Congressional Advisory Panel on the Governance of the Nuclear Security Enterprise

Interim Report

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Preface

Section 3166 of the Fiscal Year 2013 National Defense Authorization Act establishes the Congressional Advisory Panel on the Governance of the Nuclear Security Enterprise and tasks the panel to offer recommendations "…with respect to the most appropriate governance structure, mission, and management of the nuclear security enterprise." This interim report, required by Congress, summarizes the panel's initial findings on the current health of the enterprise and examines the root causes of its governance challenges. The panel is continuing to clarify and document the issues identified here. Recommendations to address the problems are being developed. The panel's findings and recommendations will be reported in depth in its final report, which is due to Congress in July, 2014.

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Executive Summary

This interim report presents the findings to date of the Congressional Advisory Panel on the Governance of the Nuclear Security Enterprise. Congress tasked the panel to examine the performance of this enterprise and to consider alternative governance models. The current viability of the U.S. nuclear deterrent is not in question. The panel finds, however, that the existing governance structures and practices are most certainly inefficient, and in some instances ineffective, putting the entire enterprise at risk over the long term.

This is no time for complacency about the nuclear deterrent. Each successive administration since that of President Eisenhower has reaffirmed the need to sustain a credible nuclear deterrent that is safe, secure and reliable. The panel endorses this commitment: America's deterrent forces remain of utmost importance, they provide the ultimate guarantee against major war and coercion, and our allies depend on these forces and capabilities for extended deterrence. Other countries carefully measure U.S. resolve and technological might in making their own decisions. The United States and its allies are in a complex nuclear age, with several nuclear powers modernizing their arsenals, new nuclear technologies emerging, and potential new actors—as well as regional challenges—raising significant concerns. Now would be a dangerous time to stumble.

This interim report summarizes the panel's findings on the current health of the enterprise and the root causes of its challenges. The panel is only now beginning to formulate the recommendations that will be provided in the final report. During the past six months, the panel has examined the entire enterprise, defined broadly to include the national leadership in Congress and the Executive branch, the components of the National Nuclear Security Administration (NNSA) and policy and oversight organizations within the Department of Energy (DOE), and NNSA's customers in the Department of Defense, Department of State, the Intelligence Community, and the Department of Homeland Security. Additionally, the panel benchmarked NNSA's management practices against proven management approaches used by other high-performing, high-technology organizations both in the private sector and in government. The panel has reviewed previous studies; conducted on-site visits to numerous installations; and benefitted from the views of dozens of expert witnesses.

One unmistakable conclusion of the panel's fact finding is that, as implemented, the "NNSA experiment" in governance has failed. The current DOE/NNSA structure of "semi-autonomy" within DOE has not established the effective operational system that Congress intended. This needs to be fixed as a matter of priority. These fixes will not be simple or quick, and they must address the systemic nature of the problem.

Despite the flaws in governance, the panel found noteworthy examples of success in NNSA's endeavors. To date, Science-Based Stockpile Stewardship has succeeded in sustaining confidence in the U.S. nuclear deterrent. Unmatched technical innovation on the part of NNSA's scientists and engineers has produced a dramatically increased understanding of the country's aging nuclear weapon stockpile. The labs and plants are providing solid support to non-proliferation efforts and unique expertise to the Intelligence Community. NNSA's Naval Reactors organization continues to provide world class performance in the development and support of the most advanced naval nuclear propulsion systems in the world.

But, NNSA as a whole continues to struggle to meet fundamental commitments. It has lost credibility and the trust of the national leadership and customers in DOD that it can deliver needed weapons and critical nuclear facilities on schedule and on budget. Simply stated, there is no plan for success with available resources. NNSA is on a trajectory towards crisis unless strong leadership arrests the current course and reorients its governance to better focus on mission priorities and deliverables.

At the root of the challenges are complacency and the loss of focus on the nuclear mission across the nation and within U.S. leadership following the end of the Cold War. Over the decades, this changed situation has translated into the absence of a widely accepted understanding of, and appreciation for, the role of nuclear weapons and nuclear technology in the 21st century. Within the nuclear enterprise this has been reflected in a lack of urgency and need for a compelling mission focus. Although the national leadership has provided strong policy statements and substantial sums of money to the enterprise, follow-through has been insufficient. Congress' current focus on the issue is a welcome development. But sustained national commitment and focus on the entirety of the mission and the enterprise charged with its execution is required.

