

GAO

Report to the Subcommittee on Strategic
Forces, Committee on Armed Services,
House of Representatives

June 2010

NUCLEAR WEAPONS

Actions Needed to Identify Total Costs of Weapons Complex Infrastructure and Research and Production Capabilities



GAO

Accountability * Integrity * Reliability



Highlights of [GAO-10-582](#), a report to the Subcommittee on Strategic Forces, Committee on Armed Services, House of Representatives

Why GAO Did This Study

The National Nuclear Security Administration (NNSA) manages and secures the nation's nuclear weapons stockpile, with annual appropriations of about \$6.4 billion. NNSA oversees eight contractor-operated sites that execute its programs. Two programs make up almost one-third of this budget: Readiness in Technical Base and Facilities (RTBF) Operations of Facilities, which operates and maintains weapons facilities and infrastructure, and Stockpile Services, which provides research and development (R&D) and production capabilities. Consistent with cost accounting standards, each site has established practices to account for these activities. The Administration has recently committed to stockpile reductions. GAO was asked to determine the extent to which NNSA's budget justifications for (1) RTBF Operations of Facilities and (2) Stockpile Services are based on the total costs of providing these capabilities. GAO was also asked to discuss the implications, if any, of a smaller stockpile on these costs. To carry out its work, GAO analyzed NNSA's and its contractors' data using a data collection instrument; reviewed policies, plans, and budgets; and interviewed officials.

What GAO Recommends

Among other things, GAO recommends that NNSA develop guidance for consistent collection of total cost information and use this information for budget formulation and program planning. NNSA agreed with the report's findings and recommendations.

View [GAO-10-582](#) or [key components](#). For more information, contact Gene Aloise at (202) 512-3841 or aloise@gao.gov.

NUCLEAR WEAPONS

Actions Needed to Identify Total Costs of Weapons Complex Infrastructure and Research and Production Capabilities

What GAO Found

NNSA cannot accurately identify the total costs to operate and maintain weapons facilities and infrastructure because of differences in sites' cost accounting practices. These differences are allowable under current NNSA guidance as long as sites comply with cost accounting standards and disclose their practices to NNSA. The differences among cost accounting practices include the facilities and activities sites support with RTBF Operations of Facilities funds and how sites use other funding sources to support weapons facilities and infrastructure. GAO's analysis of sites' responses to a data collection instrument showed that the total cost to operate and maintain weapons facilities and infrastructure likely significantly exceeds the budget request for the RTBF Operations of Facilities program submitted to Congress for fiscal year 2009. NNSA has an effort under way that, if fully implemented, would provide more detail on the total costs to operate and maintain weapons facilities and infrastructure.

NNSA does not fully identify or estimate the total costs of the products and capabilities supported through Stockpile Services R&D and production activities. Instead, NNSA primarily identifies the functional activities—such as engineering operations, quality control, and program management—and their costs supported through Stockpile Services and bases its future-year budget requests on the extent to which prior-year budgets were sufficient to execute these functions. In 2009, GAO issued a cost guide that identified using a product-oriented management tool, rather than a functionally oriented one, as a best practice for cost estimating. Using cost guide criteria, GAO's analysis found tracking costs by functions provides little information on the costs of the individual capabilities supported through Stockpile Services. NNSA has an effort under way that, if fully implemented, would provide more detail on the total costs of the products and capabilities supported through Stockpile Services.

Reducing stockpile size is unlikely to significantly affect NNSA's RTBF Operations of Facilities and Stockpile Services costs because a sizable portion of these costs is fixed to maintain base nuclear weapons capabilities. The Administration has planned to increase budget requests for NNSA's nuclear weapons program by \$4.25 billion between fiscal years 2011 and 2015. This planned increase is intended, in part, to invest in and modernize facilities and infrastructure and to ensure that base capabilities are supported such that a smaller nuclear deterrent continues to be safe, secure, and reliable. While base capability costs appear to be relatively insensitive to reductions in the stockpile, without complete and reliable information about these costs, NNSA lacks information that could help justify planned budget increases or target cost savings opportunities.

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Abbreviations

CAS	Cost Accounting Standards
DOE	Department of Energy
ESH&Q	Environment, Safety, Health, and Quality
FIRP	Facilities Infrastructure Recapitalization Program
HEAF	High Explosives Applications Facility
KCP	Kansas City Plant
LANL	Los Alamos National Laboratory
LLNL	Lawrence Livermore National Laboratory
M&O	management and operating
MTP	Management, Technology, and Production
NNSA	National Nuclear Security Administration
NTS	Nevada Test Site
PF	plutonium facility
R&D	research and development
RTBF	Readiness in Technical Base and Facilities
SFFAS	Statement of Federal Financial Accounting Standards
SNL	Sandia National Laboratories
SPEC	Scientific/Process Equipment and Capabilities
SRS	Savannah River Site
ST&E	science, technology, and engineering
Y-12	Y-12 National Security Complex

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United States Government Accountability Office
Washington, DC 20548

June 21, 2010

The Honorable James R. Langevin
Chairman
The Honorable Michael R. Turner
Ranking Member
Subcommittee on Strategic Forces
Committee on Armed Services
House of Representatives

Nuclear weapons have been and continue to be an essential part of the nation's defense strategy. The end of the Cold War resulted in a dramatic shift in how the nation maintains such weapons. Instead of designing, testing, and producing new nuclear weapons, the strategy has shifted to maintaining the existing nuclear weapons stockpile indefinitely and extending the operational lives of these weapons through refurbishment, without nuclear testing.¹ The Department of Energy's (DOE) National Nuclear Security Administration (NNSA) is responsible for the management and security of the nation's nuclear weapons programs. NNSA's annual appropriation for nuclear weapons has totaled approximately \$6.4 billion in recent years. To execute the activities to maintain and refurbish the nation's existing nuclear weapons stockpile, NNSA oversees eight separate sites—collectively known as the nuclear security enterprise—that are managed and operated by private contractors. Among other things, these contractors operate and maintain the government-owned facilities and infrastructure deemed necessary to support the nuclear weapons stockpile and to support the capabilities to conduct scientific, technical, engineering, and production activities that ensure the continued safety and reliability of the stockpile.

In October 2008, NNSA put forward a plan to modernize the nuclear security enterprise infrastructure—with the intent to make it smaller and more responsive, efficient, and secure—while continuing to meet national

¹In 1992, the United States began a moratorium on testing nuclear weapons. Subsequently, the President extended this moratorium in 1993, and Congress, in the National Defense Authorization Act of 1994, directed the Department of Energy to establish a science-based stockpile stewardship program to maintain the nuclear weapons stockpile without nuclear testing. Pub. L. No. 103-160, § 3138 (1994).

security requirements.² NNSA's plan, if fully implemented, would consolidate certain operations within the nuclear security enterprise and replace its aging infrastructure with new nuclear and nonnuclear facilities sized to support a smaller stockpile. The size of this smaller stockpile is the outcome of recently completed negotiations between Russia and the United States on a New Strategic Arms Reduction Treaty, which was signed on April 8, 2010, and, if ratified, will commit the two countries to significant and verifiable arms reductions. The President's fiscal year 2011 budget request (1) supports increased funding to replace key nuclear security enterprise facilities and to invest in infrastructure and (2) anticipates requesting an additional \$4.25 billion between fiscal years 2011 and 2015 over the fiscal year 2010 enacted level. This policy framework—to enable arms reductions by ensuring that the remaining stockpile and the infrastructure on which it depends are safe, secure, and reliable—is also underscored in the newly released Nuclear Posture Review.³

The current nuclear weapons stockpile consists of seven different warhead and bomb types delivered by four types of weapon systems,⁴ including the following:

- B61 and B83 gravity bombs delivered by dual-capable aircraft and long-range bombers;
- W80 warheads for cruise missiles deliverable by long-range bombers;
- W76 and W88 warheads for submarine-launched ballistic missiles; and
- W78 and W87 warheads for intercontinental ballistic missiles.

In recent years, NNSA has taken steps to create system-based budgets associated with each of these seven warhead and bomb types. These

²Department of Energy, NNSA, *Final Complex Transformation Supplemental Programmatic Environmental Impact Statement Summary*, DOE/EIS-0236-S4 (Washington, D.C.: Oct. 2008), and associated Records of Decision published in the *Federal Register* at 73 Fed. Reg. 77644 (Dec. 19, 2008) and 73 Fed. Reg. 77656 (Dec. 19, 2008).

³Department of Defense, *Nuclear Posture Review Report*, (Washington, D.C.: April 2010). The Nuclear Posture Review is a legislatively mandated review that establishes U.S. nuclear policy, strategies, capabilities, and force posture for the next 5 to 10 years. Pub. L. No. 110-181, div. A, title X, §1070, 122 stat. 3, 327 (Jan. 28, 2008).

⁴Although there are seven different warhead and bomb types, several of these have multiple variants.

system-based budgets represent the planned work activities NNSA identifies as specific to each warhead or bomb type. In fiscal year 2009, the seven system-based budgets totaled \$542.8 million, or 8.5 percent of NNSA's overall nuclear weapons budget. However, the vast majority of the nuclear weapons budget is not system-based but rather represents funding to support all other activities needed to operate and maintain the nuclear security enterprise, including the intellectual and technical capabilities of the nuclear workforce.

Two of the largest non-system-based components of NNSA's nuclear weapons budget are: (1) Readiness in Technical Base and Facilities (RTBF) Operations of Facilities, the goal of which is to operate and maintain facilities and infrastructure in a safe, secure, and reliable condition such that they are operationally ready to execute nuclear weapons work, and (2) Stockpile Services, the goal of which is to provide a foundation for operations, which includes the research, development, and production support capabilities for multiple nuclear weapon programs. In fiscal year 2009, Congress appropriated \$6.41 billion for NNSA's weapons activities,⁵ which an explanatory statement accompanying the annual appropriations act reported as including \$1.163 billion for RTBF Operations of Facilities and \$866.4 million for Stockpile Services.⁶ Together, these two components total over \$2 billion, or almost one-third of NNSA's total nuclear weapons activities appropriation for that year.

Consistent with Federal Accounting Standards Advisory Board guidance on identifying the full (total) cost of federal programs and activities, your subcommittee has emphasized that NNSA should establish budgets that reflect total program costs and that these budgets should be more transparent to congressional oversight, particularly as efforts proceed to

⁵Omnibus Appropriations Act, 2009, Pub. L. No. 111-8 (Mar. 11, 2009) and Supplemental Appropriations Act, 2009, Pub. L. No. 111-32 (Jun. 24, 2009).

⁶Joint Explanatory Statement, Regarding H.R. 1105, Omnibus Appropriations Act, 2009, 155 Cong. Rec. H1653, H1962-63 (Feb. 23, 2009). Although the amounts designated in committee reports for each of the NNSA weapons activity budget line items are not legally binding and may be reprogrammed within the Weapons Activities appropriation account, the appropriations committees impose limitations on NNSA's ability to reprogram funds from one line item, such as Stockpile Services, to another over the course of a year.

modernize the nuclear security enterprise.⁷ In this context you asked us to (1) determine the extent to which NNSA's RTBF Operations of Facilities congressional budget justification that supplements the *Budget of the United States Government* (the President's Budget) for fiscal year 2009 is based on the total cost of operating and maintaining weapons facilities and infrastructure; (2) determine the extent to which NNSA's fiscal year 2009 congressional budget justification for Stockpile Services identifies the total costs of providing foundational research and production support capabilities; and (3) discuss the implications, if any, of a smaller stockpile on RTBF Operations of Facilities and Stockpile Services costs.

To address these objectives, we analyzed NNSA's congressional budget justifications for fiscal years 2009, 2010, and 2011, as well as accounting records related to NNSA's execution of its RTBF Operations of Facilities and Stockpile Services programs for fiscal year 2009. We also analyzed documentation on NNSA's programs and activities, including national work breakdown structures—management tools NNSA uses to identify the work activities that completely define a project or program—for RTBF Operations of Facilities and Stockpile Services. We compared NNSA's work breakdown structures with our best practices for work breakdown structures as published in the *GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs*.⁸ Further, we analyzed budget, cost, and program documentation from all eight NNSA sites. We also collected data from NNSA's sites on their nuclear weapons facilities and the sources of funding sites use to fully support operations and maintenance of these facilities. These data were collected using a data collection instrument that was pretested with NNSA and several of its sites. We performed a reliability assessment of these data and determined they were sufficiently reliable for the purposes of this report. In addition, we analyzed NNSA's nuclear security enterprise modernization plans and associated cost estimates. Finally, we conducted

⁷According to the Federal Accounting Standards Advisory Board, established in 1990 to promulgate accounting standards and principles for the U.S. government, the full costs of government programs include evaluating direct and indirect costs. Direct costs are costs that can be specifically identified with an output, including salaries and benefits for employees working directly on the output, materials, supplies, and costs for facilities and equipment used exclusively to produce the output. Indirect costs are costs that are jointly or commonly used to produce two or more types of outputs but are not specifically identifiable with any output. These may include costs for general administration, research and technical support, and operations and maintenance for buildings and equipment.

