Chapter 7
U.S. Nuclear Infrastructure

7.1 Overview

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

"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 Report

7.2 The Nuclear Security Enterprise

In partnership with the DoD, the NNSA provides the research, development, production, and dismantlement capabilities necessary to support the U.S. nuclear weapons

stockpile. The NNSA also manages the physical infrastructure required to maintain those capabilities. The NNSA Nuclear Security Enterprise (NSE) spans eight sites, including three national laboratories. These sites are:

- Manufacturing sites: Kansas City Plant, Kansas City, Missouri; Pantex Plant, Amarillo, Texas; Savannah River Site, Aiken, South Carolina; and Y-12 National Security Complex, Oak Ridge, Tennessee
- Test site: Nevada National Security Site, Nevada[1]
- National laboratories: Lawrence Livermore National Laboratory, Livermore, California; Los Alamos National Laboratory, Los Alamos, New Mexico; and Sandia National Laboratories, Livermore, California and Albuquerque, New Mexico

Each site within the Nuclear Security Enterprise provides a unique contribution to ensure the safety, security, and effectiveness of the U.S. nuclear deterrent, as well as to support U.S. nuclear counterterrorism and counterproliferation missions.

All of the NNSA Nuclear Security Enterprise sites are government owned, contractor operated (GOCO). This status indicates that the facility, while owned by the United States Government, is managed and operated through a contract between the NNSA and a contractor selected by NNSA through a competitive bid process.

The facilities of the NNSA Nuclear Security Enterprise are primarily focused on supporting the U.S. nuclear weapons stockpile mission. Additionally, however, the NNSA Nuclear Counterterrorism and Nonproliferation programs utilize the key expertise and many of the facilities originally developed for the U.S. nuclear weapon mission. The associated facilities and infrastructure are managed and funded solely by the nuclear weapon program. Proposed infrastructure downsizing, modernization, and recapitalization efforts are optimized around the future needs of a reduced capacity weapons complex. Future infrastructure decisions may greatly affect the Nuclear Counterterrorism and Nonproliferation programs' capability while not necessarily reflecting their needs. NNSA leadership is working to resolve these issues and determine the best path forward to account for competing requirements in a cost- and resource-constrained environment.

KANSAS CITY PLANT

7.2.1 Kansas City Plant

The Kansas City Plant (KCP), established in 1949, is the primary entity responsible for the procurement and manufacturing

[1] On August 23, 2010, the NNSA announced a new name for what was previously called the Nevada Test Site (NTS). The new name reflects the diversity of nuclear, energy, and homeland security activities being conducted at the site.

of non-nuclear components for nuclear weapons. These include electrical, electronic, electromechanical, plastic, and nonfissionable metal components. The Kansas City Plant is also responsible for evaluating and testing non-nuclear weapon components.

In its non-nuclear component manufacturing role in support of the NNSA, the KCP receives product requirements from headquarters and designs from the national laboratories, procures the necessary supplies, and produces components and systems for other Nuclear Security Enterprise sites and the United States military.

The Kansas City Plant is managed and operated by Honeywell Federal Manufacturing & Technologies. It is currently located in the Bannister Road Facility in Kansas City, Missouri. As part of NNSA efforts to modernize and sustain critical physical infrastructure, a new non-nuclear components production facility for the KCP is under construction; this effort, part of the Kansas City Responsive Infrastructure Manufacturing and Sourcing (KCRIMS) initiative, is expected to be operational in the 2014 timeframe. The KCRIMS initiative is expected to reduce the Kansas City Plant's operating footprint by over 50 percent.

7.2.2 Pantex Plant

The Pantex Plant (PX) is charged with supporting three main missions: 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 its role in support of the nonproliferation mission, the plant 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 Babcock & Wilcox Technical Services Pantex, LLC or B&W Pantex. The plant originally opened for nuclear weapons, high explosive, and non-nuclear component assembly operations in 1951.

7.2.3 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).

(For more information on the NWSP, see Chapter 2: *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 formed by the Fluor Corporation with Northrop Grumman and Honeywell and subcontractors Lockheed Martin and Nuclear Fuel Services.

