters) will be shipped to NTS between 2008 and 2050.
- The quantity of MLLW from DOE sites in New Mexico to be disposed is approximately 1,000 cubic meters. Disposal of this waste is expected to occur off site at NTS and commercial facilities.

**OHIO: ASHTABULA, COLUMBUS, FERNALD, MOUND, PORTSMOUTH**

There are three active sites in the state of Ohio, each with its own unique treatment, disposal, and demolition activities.

The 42-acre Ashtabula site, also known as the RMI Extrusion site, is located in northeast Ohio near Lake Erie. Processes carried out on site included the extrusion and/or forging of depleted, normal, and slightly enriched uranium metal as well as experimental quantities of thorium metal. DOE completed remediation and declared closure of the site in 2006, releasing it to the private owner under industrial use restrictions.

Columbus, also known as the Battelle sites, consists of two sites—one within Columbus and another west of the city. Activities at the 6-acre King Avenue facility in Columbus included the processing of enriched, natural, and depleted uranium and thorium; fabricating fuel elements; and studying powder metallurgy. The 1,100-acre West Jefferson facility was historically a nuclear research site. Buildings at the site contained curies of radioactivity in the form of metallurgical samples, experimental residue, deposits in drains and piping, and particulate-contaminated hot cell equipment and hot cell interiors. DOE declared closure of both sites in 2006 and released them to a private owner under indus-
trial use restrictions. In response to the Nuclear Regulatory Commission’s plan to release the site from licensing oversight, the Ohio EPA has raised concerns about residual radionuclide contamination.

Portsmouth, also known as the Portsmouth Gaseous Diffusion Plant, is a 3,700-acre site located in southern Ohio and operated by the United States Enrichment Corporation. Before 2001, the facility was used to enrich uranium for fuel and weapons; operations were halted that year. A centrifuge demonstration facility and a depleted uranium hexafluoride conversion facility are under construction at the site. Large building complexes remain at the site and will require decontamination and deactivation, along with remediation of soil and groundwater contamination.

Accomplishments

Ohio is home to two (out of only three) sites where DOE has completed remediation. 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 recently settled litigation regarding natural resource damages. The suit was primarily focused on contamination and lost use of a portion of the Great Miami Buried Valley Aquifer. Following remediation, the site was restored to native habitats using the post-excavation topography to determine habitat type. A range of wetlands, prairies, and upland forests were planted. The site is now a green space/park with a focus on wildlife and is managed by DOE’s Office of Legacy Management. A visitor center opened in 2008.

Located in Miamisburg, southwestern Ohio, the 306-acre Mound facility operated as an integrated research, development, and production facility, performing work in support of DOE’s weapons and energy programs manufacturing triggers, detonators, and generators. The site is now managed by DOE’s Office of Legacy Management, although ongoing cleanup is being conducted by the Office of Environmental Management. Remediation of the remaining areas is expected to be complete by 2009 with subsequent transfer to the Miamisburg Mound Community Improvement Corporation for reuse. Ongoing activities will include groundwater remediation, groundwater monitoring, institutional control implementation, and monitoring.

Site-Specific Issues

Ohio’s main concern following completion of the closure sites (Ashtabula, Columbus, Fernald, and Mound), is the timely and protective decontamination and deactivation of the Portsmouth gaseous diffusion facilities. In addition, safe conversion of depleted uranium hexafluoride is a major issue at the Portsmouth site. For the sites managed by the Office of Legacy Management, the major concern is long-term stewardship including remedy maintenance, stakeholder outreach, and institutional controls.

Relationship to Other Sites in the Complex

Approximately 6,800 depleted uranium hexafluoride (DUF6) cylinders were moved from Oak Ridge, Tennessee, to the Portsmouth site for conversion upon completion of the DUF6 conversion facility. It is likely that significant volumes of mixed and low-level waste may need to be transported from the Portsmouth site for disposal at other DOE and commercial facilities.

- DOE estimates that more than 1.2 million cubic meters of LLW and MLW will be generated from the Portsmouth site between 2008 and 2050. The destination for this waste has yet to be determined.
- Additionally, DOE estimates approximately 14,700 cubic meters of waste, mostly LLW, will be sent from Mound to a commercial disposal facility between 2008 and 2050.

SOUTH CAROLINA: SAVANNAH RIVER SITE21

DOE’s Savannah River Site (SRS) complex covers 310 square miles in western South Carolina. 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 SRS shifted from nuclear material production to cleanup. Despite this shift, SRS remains a major defense installation capable of processing and purifying tritium and plutonium.