Fundamental governance reform is needed to shape an enterprise that meets all of the nation's needs and establishes the essential infrastructure that is required for the coming decades. What is needed is a governance system that will:

- Issue clear plans and provide sufficient resources for success
- Assign and align responsibility, along with the necessary authority, and
- Provide strong, accountable leadership and management at all levels.

To achieve these conditions for success, five systemic disorders will need to be addressed.

Loss of Sustained National Leadership Focus

Since the early 1990s, the United States has experienced significant erosion in its abilities to sustain its nuclear deterrent capabilities for the long term. The atrophy of these capabilities has been well documented in numerous reports over the past decade. The fundamental underlying cause of this erosion has been a lack of attention to nuclear weapon issues by senior leadership—

both civilian and military—across both past and present Administrations and Congresses. This lack of attention has resulted in public confusion, Congressional distrust, and a serious erosion of advocacy, expertise, and proficiency in the sustainment of these capabilities. Absent strong national leadership, NNSA, as well as the whole Nuclear Security Enterprise, has been allowed to "muddle through." First and foremost, as mentioned previously, national-level support must be consolidated and focused.

A Flawed DOE/NNSA Governance Model

The current NNSA governance model of semi-autonomy within DOE is fundamentally flawed. NNSA has not established effective leadership, policy, culture, or decision making. As implemented, the Administrator of NNSA is not provided the autonomy from DOE headquarters staffs necessary to accomplish the mission, nor has this governance model created a sense of accountability for mission accomplishment within the involved DOE headquarters staffs. Indeed, contrary to Congress's intent, the design and implementation of NNSA governance has led to numerous redundancies, confused authorities, poor integration across the enterprise, and weakened accountability.

Absence of Sound Management Principles

NNSA, and the associated policy-setting and oversight organizations within DOE, reflect few of the characteristics of the successful organizations benchmarked for this study. An entrenched, risk-averse bureaucracy lacks a shared vision for, and a unified commitment to, mission accomplishment. Hence, teamwork is lacking. Both DOE and NNSA lack clearly defined and disciplined roles, responsibilities, authorities, and accountability aligned to NNSA's mission deliverables. Too many people can stop mission essential work for a host of reasons and those who are responsible for getting the work done often find their decisions ignored or overturned. Chains of command are not well defined and resources are micromanaged. Personnel management and career development programs, issue resolution processes, and deliverable-aligned budgets are deficient. Shortfalls in project management and cost estimating are well-documented and acute.

Dysfunctional Relationships between Government and Management and Operating (M&O) Partners

The trusted partnership that historically existed between the field and DOE/NNSA headquarters has eroded over the past two decades to an arm's length, customer-to-contractor, adversarial relationship. The changes in mission priorities from design and production to stewardship, and heightened regulatory oversight, overturned accepted priorities within the nuclear weapons program and radically altered the well-understood relationships between line managers and mission-support functions within the government as well as between the government and the M&O contractors. In the case of the laboratories, this has led to a significant

loss in the benefits of the federally funded research and development centers—the FFRDC model. The trust essential to this model—and underscored by a recent National Resource Council of the National Academies study[1]—has been eroded by unclear accountability for risk, and a fee structure and contract approach that invites detailed, tactical oversight rather than a more strategic approach with performance-based standards. Additionally, excessive, fragmented budget and reporting lines also confound effective and efficient programmatic management and further erode any sense of trust. Furthermore there is no enterprise-wide approach within NNSA. While there are examples where the relationship has improved, such as at the Kansas City Plant, government-M&O relationships remain highly inefficient and, in some cases, severely fractured.