7.2.4 Y-12 National Security Complex

The Y-12 National Security Complex is located in Oak Ridge, Tennessee. In support of the NNSA, the Y-12 mission focuses on the production or rework 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.

The Y-12 National Security Complex is managed and operated by Babcock & Wilcox Technical Services Y-12, LLC or B&W Y-12. As part of the Y-12 Infrastructure Reduction program, in March 2010, the Highly Enriched Uranium Materials Facility (HEUMF) began operations; 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 an approximately 350, 000 square foot Uranium Processing Facility (UPF) that is intended to replace and consolidate approximately 800,000 square feet of highly enriched uranium production capabilities. Construction is expected to be completed by year 2020.

7.2.5 Nevada National Security Site

Historically, the Nevada National Security Site (NNSS) was the main site for the United States' underground nuclear test (UGT) program. Since the 1992 moratorium on U.S. underground nuclear testing and the installation of the Stockpile Stewardship Program in 1994, a suite of enhanced capabilities and facilities have been developed across the Nuclear Security Enterprise to provide data and knowledge relevant to identified stockpile concerns. Capabilities specific to NNSS include:

- Atlas, a pulsed-power machine that discharges electrical energy into a cylindrical metal shell to produce an intense pressure pulse that implodes a target containing non-nuclear materials of interest;

- Big Explosives Experimental Facility (BEEF), a hydrodynamic testing facility that provides data through conventional high explosive experiments;
- Device Assembly Facility (DAF), the criticality experiments facility;
- Joint Actinide Shock Physics Experimental Research (JASPER) Facility, a two-stage gas gun that generates high-shock pressures, temperatures, and strain rates simulating those of a nuclear weapon; and
- U1A Complex, an underground location in which subcritical experiments are conducted.

NNSS is managed and operated by National Security Technologies, LLC, a partnership that includes Northrop Grumman, AECOM, CH2M Hill, and Nuclear Fuel Services.

7.2.6 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 high-energy-density physics capabilities and unique performance scientific computing assets. LLNL is the associated physics laboratory for the W80-2/3, B83-0/1, and W87 warheads. LLNL operates facilities that support both the NNSA stockpile and non-stockpile missions, including the High Explosives Application Facility (HEAF), Site 300 Experimental Test Site, and the Nonproliferation and International Security Center (NISC), among others.

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

7.2.7 Los Alamos National Laboratory

Los Alamos National Laboratory (LANL), like 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. Similar to LLNL, 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, neutron scattering, enhanced surveillance, radiography, plutonium science and engineering, and beryllium technology. LANL is the associated physics laboratory for the B61-3/4/10, B61-7/11, W76, W78, W80-0, W80-1, and W88 warheads. LANL operates facilities that support both the NNSA stockpile and non-stockpile missions, including the Dual Axis Radiographic Hydrodynamic Test (DARHT) facility, the Plutonium Facility Site TA-55, and the Los Alamos Neutron Science Center (LANSCE), among others.

Los Alamos National Laboratory is operated by Los Alamos National Security, LLC, which is composed of Bechtel National, the University of California, the Babcock and Wilcox Company, and the Washington Division of URS Corporation.

7.2.8 Sandia National Laboratories

Sandia National Laboratories

Sandia National Laboratories (SNL) serves as the design authority for nuclear warhead systems engineering, integration, and quality assurance. SNL also provides research, development, and production of specialized non-nuclear components and ensures their integration with nuclear explosive packages and delivery systems. Like LLNL and LANL, Sandia plays an important role in providing annual safety, security, and reliability assessments in the annual stockpile assessment process. SNL operates facilities that support both the NNSA stockpile and non-stockpile missions, including Thunder Range and the Explosive Components Facility, among others.

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 (LLNL and LANL).

7.3 Nuclear Security Enterprise Transformation

At the direction of the NNSA and in coordination with the Department of Defense, the Nuclear Security Enterprise sites described above are responsible for carrying out the work associated with providing the United States with a safe, secure, and effective stockpile. Since the end of the Cold War and the subsequent transition from the "build and test" paradigm, the Nuclear Security Enterprise has been in the process of transforming from a large complex with an impressive production capability to a smaller, safer, more secure, and less expensive complex that leverages the scientific and technical abilities of a condensed,

post-Cold War workforce. There are several facilities that were once part of the NSE that have been transitioned away from nuclear weapons-related activities. Among the largest of these facilities are the Idaho National Engineering Laboratory, the Rocky Flats Plant, the Mound Site, the Pinellas Plant, and the Hanford Site. (For a visual depiction of the downsized Nuclear Security Enterprise, see Figure 7.1.)