⁸GAO, *GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs*, [GAO-09-3SP](#) (Washington, D.C.: March 2009).

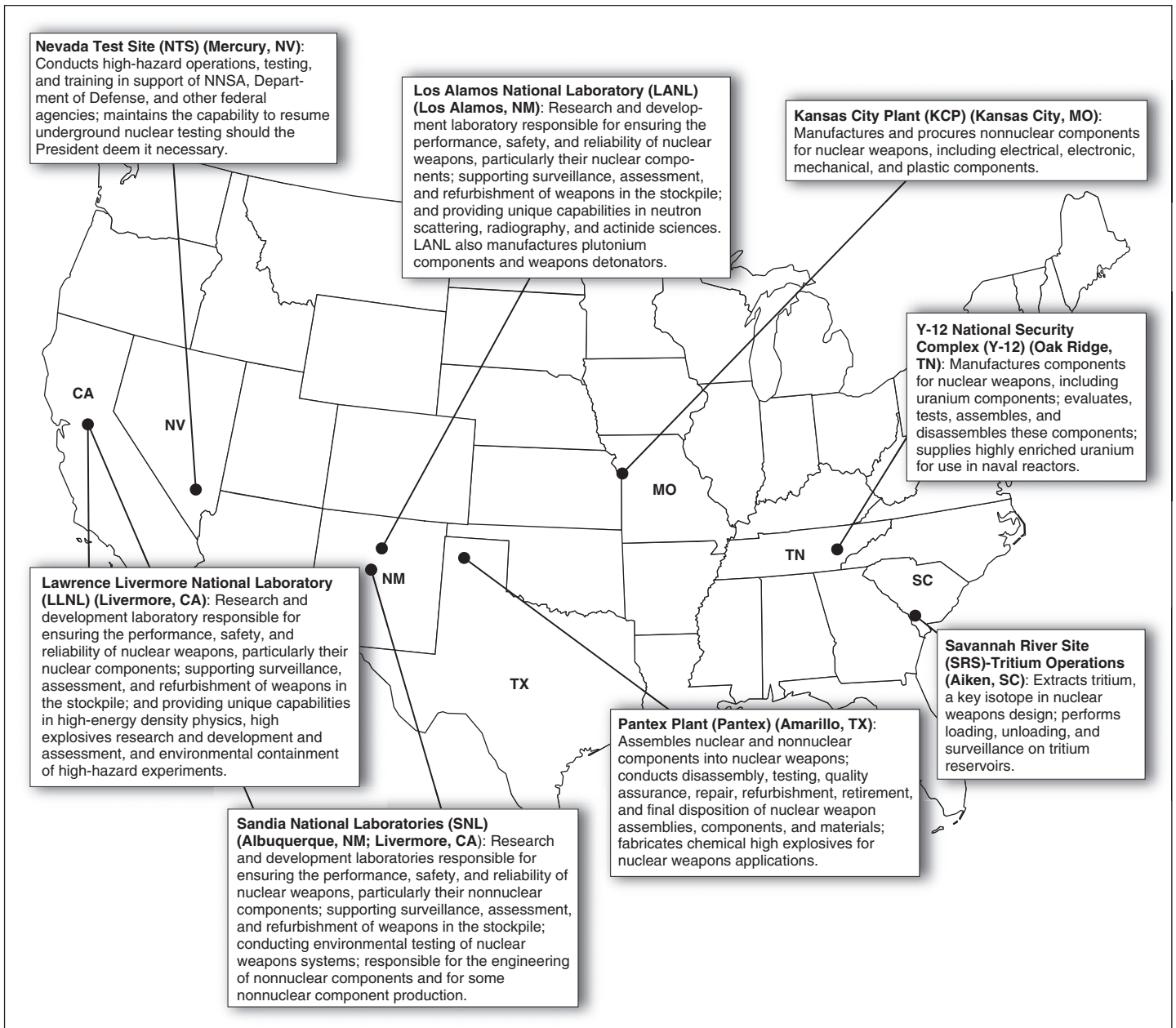
interviews with DOE, NNSA, and site officials and toured facilities at six of NNSA's eight sites. More details on our scope and methodology can be found in appendix I.

We conducted this performance audit from April 2009 to June 2010 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

Established by Congress in 2000 as a separately organized agency within DOE, NNSA has the primary mission of providing the United States with safe, secure, and reliable nuclear weapons and maintaining core competencies in nuclear weapons science, technology, and engineering. To support this highly technical mission, NNSA relies on capabilities in several thousand facilities located at eight nuclear security enterprise sites that support weapons activities. These sites are owned by the government but managed and operated by private contractors, and each has specific research and development (R&D) and/or production responsibilities within the nuclear security enterprise. (See fig. 1.)

Figure 1: Primary Responsibilities of Sites within the Nuclear Security Enterprise



Sources: NNSA; Map Resources (map).

In addition to implementing NNSA's nuclear weapons programs, some sites also support additional missions such as U.S. Navy nuclear propulsion, nuclear nonproliferation activities, and work for other federal agencies such as the Departments of Defense and Homeland Security. NNSA's Office of Defense Programs is responsible for NNSA's weapons activities and oversees the sites' management and operating (M&O) contractors to execute R&D and production work.⁹ NNSA reimburses its M&O contractors under cost-reimbursement-type contracts for the costs incurred in carrying out the department's missions, and M&O contractors have the opportunity to periodically earn additional award fees and contract extensions based on annual performance assessments.

Congress funds NNSA's nuclear weapons mission through an appropriation titled Weapons Activities. Weapons Activities is organized by NNSA into 14 operating programs with more than 40 budget lines across four activity areas. In fiscal year 2009, Congress appropriated approximately \$6.4 billion for Weapons Activities, broken down by NNSA into the four areas described in table 1.

Table 1: NNSA's Breakdown of its Fiscal Year 2009 Appropriation for Weapons Activities

(Dollars in thousands)

Weapons Activities area	Description	Fiscal year 2009 congressional spending directives by operating program
Stockpile Support	Stockpile Support provides nuclear warheads and bombs for NNSA to the Department of Defense in accordance with the President's Nuclear Weapons Stockpile Plan, which directs the number and type of weapons for the Department of Defense to maintain. Operating programs also support dismantlement and disposition of retired weapons as well as selection and maturation of production technologies critical to manufacturing to meet presidential requirements.	Directed Stockpile Work = \$1,590,152 Readiness Campaign = \$160,620 Subtotal: \$1,750,772

⁹M&O contracts are agreements under which the government contracts for the operation, maintenance, or support, on its behalf, of a government-owned or -controlled research, development, special production, or testing establishment wholly or principally devoted to one or more major programs of the contracting federal agency. Federal Acquisition Regulation, 48 C.F.R. § 17.601.

Weapons Activities area	Description	Fiscal year 2009 congressional spending directives by operating program
Science, Technology, and Engineering (ST&E)	ST&E funds support operating programs that develop improved capabilities and experimental infrastructure to assess the safety, security, reliability, and performance of nuclear weapons without reliance on further underground nuclear testing. Operating programs focus on science, engineering, high-energy density physics and fusion, and advanced computing.	Science Campaign = \$316,690 Engineering Campaign = \$150,000 Inertial Confinement Fusion and High Yield Campaign = \$436,915 Advanced Simulation and Computing Campaign = \$556,125 Science, Technology and Engineering Capability = \$30,000 Subtotal: \$1,489,730
Infrastructure	Infrastructure consists of three programs that together provide the base support to operate and maintain the nuclear weapons complex. These programs operate and maintain NNSA program facilities in a safe, secure, efficient, reliable, and compliant condition and support specific construction projects. In addition, Infrastructure funds support restoration and revitalization of sites' physical infrastructure, and facilitate sites' efforts to modernize and consolidate while ensuring compliance with environmental regulations.	Readiness in Technical Base and Facilities = \$1,674,406 Facilities and Infrastructure Recapitalization Program = \$147,449 Environmental Projects and Operations ^a = \$38,596 Subtotal: \$1,860,451
Security and Nuclear Counterterrorism	Security and Nuclear Counterterrorism funds support NNSA's efforts to provide physical protection for NNSA personnel, facilities, nuclear weapons, and special nuclear material through the use of protective guard forces, physical protection systems, and secure transportation, as well as NNSA's cyber security program. In addition, funds support nuclear emergency response assets in support of homeland security and collaborative efforts in countering nuclear terrorism in support of national security.	Secure Transportation Asset = \$214,439 Nuclear Counterterrorism Incident Response = \$215,278 Defense Nuclear Security = \$735,208 Cyber Security = \$121,286 Subtotal: \$1,286,211
Total		\$6,387,164

Source: NNSA and Joint Explanatory Statement, Regarding H.R. 1105, Omnibus Appropriations Act, 2009, 155 Cong. Rec. H1653, H1962-63 (Feb. 23, 2009).

Note: Total does not include appropriations for congressionally directed projects.

^aIn fiscal year 2010, the Environmental Projects and Operations program was integrated into a new, broader program—Site Stewardship—that additionally focuses on special nuclear material consolidation.

RTBF is the single largest program within NNSA's Weapons Activities appropriation, with nearly \$1.7 billion for fiscal year 2009, and encompasses 90 percent of NNSA's funds designated in congressional

spending directives for the Infrastructure area.¹⁰ A significant RTBF mission, executed through its Operations of Facilities subprogram, is to operate and maintain NNSA-owned programmatic capabilities in a state of readiness, ensuring that each capability—defined to include facilities, infrastructure, and supporting workforce—is operationally ready to execute programmatic tasks identified in ST&E and Stockpile Support. Congressional spending directives designated nearly \$1.2 billion of the RTBF program funds in the Weapons Activities account, or about 70 percent, for RTBF Operations of Facilities at NNSA’s eight sites.¹¹ (See app. II for additional discussion.)

In 2006, NNSA and its sites sought to improve linkages between programmatic tasks and the facilities and infrastructure that support the nuclear weapons program. To do so, NNSA established three categories for its facilities and infrastructure that indicate the extent to which they are critical to the achievement of Stockpile Support and ST&E milestones:

- *Mission Critical* facilities and infrastructure—such as for nuclear weapons production, R&D, and storage—are used to perform activities to meet highest-level Stockpile Support and/or ST&E milestones, and without these facilities and infrastructure, operations would be disrupted or placed at risk.
- *Mission Dependent, Not Critical* facilities and infrastructure—such as for waste management, nonnuclear storage, and machine shops—play a supporting role in meeting Stockpile Support and/or ST&E milestones, and loss of these facilities and infrastructure would only disrupt operations so long as operations could not resume within 5 business days.
- *Not Mission Dependent* facilities and infrastructure—such as cafeterias, parking structures, and excess facilities—do not have direct linkage to

¹⁰In this report, we refer to funding instructions contained in the legislative history of NNSA’s appropriations acts as congressional spending directives. Committee reports contain congressional spending directives that instruct NNSA to make specific amounts of funding available to each of its operating programs from within the Weapons Activities appropriation. For more information, see GAO, *Congressional Directives: Selected Agencies’ Processes for Responding to Funding Instruction*, [GAO-08-209](#) (Washington, D.C.: Jan. 31, 2008).

¹¹Beginning in fiscal year 2008, congressional spending directives designated specific amounts of RTBF Operations of Facilities funds for each NNSA site. In prior years, the total amount of RTBF Operations of Facilities funds had been directed to NNSA, which made decisions about the amounts to obligate to each site.

Stockpile Support or ST&E milestones but support secondary missions or quality-of-workplace initiatives.

Together, *Mission Critical* and *Mission Dependent, Not Critical* facilities and infrastructure are deemed “mission essential.” In fiscal year 2009, NNSA categorized its over 4,500 facilities and infrastructure in these three categories.¹² Across the entire nuclear security enterprise, over 200 facilities and infrastructure were deemed *Mission Critical* and over 1,400 were deemed *Mission Dependent, Not Critical*.