As a result of past operations, more than 500 potentially contaminated sites and 14 groundwater contamination plumes exist at SRS. Currently, the site’s annual cleanup budget is about $1.4 billion. A consent order with South Carolina addresses legacy mixed waste storage and treatment under the FFCA. A Federal Facility Agreement (FFA) between South Carolina, EPA, and DOE addresses investigation and cleanup of contaminated sites at SRS. In addition, relevant state statutes and regulations are applied to DOE cleanup activities, including treatment of high-level waste and waste water.

Accomplishments

SRS has accomplished significant cleanup with some challenges remaining. In terms of legacy mixed waste, about half of the original TRU waste volume has been dispositioned as well as the majority of MLLW streams. Out of more than 500 potentially contaminated sites at SRS, greater than 60 percent of these sites have a cleanup decision in place in accordance with the FFA. The cleanup process has achieved greater efficiencies in recent years by addressing cleanup of an entire area rather than on an individual contaminated site basis. In 2006, SRS celebrated the closure of T Area using this area closure process, 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.

One of the largest remaining challenges at SRS is treatment of approximately 36 million gallons of mixed hazardous and radioactive HLW and closure of the aging storage tanks. Closure of the first two HLW tanks in the DOE complex occurred at SRS in 1997. Since 1996 the Defense Waste Processing Facility has vitrified the sludge waste portion into more than 7 million pounds of glass final waste form.

21 The Savannah River Site is located on the border between South Carolina and Georgia. Georgia is also a member of the FFTF and has a strong interest in cleanup at the site.
for disposal in a federal repository. SRS successfully added an additional interim treatment facility in 2008 to augment treatment of the high-level waste. SRS expects to add an additional permanent treatment facility, the Salt Waste Processing Facility, in the near future to treat the largest volume of high-level waste. Timely treatment of the waste is essential to support tank closure in accordance with the schedule in the FFA.

Site-Specific Issues

There are several ongoing site missions, and their continuation and expansion are important to the state. South Carolina officials are concerned about maintaining and accelerating the rate of cleanup and legacy waste reduction for the site to support future missions. In addition, officials have lingering concerns about the value of SRS as well as questions of equity in funding allocation decisions made by DOE.

Because SRS is in a humid region of the nation, the groundwater contamination present at some areas of SRS discharges relatively quickly into surface waters and subsequently the Savannah River. Given these site conditions, South Carolina officials are concerned about minimizing the cumulative burden of wastes and residuals remaining at SRS.

Relation between Other Sites in the Complex

SRS will play a significant role in the processing and manufacture of nuclear materials for the next several years. While it moves ahead with these missions, significant volumes of waste still will require treatment or disposal at other sites in the complex, including TRU waste to WIPP and spent nuclear fuel and vitrified HLW to a HLW repository. In 1998, DOE designated SRS as the immobilization or conversion facility for much of the nation’s surplus plutonium. DOE is currently constructing the Mixed Oxide Fuel Fabrication Facility for disposition of much of this plutonium.

• The vast majority of LLW (more than 1 million cubic meters) at SRS will be disposed of on-site between 2008 and 2050, with the remainder destined for NTS.
• Most MLLW at SRS will be sent to NTS or commercial facilities, with a small amount (23 cubic meters) slated for shipment to the TSCA Incinerator at Oak Ridge.

TENNESSEE: OAK RIDGE RESERVATION

The Oak Ridge Reservation (ORR), located in east Tennessee, has an abundance of surface water and complex groundwater pathways. ORR comprises three major DOE facilities: the Office of Science managed Oak Ridge National Laboratory (ORNL), the National Nuclear Security Administration managed Y-12 National Security Complex, and the Environmental Management Program managed East Tennessee Technology Park (ETTP, formerly the K-25 Gaseous Diffusion Plant). In the 60-plus 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 300 sites on and near ORR.

Several agreements embody the regulatory framework at ORR. The Federal Facilities Agreement, issued in 1992, established environmental cleanup and restoration procedures and milestones for ORR. A consent order issued in 1993 by the Tennessee Department of Environment and Conservation (TDEC) modified storage and treatment permits regarding out-of-state waste from DOE-owned facilities. ATDEC commissioner’s order, issued in 1995, addressed mixed waste treatment and storage at all DOE facilities on 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

Several significant accomplishments at ORR are worthy of mention, including the following:

• A consent agreement signed in 1999 resulted in DOE shipping 5,952 DUF6 cylinders off-site;
• The Oak Ridge Accelerated Cleanup Plan Agreement, signed in 2002, resulted in a majority of backlogged legacy low-level radioactive waste being dispositioned by 2005 and the completion of the Melton Valley Interim Record of Decision remedial actions by 2006;
• The Tennessee Oversight Agreement with DOE has led to a robust ambient environmental monitoring program for the ORR and surrounding areas; and
• In late September 2008, DOE successfully completed a shipment of Contact Handled TRU waste from ORR to the WIPP Facility.