Insufficient Collaboration with Customers

The collaboration issues identified by the panel are mainly with the Department of Defense weapons customers. This is, at once, a cultural and communications divide. There is no affordable, executable joint DOD-DOE vision, plan, or program for the future of nuclear weapons capabilities. There is a lack of effective joint planning and budget coordination because of a fundamental lack of mechanisms to ensure requisite collaboration and consensus to address core mission requirements. As a consequence, DOD customers lack trust in NNSA's ability to modernize facilities and execute warhead life extension programs. Although other customers appear to be satisfied, here, too, a more strategic approach would strengthen capabilities and the services provided.

In conclusion, lasting reform will require aggressive action and sustained implementation in all five of these areas. The changes needed undoubtedly will be difficult to implement regardless of where the enterprise is located within the government's structure, since the fundamental problems are cultural more than organizational. Organizational change, while not unimportant, is only a small portion—the easy portion—of the revisions that must be made to facilitate success. Previous efforts to reform and previous studies calling for action have largely failed due to lack of leadership follow-through, a lack of accountability for enacting change, and the lack of effective, sustained top-level demand for change from national leadership. The Department of Energy by itself would be challenged to oversee the radical steps that will be needed. Success is imaginable only with the strong and active engagement of a knowledgeable Secretary, supported by the White House and Congress, and a structure that removes impediments and that aligns to mission priorities.

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1 National Research Council, *Quality of Science and Engineering at the NNSA National Security Laboratories* (Washington, DC: National Academies Press, 2013).

Introduction

Section 3166 of the Fiscal Year 2013 National Defense Authorization Act establishes the Congressional Advisory Panel on the Governance of the Nuclear Security Enterprise, and tasks the panel to offer recommendations "…with respect to the most appropriate governance structure, mission, and management of the nuclear security enterprise." Over the past six months, the panel has performed fact finding in support of its task. The central focus has been on the National Nuclear Security Administration (NNSA), both headquarters and field, including the laboratories, production plants, and the Nevada National Security Site. The panel has also examined the other major elements of the overall national nuclear enterprise, to include the leadership in the Congress and the Executive Branch as well as NNSA's major customers in other Federal agencies. This report summarizes the panel's interim findings on the current health of the enterprise and examines the root causes of its governance challenges.

The NNSA was established in 1999. The Act creating the NNSA established the missions comprising six major elements as follows:[2]

- To enhance United States national security through the military application of nuclear energy
- To maintain and enhance the safety, reliability, and performance of the United States nuclear weapons stockpile, including the ability to design, produce, and test, in order to meet national security requirements
- To provide the United States Navy with safe, militarily effective nuclear propulsion plants and to ensure the safe and reliable operation of those plants
- To promote international nuclear safety and nonproliferation
- To reduce global danger from weapons of mass destruction
- To support United States leadership in science and technology

These statutory missions draw on a core set of science, engineering, and manufacturing capabilities that have been developed largely to address the needs of the nuclear weapon programs. The panel's evaluation has considered each mission, with the understanding that the NNSA is solely qualified to fulfill its mission to sustain the nuclear stockpile and provide naval nuclear power, while it is one of several contributors in the other mission areas.

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[2] NNSA Act (Title XXXII of the National Defense Authorization Act for Fiscal Year 2000, Public Law 106-65).

Recognizing that there has already been extensive examination of the enterprise, the panel reviewed thousands of pages produced by studies and reviews conducted both before and since the creation of the NNSA. The members heard from many experts, both inside and outside of the enterprise.[3] This included past and present senior leadership in the Department of Energy (DOE), NNSA, and Department of Defense (DOD), Field Office managers, Management and Operating (M&O) executives and a cross-section of personnel at each site, Laboratory Directors, chairmen of previous studies of the enterprise, Congressional staff, representatives from the customer communities (DOD, Intelligence Community, the Federal Bureau of Investigation, Department of State, Department of Homeland Security), the Defense Nuclear Facilities Safety Board (DNFSB), the Government Accountability Office, and the British nuclear weapons program.

