



## Chapter 4

# U.S. Nuclear Weapons Infrastructure

### 4.1 Overview

In support of the Department of Defense, the National Nuclear Security Administration is the Department of Energy entity responsible for maintaining a safe, secure, and effective nuclear weapons stockpile without underground nuclear testing. Additionally, the DOE/NNSA is responsible for detecting and preventing the proliferation of weapons of mass destruction (WMD), securing nuclear and radiological materials, providing the Navy with safe and effective nuclear propulsion, and providing the Nation with state-of-the-art nuclear counterterrorism and emergency response capabilities.

*“A modern nuclear infrastructure and highly skilled workforce is not only consistent with our arms control and nonproliferation objectives; it is essential to them.”*

2010 Nuclear Posture Review

## 4.2 DOE/NNSA Nuclear Security Enterprise

In partnership with the DoD, the DOE/NNSA provides the research, development, production, and dismantlement capabilities necessary to support the U.S. nuclear weapons stockpile. The DOE/NNSA manages the physical infrastructure comprising the DOE/NNSA nuclear security enterprise (NSE) that sustains these capabilities. The NSE (Figure 4.1) spans eight sites with headquarters elements in Washington, DC, including:

- **Manufacturing sites:** National Security Campus, Kansas City, Missouri; Pantex Plant, Amarillo, Texas; Savannah River Site, Aiken, South Carolina; and Y-12 National Security Complex, Oak Ridge, Tennessee.
- **National laboratories:** Lawrence Livermore National Laboratory, Livermore, California; Los Alamos National Laboratory, Los Alamos, New Mexico; and Sandia National Laboratories located in Albuquerque, New Mexico and Livermore, California.
- **Test site:** Nevada National Security Site, Nye County, Nevada.

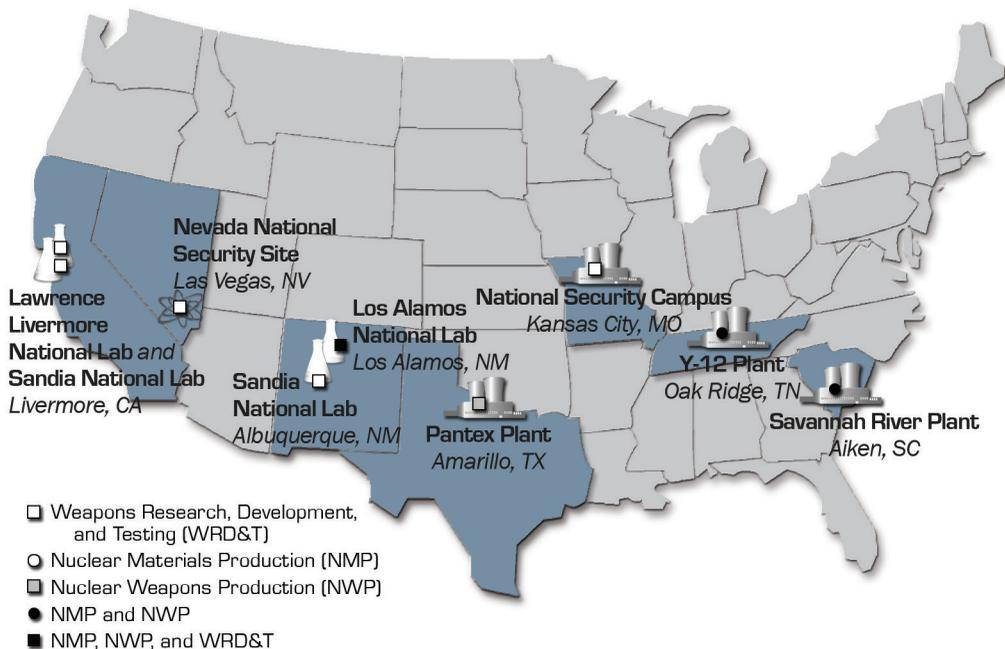


Figure 4.1 DOE/NNSA Nuclear Security Enterprise

Each site within the NSE provides a critical contribution to ensure the safety, security, and effectiveness of the U.S. nuclear deterrent. These sites also have significant roles supporting U.S. nuclear counterterrorism and counterproliferation missions.