Site-Specific Issues

Tennessee’s primary concern is to assure its citizens that their health, safety, and environment are being protected. Tennessee, DOE, and EPA are working together with stakeholders to address the following concerns:

• Groundwater contamination on and off the Oak Ridge Reservation, including the long-term effectiveness of the hydrologic isolation of the Melton Valley burial grounds;
• 100 miles of contaminated rivers and streams (addressed through fish advisories and institutional controls), 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, including six shuttered nuclear research reactors;
• Legacy low-level radioactive waste not dispositioned in 2005 and mixed low-level radioactive waste without a disposition path after 2010;
• Lack of funding for the disposition of newly generated low-level radioactive waste, creating a new backlog of waste;
• Seventy-six percent of the stored remote-handled TRU waste in the DOE complex remains on the ORR;
• 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.

Tennessee rejected DOE’s Toxic Substances Control Act (TSCA) incinerator burn plans in 1998 and 1999 and restricted use by non-Oak Ridge Operations off-site waste generators. Critical issues identified included funding, equity, cleanup levels, disposal, stewardship, and the health and safety of workers and citizens in and around the Oak Ridge Reservation. Tennessee worked with DOE to develop and implement a revised TSCA burn policy that satisfied state equity and regulatory requirements and met DOE complex-wide mixed waste treatment needs. DOE’s TSCA incinerator currently accepts DOE-owned waste that meets the waste acceptance criteria. A three-year burn plan (FY 2007–FY 2009) is approved to assist DOE in better planning and scheduling of resources.

Tennessee is concerned that there is insufficient funding to ship waste that is currently stored on site, even if access to other disposal sites is available. Tennessee officials want a financial assurance mechanism to provide for long-term stewardship.

Relationship to Other Sites in the Complex

A Record of Decision was signed in October 1999 to construct an on-site CERCLA waste disposal cell at ORR. The on-site cell is necessary to reduce the volume of material that requires off-site disposal. DOE also signed a November 1999 consent agreement with Tennessee to establish a mechanism to assure funding for long-term institutional care of this facility.

Off-site disposal options are also necessary to accommodate certain remediation and operational waste streams from Oak Ridge that are not suitable for on-site disposal. As part of its cleanup strategy, DOE is proposing to dispose of significant quantities of Oak Ridge’s waste off-site, including TRU waste to WIPP.

• DOE estimates approximately 150,000 cubic meters of LLW will be sent to NTS between 2008 and 2050, while more than 27,000 cubic meters will be sent to commercial facilities. At ORR, nearly 1 million cubic meters of LLW, and more than 48,000 cubic meters of MLLW, will be disposed of on site.

• The disposal location of approximately 19,000 cubic meters of LLW and MLLW at ORR has yet to be determined. A small quantity (22 cubic meters) of MLLW and LLW will be disposed of at the TSCA Incinerator.

WASHINGTON (AND OREGON): HANFORD SITE

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. The site, which began operations in 1944, includes nine reactors; four chemical separations plants; plutonium processing facilities; and 177 underground high-level nuclear waste tanks, containing 53 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 wastes. Hanford has 60 percent of the volume of the nation’s defense-related high-level radioactive waste. In addition to the tank wastes, this left a waste legacy that included:

• 2,100 tons of disintegrating nuclear fuel rods and sludge stored in basins next to the Columbia River;

• 1,500 waste sites; 50 hazardous waste treatment, storage, and disposal sites; and more than 9.3 million tons of contaminated soil adjacent to the Columbia River; and

• 180 square miles of contaminated ground water—nearly half of which violates both federal and state drinking water standards.

Currently, Hanford is engaged in the world’s largest single environmental cleanup project with an annual cleanup budget of approximately $1.8 billion. The shift in mission from operations to cleanup became complete in 1989 when DOE, EPA, and the Washington State Department of Ecology signed the landmark Hanford Federal Facility Agreement and Consent Order, commonly known as the Tri-Party Agreement or TPA. The TPA outlines legally enforceable milestones for all aspects of cleanup at Hanford, including but not limited to tank waste removal and treatment, mixed waste treatment and disposal, environmental restoration activities, and LLW disposal.

In 2006, DOE and Washington’s Department of Ecology reached a settlement agreement that will result in a comprehensive Tank Closure and Waste Management Environmental Impact Statement (TC&W EIS). While the TC&W EIS faces huge technical, logistic, and policy challenges, it will provide an important step toward a comprehensive picture of the risks posed by Hanford contaminants and will ultimately lead to better cleanup decisions.