Directed Stockpile Work is the second largest program within NNSA’s Weapons Activities appropriation, with nearly \$1.6 billion in fiscal year 2009. The Directed Stockpile Work program is executed through four subprograms:

- Stockpile Services, the largest of these subprograms, with \$866.4 million in fiscal year 2009, builds on weapons activities facilities and infrastructure to provide the foundational capabilities to conduct R&D and production work applicable to multiple warhead and bomb types. According to NNSA, the capabilities supported with Stockpile Services funds enable the achievement of other Directed Stockpile Work missions.
- Weapons Dismantlement and Disposition, with \$190.2 million in fiscal year 2009, supports efforts to reduce the inventory of retired nuclear weapons and their components.¹³
- The Life Extension Program, with \$205 million in fiscal year 2009, represents one of NNSA’s two subprograms focused on specific warhead and bomb types. The Life Extension Program funds efforts to refurbish and extend the expected stockpile lifetime of legacy warheads and bombs for 20 to 30 years.
- Stockpile Systems funding supports ongoing sustainment activities for the active nuclear weapons stockpile, such as the exchange of components with limited lives and weapon-specific assessments. In fiscal year 2009,

¹²A single building may actually comprise multiple facilities. For example, in Pantex’s Building 12-44—which is used for assembling and disassembling nuclear weapons—each assembly cell is counted as a separate *Mission Critical* facility.

¹³Fiscal year 2009 funds for Weapons Dismantlement and Disposition included almost \$70 million in operating funds associated with construction projects that are no longer funded through this subprogram.

Congress directed \$328.5 million for these activities, which NNSA prioritized among specific weapon and bomb types.

NNSA reimburses its M&O contractors for the costs incurred in carrying out NNSA's missions. These include costs that can be directly identified with a specific NNSA program (known as direct costs)—for example, the costs for dismantling a retired weapon—and costs of activities that indirectly support a program (known as indirect costs), such as administrative activities. To ensure that NNSA programs are appropriately charged for incurred costs, M&O contractors' accounting systems assign the direct costs associated with each program and collect similar types of indirect costs into pools and allocate them among the programs. Consistent with Cost Accounting Standards (CAS), M&O contractors must classify their costs as either direct or indirect, and once costs are classified, must consistently charge their costs.¹⁴ M&O contractors are required to disclose their cost accounting practices in formal disclosure statements, which are updated annually and approved by NNSA officials. M&O contractors' cost accounting practices cannot be readily compared with one another because contractors' methods for accumulating and allocating indirect costs vary—that is, a cost classified as an indirect cost at one site may be classified as a direct cost at another.¹⁵

NNSA has developed national work breakdown structures for RTBF Operations of Facilities and for Stockpile Services, management tools that define the scope of work associated with the two subprograms.¹⁶ (See app. II and app. III for these fiscal year 2009 work breakdown structures.) In March 2009, we issued a cost estimating guide, a compilation of cost estimating best practices from across industry and government.¹⁷ Among

¹⁴CAS is a set of 19 standards promulgated by the U.S. Cost Accounting Standards Board, an independent and statutorily established board (41 U.S.C. §422) that is administratively part of the Office of Management and Budget's Office of Federal Procurement Policy. For current applicability of CAS, see chapter 99 of Title 48, U.S. Code of Federal Regulations.

¹⁵GAO examined trends in indirect cost rates at five DOE laboratories, three of which are NNSA laboratories, in 2005. See GAO, *Department of Energy: Additional Opportunities Exist for Reducing Laboratory Contractors' Support Costs*, [GAO-05-897](#) (Washington, D.C.: Sept. 9, 2005).

¹⁶In this report, when we refer to the RTBF Operations of Facilities or the Stockpile Services work scopes, we are referring to the complete set of activities that may be paid for with congressionally directed funds for these programs as defined by their work breakdown structures. Consistent with sites' cost accounting practices, activities included in these work scopes may in fact be paid for with other funding sources.

¹⁷[GAO-09-3SP](#).

other things, these best practices discuss establishing product-oriented work breakdown structures, where a product is defined as an output and 100 percent of the work associated with achieving that output.¹⁸ Product-oriented work breakdown structures allow a program to track cost and schedule by defined deliverables, promote accountability by identifying work products that are independent of one another, and provide a basis for identifying resources and tasks for developing a program cost estimate. The ability to generate reliable cost estimates is a critical function, and a program's cost estimate is often used to establish budgets.

While individual M&O contractors account for the activities included in NNSA's work breakdown structures according to their own accounting practices and these practices vary, NNSA is required to provide reliable and timely information on the full cost of its programs because this information is crucial for effective management of government operations and for oversight.¹⁹ Full costs include direct and indirect costs that contribute to programs, regardless of funding sources. To meet this requirement, NNSA needs complete and reliable information from its M&O contractors so that it can determine the full (or total) costs of its programs. We have previously reported on NNSA's lack of managerial cost accounting systems for its programs, particularly with respect to stockpile life extension programs.²⁰

¹⁸Throughout this report, we consider work breakdown structures that are oriented around production or R&D capabilities within the definition of a product oriented work breakdown structure where the maintenance of a production or R&D capability is the output. However, when following the product-oriented best practice, there should not be work breakdown structure elements for various functional activities like design, engineering, tooling, risk, or quality, because these efforts should be embedded in each activity.

¹⁹Federal Accounting Standards Advisory Board, *Statement of Federal Financial Accounting Standards No. 4, Managerial Cost Accounting Standards and Concepts*, (Washington, D.C.: June 2008).

²⁰GAO, *Nuclear Weapons: Opportunities Exist to Improve the Budgeting, Cost Accounting, and Management Associated with the Stockpile Life Extension Program*, [GAO-03-583](#) (Washington, D.C.: July 28, 2003).

NNSA Cannot Accurately Identify the Total Costs to Operate and Maintain Weapons Activities Facilities and Infrastructure, and These Costs Likely Significantly Exceed the Budget Justified to Congress for the RTBF Operations of Facilities Program

NNSA cannot accurately identify the total costs to operate and maintain weapons activities facilities and infrastructure because of differences in sites' cost accounting practices. NNSA does not require sites to report the total cost to execute their RTBF Operations of Facilities work scope, but the results of our analysis of sites' responses to our data collection instrument showed that the total cost to execute the RTBF Operations of Facilities work scope likely significantly exceeds the budget for the RTBF Operations of Facilities program justified to Congress. Efforts are under way to revise NNSA's work breakdown structure that includes RTBF Operations of Facilities. According to NNSA officials, once the revised work breakdown structure is fully implemented it will capture these total costs, but NNSA will not begin collecting this information until 2011.

NNSA Cannot Accurately Identify the Total Costs to Operate and Maintain Weapons Activities Facilities and Infrastructure

Each of the eight sites in the nuclear security enterprise has established its own practices for how to account for the activities necessary to operate and maintain weapons activities facilities and infrastructure. While individual M&O contractors are required to be CAS compliant,²¹ differences in their cost accounting practices preclude NNSA from being able to identify the total costs to operate and maintain the facilities and infrastructure essential to achieving Stockpile Support and ST&E program missions. These differences include determining (1) which weapons activities facilities and infrastructure individual sites support with RTBF Operations of Facilities funds, (2) which activities included in the RTBF Operations of Facilities work breakdown structure each site supports directly or indirectly, and (3) the additional funding sources sites use to support certain activities included in the RTBF Operations of Facilities work breakdown structure. (For a detailed discussion of the differences in M&O contractors' cost accounting practices, see app. II.) For example,

²¹Our review did not address the extent to which individual M&O contractors' cost accounting practices are CAS compliant. Rather, our review focused on the extent to which CAS allows contractors' cost accounting practices to differ from another to expend the same funds.

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- While NNSA has identified the *Mission Critical* facilities and infrastructure at each of its sites, NNSA does not require M&O contractors to pay for them with RTBF Operations of Facilities funds. In fiscal year 2009, Pantex fully funded the RTBF Operations of Facilities work scope at all of its *Mission Critical* facilities with RTBF Operations of Facilities funds. In contrast, LANL partially funded the RTBF Operations of Facilities work scope at the majority, but not all, of its *Mission Critical* facilities with RTBF Operations of Facilities funds.
 - Six of the eight sites in the nuclear security enterprise reported to us that in fiscal year 2009 they allocated the costs of certain activities included in the RTBF Operations of Facilities work scope into indirect cost pools, including the costs of activities such as utilities purchasing and real property maintenance. These indirect cost pools are often funded through multiple funding sources.
 - All sites used funding in addition to RTBF Operations of Facilities funds to pay for activities included in the RTBF Operations of Facilities work scope in fiscal year 2009. In response to our data collection instrument, site officials identified 11 sources of funding congressionally directed for other Weapons Activities programs and subprograms that they expended, in part, on activities they considered to be included in NNSA's RTBF Operations of Facilities work breakdown structure. In addition, some sites have developed user fee or cost recovery models for multiprogram facilities. These models are generally based on charges to programmatic users based on rates applied to, for example, the square footage of a facility users occupy or the volume of waste they produce. User fees or cost recovery may be charged as direct costs to Weapons Activities programs as well as to other programs and projects, or they may be charged through an indirect cost pool.

As a result of these differences, NNSA cannot reliably identify the total costs to operate and maintain these facilities and infrastructure across the nuclear security enterprise. Rather, NNSA officials can only accurately identify the direct costs to the RTBF Operations of Facilities program, and in some instances, the direct costs to other Weapons Activities programs. Senior NNSA officials in the RTBF Program Office acknowledged that NNSA does not know the sites' baseline costs to fully execute RTBF Operations of Facilities work scope, and NNSA does not require M&O contractors to track their sites' total operations and maintenance costs for weapons activities facilities and infrastructure. Instead, NNSA officials told us they rely on individual contractors to know this information for their sites as a basis for formulating budget requests; however, some contractors did not identify a total cost for their sites' weapons activities

facilities and infrastructure. For example, when we asked, M&O contractors from two sites—Y-12 and LANL—did not provide the total cost to operate and maintain weapons activities facilities and infrastructure at their sites. LANL did not provide this information because site officials could not determine the extent to which costs charged against indirect cost pools were associated with activities included in the RTBF Operations of Facilities work scope. Y-12 did not provide this information because, according to officials, while their management system is capable of identifying this information, it cannot do so readily with accuracy.²²

Total Costs to Operate and Maintain Weapons Activities Facilities and Infrastructure Likely Significantly Exceed the RTBF Operations of Facilities Budget NNSA Justified to Congress

The total costs to operate and maintain weapons activities facilities and infrastructure likely significantly exceed the amount NNSA justified to Congress in the President's Weapons Activities budget request for RTBF Operations of Facilities and that Congress directed to NNSA's sites in fiscal year 2009. While NNSA requires M&O contractors to report information on their direct costs to the RTBF Operations of Facilities program, NNSA does not require M&O contractors to report on the total sitewide operation and maintenance costs for their weapons activities facilities and infrastructure.²³ NNSA officials acknowledged that a more accurate figure for total costs to support the enterprisewide work scope for RTBF Operations of Facilities would include these other funding sources M&O contractors use to operate and maintain weapons activities facilities and infrastructure.

As reported above, when we asked, not all M&O contractors determined the total cost to operate and maintain weapons activities facilities and infrastructure at their sites. However, for the six contractors that did so, the cost to fully operate and maintain weapons activities facilities and infrastructure greatly exceeded the amount of funding for RTBF Operations of Facilities in fiscal year 2009. Congressionally directed RTBF Operations of Facilities funding for these six sites in fiscal year 2009 totaled approximately \$558.6 million, but their estimated fiscal 2009 expenditures for this work scope drawn from all funding sources totaled

²²Officials from Y-12 and LANL told us they are able to identify the total amounts of funding they accumulate in their indirect cost pools to pay for sitewide costs.

²³NNSA does require sitewide reporting on different categories of support costs, including several categories that are included in the RTBF Operations of Facilities work scope, such as facilities management, maintenance, and utilities. According to an NNSA official, these costs include support costs associated with weapons activities facilities and infrastructure, but these costs cannot be separated from sitewide support costs.

approximately \$1.1 billion.²⁴ Officials from the two M&O contractors that did not provide the total costs to operate and maintain weapons activities facilities and infrastructure at their sites also told us that their expenditures for this purpose in fiscal year 2009 exceeded their congressionally directed RTBF Operations of Facilities funds, as funding from other programs also contributed. NNSA's congressional budget justification for RTBF Operations of Facilities is not based on total cost information, and it does not fully support the scope of work it describes.