The panel divided its field investigative work into four fact-finding groups as follows:

- The *National Leadership* group focused on the perspectives of the Executive branch (National Security Council Staff, Office of Management and Budget (OMB), and Office of Science and Technology Policy); the Legislative branch (both the Senate and the House of Representatives, and both the appropriations and authorization committees); Department of Energy headquarters; and the Nuclear Regulatory Commission, the DNFSB and other national-level stakeholders such as the Occupational Safety and Health Administration (OSHA) and the American Federation of Labor and Congress of Industrial Organizations (AFL-CIO).
- The *NNSA* group interviewed leadership personnel within NNSA headquarters and also conducted site visits to the three laboratories (Los Alamos National Laboratory (LANL), Lawrence Livermore National Laboratory (LLNL), and Sandia National Laboratory (SNL)), the four production plants (Kansas City Plant, Pantex, Savannah River Site, and Y-12 National Security Complex), and the Nevada National Security Site (NNSS). These visits incorporated discussions with the Field Offices (including the Albuquerque Complex) and the M&O contractor leadership as well as tours of some of each site's important facilities.
- The *Customer* group obtained perspectives of the clients of the enterprise to include DOD, the Intelligence Community, Department of State, Department of Homeland Security, the Federal Bureau of Investigation, and the British nuclear weapons program.
- The *Benchmarking* group examined successful high-risk, high technology organizations to identify potential processes and structures that might be adopted by the enterprise. Among these organizations were Naval Reactors, Navy Strategic Systems Programs, National Aeronautics and Space Administration (NASA), representatives from the civil

[3] A full list of those who provided not-for-attribution testimony to the panel may be found in Appendix A.

nuclear power industry, DOE's Office of Science, the Centers for Disease Control, the Federal Aviation Administration, and the British nuclear weapons program.

The panel's findings and recommendations will be reported in depth in its final report, which is due to Congress in July, 2014. This interim assessment provides ample evidence of troubled enterprise governance. The telling symptoms of distress reported to the panel were confirmed through many sources and are consistent with the findings of numerous earlier studies. Notable among these

- Lack of agreed mission priorities for the enterprise as a whole
- Goals that are not matched to NNSA's budgets
- A loss of credibility and the trust of the national leadership and customers that NNSA can deliver needed weapons and critical nuclear facilities on schedule and on budget
- Inability of the NNSA to accurately estimate costs and schedules as the basis for planning
- Highly detailed, inefficient budgeting and reporting requirements imposed upon the NNSA by Congress and further complicated by the NNSA
- Lack of operational experience, stability, and continuity of NNSA leadership
- Absence of structured decision making and agreed-upon authority within the DOE and NNSA to resolve issues promptly
- Failure of NNSA to appropriately delegate responsibility and authority, monitor results, and enforce accountability at virtually all organizational levels
- A risk averse culture within NNSA headquarters and field offices that fosters mistrust and encourages onerous transactional oversight of M&O performance
- Excessive and often vague DOE rules, regulations, and procedures
- Weak risk management processes and execution within DOE headquarters, the NNSA headquarters, and the NNSA's national laboratories
- Multiple, redundant DOE and NNSA mission-support activities (overseeing such functions as environment, safety, and health), with relatively autonomous authorities
- Mismatch of skill needs and staff capabilities, especially for program management and cost estimation
- Inadequate investments for infrastructure maintenance at the NNSA laboratories and production facilities
- Ineffectual NNSA communications, externally, with customers, and internally, from leadership to staff and from staff to leadership

- Erosion of the NNSA-laboratory partnership, undermining the contributions of the labs as Federally Funded Research and Development Centers

Despite the governance shortcomings that are the focus of this report, it is important to recognize the achievements of the individuals and organizations working within the enterprise. Selected significant accomplishments in Science-Based Stockpile Stewardship, naval nuclear propulsion, non-proliferation, and intelligence are highlighted in Table 1. Many customers are satisfied with their working relationships with the laboratories and plants, as well as with the products and services they obtain from the enterprise. Unfortunately, these accomplishments are often overshadowed by the NNSA's management shortcomings, including failures to serve key weapons customers, prudently manage resources, maintain agreed-upon schedules, and effectively communicate with its customers and national leadership.