Accomplishments

Over the course of cleanup, much has been accomplished given the enormity and complexity of the environmental damage:

• Cleanup and disposal of more than seven million tons of contaminated soil from liquid waste sites and burial grounds along the Columbia River Corridor;

• Clean out and demolition of more than 100 buildings near the Columbia River, including two former high-risk radiochemistry laboratories;

• Removal of spent nuclear fuel from basins adjacent to the Columbia River and containment of radioactive sludge, paving the way for ultimate removal of the basins;

• Retrieval of 33,106 drum-equivalents (of Hanford’s estimated 75,000 drum-equivalents) of radioactive waste from unlined burial trenches;

• Shipment of more than 650 cubic meters (3,125 drum-equivalents) of TRU waste to WIPP;

22 The Toxic Substances Control Act (TSCA) incinerator located at Oak Ridge is the only such facility in the nation permitted to treat radioactive solid waste contaminated with polychlorinated biphenyls (PCBs). It is the only incinerator operated by DOE. Therefore, significant demand exists among DOE sites to treat their waste at the Oak Ridge facility.

23 While the Hanford Site is located completely in Washington state, Hanford’s proximity to Oregon, and especially to the Columbia River, has led Oregon to actively involve itself with the Hanford cleanup. Oregon works with DOE and with Washington and EPA to ensure its concerns are addressed.

C l e a n i n g  U p  A m e r i c a ’ s  N u c l e a r  W e a p o n s  C o m p l e x :  A n  U p d a t e  f o r  S t a t e s  2 1
• Commencement of shipments of plutonium for consolidation to SRS;
• Technology deployment to reduce groundwater contamination including chemical barriers, ecological systems, and new pump and treat systems;
• Resumption of full construction of the Hanford vitrification plant. As of 2008, the plant is more than 38 percent constructed and more than 70 percent designed;
• Removal of pumpable liquids from Hanford’s single-shell tanks (Interim Stabilization); and
• Removal of waste from seven of Hanford’s aging single-shell tanks.

Site-Specific Issues

Both the state of Washington and neighboring Oregon’s primary concern is the threat of Hanford’s legacy contamination to the Columbia River, which bisects the site. Much of this waste is contained in 177 underground tanks containing millions of gallons of intensely radioactive HLW. Approximately half of the tanks have leaked, posing a threat to the Columbia River. Current remediation plans call for construction of a Waste Treatment Plant (WTP) vitrification facility. The states are concerned about the pace of waste retrieval from Hanford’s aging tanks, construction delays and technical challenges plaguing the WTP facility, and remediation of groundwater contamination. Additionally, because Hanford has for decades already been receiving LLW from nondefense sites, submarine reactor vessels, spent fuel, and plutonium (in addition to its own on-site LLW), state officials are concerned about equity issues, such as taking mixed LLW from other sites for disposal at Hanford. Moreover, Washington and Oregon officials need assurance of adequate and long-term funding (i.e., through approximately 2050) to ensure cleanup, especially once most other sites are cleaned up.

• A legal ruling, Washington v. Bodman, stipulates that until completion of the TC&WM EIS, DOE will not import off-site LLW/MLLW or TRU waste to the Hanford Site, except as permitted. Citizens also have resorted to voter initiatives and lawsuits to prevent the importation of off-site wastes until Hanford is in substantial compliance with environmental laws and cleanup schedules.
• In May 2007, the state of Washington, DOE, and EPA initiated discussions to address the inability of DOE to comply with certain milestones under the TPA. During late 2007 and early 2008, the parties recognized that a number of major milestones in the current TPA related to construction of the WTP and retrieving and treating waste from Hanford’s underground tanks would go unmet. Furthermore, the failure to meet milestones in the near-term has a cascading effect on future milestones. Negotiators for Washington and EPA are reluctant to provide extensions without clear, enforceable commitments and plans that ensure that projects are completed on schedule without further delay. Both the state and EPA also are seeking commitments from DOE to accelerate groundwater cleanup work to mitigate potential environmental impacts. Issues that have been discussed by the parties to date include:
  – New timelines for completing the design and construction of the WTP and treatment of all of Hanford’s high-level and low-activity tank waste;
  – New timelines for retrieving waste from the single-shell tanks;
  – New requirements for vadose zone and groundwater cleanup; and
  – Development of a cost analysis report setting out the lifecycle scope, schedule, and unconstrained cost for completing the Hanford Site cleanup.