NNSA Is Revising Its Work Breakdown Structure to Capture the Total Costs to Operate and Maintain Weapons Activities Facilities and Infrastructure

NNSA officials and M&O contractors told us that RTBF program representatives from all of the sites are working closely together and with NNSA to develop an updated national RTBF work breakdown structure that will be integrated into a larger national work breakdown structure for all of the activities overseen by the Office of Defense Programs. The revised Defense Programs work breakdown structure, once implemented, is to more closely align activities, including RTBF activities, at the sites with the nuclear weapons R&D and production capabilities they support. Moreover, according to NNSA officials, NNSA envisions the sites using the revised work breakdown structure for budget formulation, budget execution, and cost collection, unlike the current RTBF work breakdown structure, which is used only for program management during a single fiscal year. NNSA has asked that the sites begin submitting their RTBF program budget requests using the revised Defense Programs work breakdown structure format. NNSA and site officials agreed that the revised work breakdown structure should help better explain how RTBF supports the core missions of the weapons complex and the base capabilities needed to support those missions. NNSA officials expect the first phase of revisions to the Defense Programs work breakdown structure to be completed around the end of 2010. Starting in 2011, NNSA officials said they plan to begin efforts to further enhance the revised work breakdown structure by including total cost information for operating and maintaining weapons activities facilities and infrastructure to support future budget formulation activities. While this total cost information will not be wholly captured within the portion of the revised Defense Programs work breakdown structure associated with RTBF Operations of Facilities, according to NNSA officials total cost information will be captured in the

²⁴In providing these estimates, officials from these sites cautioned that because of how indirect cost pools are accumulated, the multiple funding sources that support RTBF Operations of Facilities work scope are not completely independent from one another. Thus, under current practices, there is the potential for error when calculating this total.

revised work breakdown structure as a whole. Differences in how sites pay for RTBF Operations of Facilities activities—and weapons activities facilities and infrastructure—will persist under the revised work breakdown structure. However, NNSA officials said once the revised Defense Programs work breakdown structure is fully implemented, NNSA will have a tool to collect consistent cost information from contractors' disparate cost accounting systems.

NNSA Does Not Fully Identify or Estimate the Total Costs of the Products and Capabilities Supported through Stockpile Services R&D and Production Activities

While in total NNSA's Stockpile Services work breakdown structure for fiscal year 2009 reflects \$866.4 million in work scope as justified to Congress, the work breakdown structure does not fully identify or provide the estimated costs of the products or capabilities supported through the Stockpile Services program. Rather, the work breakdown structure is organized largely around work functions and only partially by specific products or capabilities. (See app. III for a more detailed Stockpile Services work breakdown structure.) NNSA officials told us that the largely functionally oriented work breakdown structure for Stockpile Services in total captures all the work activities associated with providing foundational programmatic capabilities for R&D and production capacity across the nuclear security enterprise. In addition, they said the work breakdown structure for Stockpile Services is a useful management tool for executing work functions across products and deliverables. However, the organization of much of the work breakdown structure precludes the ready identification of base capabilities and their costs. For example, the activities included in the Stockpile Services work scope range widely—from basic infrastructure support to the manufacturing of actual weapons components—often without specifically identifying the products or capabilities they are supporting. The exception is Plutonium Sustainment, the one group that is product-based and that better aligns work activities with the product or capability it is ultimately supporting. The five work activity groups in the Stockpile Services work breakdown structure are as follows (see app. III for more detailed descriptions of these activities):

- *Production Support* (\$293.1 million in fiscal year 2009) includes non-weapon-type specific or multi-weapon-type activities that a site performs to support its own production mission, whatever that mission might be. Examples of these activities include engineering and manufacturing operations; quality supervision and control; and tool, gauge, and equipment services.
- *Management, Technology, and Production (MTP)* (\$195.3 million in fiscal year 2009) includes activities that (1) sustain and improve stockpile

management, (2) develop and deliver weapon use control technologies, and (3) result in production of weapons components for use in multiple warhead and bomb types.²⁵ In contrast to Production Support activities that are focused on individual sites' production missions, MTP includes those activities that benefit the nuclear security enterprise as a whole.

- *R&D Certification and Safety* (\$187.6 million in fiscal year 2009) provides the underlying capabilities to mature basic research conducted in ST&E programs and serves as a technology development bridge between research and weaponized technologies. Activities support design work to develop certain multisystem limited life weapon components; the specialized facilities, equipment, and personnel to maintain a base capability to perform hydrodynamic tests and subcritical experiments; and the preparation of various types of studies.²⁶
- *R&D Support* (\$35.1 million in fiscal year 2009) consists largely of administrative and infrastructure support activities for sites' R&D missions. These activities include program management for and coordination of Stockpile Services' many different outputs, R&D quality control, computing hardware for personnel, and financial database maintenance.
- *Plutonium Sustainment* (\$155.3 million in fiscal year 2009) captures work activities associated with pit manufacturing and related R&D, as well as associated indirect and overhead costs.²⁷ These funds not only support the base capabilities for pit manufacturing, but also contribute to the operation and maintenance of the facilities and infrastructure necessary to

²⁵Weapon use control technologies are solutions that can be engineered into nuclear weapons to help ensure denial of unauthorized use.

²⁶Hydrodynamic tests examine the performance of certain nuclear weapons components, known as pits, using surrogate materials to replace fissile materials. Subcritical experiments examine the material properties of plutonium through shock physics experiments.

²⁷Plutonium Sustainment became part of the Stockpile Services work breakdown structure in fiscal year 2009 once its primary goal, to reestablish the nation's capability to manufacture plutonium weapons components, known as pits, was achieved. The capability to manufacture and certify pits is critical to maintaining the reliability of the stockpile. The nation's capability to manufacture pits was lost when DOE's Rocky Flats Plant near Denver, Colorado, was closed in 1989. Beginning in 2002, a Pit Manufacturing Campaign was established as an ST&E program to reconstitute this capability. The campaign ended when this effort was determined to be successful, and funds to maintain the capability and continue R&D work on plutonium were transferred to Stockpile Services in fiscal year 2009.

Neutron Generators

Neutron generators are designed by SNL and manufactured at SNL in Albuquerque, New Mexico. According to an SNL official associated with neutron generator production, it is not easy to identify all of the activities associated with neutron generators in NNSA's functionally oriented work breakdown structure. To identify the more than \$36 million in Stockpile Services costs to support activities associated with neutron generators in fiscal year 2009 at SNL, NNSA program officials provided the following information from different activity groups in the Stockpile Services work breakdown structure:

R&D Certification and Safety:

- Weapon Component Development costs: \$7.2 million
- Packaging Technologies: \$0.1 million

Production Support:

- Engineering Operations: \$8.3 million
- Manufacturing Operations: \$9.5 million
- Quality Supervision and Control: \$3.8 million
- Tool, Gage, and Equipment Services: \$0.8 million
- Purchasing, Shipping, and Materials: \$0.8 million
- Electronic Product Flow Information Systems: \$5.7 million

According to an SNL official, between \$2.7 million and \$12.2 million in fiscal year 2009 Production Support funds paid for activities that could be considered RTBF Operations of Facilities work scope related to operating and maintaining SNL's neutron generator facilities and infrastructure.



Source: NNSA.

conduct these activities and the actual manufacturing of a limited number of pits each year.

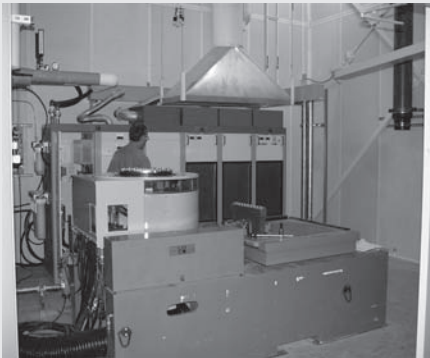
According to NNSA officials, the fiscal year 2009 Stockpile Services work breakdown structure was used to estimate costs and formulate future budget requests based on the sufficiency of prior-year budgets to execute the program and adjusted to reflect planned changes in program execution. NNSA's process for validating the methodology used to formulate the Stockpile Services fiscal year 2009 budget request was based on a site-by-site review of prior-year spending for ongoing activities, rather than a bottom-up approach to integrate product or capability costs across the nuclear security enterprise.²⁸ Our cost guide states the risks of using a functionally oriented work breakdown structure—rather than a product-oriented work breakdown structure—to develop cost estimates, including difficulty in identifying work products that are independent from one another, and difficulty in evaluating and accounting for the level of effort associated with products (see app. III for additional discussion of our cost guide). This methodology provides little information that would help NNSA identify capability costs or better explain the effects of proposed funding increases or decreases on Stockpile Services activities. For example,

- A key nuclear weapon component known as a neutron generator is designed and manufactured at SNL. Activities associated with neutron generator R&D and production are distributed across several parts of the Stockpile Services work breakdown structure and are not combined by NNSA either to provide a total accounting of the activities necessary to sustain the neutron generator capability or to determine the total costs of these activities. Furthermore, common support costs—such as program management—are not allocated to the neutron generator capability. Our cost guide states that common support costs should be included in the work breakdown structures of their associated products or capabilities.
- When we asked, NNSA identified \$45.9 million in MTP production costs for weapon surveillance testing support in fiscal year 2009. Weapon

²⁸In contrast, during fiscal year 2009, NNSA undertook a zero-based review of costs associated with its physical security program, the goals of which included elimination of unnecessary costs and improvement of the consistency and clarity of security requirements. As a result, NNSA's fiscal year 2011 congressional budget justification attributes a \$38.8 million reduction in the President's request for physical security funding to the results of this zero-based review.

Surveillance to Ensure Weapons Safety and Reliability

In fiscal year 2009, NNSA and its M&O contractors spent \$45.9 million in MTP production funds to provide the capabilities, testers, engineering resources, and data management tools to facilitate enterprisewide interpretation of data and information regarding the condition of systems, subsystems, and components in the stockpile. This work supports assessments of warhead reliability, as well as ongoing laboratory safety, security, and use control evaluations. Surveillance capabilities include simulating and testing the effects of vibration, shock, acceleration, temperature, and radiation environments on weapons and their components. The illustration below shows a shaker table, used for testing the effects of vibration on weapons components.



Source: NNSA.

surveillance testing is used to assess the condition of systems, subsystems, and components in the stockpile. According to an NNSA official, surveillance costs in Stockpile Services for fiscal year 2009 could be as high as \$100 million to \$130 million, depending on the extent to which costs are included for activities that support both surveillance and other capabilities. For example, certain tools may be used for surveillance and for other production missions. The \$45.9 million identified as the costs for surveillance do not include the costs to maintain or upgrade those tools. Rather, NNSA tracks the costs for tooling as a function across all products and capabilities. In its fiscal year 2011 congressional budget justification for both R&D Certification and Safety and MTP, NNSA discusses funding to support the surveillance testing capabilities. The budget justification provides no explanation for why funding in both activity groups is requested and does not identify the total amount requested for Stockpile Services surveillance activities.

NNSA's ongoing effort to revise the Defense Programs work breakdown structure includes revising the portion associated with Stockpile Services. Its primary purpose is to provide better evidence to support assertions made in congressional budget justifications. Our analysis shows the revised work breakdown structure, once fully implemented, will better identify products and capabilities supported through Stockpile Services and provide improved total cost information. NNSA is planning to "tag" individual activities in the revised Defense Programs work breakdown structure, including Stockpile Services activities, to identify the products and capabilities with which those activities are associated, where possible. This will allow officials to aggregate activities (and their costs) by product or capability as necessary within the Defense Programs work breakdown structure. NNSA officials also said that current plans include tagging indirect or overhead costs. According to NNSA officials, fully realizing the revised Defense Programs work breakdown structure will give federal program managers a tool to collect consistent cost information from disparate contractor cost accounting systems on the products supported through Stockpile Services.

RTBF Operations of Facilities and Stockpile Services Costs Are Unlikely to Be Significantly Affected by Reductions in Stockpile Size, and NNSA Lacks Cost Information to Help Justify Planned Budget Increases

Reducing the stockpile size, as has recently been negotiated in the New Strategic Arms Reduction Treaty, if ratified, and reinforced by the 2010 Nuclear Posture Review, is unlikely to significantly affect NNSA's RTBF Operations of Facilities and Stockpile Services costs, which represent about one-third of NNSA's total nuclear weapons program budget. A sizable portion of these costs are fixed and represent the costs of maintaining the base capabilities necessary to ensure that the nuclear weapons stockpile continues to be safe, secure, and reliable without underground nuclear testing. NNSA and its sites are working to reduce fixed costs and to bring these costs into line with base capabilities by modernizing and downsizing facilities and infrastructure and by eliminating excess production and experimental capacity. However, NNSA lacks information on the costs of these base capabilities that could adequately justify planned budget increases, particularly with respect to infrastructure investment.