7.3.1 Idaho National Engineering Laboratory

The Idaho National Engineering Laboratory (INEL) was established in 1949. The INEL served as one of the primary centers for DOE research and development activities on reactor performance, materials testing, environmental monitoring, waste processing, and breeder reactor development; it also served as a naval reactor training site. INEL reactors represent the world's most extensive and varied collection of reactors, ranging from research and testing to power and ship propulsion. Until 1992, spent reactor fuels were reprocessed at the laboratory's Idaho Chemical Processing Plant. Today, the INEL has transitioned to the Idaho National Laboratory (INL), a leading United States laboratory for nuclear energy research and development.

7.3.2 Rocky Flats Plant

From 1952 until the early 1990s, the Rocky Flats Plant produced nuclear and non-nuclear components for new warheads, disassembled nuclear and non-nuclear components for retired warheads, and recovered nuclear materials. As a DOE facility, Rocky Flats machined and milled plutonium components for new warheads and recovered plutonium from dismantled warheads. The site was located on 6,500 acres in Golden, Colorado, about 20 miles northwest of Denver.

Nuclear production work at Rocky Flats ceased in 1992 and non-nuclear production was terminated in 1994. In October 2005, the Department of Energy completed an accelerated, ten year, seven billion dollar cleanup of chemical and radiological contamination, remnants of almost 50 years of production. The cleanup required the decommissioning, decontamination, demolition, and removal of over 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.

Following completion of the cleanup, Rocky Flats was designated as two operable units within the boundaries of the property: the 1,308-acre Central Operable Unit and the 4,883-acre Peripheral Operable Unit. The Central Operable Unit consolidates all areas of Rocky