Relationship to Other Sites in the Complex

While much of Hanford’s cleanup activities will occur on site, the need remains to send waste and materials to other sites in the complex, including TRU waste to WIPP and spent fuel and vitrified HLW to a HLW repository. Hanford hosts one of only two existing mixed waste disposal facilities in the DOE complex (the other is located at NTS). To reduce storage and “mortgage” costs, significant demand exists from other sites for disposal at Hanford. DOE expects to continue disposal of LLW at Hanford from nondefense facilities and other DOE sites once legal issues are resolved and the TC&WM EIS is completed.

• DOE estimates that approximately 193,000 cubic meters of LLW at Hanford will be disposed of on site. An additional 43,600 cubic meters of LLW will be disposed of at a commercial facility.
• Approximately 179,000 cubic meters of MLLW at Hanford will be disposed of on site, while almost 27,000 cubic meters will be disposed of at commercial facilities. The disposal location of approximately 3,500 cubic meters of MLLW at Hanford has yet to be determined.

OTHER MAJOR SITES

While not as large as or with cleanup plans smaller in scope than the sites listed above, the following are sites in additional states that are part of DOE’s cleanup program.

Kentucky: Paducah Site

The Paducah site, comprising approximately 3,400 acres, is located in rural western Kentucky, 15 miles west of Paducah, near the confluence of the Ohio and Mississippi rivers. For about 50 years, the Paducah Gaseous Diffusion Plant supported the federal government and commercial nuclear power missions. Decades of nuclear energy and national security missions left radioactive and chemical contamination. The mission of the site is transitioning from primarily enrichment operations to shared missions with environmental cleanup, waste management, depleted uranium conversion, deactivation and decommissioning, and long-term stewardship.

In 2003, DOE signed a Letter of Intent with the Commonwealth of Kentucky that includes completion milestones for cleanup of groundwater sources in 2010, soils in 2015, surface water in 2017, and burial grounds in 2019. In addition, Paducah will complete construction and begin operating a
depleted uranium hexafluoride conversion facility. Planning for the decontamination and decommissioning (D&D) of the main Gaseous Diffusion Plant is underway. This will be a huge project, expected to extend through the year 2040 and generate roughly 3.7 million cubic yards of waste. DOE is studying on-site and off-site options for disposal of this waste.

**Missouri: Weldon Spring Site and Kansas City Plant**

The Weldon Spring Site is located in St. Charles County, Missouri, about 30 miles west of St. Louis. In 1941, the U.S. Government acquired 17,232 acres of rural land in St. Charles County to establish the Weldon Spring Ordnance Works. Between 1941 and 1984, the site served a variety of missions for the U.S. Army and the Atomic Energy Commission involving both explosive ordnance and nuclear materials. The plant converted processed uranium ore concentrates to pure uranium trioxide, intermediate compounds, uranium metal, and processed a small amount of thorium. Cleanup of contamination at the site 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. Residual groundwater contamination remains in the shallow aquifer beneath the Chemical Plant Area, at the Quarry, and at some surrounding areas. The site transferred to the DOE long-term surveillance program in 2002 and is now part of the DOE’s Legacy Management program. The long-term surveillance plan details a groundwater monitoring program, a site-wide inspection process, and institutional controls, which will be maintained in perpetuity. The site also features a viewing platform at the peak of the disposal cell, a prairie restoration project (surrounding the cell), public trails, and an interpretive center that preserves the history of the site.

The Kansas City Plant occupies 136 acres of the 300-acre Bannister Federal Complex in Kansas City, Missouri. The Kansas City Plant continues to have a NNSA mission to manufacture non-nuclear components for defense purposes. The federal complex was originally started by the Navy in the 1940s prior to DOE operation. As a result of these naval and DOE operations (from the 1940s to the 1980s), hazardous materials were released to the environment. Contaminants include primarily chlorinated solvents and PCBs, but do not include radionuclides. Environmental restoration activities, which were completed at the end of FY 2006, were performed at 43 release sites or areas of concern that posed a potential threat to human health and the environment. The environmental restoration program at the Kansas City Plant is regulated by the state of Missouri under a Resource Conservation and Recovery Act (RCRA) Post Closure Permit. The cleanup addressed both contaminated soil and groundwater. Areas where risks still remain are managed through institutional controls. Contaminated groundwater is contained and remediated through the operation of pump-and-treat facilities, which will be maintained indefinitely until groundwater cleanup criteria are demonstrated.

**New York: West Valley Demonstration Project**

The West Valley Demonstration Project is located about 40 miles south of Buffalo, New York. DOE has operational responsibility for approximately 165 acres located near the center of the larger 3,345 acre Western New York Nuclear Service Center, which is owned by the state of New York. From 1966 to 1972, the West Valley site reprocessed 640 metric tons of commercial and U.S. Atomic Energy Commission (AEC) spent nuclear fuel to recover uranium and plutonium. As such, it is one of only four sites in the nation housing HLW (the other sites are Idaho National Lab, Hanford, and Savannah River), and the only site with HLW that is considered non-defense waste (i.e., not directly related to the nuclear weapons complex).