Base Capability Costs Are Unlikely to Be Significantly Affected by Reductions in Stockpile Size

NNSA and site officials identify the scope of work captured in the RTBF Operations of Facilities and Stockpile Services work breakdown structures as providing the base capabilities necessary to conduct the ST&E and system-specific work that ensures the continued safety, security, and reliability of the nuclear weapons stockpile without underground nuclear testing. According to NNSA and site officials, most of the base capabilities these programs provide would be necessary to maintain even if the size of the stockpile were significantly reduced. Furthermore, NNSA and site officials identify the majority of the costs associated with these base capabilities as fixed and thus relatively insensitive to stockpile size. NNSA recently analyzed its fiscal year 2008 costs to determine the extent to which these costs represented the fixed or variable costs of sustaining the nuclear security enterprise. NNSA's resulting analysis showed that 100 percent of RTBF cost is fixed for certain capabilities, including high explosives and weapons assembly/disassembly facilities and infrastructure. In addition, the analysis showed that between 85 and 90 percent of cost was fixed for nonnuclear components and plutonium and uranium work. Many of these costs are included in the RTBF Operations of Facilities and Stockpile Services work scopes.

While we were unable to independently verify NNSA's analysis, during the course of our review we did observe the relatively fixed nature of the infrastructure and activities necessary to maintain base capabilities. For

example, an NNSA official estimated that the base capability cost for pit manufacturing is about \$120 million in Stockpile Services funds annually, in comparison with overall Plutonium Sustainment funding for fiscal year 2009 of \$155.3 million.²⁹ Plutonium Sustainment funding also included production-related R&D costs, as well as incremental costs for actual component manufacturing. In addition, officials from several sites highlighted equipment that may be operated for only a limited portion of each year but that still must be maintained and operated when needed. Officials at Y-12 noted that the fixed costs to maintain certain of these capabilities currently exceed the value of their output; however, to ensure that Stockpile Support and ST&E missions are achieved, these capabilities must be maintained.

While base capability costs for the nuclear security enterprise are unlikely to significantly decline as a result of stockpile reductions, a primary purpose of NNSA's effort to modernize the nuclear security enterprise is to reduce the overall level of fixed costs at and among sites by consolidating infrastructure and reducing capacity to base levels without compromising national security. According to an NNSA official, 10 years from now one-third of NNSA's total existing facilities and infrastructure will be in excess of programmatic need. Furthermore, NNSA's modernization plans call for consolidating experimental capabilities among sites within the complex and for reducing excess production capacity. We previously reported on efforts at several sites, including LANL and LLNL, to reduce or eliminate storage of significant quantities of weapons-grade special nuclear material in site facilities.³⁰ We also recently reported on progress to replace KCP infrastructure with a new, modern facility that NNSA expects to result in significantly reduced operations and maintenance costs for that site.³¹ Other efforts include construction of the new Highly Enriched Uranium Materials Facility at Y-12, which will enable closure of several older storage facilities at the Y-12 site. In addition, facility disposition at multiple

²⁹In providing technical comments on a draft of this report, LANL officials said the base budget for pit manufacturing is about \$140 million.

³⁰GAO, *Los Alamos National Laboratory: Long-Term Strategies Needed to Improve Security Management and Oversight*, [GAO-08-694](#) (Washington, D.C.: June 13, 2008), and *Nuclear Security: Better Oversight Needed to Ensure That Security Improvements at Lawrence Livermore National Laboratory Are Fully Implemented and Sustained*, [GAO-09-321](#) (Washington, D.C.: Mar. 16, 2009).

³¹GAO, *Nuclear Weapons: National Nuclear Security Administration Needs to Better Manage Risks Associated with Modernization of Its Kansas City Plant*, [GAO-10-115](#) (Washington, D.C.: Oct. 23, 2009).

sites, including LANL, LLNL, NTS, Pantex, and Y-12, will reduce both ongoing maintenance costs and deferred maintenance backlogs. Consolidation of equipment at NTS will reduce maintenance.

NNSA Lacks Information on Program Costs That Could Help Justify Planned Budget Increases

While base capability costs appear to be relatively insensitive to changes in the stockpile, complete and reliable information about the costs of these capabilities is necessary for sound program management and to help inform future planning. This is particularly important in the current political and budgetary environment, in which stockpile reductions are anticipated, and the Administration has planned to increase budget requests for Weapons Activities by \$4.25 billion over the fiscal year 2010 enacted level between fiscal years 2011 and 2015.³² This planned budget increase is envisioned in part to ensure adequate support to maintain and improve base capabilities, including infrastructure recapitalization and replacement. In such an environment, NNSA is likely to face increased scrutiny of its planning, programming, and budget execution to determine the effect of funding increases on the overall health of base capabilities.

In the past, Congress, we, and NNSA have examined different ways of generating information on the costs of the nuclear weapons program that would be useful to NNSA management and congressional decision makers for planning purposes. In 2000 we recommended that NNSA develop a method to relate its program structure to DOE's cost accounting considerations so that fixed and variable costs of the program's activities could be determined and made available when the program makes its annual budget submission.³³ In fiscal year 2005, NNSA reorganized its budget structure in response to congressional appropriations committees, which instructed NNSA to begin budgeting by warhead and bomb type—another way to understand program costs.³⁴ The current budget structure does identify some type-specific information. However, NNSA and site officials have continued to caution against allocating RTBF and Stockpile Services costs to specific warhead or bomb types, stating that allocating fixed costs does not really provide any additional information than is already available and could prove to be misleading; in the event of

³²Planned increases to the fiscal years 2012 through 2015 budget requests for Weapons Activities were included in NNSA's congressional budget justification for fiscal year 2011.

³³GAO, *Nuclear Weapons: Improved Management Needed to Implement Stockpile Stewardship Program Effectively*, [GAO-01-48](#) (Washington, D.C.: Dec. 14, 2000).

³⁴H.R. Rep. 107-258.

stockpile reductions, fixed costs would simply be reallocated across remaining warhead and bomb types and fail to produce the significant cost savings that might be anticipated.

Statement of Federal Financial Accounting Standards (SFFAS) No. 4, Managerial Cost Accounting Standards, states a general standard for federal agencies to provide reliable and timely information on the full cost of federal programs. The principal purpose of SFFAS No. 4 is to determine the cost of delivering a program or output to allow an organization to assess the reasonableness of this cost or to establish a baseline for comparison. Congressional appropriations committees sought to define individual warhead and bomb types as NNSA's programs; however, since 2005 NNSA has defined its programs as a mix of individual warhead and bomb types, production and R&D functions that support multiple warhead and bomb types, facilities and infrastructure support, and other supporting programs such as security. In part, NNSA has done so because DOE's accounting guidance does not require NNSA to allocate basic R&D costs and certain infrastructure capacity costs. Also, by identifying RTBF and Stockpile Services as programs, NNSA has identified in its budget structure costs it has determined are fixed. Going forward, NNSA appears to be moving toward a budget structure aimed at ensuring sufficient funding to sustain base capabilities and to identify additional funding that may be necessary to modernize capabilities or to achieve a level of research or production capacity above the base level. NNSA currently lacks the total cost information about its existing programs to ensure it can accurately identify the costs of its base capabilities for future budget justifications. Through its ongoing effort to revise its Defense Programs work breakdown structure, which includes portions associated with RTBF Operations of Facilities and Stockpile Services, NNSA has the opportunity to capture this information. More specifically,

- NNSA's preliminary revisions to its national work breakdown structure for RTBF Operations of Facilities reorients the work breakdown structure around capabilities and products; highlights *Mission Critical* facilities that support these capabilities; and identifies three types of costs to support these capabilities: (1) operations, which represents the current program; (2) risk reduction, which includes costs above base capability to support facility and equipment upgrades; and (3) transformation, which includes costs to replace facilities and infrastructure or otherwise significantly invest in their modernization. These revisions are positive developments that we believe will enable NNSA to improve its understanding of facilities and infrastructure costs paid for with congressionally directed RTBF Operations of Facilities funds and to

improve the transparency of its RTBF Operations of Facilities budget justification. According to NNSA officials, once the revised work breakdown structure for all of Defense Programs has been fully implemented, it should allow NNSA to capture information on the total costs to operate and maintain weapons activities facilities and infrastructure, not just those costs paid for with congressionally directed funds for RTBF Operations of Facilities. In the absence of total cost information, according to a senior NNSA official, NNSA is challenged to balance operations and maintenance costs with recapitalization projects and with large facility replacement projects.

- According to NNSA officials, the portion of the revised Defense Programs work breakdown structure for Stockpile Services will include a reorientation around capabilities and products, where possible. While several NNSA officials said that improving cost estimating is not a primary impetus for revising the Stockpile Services work breakdown structure because all Stockpile Services costs are fixed, officials responsible for revising the Defense Programs work breakdown structure told us that doing so will help achieve transparent cost reporting from disparate contractor cost accounting systems, regardless of the fixed nature of these costs. Without identifying the total costs of Stockpile Services-supported products and capabilities, NNSA will be challenged to explain the effects of funding changes or justify the necessity for increased investment to support or enhance base capabilities. It is important to recognize that having a product- or capability-oriented work breakdown structure for Stockpile Services that includes associated support costs should not reduce NNSA's or its M&O contractors' flexibility to manage Stockpile Services activities by function.

Conclusions

Within the global community, the Administration, and Congress, a bargain is being struck on nuclear weapons policy. Internationally, if the treaty is ratified, significant stockpile reductions have been negotiated between the United States and Russia. Domestically, a new Nuclear Posture Review has provided an updated policy framework for the nation's nuclear deterrent. To enable this arms reduction agenda, the Administration is requesting from Congress billions of dollars in increased investment in the nuclear security enterprise to ensure that base scientific, technical, and engineering capabilities are sufficiently supported such that a smaller nuclear deterrent continues to be safe, secure, and reliable. For its part, NNSA must accurately identify these base capabilities and determine their costs in order to adequately justify future presidential budget requests and show the effects on its programs of potential budget increases. As it now stands, NNSA may not be accurately identifying the costs of base capabilities

because (1) without guidance to M&O contractors for consistent reporting, NNSA cannot identify the total costs to operate and maintain essential weapons activities facilities and infrastructure, and (2) NNSA analyzes the reported costs of R&D and production functions without fully identifying these functions with the specific capabilities supported through Stockpile Services. Without taking action to identify these costs, NNSA risks being unable to identify the return on investment of planned budget increases on the health of its base capabilities or to identify opportunities for cost saving. NNSA has the opportunity to mitigate these risks by addressing them through the ongoing revision of work breakdown structures and through identifying means of collecting the total costs of its base capabilities from M&O contractors, which will not necessitate any changes to the way that Weapons Activities programs are budgeted or how funds are expended. Without taking these actions, NNSA will not have the management information it needs to better justify future budget requests by making its justifications more transparent. Additionally, the availability of this information will assist Congress with its oversight function.

Recommendations for Executive Action

We recommend that the Administrator of NNSA take the following five actions.

To allow Congress to better oversee management of the nuclear security enterprise and to improve NNSA's management information with respect to the base capabilities necessary to ensure nuclear weapons are safe, secure, and reliable:

- (1) develop guidance for M&O contractors for the consistent collection of information on the total costs to operate and maintain weapons activities facilities and infrastructure;
- (2) require M&O contractors to report to NNSA annually on the total costs to operate and maintain weapons activities facilities and infrastructure at their sites;
- (3) evaluate the total costs of operating and maintaining existing weapons activities facilities and infrastructure as part of program planning processes and budget formulation, especially in relation to recapitalization and modernization of the nuclear security enterprise; and
- (4) once the Stockpile Services work breakdown structure reflects a product or capability basis, use this work breakdown structure to develop product/capability cost estimates that adequately justify the congressional budget request for Stockpile Services.

In light of significant proposed increases to NNSA's nuclear weapons program budget in fiscal year 2011 and beyond, we also recommend that the Administrator of NNSA:

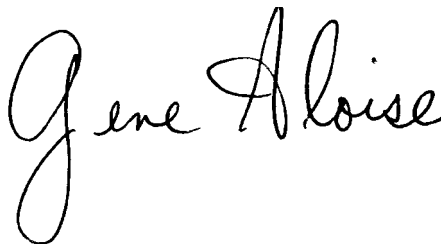
(5) include in future years' congressional budget justifications (a) detailed justifications for how these proposed funding increases will affect program execution and (b) information about how the funding increases affected programs.

Agency Comments and Our Evaluation

We provided a draft of this report to NNSA for its review and comment. NNSA agreed with the report and its recommendations. NNSA's comments on our draft report are presented in appendix IV. NNSA and several of its sites also provided technical comments, which we incorporated into the report as appropriate. In particular, we worked with NNSA officials to ensure the technical accuracy of the discussion of NNSA's efforts to revise the Defense Programs national work breakdown structure. Because this effort is ongoing, we and NNSA wanted to ensure that information included in this report is as current and complete as possible.

We are sending copies of this report to the appropriate congressional committees, Secretary of Energy, Administrator of NNSA, and other interested parties. In addition, the report will be available at no charge on the GAO Web site at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-3841 or aloisee@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix V.