Table 1. Noteworthy Accomplishments of the Nuclear Security Enterprise

- Nuclear Stockpile Maintenance program has delivered W87 and W76 Life Extension Program (LEP) warheads
- Science-Based Stockpile Stewardship
  - Vigorous processes for two decades of successful annual certification of the stockpiles
  - Tri-lab competition and collaboration (W76 dual-revalidation, Reliable Replacement Warhead competition)
  - World-leading scientific advances: significantly improved understanding of weapons' physics, aging, and material properties
  - Leadership in high-performance computing
  - Successful completion of new manufacturing and experimental facilities
- Naval Reactors programs successfully sustain and advance technologies for ship propulsion
- Continued plaudits for support to Interagency programs in areas such as non-proliferation, counter-proliferation, and counter nuclear terrorism (e.g., Intelligence Community, Department of Homeland Security, State Department)

The panel is seeking to identify lasting solutions for the failings of the enterprise governance system. It is the panel's judgment, reinforced by a comparison of the NNSA with

high-performing benchmark organizations, that this will require addressing five systemic disorders touching every organization within the national nuclear enterprise:

- First, a loss of sustained national leadership focus starting with the end of the Cold War, which has undermined the foundation for nuclear enterprise governance and contributes to virtually all of the observed problems;
- Second, a flawed DOE/NNSA governance model, resulting from the flawed implementation of legislation establishing NNSA as a "separately organized" sub-element of DOE;
- Third, an absence of sound management principles within DOE/NNSA;
- Fourth, dysfunctional relationships between the government and its M&O partners;
- Fifth, insufficient collaboration with customers.

Solutions must address each of these disorders. Difficult steps will be necessary, and senior management will need strong external support to bring about the needed change.

1. Loss of Sustained National Leadership Focus

Every aspect of the enterprise supporting the nuclear deterrent is colored by the fact that, since the end of the Cold War, nuclear weapons have become *orphaned* by senior officials in both the Executive and Legislative branches. The overall environment in which the enterprise operates across the U.S. government, in terms of interest, understanding, and advocacy, can be characterized as disparate, thin, and thinning.[4] Across the government, there remains a relatively small community of experts focused on nuclear deterrence matters, and they tend to be isolated in organizations with broad portfolios. To be sure, top-level guidance has been clearly articulated (e.g., the 2010 *Nuclear Posture Review,*[5] subsequent work leading to the Nuclear Weapons Employment Policy in June 2013,[6] Presidential speeches, the 2014 *Quadrennial Defense Review,*[7] and the annual *Nuclear Weapons Stockpile Memorandum*). Most recently, the President's FY15 Budget submission and the 2014 *Quadrennial Defense Review* emphasize the fundamental importance of nuclear deterrence and the commitment to invest in order to "retain an effective Triad."[8] In support of these policies, billions of dollars are provided every year. Nevertheless, the day-to-day operation of the enterprise suffers from a lack of follow-through in shaping plans and resources, and in overseeing mission execution, both from the Legislative and Executive branches.

Within Congress, there are multiple challenges. A dwindling number of Members of Congress advocate for the needs of the enterprise or fully appreciate the enterprise's mission and its importance. In both the Senate and the House of Representatives, the panel found varied and disparate perspectives, and uneven communication among committee Members and their staffs. Communication challenges are further compounded by multiple committee jurisdictions over various parts of the enterprise. Nevertheless, some committed legislators and staffs continue to bring focus to these issues, as evidenced by the charter for this review.

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4 Earlier studies, spanning more than a decade, have underscored this problem, including: Chiles Commission, *Report of the Commission on Maintaining United States Nuclear Weapons Expertise* (Washington, DC: DOE, 1999); Defense Science Board (DSB), *Report of the Defense Science Board Task Force on Nuclear Capabilities* (Washington, DC: Office of the Undersecretary of Defense for Acquisition Technology and Logistics, 2006); DSB, *Report of the Defense Science Board Task Force on Nuclear Deterrence Skills* (Washington, DC: Office of the Undersecretary of Defense for Acquisition Technology and Logistics, 2008).

5 DOD, *Nuclear Posture Review Report* (Washington, DC: DOD, April 6, 2010).

6 An overview of this policy is provided in Office of the Press Secretary, The White House, "Fact Sheet: Nuclear Weapons Employment Strategy of the United States," June 19, 2013, http://www.whitehouse.gov-the-press-office/2013/06/19, accessed April 30, 2014.