Under the West Valley Demonstration Project Act of 1980, DOE is responsible for the cleanup of HLW tanks at the site. The act requires DOE to decommission the HLW tanks and facilities at the site in accordance with criteria prescribed by the U.S. Nuclear Regulatory Commission. The approach for decommissioning and closure of the HLW tanks, groundwater plume, and facilities is the subject of an ongoing Environmental Impact Statement process, as are a number of other factors (including the volume of waste for disposal, the schedule for the completion of the West Valley Demonstration Project, etc.). A Record of Decision is anticipated in 2010.

**Texas: Pantex Site**

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

Historical waste management operations at the plant resulted in contamination of the soils and groundwater, including groundwater that has migrated past the plant boundaries. An environmental restoration project is nearing completion in 2008. The Texas Commission on Environmental Quality and the U.S. EPA will evaluate the cleanup for regulatory compliance. Thereafter, NNSA will be responsible for carrying out long-term stewardship tasks (i.e., environmental monitoring and maintenance of the corrective measures implemented in previous years).
During the 1990s, the nation began the job of cleaning up the legacy of nuclear waste left behind from decades of weapons production. Just as the production phase took decades, the cleanup phase will take decades—and a sustained commitment—to complete. The states and DOE have a common interest in completing the cleanup of the nuclear weapons complex in a manner that protects citizens, the workforce, and the environment. Moreover, even after cleanup is completed, most sites will not be able to return to unrestricted land use because of residual contamination. Such sites will require long-term stewardship to protect public health and the environment.

Over the last decade, states and DOE have shown that innovation and collaborative decisionmaking can lead to beneficial results. The accelerated cleanup and closure plans of Rocky Flats, Fernald, and Mound proved that sites could be cleaned up decades earlier than anticipated by focusing resources and providing financial incentives to faster cleanups. Collaboration and communication between states and DOE have led to innovations like the top-to-bottom review of DOE’s Environmental Management program and the creation of performance management plans.

The enactment of the Federal Facilities Compliance Act (FFCA) of 1992 brought governors and their state regulatory staff into a new and mutually beneficial relationship with DOE. While the immediate tasks envisioned under the FFCA were completed some time ago, states have benefited from the continuing exchange of information and ongoing dialogue with DOE. As cleanup of the sites proceeds and transitions into long-term stewardship, it will be essential to continue this positive and open exchange of information between states and DOE. This will ensure that decisions are made with complete information and that states can fully understand their part in complex-wide decisions and strategies.

Conclusion

PHOTO COURTESY OF NATIONAL NUCLEAR SECURITY ADMINISTRATION/NEVADA SITE OFFICE

Workers prepare to remove lead bricks at Test Cell A located on the Nevada Test Site
## Appendix A

### TYPES OF WASTE AND DISPOSAL DESTINATIONS

<table>
<thead>
<tr>
<th>WASTE TYPE</th>
<th>DESTINATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DOE WASTE</strong></td>
<td></td>
</tr>
<tr>
<td>Low-Level Waste (LLW)</td>
<td>Nevada Test Site (NV)</td>
</tr>
<tr>
<td>» Mixed</td>
<td>Hanford Site (WA)*</td>
</tr>
<tr>
<td>» Not Mixed</td>
<td>On-Site Disposal**</td>
</tr>
<tr>
<td>Transuranic Waste (TRU)</td>
<td>Waste Isolation Pilot Plant (NM)</td>
</tr>
<tr>
<td>» Mixed</td>
<td></td>
</tr>
<tr>
<td>» Not Mixed</td>
<td></td>
</tr>
<tr>
<td>High-Level Waste (HLW)</td>
<td>Yucca Mountain Repository***</td>
</tr>
<tr>
<td><strong>COMMERCIAL WASTE</strong></td>
<td></td>
</tr>
<tr>
<td>Spent Nuclear Fuel (SNF)</td>
<td>Yucca Mountain Repository</td>
</tr>
<tr>
<td>Low-Level Waste (LLW)</td>
<td>State Compact System or Licensed Commercial Disposal Facility</td>
</tr>
<tr>
<td>» Class A</td>
<td></td>
</tr>
<tr>
<td>» Class B</td>
<td></td>
</tr>
<tr>
<td>» Class C</td>
<td></td>
</tr>
<tr>
<td>» Greater Than Class C LLW</td>
<td></td>
</tr>
</tbody>
</table>

*Not currently available for disposal of waste from off site.