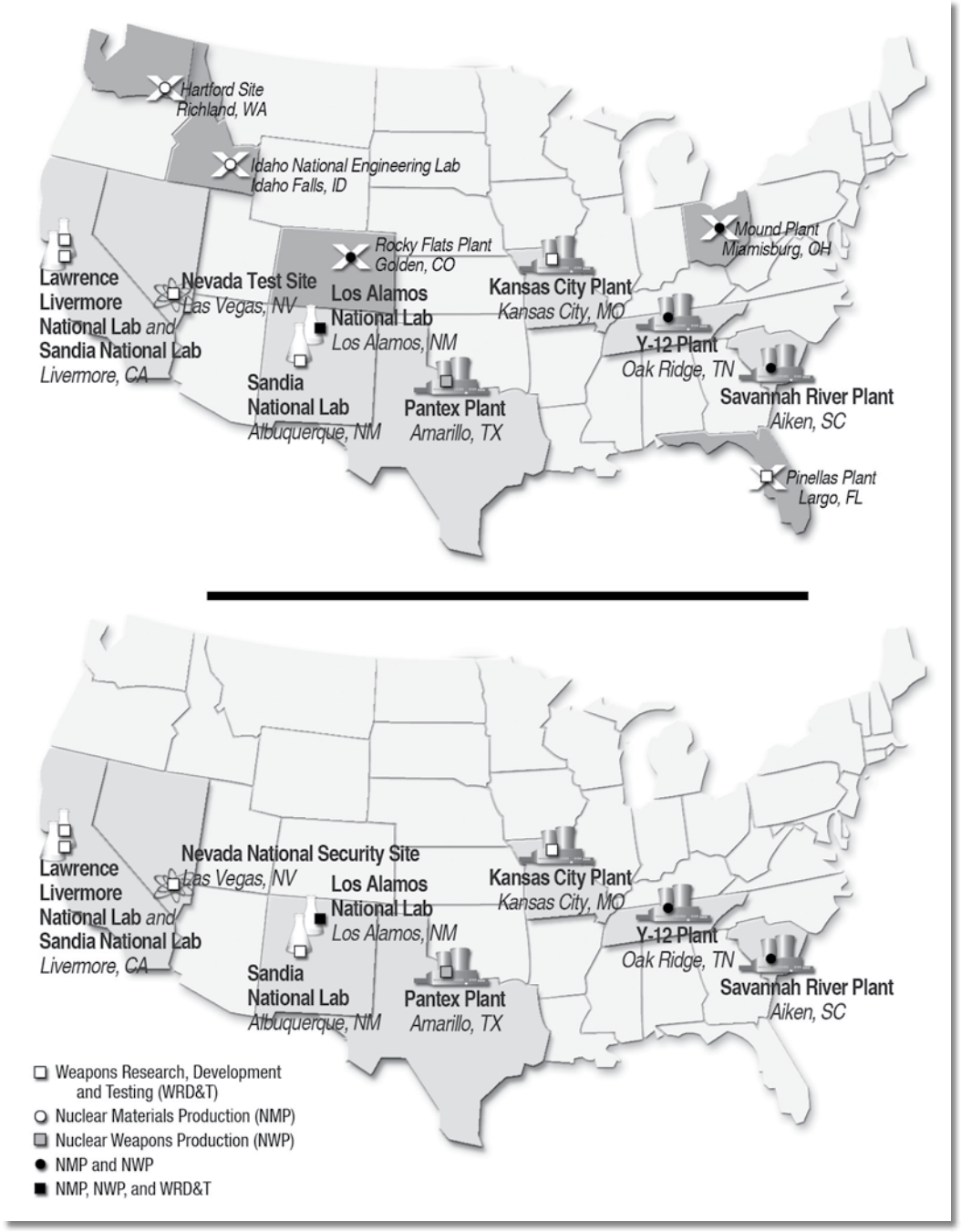

Figure 7.1 Downsized Nuclear Security Enterprise

Flats that require additional remedial and response actions. The primary contaminants, contaminated media, and waste present in the Central Operable Unit include: disposed wastes, trash and construction debris, contaminated subsurface soils, contaminated surface soils, and areas of ground water contaminant plumes. In 2007, the Department of Energy transferred the majority of the property comprising the Peripheral Operable Unit to the United States Fish and Wildlife Service in order to establish the Rocky Flats National Wildlife Refuge. The DOE Office of Legacy Management remains responsible for the long-term surveillance and maintenance of the Rocky Flats Site (now consisting of the Central Operable Unit) in perpetuity.

7.3.3 Mound Site

The Mound Site was established in 1948 in Miamisburg, Ohio. Early work at the site involved production of polonium-beryllium initiators used in early nuclear weapons and research related to radionuclides and detonators. In the 1950s, the Mound Site manufactured a variety of nuclear weapons parts, including cable assemblies, explosive detonators, and electronic firing sets. The Mound Site evolved into an integrated research, development, and production facility performing various tasks, which included production of explosive and inert components, diagnostic surveillance testing of nuclear and explosive components, and recovering tritium from retiring tritium components.

In 1995, the administration of the site was transferred to the DOE Environmental Management program. Since that time, the DOE has worked with the Environmental Protection Agency (EPA) and the Ohio EPA to assess and review the status of each building and potential contamination release site to determine the appropriate remediation. As of August 2009, all nuclear material was shipped off the Mound Site, all facilities were demolished or transitioned, and all environmental remediation activities were complete. The 306-acre site was divided into discrete land parcels, and, since February 1999, more than 60 percent of the site footprint has been transferred to the Miamisburg Mound Community Improvement Corporation (MMCIC) that, in cooperation with the local community, works to transition the Mound Site for reuse as a technology and industrial park.

7.3.4 Pinellas Plant

The Pinellas Plant was established in 1957 on 100 acres in Largo, Florida, between St. Petersburg and Clearwater. Until 1994, the Pinellas Plant manufactured neutron generators, thermal batteries, lithium ambient batteries, special capacitors and switches, and other electrical and electronic components for nuclear weapons. It also manufactured

radioisotope thermoelectric generators (RTGs), using plutonium-238 capsules provided by the Mound Plant.