The NSE sites are government-owned, contractor-operated (GOCO). This status indicates that the facility, while owned by the U.S. Government, is managed and operated through a contract between the DOE/NNSA and a contractor or contractor team selected by DOE/NNSA through a competitive bid process. As such, the vast majority of the employees at the NSE sites are not federal employees.

The facilities of the NSE are primarily focused on supporting the U.S. nuclear weapons stockpile mission. The DOE/NNSA nuclear counterterrorism and nonproliferation programs heavily leverage the key expertise and facilities developed for and funded by the U.S. nuclear weapons mission. Proposed infrastructure modernization, recapitalization,

and downsizing efforts are optimized around the future needs of a reduced capacity weapons complex.



*“By ‘responsive’ we refer to the resilience of the nuclear enterprise to unanticipated events or emerging threats, and the ability to anticipate innovations by an adversary and to counter them before our deterrent is degraded. The elements of a responsive infrastructure include the people, the science and technology base, and the facilities and equipment to support a right-sized nuclear weapons enterprise.”*

*Ambassador Linton F. Brooks,  
Testimony, April 4, 2005*

#### 4.2.1 Lawrence Livermore National Laboratory

Lawrence Livermore National Laboratory (LLNL) is a nuclear weapon design laboratory responsible for providing research, development, and manufacturing guidance authority for nuclear explosive packages and other nuclear weapon components. The laboratory, as a major participant in the annual stockpile assessment process, has responsibilities to ensure the performance, safety, and reliability of nuclear warheads; support surveillance, assessments, and refurbishments of stockpile weapons; and possess and employ important stewardship capabilities that include high-energy-density physics and unique performance scientific computing assets. For today’s stockpile, LLNL is the physics laboratory and design agency for the B83-1, W80-1/4, and W87 warheads. LLNL operates facilities that support both the DOE/NNSA stockpile and non-stockpile missions, including the High Explosives Application Facility (HEAF), Site 300 Experimental



Test Site, the National Ignition Facility (NIF), and the Nonproliferation and International Security Center (NISC).

Lawrence Livermore National Laboratory is operated by Lawrence Livermore National Security, LLC, a group composed of a corporate management team including Bechtel National, Inc., the University of California, Babcock and Wilcox, the Washington Division of URS Corporation, and Battelle.

#### 4.2.2 Los Alamos National Laboratory

Established in 1943 as part of the Manhattan Project, Los Alamos National Laboratory (LANL) is a nuclear weapon design laboratory, responsible for providing research, development, and manufacturing guidance authority for nuclear explosive packages and other nuclear weapon components. LANL has responsibilities associated with its participation in the annual stockpile assessment process to ensure the performance, safety, and reliability of nuclear warheads; to support surveillance, assessments, and refurbishments of stockpile weapons; and to provide unique capabilities in high-performance scientific computing, dynamic and energetic materials science, neutron scattering, enhanced surveillance, radiography, plutonium science and engineering, actinide chemistry, and beryllium technology. LANL is the associated physics laboratory and design agency for the W76-0/1, W78, and W88 warheads and B61 family of gravity bombs. LANL operates a number of unique facilities that support both the DOE/NNSA stockpile and non-stockpile missions, including the Dual Axis Radiographic Hydrodynamic Test (DARHT) facility, the plutonium science and manufacturing facility (TA-55), and the Los Alamos Neutron Science Center (LANSCE), among others.



Los Alamos National Laboratory is managed and operated by the Los Alamos National Security (LANS) LLC, a group composed of the four organizations of the University of California, Bechtel National, Inc., Babcock and Wilcox, and URS Corporation.

#### 4.2.3 Sandia National Laboratories

Sandia National Laboratories (SNL) designs, develops, qualifies, tests, certifies, and serves as the system integrator of all components required to safe, arm, fuze, and fire a weapon to military specifications. The SNL mission encompasses production agency responsibilities for weapon components, including neutron generators and trusted radiation-



hardened integrated circuits. Like LLNL and LANL, Sandia plays an important role in providing annual safety, security, and reliability assessments in the annual stockpile assessment process.