7 DOD, *2014 Quadrennial Defense Review* (Washington, DC: DOD, March 4, 2014).

8 Ibid., 32.

Some Congressional policies and practices hamper effective and efficient execution of the mission. First, Congress has increased the number of budget control points imposed on the enterprise. In 1998, there were nine control points; today, in contrast, there are eighty-two imposed on NNSA. This has restricted the ability of the enterprise to manage efficiently and adjust resources as needed to meet mission priorities. A second budget issue is one that applies to the entire U.S. Government: the impact of Continuing Resolutions and the Budget Control Act. As funding is issued incrementally (and often late in the year of execution), the ability to manage the array of interrelated activities and adhere to multi-year schedules is compromised, which ultimately results in both increased cost and delivery delays. In addition, the inability of Congress to confirm nominees to important leadership positions in a timely manner leaves key roles vacant, hinders others already working within the organization to effect necessary changes pending the arrival of new leadership, and ultimately risks reducing the number of well-qualified leaders who are willing to subject themselves to this process.

Leadership challenges within the Executive Branch are evident as well. DOE has a broad span of civilian responsibilities in addition to the nuclear security programs, and few principals in DOE headquarters, outside of NNSA, focus on nuclear weapon issues. As for DOD, several key senior staffs and analytical activities focused on deterrence strategy, operations, and programs have been eliminated or significantly reduced over the past two decades.[9] Executive Branch oversight is constrained by the limited staffs in both the National Security Council and the Office of Management and Budget. Studies and after action reviews of lapses in nuclear operations typically find that oversight mechanisms, leadership decisions, and workforce attitudes are shaped over time by the weakened top management focus on nuclear weapons. The most recent incident within DOE is the Y-12 security incursion. DOD examples during the past seven years include the unauthorized, inadvertent transfer of nuclear-armed Advanced Cruise Missiles from Minot Air Force Base (AFB) to Barksdale AFB, the mistaken shipment of Intercontinental Ballistic Missile (ICBM) warhead non-nuclear components to Taiwan, and recently-reported problems with personnel supporting U.S. ICBM operations.

In short, the governance of the enterprise has suffered from a lack of strong, focused political leadership at the department and national level. This is manifest in at least three ways.

A. Lack of a Unifying Narrative Clarifying Mission Priorities

Good governance begins with a clear understanding of mission priorities. Existing policy guidance supports each of NNSA's missions, but the guidance does not resolve and delineate program and resource priorities among those missions. Consequently, the panel has found there

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9 DSB, *Report of the Defense Science Board Task Force on Nuclear Deterrence Skills*.

is no agreement across the government.[10] For many, the core mission is nuclear weapons stewardship. Others place non-proliferation programs as the top priority. Another view is that leadership in nuclear security science and engineering, not the nuclear force itself, is the core capability that underwrites deterrence. These views compete in setting programmatic and resource priorities; few interlocutors chose to name one mission as *core*, and each is able to cite higher-order guidance in support of the priorities they perceive. National leadership has the essential role in establishing the needed strategy, guidance, and resources.

B. Lack of an Executable Plan

Good governance also requires an implementable plan. Lacking strong leadership that unifies priorities, there has been no mechanism for the NNSA, its customers, and the national leadership to converge on a credible resource-loaded plan to chart the path ahead. The President's annual Nuclear Weapons Stockpile Memorandum and the Nuclear Weapons Council evolving "baseline" plan, for instance, provide important direction, but they do not provide programmatic guidance. As discussed in Section 5 on NNSA's collaboration with its customers, the Nuclear Weapons Council and the Mission Executive Council for interagency customer coordination continue to struggle in setting priorities, defining the enterprise's needs, and identifying resources to support those needs. And, of course, planning efforts have been seriously undermined by the turbulent national budget environment as well as by NNSA's inability to accurately estimate costs.