The Pinellas Plant ceased all operations in 1997, and the DOE and the Pinellas County government jointly redeveloped the site for commercial use. Pinellas County currently owns the facility, now called the Young-Rainy Science, Technology, and Research Center, which houses more than 20 businesses. As a result of historical waste disposal practices, portions of the site's subsurface and the shallow surficial aquifer were contaminated with organic solvents and metals. The DOE has conducted ongoing cleanup and surveillance activities to remedy these issues.

7.3.5 Hanford Site

The Hanford Site sits on 586 square miles near Richmond in southeastern Washington State. The area is home to nine former nuclear reactors and their associated processing facilities that were built beginning in 1943. The reactors were used to produce plutonium needed for U.S. nuclear weapons. Plutonium from Hanford was used in the *Fat Man* bomb, which was dropped on Nagasaki, Japan in August 1945.

Figure 7.2
Workers preparing debris at the Hanford Site

Hanford reactors produced approximately 53 metric tons of weapons-grade plutonium from 1944 until 1987. Today, Hanford workers are involved in an environmental cleanup project of immense proportions necessitated by the processes required to transform raw uranium into plutonium for nuclear defense. All of the facilities and structures associated with Hanford's defense mission are undergoing deactivation, decommissioning, decontamination, and demolition.

7.4 Future Nuclear Security Enterprise

In developing the plans for the future of the NSE, the NNSA has proposed a future complex that would:

1. Consolidate special nuclear materials from six to five sites and reduce the square footage of SNM within those sites.

2. Reduce the square footage of buildings and structures supporting weapons missions by approximately 9 million square feet.
3. Employ 20-30 percent fewer workers in activities that directly support weapons missions.
4. Allow for the dismantlement of weapons at a significantly faster pace in keeping with the United States' nonproliferation goals.

While the NNSA is in process of implementing this transition, it is still responsible for maintaining the current U.S. nuclear stockpile in a manner consistent with presidential guidance and national directives. The NNSA accomplishes this task through the Stockpile Stewardship Program.

7.5 Stockpile Stewardship Program

The purpose of the Stockpile Stewardship Program is to sustain the safety and effectiveness of the nation's nuclear arsenal in the absence of nuclear testing.

The NNSA Stockpile Stewardship Program was established by Presidential Directive and authorized by Congress in October 1993. The purpose of the program is to sustain the safety and effectiveness of the nation's nuclear arsenal in the absence of nuclear testing. Stockpile stewardship is an all-encompassing program that includes:

- operations associated with surveying, assessing, maintaining, refurbishing, manufacturing, and dismantling the nuclear weapons stockpile;
- activities associated with the research, design, development, simulation, modeling, and non-nuclear testing of nuclear weapon components; and
- the assessment of the safety, security, and reliability and the certification of the stockpile.

Current statute requires: "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." This document, known as the Stockpile Stewardship Plan (SSP), has been submitted to Congress every year since 1998. It is commonly referred to as "the Greenbook."

In the past, nuclear testing and the continuous development and production of new nuclear weapons were essential to preserve high confidence in the stockpile. However, the United States has not manufactured a new weapon-type for almost twenty years. Under the SSP, the U.S. strategy is to maintain the existing nuclear weapons stockpile using improved

experimental capabilities complemented by advanced simulation and surveillance tools, which serve as a substitute for underground nuclear testing.

7.5.1 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 NNSA, Stockpile Stewardship Plan implementation has been organized into Weapons Activities involving eight programs and five campaigns. The programs are:

- Directed Stockpile Work (DSW) program
- Readiness in Technical Base and Facilities (RTBF) program
- Secure Transportation Asset (STA) program
- Nuclear Counterterrorism Incident Response (NCTIR) program
- Facilities and Infrastructure Recapitalization program (FIRP)
- Site Stewardship program
- Defense Nuclear Security (DNS) program
- Cyber Security program

The campaigns are:

- Science campaign
- Engineering campaign
- Inertial Confinement Fusion (ICF) Ignition and High Yield campaign
- Advanced Simulation and Computing (ASC) campaign
- Readiness campaign

The thirteen separate—yet related—elements constitute the Weapons Activities effort, essential for continuing the assessment and certification of the nuclear weapons stockpile. A detailed description of the programs and campaigns is below.