SNL mission-essential facilities include specialized test facilities, and manufacturing space for microelectronics, neutron generators, and unique power sources. Scientific facilities include reactors, pulsed-power devices, material characterization, and computational modeling and simulation capabilities housed in specialized facilities that support investigation into and certification of weapons without underground nuclear testing.

Sandia National Laboratories is managed and operated by the Sandia Corporation, a subsidiary of the Lockheed Martin Corporation. SNL has locations in California and New Mexico to ensure proximity to each of the national design laboratories.

#### 4.2.4 National Security Campus

Formerly known as the Kansas City Plant, the National Security Campus (NSC) is the primary entity responsible for the procurement and manufacturing of non-nuclear components for nuclear weapons. These components include radar systems, mechanisms, programmers, reservoirs, joint test assemblies, engineered materials, and mechanical components. The NSC is also responsible for evaluating and testing non-nuclear weapon components.



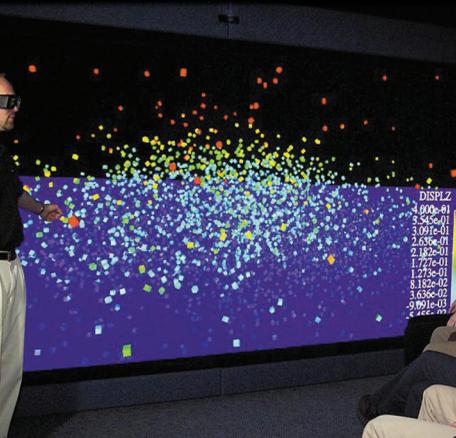
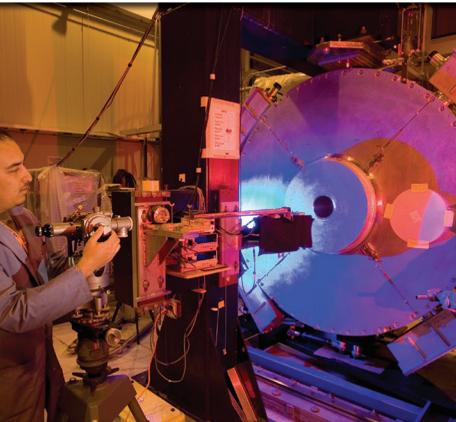
As a part of DOE/NNSA efforts to deliver a smaller, more responsive, and more flexible infrastructure, the non-nuclear components production capability was relocated to a new site as part of the Kansas City Responsive Infrastructure Manufacturing and Sourcing (KCRIMS) initiative. The relocation to the new, leased facility was successfully completed in July 2014, ahead of schedule and under budget. The new facility is LEED® Gold-rated and reduces the operating footprint by over 50 percent.

The National Security Campus is managed and operated by Honeywell Federal Manufacturing & Technologies, LLC.

#### 4.2.5 Pantex Plant

In 1951, the Pantex Plant (PX) became operational to focus on high explosive and non-nuclear component assembly operations. Today, PX is





charged with supporting the three key missions of stockpile stewardship, nonproliferation, and safeguards and security. In support of the stockpile stewardship mission, Pantex is responsible for the evaluation, retrofit, and repair of weapons for life extension programs and weapon safety and reliability certification. Pantex is also responsible for the development, testing, and fabrication of high explosive components. In support of the nonproliferation mission, PX is responsible for dismantling surplus strategic stockpile weapons, providing interim storage and surveillance of plutonium pits, and sanitizing dismantled weapons components. In support of the safeguards and security mission, Pantex is responsible for the protection of plant personnel, facilities, materials, and information.

The Pantex Plant is operated by Consolidated Nuclear Security, LLC, which combines the resources of Bechtel National, Inc., Lockheed Martin Services, Inc., Orbital ATK, Inc., and SOC LLC, with Booz Allen Hamilton, Inc. as a teaming subcontractor.