A rough estimate, based on assessments by DOD's Cost Assessment and Program Evaluation Office and the Congressional Budget Office, is that the aggregate NNSA program, as was structured in its 2014 Stockpile Stewardship and Management Plan, was at least $10 billion under-funded over the coming decade.[11] The recently released 2015 Stockpile Stewardship and Management Plan reduces projected funding over the next decade and proposes significant delays in the delivery of several major life extension programs and nuclear facilities.[12] Without commitment to an executable plan, NNSA has reacted and adjusted to funding as it is doled out year-to-year, or month-to-month. Large construction projects, Life Extension Programs (LEP),

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[10] The most wide-ranging and comprehensive recent document on the lack of consensus can be found in Stephanie Spies and John K. Warden, *Forging a Consensus for a Sustainable U.S. Nuclear Posture* (Washington, DC: Center for Strategic and International Studies, April 2013). See, in particular, pages 10 and 11 on the need for a unifying, lasting consensus amongst our national leadership. See also Strategic Posture Commission, *America's Strategic Posture: The Final Report of the Congressional Commission on the Strategic Posture of the United States* (Washington, DC: United States Institute of Peace, 2009).

[11] OSD Office of Cost Assessment and Program Evaluation, "NNSA Governance Discussions: Briefing to the Advisory Panel" (Washington, DC: DOD, December, 2013); Congressional Budget Office (CBO), *Projected Cost of U.S. Nuclear Forces, 2014 to 2023* (Washington, DC: CBO, December 2013).

[12] U.S. Department of Energy (DOE), *FY2015 Stockpile Stewardship and Management Plan* (Washington, DC: DOE, April 2014).

and infrastructure modernization investments are managed with incremental funding. This creates significant inefficiency. In each area the enterprise routinely incurs program slips, delivery delays, program suspensions, and accumulations of deferred maintenance—all leading to increased long-term costs.

C. Absence of Follow-Through for Governance Reform

Governance has also been affected by another symptom reflecting unfocused leadership: the weakened ability of NNSA leaders to address controversial governance problems, including personnel reforms, Federal workforce initiatives, shifts in budget priorities, re-sizing or re-shaping of the complex's infrastructure, and the enforcement of accountability. Because the NNSA has lacked consistent, high-level political support, it has muddled through, adopting a reactive style and failing to make tough management choices, even though many NNSA leaders have seen the need to address the governance problems this report and others outline.[13] The difficult work in addressing the fundamental problems will fall on the shoulders of the NNSA leadership and the operating units of the enterprise. But, their efforts cannot succeed without the strong national level support for tough and sometimes politically difficult actions. To achieve this, it will be necessary to consolidate and focus available support to establish the nuclear weapons mission as a national priority in Congress and in the Executive Branch.

[13] See, for example, DSB, *Report of the Defense Science Board Task Force on Nuclear Deterrence Skills*; and Spies and Warden, *Forging a Consensus for a Sustainable US Nuclear Posture*.

2. A Flawed Department of Energy/National Nuclear Security Administration (DOE/NNSA) Governance Model

Despite the intent of the NNSA Act to create a *separately organized* NNSA within DOE, the NNSA has not established autonomous leadership authorities, a policy framework, distinct culture, or integrated decision-making mechanisms.[14] The panel concludes that the relationships among NNSA, the Secretary of Energy, and the DOE headquarters staffs are fundamentally broken and must change.

Except for Naval Reactors, the NNSA Act does not provide a blanket exemption of NNSA from DOE orders and directives.[15] NNSA decisions and initiatives remain subject to DOE headquarters staffing processes prior to consideration for Secretarial approval. For instance, the department's directive program (DOE O 251.1C) requires policies, orders, notices, guides, and technical standards to be reviewed by a Directives Review Board chaired by the Director of theOffice of Management.[16] Senior representatives from the three Under Secretarial offices, the Office of General Counsel, and the Office of Health, Safety and Security all serve as members whose concurrence is needed before final issuance. Should the review board be unable to reach consensus, the Deputy Secretary decides whether to overturn the position of the directive's originating office.