Programs

Directed Stockpile Work

The Directed Stockpile Work program mission is to provide nuclear warheads and bombs to the Department of Defense in accordance with the Nuclear Weapons Stockpile Plan

memorandum. To fulfill this mission, DSW is responsible for ensuring that the safety, security, and reliability of the nation's nuclear weapons are maintained and enhanced. DSW is also responsible for the dismantlement and disposition of retired weapons and weapon components and the sustainment of the plutonium enterprise.

Four subprograms comprise DSW:

1. Life Extension Programs (LEPs), which enable the nation's nuclear weapons to respond to current-day threats.
2. Stockpile Systems, to include: weapon-specific research and development, assessment, and certification activities; limited life component exchange activities; surveillance activities; maintenance, feasibility, and safety studies; and military liaison work for the B61, W76, W78, W80, B83, W87, and W88 weapon systems.
3. Weapons Dismantlement and Disposition (WDD), to include the dismantlement and disposition of retired weapons, weapon components, and supporting functions.
4. Stockpile Services, which provides: research, development, and production support base capabilities for multiple warheads and bombs; certification and safety efforts; quality engineering and plant management, technology, and production services; support for stockpile evaluation and surveillance; and investigation options for meeting DoD requirements.

Readiness in Technical Base and Facilities

The goals of the Readiness in Technical Base and Facilities program are to operate and maintain NNSA program facilities in a safe, secure, efficient, reliable, and compliant condition in areas including facility operating costs (e.g., utilities, equipment, facility personnel, training, and salaries); facility and maintenance equipment costs (e.g., staff, tools, and replacement parts); and environmental, safety, and health costs. The RTBF program is also responsible for planning, prioritizing, and constructing state-of-the-art facilities, infrastructure, and scientific tools that are not directly funded by DSW or campaigns.

Secure Transportation Asset

The STA program is a Direct Federal Program (government-owned and operated). Its mission is to provide a capability for the safe and secure transport of nuclear warheads, components, and special nuclear material that meets projected NNSA, DOE, DoD, and other customer requirements. These shipments are highly guarded for the utmost protection of the public and U.S. national security. The federal agents who do this work are trained to

defend, recapture, and recover nuclear materials in case of an attack. The STA program is also involved with international shipments to and from Canada, the United Kingdom, and France.

Nuclear Counterterrorism Incident Response

The mission of the NCTIR program is to ensure that capabilities are in place to respond to DOE/NNSA facility emergencies or to any nuclear or radiological incident with the United States or abroad. The NCTIR program also provides operational planning and training to counter both domestic and international nuclear terrorism. The NCTIR program administers and directs the DOE/NNSA emergency response programs that provide the capability to respond to and mitigate the effects of a nuclear or radiological incident or emergency. To meet its mission, the NCTIR program is divided into seven subprograms:

1. Emergency Management,
2. Emergency Response,
3. NNSA Emergency Management Implementation,
4. Emergency Operations Support,
5. National Technical Nuclear Forensics,
6. International Emergency Management and Cooperation, and
7. Nuclear Counterterrorism.

Facilities and Infrastructure Recapitalization

The FIRP mission is to restore, rebuild, and revitalize the physical infrastructure of the Nuclear Security Enterprise. FIRP applies direct appropriations to address an integrated, prioritized series of repair and infrastructure projects focusing on completion of deferred maintenance with the intent to significantly increase operational efficiency and effectiveness of the NSE.

Site Stewardship

The Site Stewardship program is responsible for maintaining facility and overall site capabilities and efficacies by ensuring: regulatory and energy efficiency requirements are being met, SNM is being appropriately and cost-effectively managed, and NNSA excess facilities are properly disposed of (i.e., sold, transferred, or demolished) in order to better focus resources in support of the overall NNSA mission.

Defense Nuclear Security

The DNS program is responsible for the implementation of security programs for the NNSA. In this capacity, DNS is responsible for security direction and program management with

respect to prioritization of resources, program evaluation, and funding allocation. DNS continuously evaluates the status of protection programs at all NNSA facilities against national policy and departmental security requirements to determine the appropriate level of resource allocation at each site across the NSE. Resource allocation is based on a rigorous requirements validation and evaluation process that incorporates site-level vulnerability analysis and risk assessments.