#### 4.2.6 Savannah River Site

The Savannah River Site (SRS) is primarily responsible for the management of tritium

inventories and facilities. As part of this responsibility, SRS personnel load tritium and non-tritium reservoirs to meet the requirements of the Nuclear Weapons Stockpile Plan (NWSP). The NWSP is discussed in *Chapter 5: Stockpile Management, Processes, and Organizations*. SRS is also responsible for the conduct of reservoir surveillance operations, the testing of gas transfer systems, and research and development on tritium operations.

The Savannah River Site is operated by Savannah River Nuclear Solutions, LLC, a partnership among the Fluor Corporation, Newport News Nuclear, Inc., and Honeywell International, Inc. with subcontractors Lockheed Martin Corporation and Nuclear Fuel Services, Inc.

#### 4.2.7 Y-12 National Security Complex

In support of the DOE/NNSA, the Y-12 mission is the production or refurbishment of complex nuclear weapon components and secondaries; the receipt, storage,

and protection of special nuclear material (SNM); and the dismantlement of weapon secondaries and disposition of weapon components. As part of the Y-12 Infrastructure Reduction program, the Highly Enriched Uranium Materials Facility (HEUMF) began



operations in March 2010. The completion of the HEUMF, an ultra-secure uranium warehouse providing uranium storage at Y-12, replaces and consolidates aging buildings. Y-12 is also in the process of designing a Uranium Processing Facility (UPF), which is intended to replace and consolidate approximately 800,000 square feet of highly enriched uranium production capabilities. Construction is expected to be completed by the year 2025.

The Y-12 National Security Complex is managed by Consolidated Nuclear Security, LLC, which combines the resources of Bechtel National, Inc., Lockheed Martin Services, Inc., Orbital ATK, Inc., and SOC LLC, with Booz Allen Hamilton, Inc. as a teaming subcontractor.

#### 4.2.8 Nevada National Security Site

Historically, the Nevada National Security Site (NNSS) was the main site for the United States' underground nuclear testing program. The 1992 moratorium on U.S. underground nuclear testing shifted the NNSS mission areas. Today the NNSS provides facilities, infrastructure, and personnel that the national laboratories and other organizations use to conduct nuclear and non-nuclear experiments essential to maintaining the nuclear stockpile. The NNSS is the primary location where experiments using radiological and other high-hazard materials are conducted and is the only location where highly enriched-driven plutonium experiments can be conducted. Additional mission areas include development and deployment of state-of-the-art diagnostics and instrumentation, data analysis, storage of programmatic materials, conduct of criticality experiments, counterterrorism, and counterproliferation.