Gene Aloise, Director,
Natural Resources and Environment

Appendix I: Objectives, Scope, and Methodology

At the request of the Chairman and Ranking Member, Subcommittee on Strategic Forces, Committee on Armed Services, House of Representatives, we were asked to (1) determine the extent to which the National Nuclear Security Administration's (NNSA) Readiness in Technical Base and Facilities (RTBF) Operations of Facilities congressional budget justification that supplements the *Budget of the United States Government* (i.e., the President's Budget) for fiscal year 2009 is based on the total cost of operating and maintaining weapons facilities and infrastructure; (2) determine the extent to which NNSA's fiscal year 2009 congressional budget justification for Stockpile Services identifies the total costs of providing foundational research and production support capabilities; and (3) discuss the implications, if any, of a smaller stockpile on RTBF Operations of Facilities and Stockpile Services costs.

In conducting our review and to accomplish all of these objectives, we reviewed and analyzed relevant documents concerning NNSA's weapons programs and activities, such as NNSA's congressional budget justifications for fiscal years 2009, 2010, and 2011 and the fiscal year 2009 national work breakdown structures for RTBF Operations of Facilities and Stockpile Services (see apps. II and III). We analyzed NNSA's work breakdown structures and compared them with GAO's best practices, as published in the *GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs*.¹ To help assess the merits and requirements of indirect cost allocations to warhead and bomb types, we examined the Statement of Federal Financial Accounting Standards No. 4, promulgated by the Federal Accounting Standards Advisory Board, and Cost Accounting Standards, promulgated by the U.S. Cost Accounting Standards Board. In addition, we interviewed key officials from the Department of Energy's Office of the Chief Financial Officer and Office of Engineering and Construction Management, and NNSA's Office of Defense Programs, Office of Management and Administration, Office of Field Financial Management, and site offices. Furthermore, we collected and analyzed budget, cost, and program documents and interviewed key officials from all eight NNSA sites. We visited six of the eight sites, including Lawrence Livermore (LLNL), Los Alamos (LANL), and Sandia National Laboratories (SNL); Nevada Test Site (NTS); Pantex Plant (Pantex); and Y-12 National Security Complex (Y-12),

¹GAO, *GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs*, [GAO-09-3SP](#) (Washington, D.C.: March 2009).

where in total we toured more than 30 weapons activities facilities. All of these facilities were *Mission Critical*—directly employed to meet highest-level NNSA weapons program milestones. We selected these facilities based upon the following criteria: (1) their uniqueness within the nuclear security enterprise, (2) the importance of the capabilities provided by the facilities, and (3) the complexity of their operations. We went to these sites to understand their roles in weapons program activities and the nuclear weapons budget, and to see the facilities, equipment, and infrastructure within the nuclear security enterprise.

To determine the extent to which NNSA's RTBF Operations of Facilities congressional budget justification for fiscal year 2009 is based on the total cost of operating and maintaining weapons facilities and infrastructure, we also collected data from NNSA's eight sites on their facilities and the sources of funding they use to fully support the operations and maintenance of weapons activities facilities and infrastructure. These data were collected through the use of a data collection instrument we developed and transmitted electronically to officials identified at all eight sites in the form of a Word Electronic Questionnaire. The data collection instrument was used to obtain RTBF program information and fiscal year 2009 expenditure data. The practical difficulties of employing any data collection instrument may introduce unwanted discrepancies. For example, differences in how a particular question is interpreted, the sources of information available to respondents, or the individual characteristics of the people who respond can introduce unwanted variability into the results. We included steps in both the data collection and data analysis stages to minimize such discrepancies. For example, we took the following steps:

- In developing this data collection instrument, we consulted with stakeholders within GAO and with NNSA officials to properly phrase our questions and to format the instrument; we also pretested the instrument with NNSA officials in the Office of Defense Programs and the NNSA Service Center, and with NTS, Pantex, and SNL management and operating (M&O) contractors, on a line-by-line basis to ensure the questions were clear, complete, and accurate, and made appropriate modifications and clarifications to increase data validity and reliability.
- Upon receiving responses from the sites to the data collection instrument, we analyzed data on costs, budget, work scope, direct funding sources, and indirect cost pools on a consistent basis for all sites; we followed up with sites as needed to ensure their responses were accurate and complete; and finally, we performed a reliability assessment of these data

and determined they were sufficiently reliable for the purposes of our report.

In addition, we reviewed NNSA documents such as the RTBF Operations of Facilities national work breakdown structure, the RTBF Mission Dependency Guidance, and sites' documents such as their RTBF Site Execution Plans and RTBF Quarterly Reports, and interviewed NNSA and site officials. We also requested general information and general fiscal year 2009 funding information from sites on several specific weapons activities facilities to use as examples in this report. We worked with GAO methodologists to develop criteria for selecting the facility examples such as facilities at sites we visited, facilities at both laboratories and plants, facilities with diverse funding expenditures, and facilities conducting both R&D and production missions.

To determine the extent to which NNSA's fiscal year 2009 congressional budget justification for Stockpile Services identifies the total costs of providing foundational research and production support capabilities, we also examined and analyzed NNSA's Stockpile Services national work breakdown and NNSA's expenditure data for fiscal year 2009, observed neutron generator and plutonium pit manufacturing facilities supported with Stockpile Services funds, and interviewed NNSA and site officials. In addition, we requested information from NNSA on specific Stockpile Services activities to use as examples in our report. We selected activities based on their financial significance in the Stockpile Services work breakdown structure.

To discuss the implications, if any, of a smaller stockpile on RTBF Operations of Facilities and Stockpile Services costs, we also reviewed documents such as NNSA's Final Complex Transformation Supplemental Programmatic Environmental Impact Statement and NNSA's Infrastructure and Modernization Report to obtain estimates of the nuclear security enterprise's fixed costs. In addition, we interviewed NNSA and site officials.

We conducted the work between April 2009 and June 2010 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: Readiness in Technical Base and Facilities Operations of Facilities

RTBF Operations of Facilities Funding and Work Breakdown Structure

Congressional spending directives designate funds within NNSA's Weapons Activities appropriation for the RTBF Operations of Facilities subprogram at each of NNSA's eight sites. In addition, a small amount is also directed for Institutional Site Support, which is at NNSA's discretion to prioritize for expenditure (see table 2).

Table 2: Congressional Spending Directives by Site for RTBF Operations of Facilities, Fiscal Year 2009

(Dollars in thousands)

Site	Spending directives
Kansas City Plant (KCP)	\$89,871
LLNL	82,605
LANL	289,169
NTS	92,203
Pantex	101,230
SNL ^a	123,992
Savannah River Site (SRS)	92,762
Y-12	235,397
Institutional Site Support ^b	56,102
Total	\$1, 163, 331

Source: NNSA's Fiscal Year 2010 Congressional Budget Justification.

^aSNL includes the New Mexico and California sites.

^bNNSA defines Institutional Site Support as supporting corporate activities across the nuclear security enterprise, including planning, program management and performance monitoring, independent and internal technical reviews and assessments, and contractor support. Institutional Site Support also provides funding for specific projects across the complex to meet changing programmatic requirements. Institutional Site Support funds are directed by Congress to NNSA, which obligates funds to sites based on priority need.

Table 3 provides NNSA's RTBF work breakdown structure applicable to all sites for fiscal year 2009 and showing three levels of detail. Sites may create further levels of detail for their own management, budgeting, or cost collection. Alternatively, sites may use their own work breakdown structures that they ultimately cross-walk to NNSA's work breakdown structure to report to NNSA program managers on how congressionally directed funds were expended.

**Table 3: NNSA's National Work Breakdown Structure for RTBF Operations of
Facilities, Fiscal Year 2009**

RTBF
Operations of Facilities (by site)
<i>Facilities Management and Support</i>
Facility Management and Administration
Facility Operations
Facility Engineering
Facility Planning and Analysis
Facility Training
Rental/Lease of Land/Building
Other Facility Support Activities
<i>Real Property Maintenance</i>
Management, Planning, and Engineering
Corrective Maintenance
Preventive Maintenance
Predictive Maintenance
<i>Scientific/Process Equipment and Capabilities (SPEC)</i>
SPEC Management and Administration
SPEC Operations
SPEC Engineering
SPEC Planning and Analysis
SPEC Training
SPEC Maintenance
SPEC Upgrades
Other SPEC Activities
<i>Utilities and General Services</i>
Utilities and General Services Management and Planning
Purchased Utilities
Site Utilities
General Site Services
<i>Environment, Safety, Health, and Quality (ESH&Q)</i>
ESH&Q Management and Planning
Environmental
Nuclear Safety
Industrial Safety and Health
Quality Assurance

**Appendix II: Readiness in Technical Base and
Facilities Operations of Facilities**

RTBF

Operations of Facilities (by site)

ESH&Q Document Control and Records Management

Waste Management

Excess Facilities Management and Disposition

Management and Disposition

Deactivation

Surveillance and Maintenance

Decontamination

Demolition

Other Excess Facilities Management and Disposition

Capital Equipment

SPEC Equipment

Facility Equipment

Other Project Costs (associated with RTBF line item construction projects)

General Plant Projects

Real Property General Plant Projects

Scientific/Process Capability General Plant Projects

Utilities General Plant Projects

Compliance General Plant Projects

Other Construction General Plant Projects

Expense Funded Projects

Real Property Expense Funded Projects

Scientific/Process Capability Expense Funded Projects

Utilities Expense Funded Projects

Compliance Expense Funded Projects

Other Construction Expense Funded Projects

Institutional Site Support

Congressional Directed Activities

Source: NNSA.

Differences in Sites' Cost
Accounting Practices for
RTBF Operations of
Facilities

Each of the eight sites in the nuclear security enterprise has established its own cost accounting practices for how to account for the activities necessary to operate and maintain weapons activities facilities and infrastructure. While individual M&O contractors may be Cost Accounting Standards (CAS) compliant,¹ differences in their cost accounting practices preclude NNSA from being able to identify the total costs to operate and maintain the facilities and infrastructure essential to achieving Stockpile Support and science, technology, and engineering (ST&E) program missions. These differences include determining (1) which weapons activities facilities and infrastructure individual sites support with RTBF Operations of Facilities funds, (2) which activities included in the RTBF Operations of Facilities work breakdown structure each site supports directly or indirectly, and (3) the additional funding sources sites use to support certain activities included in the RTBF Operations of Facilities work breakdown structure.

Facilities and Infrastructure
Supported with RTBF
Operations of Facilities Funds

Consistent with congressional funding direction, each site has discretion to determine which of its facilities and infrastructure will be supported with RTBF Operations of Facilities funds.² While NNSA has identified the mission essential facilities and infrastructure at each of its sites, NNSA does not require M&O contractors to pay for essential facilities and infrastructure with RTBF Operations of Facilities funds. For example, LLNL officials told us their top priority for RTBF Operations of Facilities funds is fully supporting safe and secure nuclear facilities operations. In fiscal year 2009, only KCP fully funded all of its essential weapons activities facilities with RTBF Operations of Facilities funds. Table 4 shows the extent to which weapons activities facilities and infrastructure were fully, partially, or not supported with RTBF Operations of Facilities funds in fiscal year 2009 across the nuclear security enterprise.

¹Our review did not address the extent to which individual M&O contractors' cost accounting practices are CAS compliant. Rather, our review focused on the extent to which CAS allows contractors' cost accounting practices to differ from one another to expend the same funds.

²In some instances, Congress directed that other programs, such as the Advanced Simulation and Computing Campaign, would pay for the operations and maintenance of specific *Mission Critical* weapons activities facilities and infrastructure associated with that program.

Table 4: Number and Percentage of Weapons Activities Facilities Supported Directly with RTBF Operations of Facilities Funds, by Category, Fiscal Year 2009

Facilities	Mission Critical facilities		Mission Dependent, Not Critical facilities	
	Number	Percent	Number	Percent
Fully supported with RTBF Operations of Facilities	97	44	84	5
Partially supported with RTBF Operations of Facilities	72	32	937	61
Not supported with RTBF Operations of Facilities	54	24	529	34

Source: GAO analysis of responses provided by site officials to data collection instrument.