Cyber Security

The Cyber Security program provides the requisite guidance needed to ensure that sufficient information technology and information management security safeguards are implemented throughout the NSE. The program implements a flexible, comprehensive, and risk-based cyber security program that adequately protects NNSA information and information assets; is predicated on Executive Orders, national standards, laws, and regulations and DOE and NNSA orders, manuals, directives, and guidance; and results in a policy-driven cyber architecture, a programmatic framework and methodology that is based on current policies and procedures, and a management approach that integrates all of the components of a comprehensive cyber security program.

Campaigns

Science

The Science campaign supports the development of the knowledge, tools, and methods used to assess the performance of the nuclear warhead's nuclear explosive package. These tools and methods support critical stockpile decisions—for example, those decisions relating to the impact of significant finding investigations (SFIs) on nuclear safety and performance or those affecting the annual assessment and certification processes. Science campaign results also provide technical and scientific resources required to carry out Directed Stockpile Work support for each warhead-type and to ensure the nation's ability to respond quickly and flexibly to changing requirements to the United States' nuclear posture.

Engineering

The primary goal of the Engineering campaign is to develop capabilities to assess and improve the safety, reliability, and performance of the engineering components within the nuclear and non-nuclear explosive package of the nuclear weapon without the use of underground nuclear testing. An additional goal of the Engineering campaign is to increase the ability to predict the response of all nuclear weapons components and subsystems to external stimuli (such as large thermal, mechanical, and combined forces and extremely high radiation fields) and to predict the effects of aging. The results of these studies provide

information, data, tools, predictive capability, and expertise to designers, analysts, and surveillance and systems managers that assist in the development of technology options and essential capabilities for the stockpile.

Inertial Confinement Fusion Ignition and High Yield

The Inertial Confinement Fusion Ignition and High Yield campaign mission is to provide experimental capabilities and scientific understanding in the area of high energy density physics (HEDP). The campaign has three strategic objectives:

1. Achieve thermonuclear ignition in the laboratory and develop it as a routine scientific tool to support stockpile stewardship.
2. Develop advanced capabilities—including facilities, diagnostics, and experimental methods—that can access the high energy density regimes of extreme temperature, pressure, and density required to assess the nuclear stockpile.
3. Maintain U.S. preeminence in high energy density science and support broader national science goals.

HEDP experiments on ICF facilities are required to validate the advanced theoretical models that are used to assess and certify the stockpile without nuclear testing.

Advanced Simulation and Computing

The Advanced Simulation and Computing campaign's mission is to provide high-end simulation capabilities needed to meet weapons assessment and certification requirements and to predict—with confidence—the behavior of nuclear weapons through comprehensive, science-based simulations.

Readiness

The Readiness campaign identifies, develops, and deploys new or enhanced processes, technologies, and capabilities to meet current nuclear weapon design, production, and dismantlement needs and provide quick response to national security requirements.

7.6 Nuclear Counterterrorism

The NNSA Nuclear Counterterrorism (NCT) program, integrates, sustains, and executes key activities and provides specialized expertise in partnership with the NNSA weapons design-, stockpile science-, weapons surety-, and nuclear material-related programs to advise and enable all technical aspects of U.S. government nonproliferation, counterproliferation, and nuclear counterterrorism missions. The program focuses on nuclear materials and nuclear threat devices, which include improvised nuclear devices, foreign weapon designs of a

proliferant concern, and any device that may have fallen outside the custody of a foreign nuclear weapon state.

The NCT program works to understand the full range of nuclear threat device (NTD) designs; from an unknown "homemade nuke" or improvised nuclear device (IND) to a weapon from one of the established nuclear weapons states that has fallen out of state control. The NCT focus is on nuclear terrorism, sub-state actors, and proliferators and includes modified stockpile and non-stockpile nuclear devices (i.e., attractive to terrorists or sub-state actors).

The strategic objectives of the Office of Nuclear Counterterrorism are to: achieve the president's vision of preventing nuclear terrorism, serve as the premier U.S. government program regarding NTDs, guide research and development to understand the full spectrum of NTDs to support the full range of countering nuclear threat activities, provide accurate information to ensure effective response to nuclear terrorism and to inform associated policies, protect sensitive information from disclosure, and advocate for the long-term stewardship of the nation's capability to prevent nuclear terrorism.