**On-site disposal of DOE LLW (not MLLW) occurs at Fernald, Hanford, INL, LANL, Oak Ridge, and Savannah River.

***Earliest opening date is 2017. License application submitted to NRC in June 2008.

### DEFINITIONS

(definitions for 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. Some DOE facilities dispose of LLW on site.

**Mixed waste** contains both source, special nuclear, or by-product material subject to the Atomic Energy Act of 1954, as amended, and a hazardous component subject to RCRA.

**Transuranic waste** is radioactive waste containing more than 100 nanocuries (3700 becquerels) of alpha-emitting transuranic isotopes per gram of waste, with half-lives greater than 20 years, except for: (1) high-level radioactive waste; (2) 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 required by the 40 CFR Part 191 disposal regulations; or (3) waste that the Nuclear Regulatory Commission has approved for disposal on a case-by-case basis in accordance with 10 CFR Part 61.

**High-level waste** is the highly radioactive waste material resulting from the reprocessing of 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; and other highly radioactive material that is determined, consistent with existing law, to require permanent isolation.

**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)** low-level radioactive waste contains the lowest concentration of radioactive materials, and most of those materials have half-lives of less than five years.

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

**Class C (Commercial Waste)** low-level waste has the highest concentration of radioactive material allowed to be buried in a low-level waste disposal facility.

The concentration of radioactive materials in Greater Than Class C exceeds the limits for Class C waste specified in 10 CFR 61.55. All Greater Than Class C waste is the responsibility of the federal government and must be disposed of in a geologic repository.

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

Mixed Waste contains both radioactive and chemically hazardous materials.

TRU 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 will remain radioactive for tens of thousands of years.

HLW is highly radioactive and must be isolated from the environment for thousands of years.

There is currently no disposal facility for Greater Than Class C waste.
Appendix B

The following charts illustrate DOE estimates of low-level waste (LLW) and mixed low-level waste (MLLW) disposition throughout the nuclear weapons complex. Most waste is disposed of on site. Estimates of transuranic (TRU) waste disposition were not available at the time of writing. DOE waste estimates are presented for both short-term (FY 2009 to FY 2013) and long-term (FY 2014 to end). Estimates of waste disposal volumes will change depending on future site cleanup decisions.

MLLW DISPOSITION BY STATE

Information in Appendix B comes from DOE’s Waste Information Management System (WIMS).
Appendix B continued

LLW DISPOSITION BY STATE

FY2009 to FY2013 Projected Disposition
FY2014 to end Projected Disposition

Cubic Meters

LESS THAN 8,000 CUBIC METERS
Appendix C

ACRONYMS

AEA Atomic Energy Act of 1954
AEC Atomic Energy Commission
ANL Argonne National Laboratory
BNL Brookhaven National Laboratory
CERCLA Comprehensive Environmental Response, Compensation and Liability Act
CH-TRU Contact-Handled Transuranic Waste
D&D Decontamination & Decommissioning
DOE Department of Energy
DUF6 Depleted uranium hexafluoride
EIS Environmental Impact Statement
EM Office of Environmental Management (US DOE)
EO Executive Order
EPA Environmental Protection Agency
ERDA Energy Research and Development Administration
ETTP East Tennessee Technology Park (formerly known as K-25)
FFA Federal Facility Agreement
FFACO Federal Facility Agreement and Consent Order
FFCA Federal Facility Compliance Act
FFTF Federal Facilities Task Force
FY Fiscal Year
GNEP Global Nuclear Energy Partnership
GTCC Greater Than Class C Low-Level Radioactive Waste
HLW High-Level Waste
INL Idaho National Laboratory
INTEC Idaho Nuclear Technology and Engineering Center
LANL Los Alamos National Laboratory
LBNL Lawrence Berkeley National Laboratory
LLNL Lawrence Livermore National Laboratory
LLW Low-Level Waste
LM Office of Legacy Management (US DOE)
LTS Long-term stewardship
LTS&M Long-term surveillance and maintenance
MLLW Mixed low-level waste
NGA National Governors Association
NEPA National Environmental Policy Act of 1969
NNSA National Nuclear Security Administration (US DOE)
NPL National Priorities List
NRC Nuclear Regulatory Commission
NRDA Natural Resource Damage Assessment
NTS Nevada Test Site
NWPA Nuclear Waste Policy Act of 1982
OCRWM Office of Civilian Radioactive Waste Management (US DOE)
ORNL Oak Ridge National Laboratory
ORP Office of River Protection (Hanford)
ORR Oak Ridge Reservation
PNNL Pacific Northwest National Laboratory
R&D Research and Development
RCRA Resource Conservation and Recovery Act of 1976
RFETS Rocky Flats Environmental Technology Site
RH-TRU Remote-Handled Transuranic Waste
RL DOE Hanford Site (Richland)
ROD Record of Decision
SNF Spent Nuclear Fuel
SNM Special Nuclear Material
SNL Sandia National Laboratories
SRS Savannah River Site
TC&WM EIS Tank Closure and Waste Management Environmental Impact Statement
TPA Tri-Party Agreement
TRU Transuranic (elements with atomic number greater than 92)
TSCA Toxic Substances Control Act
US ACE United States Army Corps of Engineers
WAC Waste Acceptance Criteria
WAC Waste Information Management System
WIPP Waste Isolation Pilot Plant
WIPPP Waste Isolation Pilot Plant
WIR Waste Incidental to Reprocessing
WM Waste Management
WTP Waste Treatment Plant
WVDP West Valley Demonstration Project
Y-12 A site within the Oak Ridge Reservation
Appendix D