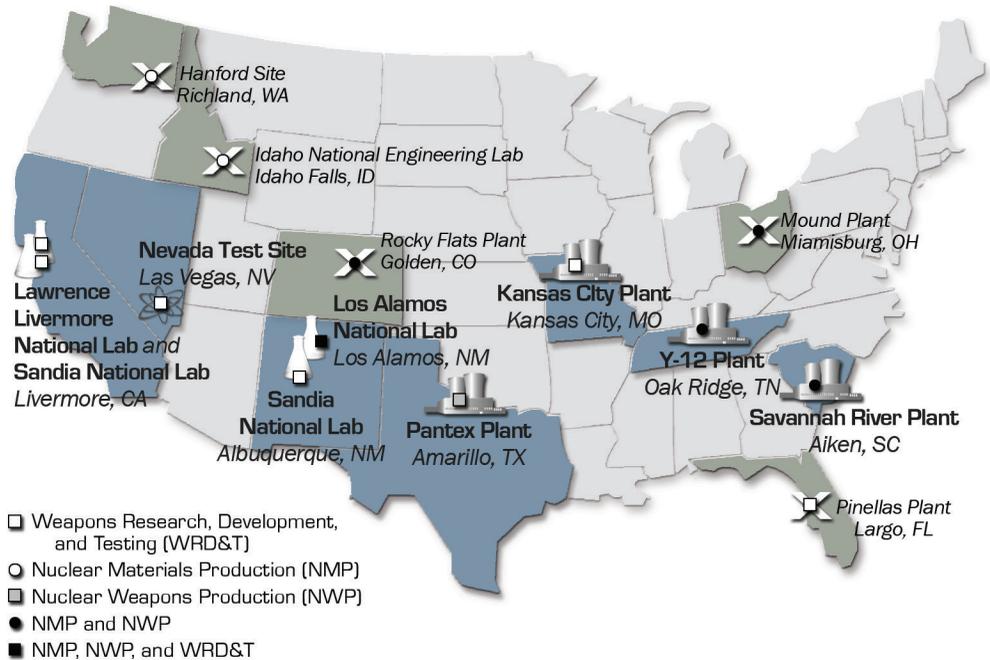


The Nevada National Security Site is managed and operated by National Security Technologies, LLC (NSTec), a company that was formed in 2006 as a joint venture between Northrop Grumman Corporation, and corporate partners AFCOM, CH2M Hill, and Babcock and Wilcox.

### 4.3 Nuclear Security Enterprise Transformation

Since the end of the Cold War and the subsequent transition from the “build and test” paradigm, the NSE has been in the process of transforming from a large complex with an impressive production capability to a smaller, safer, more secure, and cost-effective complex that leverages the scientific and technical abilities of its workforce (see

Figure 4.2 Cold War Nuclear Weapons Complex



**Figure 4.2).** There are several facilities that were once part of the NSE and have been transitioned away from nuclear weapons-related activities. Among the largest of these are the Idaho National Engineering Laboratory, the Rocky Flats Plant, the Mound Site, the Pinellas Plant, and the Hanford Site.

## 4.4 Stockpile Stewardship Program

The Stockpile Stewardship Program (SSP) was established by Presidential Directive 28 and authorized by Congress in October 1993. The SSP ensures a robust weapons infrastructure by sustaining the safety and effectiveness of the Nation’s nuclear arsenal without producing new weapons or conducting nuclear explosive tests. The SSP strategy is to establish a sufficient scientific understanding of the nuclear explosive process to replace those capabilities that were enabled by underground nuclear testing and to support discovery and correction of any deficiencies that might occur during the lifetime of a weapon.

In the past, underground nuclear testing and the continuous development and production of new nuclear weapons were essential to preserve high confidence in the stockpile.

The United States has not manufactured a new weapon-type for more than 20 years. The challenge for the DOE/NNSA is maintaining confidence in the nuclear weapons in the stockpile without producing new weapons or conducting nuclear explosive tests. The solution has been to field a suite of innovative experimental platforms, diagnostic equipment, and high-performance computers that build on past test data to simulate the internal dynamics of nuclear weapons. Armed with this understanding, the effects of changes to the current stockpile through either aging or component replacement may be modeled.

#### 4.4.1 Stockpile Stewardship Program Elements

The goals of the SSP are achieved through the integration of stockpile support, surveillance, assessment, certification, design, and manufacturing processes. The need for these activities has remained constant; however, the integrating strategies have evolved as the program has matured. The accelerated and expanded use of strategic computing and simulation tools has been a fundamental innovation of this evolution. Within the DOE/NNSA, SSP implementation has been organized into several different weapons-activity programs. These programs are essential for continuing the assessment and certification of the nuclear weapons stockpile. These program elements can be found in the latest copy of the Stockpile Stewardship and Management Plan (SSMP) on the DOE/NNSA website. The SSMP originated in current statute that states: “The Secretary of Energy shall develop and annually update a plan for maintaining the nuclear weapons stockpile. The plan shall cover stockpile stewardship, stockpile management, and program direction.” The SSMP has been submitted to Congress every year since 1998. Starting in 2013, however, the SSMP report to Congress is only required every odd-numbered fiscal year, with summaries of the plan provided in even-numbered fiscal years.

*The purpose of the Stockpile Stewardship Program is to sustain the safety and effectiveness of the Nation’s nuclear arsenal without producing new weapons or conducting nuclear explosive tests.*