Activities Included in the RTBF Operations of Facilities Work Breakdown Structure Supported Directly or Indirectly

While NNSA can identify the activities its contractors classify as direct to the RTBF Operations of Facilities program, NNSA cannot easily identify those activities its contractors classify as indirect but that also are included in the RTBF Operations of Facilities work breakdown structure. Six of the eight sites in the nuclear security enterprise reported to us that in fiscal year 2009 they allocated certain activities included in the RTBF Operations of Facilities work scope into indirect cost pools. These indirect cost pools are often funded through multiple funding sources.³ For example,

- NNSA includes utilities and general services, such as electric power and steam supplied to weapons activities facilities, as an activity in its RTBF Operations of Facilities work breakdown structure, but two sites—LLNL and SNL—did not consider utilities costs to be direct to the RTBF Operations of Facilities program in fiscal year 2009.
- The RTBF Operations of Facilities work breakdown structure includes real property maintenance—maintenance for facilities, facility equipment, and programmatic equipment—when that real property supports multiple, not individual, weapon programs. SNL officials told us that their direct costs to the RTBF Operations of Facilities program

³Consistent with CAS, when indirect cost pools were used to support these activities, the costs were paid indirectly sitewide, including for weapons activities facilities and infrastructure, not simply in lieu of using congressionally directed RTBF Operations of Facilities funds.

Nevada Test Site's U1a Complex

Year facility began operations: 1988

Facility dimensions: The 14 million-square foot complex is a laboratory approximately 960 feet underground and consisting of several mined horizontal tunnels

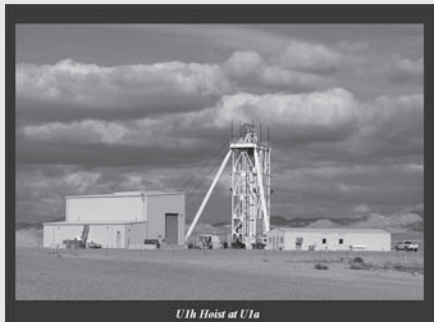
NNSA Defense Programs missions supported: U1a supports LANL's subcritical experiments, which use explosives to assess the properties of plutonium under high-pressures that stop short of a nuclear detonation

Other federal government missions supported: None

Key weapons capabilities and systems supported: U1a is used by the nuclear security enterprise to conduct shock physics experiments with plutonium and provides support to the entire enduring nuclear weapon stockpile

Total cost to execute the Operations of Facilities work scope in fiscal year 2009: \$15,965,957

RTBF Operations of Facilities expenditures in fiscal year 2009: \$15,965,957



Source: National Security Technologies (NSTec), LLC.

for real property maintenance include only the programmatic equipment that provides mission capabilities inside weapons activities facilities. Real property maintenance costs for facilities or facility equipment are indirect. In contrast, LLNL officials told us that real property maintenance costs for programmatic equipment, facility equipment, and facilities themselves may be direct costs to the RTBF Operations of Facilities program, depending on the facility and the nature of the equipment.

- NNSA includes SPEC, such as running and maintaining programmatic equipment and training staff to operate this equipment, in its RTBF Operations of Facilities work breakdown structure,⁴ but there were significant differences across the nuclear security enterprise in how SPEC costs were actually funded during fiscal year 2009. Three sites—KCP, Pantex, and NTS—funded all SPEC costs directly with RTBF Operations of Facilities funds. Another three sites—LLNL, LANL, and SNL—classified SPEC costs as direct and partially paid for these costs with RTBF Operations of Facilities funds. Y-12 did not fund SPEC with RTBF Operations of Facilities funds at all, while SRS reported that it did not spend any money on SPEC activities in fiscal year 2009.

⁴NNSA defines SPEC as including costs associated with maintaining, repairing, and upgrading the scientific and/or process equipment that provides Stockpile Support and ST&E programs with the capabilities needed to accomplish their missions.

Additional Funding Sources
Used to Support Activities
Included in the RTBF
Operations of Facilities Work
Breakdown Structure

Finally, all sites used funding in addition to RTBF Operations of Facilities funds to pay for activities included in the RTBF Operations of Facilities work scope in fiscal year 2009. Consistent with CAS, M&O contractors are allowed to use these additional funding sources as long as their cost accounting practices are disclosed; their costing practices for supporting facilities and infrastructure are consistently applied; the programs supporting facilities and infrastructure benefit from their use; and their practices otherwise comply with applicable cost principles, CAS, and the M&O contract. These additional sources of funding included (1) other Weapons Activities programs that in some instances are congressionally mandated, and (2) programs outside of Weapons Activities, including Defense Nuclear Nonproliferation, Department of Energy (DOE), and other federal agencies.⁵ NNSA officials cannot easily identify all of the costs associated with RTBF Operations of Facilities work scope paid for through these other funding sources. In response to our data collection instrument, site officials identified 11 sources of funding congressionally directed for other Weapons Activities programs and subprograms that they expended, in part, on activities they considered to be included in NNSA's RTBF Operations of Facilities work breakdown structure. For example,

- As congressionally directed, LLNL expended funds designated for the Inertial Confinement Fusion and High Yield and the Advanced Simulation and Computing Campaigns to support RTBF Operations of Facilities activities for facilities and infrastructure associated with these programs.
- LANL expended congressionally directed funds for the Directed Stockpile Work program to support activities included in the RTBF Operations of Facilities work breakdown structure—including some facilities management and support, real property maintenance, and SPEC costs.
- SRS expended funds congressionally directed for the Tritium Readiness Campaign to support all the activities included in the RTBF Operations of Facilities work breakdown structure at its Tritium Extraction Facility.

⁵NNSA's sites often undertake "work for others," which DOE Order 481.1C defines as the performance of work for non-DOE entities by DOE/NNSA personnel and their respective contractor personnel or the use of DOE/NNSA facilities for work that is not directly funded by DOE/NNSA appropriations.

LLNL's High Explosives Applications Facility (HEAF)

Year facility began operations: 1989

Facility dimensions: approximately 121,028 square feet

NNSA Defense Programs missions supported: High explosives research, development, and testing for the Science and Engineering Campaigns, Advanced Simulation and Computing (computer modeling), and Directed Stockpile Work (detonator surveillance)

Other federal government missions supported: Department of Defense's advanced conventional weapon technologies and Department of Homeland Security's threat assessments on conventional and improvised explosives

Key weapons capabilities supported: HEAF is used to conduct high explosives R&D shock research and as a laboratory for the design, development, and testing of detonators

Total cost to execute the Operations of Facilities work scope in fiscal year 2009: Approximately \$8.4 million

RTBF Operations of Facilities expenditures in fiscal year 2009: \$3.8 million

Other expenditures to execute the Operations of Facilities work scope in fiscal year 2009: FIRP and costs allocated to indirect cost pools



Source: Lawrence Livermore National Laboratory.

- Y-12 expended funds congressionally directed for the Facilities Infrastructure Recapitalization Program (FIRP) to support RTBF Operations of Facilities activities covering real property maintenance, excess facilities management and disposition, and construction projects.⁶
- NNSA includes capital equipment procurement for both SPEC and facility equipment in its RTBF Operations of Facilities work breakdown structure.⁷ However, most M&O sites only partially paid for capital equipment costs in their weapons activities facilities with RTBF Operations of Facilities funds in fiscal year 2009.⁸ Officials from multiple sites, including Pantex and SNL, told us that some capital equipment costs that could be paid for with RTBF Operations of Facilities funds can also be paid for with funds directed for other Weapons Activities programs, such as Stockpile Services, that use the equipment.

In addition, some sites with essential facilities that are used by multiple programs have developed user fee or cost recovery models for those facilities. These models are generally based on charges to programmatic users based on rates applied to, for example, the square footage of a facility users occupy or the volume of waste they produce. User fees may be charged as direct costs to Weapons Activities programs as well as to other NNSA, DOE, and non-DOE programs and work for others projects, or they may be charged through an indirect cost pool. These charges may be in addition to a base amount of support provided through RTBF Operations of Facilities. Some sites, such as SNL, NTS, and Y-12 apply cost recovery models to all of their facilities. In contrast, LANL applies user fees to those certain facilities that are multiprogram in nature and particularly expensive to operate and maintain. For example, LANL officials explained that in fiscal year 2009 it charged approximately \$34.8

⁶FIRP was authorized by Congress to eliminate a backlog of deferred maintenance in weapons activities facilities and infrastructure by fiscal year 2013. NNSA obligates funding for this program to sites on an individual project basis for work to address maintenance deferred prior to fiscal year 2005. While NNSA separates FIRP projects from RTBF Operations of Facilities work scope, we found that several sites view FIRP funds as integral to their overall maintenance funding.

⁷NNSA defines capital equipment as including costs for purchasing equipment that is not otherwise purchased as part of a line item construction project or is not attributed to a single Stockpile Support or ST&E programmatic use.

⁸The exception is KCP, which fully funded its capital equipment costs in fiscal year 2009 with RTBF Operations of Facilities funds.

LANL's Plutonium Facility (PF-4)

Year facility began operations: 1974

Facility Dimensions: approximately 232,753 gross square feet

NNSA Defense Programs missions supported: Directed Stockpile Work (plutonium infrastructure sustainment and life extension programs), ST&E missions associated with plutonium R&D, Advanced Simulation and Computing Campaign (computer modeling), and recovery and recycling of plutonium

Other federal government missions supported: NNSA's Defense Nuclear Nonproliferation; DOE's Office of Nuclear Energy; and DOE's Material, Identification, and Surveillance Program

Key weapons capabilities and systems supported: PF-4 capabilities include plutonium stabilization for storing and manufacturing plutonium components; surveillance and disassembly of plutonium weapons components; plutonium processing R&D; R&D testing on power sources; and storage, shipping, and receiving of special nuclear material

Total cost to execute the Operations of Facilities work scope in fiscal year 2009: LANL was unable to determine the total cost to execute Operations of Facilities work scope at PF-4

RTBF Operations of Facilities expenditures in fiscal year 2009: \$53.6 million

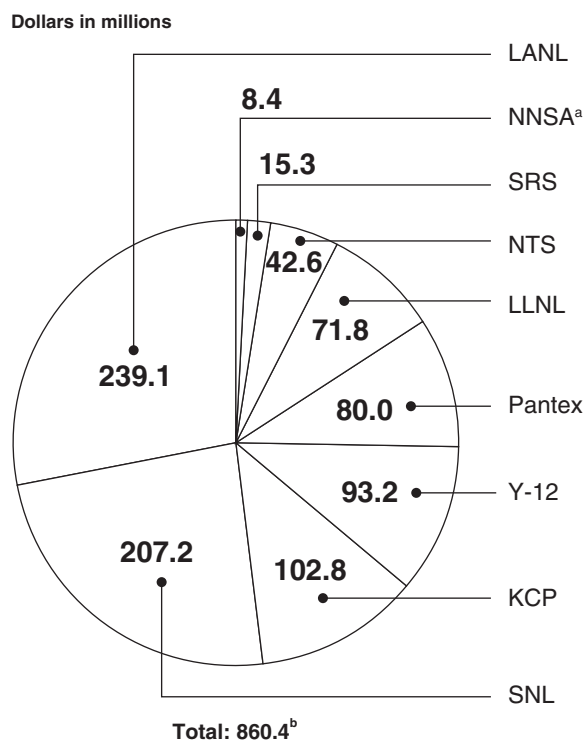
Other expenditures to execute the Operations of Facilities work scope in fiscal year 2009: \$34.8 million in cost recovery collected from Stockpile Services; Science Campaign; NNSA's Defense Nuclear Nonproliferation; DOE's Office of Nuclear Energy; and DOE's Material, Identification, and Surveillance program; additional costs allocated to indirect cost pools

million in user fees to Weapons Activities programs—such as the pit manufacturing program, and the Science and Engineering Campaigns—as well as to other work sponsors that used space inside the laboratory's plutonium facility.

Appendix III: Stockpile Services

Congressional spending directives designate funds within NNSA's Weapons Activities appropriation for the Stockpile Services subprogram. Within the subprogram, NNSA obligates funds to its eight sites for expenditure. In fiscal year 2009, NNSA obligated \$866.4 million to its sites to execute Stockpile Services work scope (see fig. 2).

Figure 2: NNSA's Stockpile Services Obligations to Sites, Fiscal Year 2009



Source: NNSA.

^aIncludes small amounts for sites outside the nuclear security enterprise.

^bThe \$6 million difference between the total shown here and the total of the five Stockpile Services work groups discussed on page 17 represents funds obligated to support M&O contractors from across the nuclear security enterprise who are temporarily assigned to duties at NNSA.