NATIONAL GOVERNORS ASSOCIATION CENTER FOR BEST PRACTICES’ (NGA CENTER’S) FEDERAL FACILITIES TASK FORCE (FFTF)

List of Governors’ Representatives as of October 2008

Georgia
Jim Sommerville
Chief, Program Coordination Branch
Georgia Environmental Protection Division

Idaho
Robert Bullock
Hazardous Waste Permits 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
Todd Mullins
Registered Geologist
Kentucky Division of Waste Management
Department of Environmental Protection
Edward Winner
Supervisor
Paducah Gaseous Diffusion Plant (PGDP) Section
Department of Environmental Protection

Missouri
Branden Doster, P.E.
Chief, DOE Unit
Missouri Department of Natural Resources
Bob Geller
Director, Hazardous Waste Program
Missouri Department of Natural Resources
Aaron Schmidt, P.E.
Chief, Federal Facilities Section
Missouri Department of Natural Resources

New Mexico
James P Bearzi
Chief, Hazardous Waste Bureau
New Mexico Environment Department
Marcy Leavitt
Director, Water & Waste Management
New Mexico Environment Department

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

New York
Patrick Concannon
Engineering Geologist
New York State Department of Environmental Conservation
Paul Piciulo
Program Director, West Valley Site Management Program
New York State Energy Research and Development Authority

Ohio
Tom Schneider
Fernald Project Manager, Office of Federal Facilities Oversight
Ohio Environmental Protection Agency
Thomas Winston
Chief, Southwest District Office
Ohio Environmental Protection Agency

Oregon
Michael W. Grainey
Director, Oregon Department of Energy
Ken Niles
Assistant Director, Oregon Department of Energy

South Carolina
Shelly Wilson
Federal Facilities Liaison
Environmental Quality Control Administration
South Carolina Department of Health and Environmental Control
David Wilson
Assistant Bureau Chief
Bureau of Land and Waste Management
South Carolina Department of Health and Environmental Control

Tennessee
Jim Fyke
Commissioner
Tennessee Department of Environment and Conservation
John Owsley
Director
Tennessee Department of Environment and Conservation
DOE Oversight Division

Texas
Roger Mulder
Director, Pantex Program
Texas State Energy Conservation Office
Susan White
Environmental Law Division
Texas Commission on Environmental Quality

Washington
Jane Hedges
Program Manager, Nuclear Waste Program
Washington Department of Ecology
NGA CENTER DIVISIONS

The Center is organized into five divisions with some collaborative projects across all divisions.

- **Education** provides information on early childhood, elementary, secondary, and postsecondary education, including teacher quality, high school redesign, reading, access to and success in postsecondary education, extra learning opportunities, and school readiness.

- **Health** covers a broad range of health financing, service delivery and policy issues, including containing health care costs, insurance coverage trends and innovations, state public health initiatives, obesity prevention, Medicaid and long-term care reforms, disease management, health information technology, health care quality improvement, and health workforce challenges.

- **Homeland Security & Technology** supports the Governors Homeland Security Advisors Council and examines homeland security policy and implementation, including public health preparedness, public safety interoperable communications, intelligence and information sharing, critical infrastructure protection, energy assurance, and emergency management. In addition, this unit assists governors in improving public services through the application of information technology.

- **Environment, Energy & Natural Resources** analyzes state and federal policies affecting energy, environmental protection, air quality, transportation, land use, housing, homeownership, community design, military bases, cleanup and stewardship of nuclear weapons sites, and working lands conservation.

- **Social, Economic & Workforce Programs** focuses on policy options and service delivery improvements across a range of current and emerging issues, including economic development, workforce development, employment services, criminal justice, prisoner reentry, and social services for children, youth, and low-income families.