According to our cost guide, a work breakdown structure is the cornerstone of every program because it defines in detail the work necessary to accomplish a program's objectives and promotes accountability by identifying work products that are independent of one another.¹ This provides a basis for identifying resources and tasks for

¹GAO-09-3SP.

developing a program cost estimate. The ability to generate reliable cost estimates is a critical function, and a program’s cost estimate is often used to establish budgets. NNSA’s sites may create further levels of detail within the work breakdown structure for their own management, budgeting, or cost collection. Our cost guide is a compilation of cost estimating best practices from across industry and government. Among other things, these best practices discuss establishing a product-oriented work breakdown structure, which allows a program to track cost and schedule by defined deliverables. This allows a program manager to more precisely identify which components are causing cost or schedule overruns and to more effectively mitigate the root causes of overruns. For NNSA, a product may best be thought of more broadly as a capability, since a significant portion of NNSA’s mission is research and development (R&D). Thus, a product-oriented work breakdown structure for NNSA could be focused on the capability to execute a class of experiments, to produce a weapon component, or to conduct specified R&D. Our cost guide emphasizes that a product-oriented work breakdown structure should contain program management and other overhead activities to make sure all work activities are included. In contrast, a functionally based work breakdown structure—for example, one based on manufacturing, engineering, or quality control—would not have the detailed information to reflect cost, schedule, and technical performance on specific deliverables. Table 5 provides NNSA’s work breakdown structure applicable to all sites for fiscal year 2009 and showing four levels of detail.

Table 5: NNSA’s National Work Breakdown Structure for Stockpile Services, Fiscal Year 2009

Directed Stockpile Work
Stockpile Services
<i>Research and Development Certification and Safety</i>
Weapon Component Development
Base Hydrodynamic Experiments and Subcritical Tests
Department of Defense/Department of Energy Munitions Memorandum of Understanding
Research and Development Studies
<i>Management, Technology, and Production</i>
Management: Product Realization Integrated Digital Enterprise
Management: Weapons Training and Military Liaison
Management: Studies and Initiatives
Management: General Management Support

Directed Stockpile Work

Technology: Assessments and Studies

Production: Surveillance

Production: Support for External Production Missions

Production: Production of new non-weapon-specific base spares, test/handling gear, containers, and weapon components

Production: Maintenance of existing non-weapon-specific base spares, test/handling gear, containers, and weapon components

Production Support

Engineering Operations

Manufacturing Operations

Quality Supervision and Control

Tool, Gage, and Equipment Services

Purchasing, Shipping, and Materials Management

Electronic Product Flow Information Systems

Research and Development Support

Research and Development Infrastructure Support

Program Management and Integration for Research and Development Activities

Laboratory Research and Development Support to the Production Agencies

Nuclear Component Surveillance Activities

Quality Control for Research and Development Activities

Plutonium Sustainment

Pit Manufacturing: Facility Services and Support

Pit Manufacturing: Manufacturing Operations

Pit Manufacturing: Infrastructure and Program/Project Management

Pit Manufacturing: Equipment Engineering and Installation

Pit Manufacturing: Pit Component Characterization

Pit Capability: Infrastructure and Program Management

Pit Manufacturing: Technology Design and Development

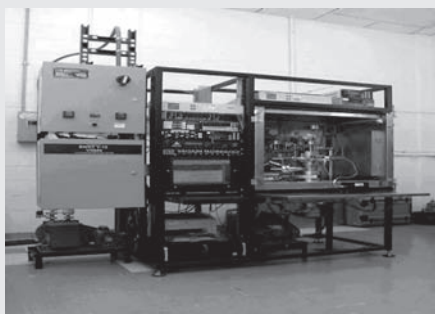
Source: NNSA.

As table 5 shows, NNSA’s Stockpile Services work breakdown structure is organized around five work activity groups, four of which are primarily functionally oriented. Descriptions of these work activity groups follow:

- *Production Support.* Production Support is the largest activity group within Stockpile Services. According to NNSA’s fiscal year 2009 congressional budget justification and as confirmed by NNSA officials, Production Support includes those non-weapon-type-specific or multi-weapon-type activities that a site performs to support its internal site

Tooling in Support of Manufacturing

In fiscal year 2009, \$59.6 million in Production Support funds was spent to provide tooling and tooling services at sites where production work occurs. Tooling provides production facilities with the tools, parts and accessories, machinery, equipment, and labor needed for production and to maintain production equipment. This work also involves preparation of specifications and designs for tooling and test equipment. The illustration below shows a vacuum calibration system—a piece of specialized equipment used to calibrate/certify vacuum gages—for which tooling funds support corrective and preventive maintenance.



Source: NNSA.

production mission, whatever that mission may be. More specifically, these support activities—such as engineering and manufacturing operations; quality supervision and control; tool, gage, and equipment services (tooling); purchasing, shipping, and materials management; and electronic information systems—enable the production of weapons components and weapon assembly/disassembly, and help support surveillance testing. To this end, NNSA officials characterized Production Support as paying directly for the indirect activities at individual sites that (1) are associated with providing manufacturing support for production processes and (2) support more than one warhead or bomb type.

- *Management, Technology, and Production (MTP)*. MTP is the second largest activity group within Stockpile Services. According to NNSA, MTP includes activities that (1) sustain and improve stockpile management, (2) develop and deliver weapon use control technologies,² and (3) result in production of weapons components for use in multiple warhead and bomb types. In contrast to Production Support activities that are focused on individual sites' production missions, MTP includes those activities that benefit the nuclear security enterprise as a whole. NNSA officials characterized MTP as supporting a mix of direct and indirect activities. More specifically, among other things, MTP management funds support weapons test data archiving and other shared data systems; MTP technology funds support studies and assessments relating to the safety and security of nuclear weapons; and MTP production funds support the interpretation of the results from surveillance tests, which are used to monitor and evaluate the condition, safety, and reliability of weapons in the stockpile.³ In addition, certain activities are captured within MTP that would be classified by NNSA if associated with a specific warhead or bomb type.⁴ According to NNSA officials, costs for these activities represent a relatively small amount of MTP, which one official

²Weapon use control technologies are solutions that can be engineered into nuclear weapons to help ensure denial of unauthorized use.

³According to NNSA officials, while the interpretation of surveillance results is supported with funds from MTP, actual surveillance testing is paid for through a different Directed Stockpile Work subprogram, Stockpile Systems, through which NNSA obligates funds to support specific warhead and bomb types.

⁴NNSA officials told us the agency classifies information that is specific to nuclear weapons design.

Hydrodynamic and Subcritical Tests

In fiscal year 2009, NNSA and its M&O contractors spent \$93.3 million in R&D Certification and Safety funds supporting the base capability to conduct hydrodynamic and subcritical tests. These experiments improve understanding of weapons materials. Hydrodynamic tests assess the performance and reliability of a weapon by using high explosives to detonate mock weapons that contain surrogate rather than fissile materials, to analyze the response of the adjacent materials in the weapon. Subcritical tests use explosives to assess the properties of plutonium under high pressures that stop short of a nuclear detonation. The illustration below shows the Cygnus dual-beam radiographic facility, which provides X-ray imaging of subcritical tests. Cygnus is located in the NTS's U1a Tunnel Complex, approximately 1,000 feet underground.



Source: NNSA.

estimated at approximately 10 percent of surveillance costs, or about \$4.6 million in fiscal year 2009.

- R&D Certification and Safety.* R&D Certification and Safety provides the underlying capabilities to mature basic research conducted in ST&E programs. In this sense, R&D Certification and Safety serves as a technology development bridge between research and weaponized technologies. Among other things, R&D Certification and Safety funds support three major activities. First, funds are used to support design work to develop certain limited life weapon components that are used in multiple warhead and bomb types and that must be exchanged on a regular basis because they expire. Second, funds support the specialized facilities, equipment, and personnel to maintain a base capability to perform hydrodynamic tests, which examine the performance of nuclear weapons pits using surrogate materials to replace fissionable materials, and subcritical experiments, which examine the material properties of plutonium. Finally, funds support the preparation of various types of studies, including those produced annually to report to the President of the United States on the safety, security, and reliability of the stockpile.
- R&D Support.* R&D Support is the smallest of the functional work activity groups in Stockpile Services. R&D Support consists largely of indirect activities that provide administrative and infrastructure support for sites' R&D missions. These activities include program management for and coordination of Stockpile Services' many different outputs, R&D quality control, computing hardware for personnel, and financial database maintenance.
- Plutonium Sustainment.* Plutonium Sustainment is the only fully product-oriented activity group in Stockpile Services. While incorporated as an activity group within Stockpile Services, Plutonium Sustainment has its own work breakdown structure that is independent from the other four Stockpile Services activity groups. The Plutonium Sustainment work breakdown structure includes production support, R&D support, and program management activities. According to an NNSA official, this work breakdown structure, which captures work activities associated with pit manufacturing and related R&D—as well as associated indirect and overhead costs—is largely a legacy from when Plutonium Sustainment was an ST&E program instead of part of

Stockpile Services.⁵ This is markedly different from the other four groups, where production or R&D activities are organized separately from their supporting overhead activities. The same NNSA officials said that nearly all Plutonium Sustainment funds are spent at LANL, which is home to the nation's pit manufacturing capability. These funds not only support the base capabilities for plutonium R&D and pit manufacturing, but also contribute to the operation and maintenance of the facilities and infrastructure necessary to conduct these activities as well as the actual manufacturing of a limited number of pits each year.

⁵Plutonium Sustainment became part of the Stockpile Services work breakdown structure in fiscal year 2009 once its primary goal, to reestablish the nation's capability to manufacture plutonium weapons components, was achieved. The capability to manufacture and certify pits is critical to maintaining the reliability of the stockpile. The nation's capability to manufacture pits was lost when DOE's Rocky Flats Plant, near Denver, Colorado, was closed in 1989. Beginning in 2002, a Pit Manufacturing Campaign was established as an ST&E program to reconstitute this capability. The campaign ended when this effort was determined successful, and funds to maintain the capability and continue R&D work on plutonium were transferred to Stockpile Services in fiscal year 2009.

Appendix IV: Comments from the National Nuclear Security Administration



Department of Energy
National Nuclear Security Administration
Washington, DC 20585
JUN 11 2010



Mr. Gene Aloise
Director, National Resources
and Environment
U.S. Government Accountability Office
Washington, D.C. 20458

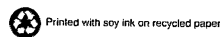
Dear Mr. Aloise:

The National Nuclear Security Administration (NNSA) appreciates the opportunity to review the Government Accountability Office (GAO) draft report, *NUCLEAR WEAPONS: Actions Needed to Identify Total Costs of Weapons Complex Infrastructure and Research and Production Capabilities*, GAO-10-582. I understand, that at the request of the Strategic Forces Subcommittee of the House Armed Services Committee, GAO was asked to determine (1) the extent to which NNSA's Readiness in Technical Base and Facilities (RTBF) Operations of Facilities congressional budget justification that supplements the *Budget of the United States* for FY 2009 is based on the total cost of operating and maintaining weapons facilities and infrastructure; (2) the extent to which NNSA's FY 2009 congressional budget justification for Stockpile Services identifies the total costs of providing foundational research and production support capabilities; and (3) discuss the implications, if any, of a smaller stockpile on RTBF Operations of Facilities and Stockpile Services costs. The review provided NNSA with recommendations focused on strengthening contractor cost reporting and improving cost evaluation, cost structure and data collection capabilities.

NNSA has recognized the need for improvements in these areas for some time and has been working diligently to enhance the integration of our budget information in a way that builds on past improvements. NNSA shares the GAO opinion that these improvements, when implemented, will address the noted concerns and will result in much better capability to present integrated budget information about the investments needed to deliver the Defense Programs mission.

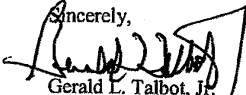
In many cases, NNSA's current capabilities rely on the expert knowledge of our program managers to define the necessary capabilities and linkages in an integrated fashion. NNSA is well on its way to implementing a portfolio management system for Defense Programs that incorporates a National Work Breakdown Structure that accounts for all work required to execute the mission and documents the cost of mission products and capabilities. We are making progress in several cost management initiatives including a uniform cost structure.

NNSA appreciates the GAO's efforts in identifying opportunities for ongoing improvement and is confident in our ability to achieve these improvements in the coming year. We are committed to being effective stewards of the taxpayer's money, and take that responsibility very seriously. We would like to acknowledge and thank the efforts of the GAO auditors in working with us in ensuring the technical accuracy of this draft report.



**Appendix IV: Comments from the National
Nuclear Security Administration**

If you have any questions concerning this response, please contact JoAnne Parker, Director,
Office of Internal Controls, at 202-586-1913.

Sincerely,

Gerald L. Talbot, Jr.
Associate Administrator
for Management and Administration

Enclosure

cc: Principal Assistant Deputy Administration for Military Application

Appendix V: GAO Contacts and Staff Acknowledgments

GAO Contact

Gene Aloise, (202) 512-3841, or aloisee@gao.gov

Acknowledgments

In addition to the contact named above, the following staff members made key contributions to this report: Jonathan Gill, Assistant Director; John Bauckman; Allison Bawden; Muriel Brown; Abe Dymond; Eugene Gray; Carol Henn; Alison O'Neill; Timothy Persons; Cheryl Peterson; Rebecca Shea; Vasiliki Theodoropoulos; Jack Warner; and Franklyn Yao.

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