DOE's implementation of the NNSA Act has produced parallel, intertwined NNSA and DOE headquarters staffs in many functional areas, rather than truly separate or independent DOE

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14 "…NNSA and DOE have not fully agreed on how NNSA should function within the department as a separately organized agency. This lack of agreement has resulted in organizational conflicts that have inhibited effective operations." Government Accountability Office (GAO), *National Nuclear Security Administration: Additional Actions Needed to Improve Management of the Nation's Nuclear Programs* (Washington DC: GAO, 2007).

15 DOE and NNSA define and govern their relationship based on legislation that does not unequivocally assign policy and risk acceptance authority. *§ 7144 of 42 U.S. Code Chapter 84* reads, "The Secretary shall be responsible for establishing policy for the National Nuclear Security Administration" and "The Secretary may direct officials of the Department…to review the programs and activities of the Administration and to make recommendations to the Secretary regarding administration of those programs and activities, including consistency with other similar programs and activities of the Department." *§ 7144(a)* further states that, "The Secretary shall be responsible for developing and promulgating the security, counterintelligence, and intelligence policies of the Department." These statutes conflict with *§ 2402(b) of 50 U.S. Code Chapter 41* which declares, "The Administrator has authority over, and is responsible for, all programs and activities of the Administration…including…(2) Policy development and guidance…(6) Safeguards and Security…(9) Environment, safety, and health operations" and *§ 2402(d)* which states "the Administrator can establish NNSA-specific policies unless disapproved by the Secretary."

16 U.S. Department of Energy, *Departmental Directives Program*, DOE O 251.1C (Washington, DC: Office of Management, January 15, 2009).

and NNSA staff offices.[17] Parallel staffs exist in areas such as General Counsel, Human Capital Office, Public Affairs, Legislative Liaison, Chief Financial Officer, Environmental, Safety and Health (ES&H), Security, and Chief Information Office. Members of both the DOE headquarters and NNSA staffs point to the inefficiencies this creates. For example, NNSA has separate, non-integrated personnel systems and is not participating in an ongoing DOE effort to reduce support costs. The failure of a separately organized NNSA is further elucidated in the examples provided in sub-section C.

As implemented, the NNSA Act has actually been counter-productive. The problems fall into three main areas.

A. Overlapping DOE Headquarters and NNSA Staff Responsibilities

The parallel DOE headquarters and NNSA staff structures increase bureaucracy, cloud decision-making authority, and add to the number of people without clear authority and accountability who can stop or delay decisions. As one field representative put it, "We suffer in a regulatory framework where there are no clear lines of appeal or decision-making and no integrated place for the cost-benefit analysis to be done. For example, regarding facility safety and operational infrastructure, I get direction from the Office of Acquisition and Project Management, the Defense Programs leadership, the leadership for infrastructure management, DOE headquarters, and the Defense Nuclear Facilities Safety Board. How am I to do my job when getting direction from five different organizations?" Outcomes are determined by negotiations among the competing interests, which consume time and energy, and tend to yield ultra-conservative, minimal-risk approaches.

B. A Deepened Divide between Line Management and Mission-Support Responsibilities

Under the existing parallel staff structure, DOE headquarters staffs continue to exercise their mission-support oversight of NNSA, but they do not have the countervailing pressures to accomplish the mission. This structure skews incentives at the DOE headquarters level. These factors create strong and counter-productive incentives to eliminate all risks—large and small—rather than seeking to effectively manage the most important ones. Because many officials in the DOE headquarters have lacked a compelling interest in mission execution (as many outside observers have noted), the staff conservatism is not challenged by the department's leadership.

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[17] Earlier studies arrived at this conclusion as well. "Implementation of the NNSA Act failed to achieve the intended autonomy of NNSA within DOE." Elizabeth Turpen, *Leveraging Science for Security: A Strategy for the Nuclear Weapons Laboratories in the 21st Century* (Washington, DC: Stimson, 2009). "The governance structure of the NNSA is not delivering the needed results. NNSA has failed to meet the hopes of its founders. It lacks the needed autonomy." Strategic Posture Commission, *America's Strategic Posture.*

C. Ineffective and Inefficient DOE Orders, Directives, and Rulemaking Processes

Because of the diversity of DOE operations, orders are often written broadly to apply to both non-nuclear and nuclear activities even though the latter may demand special considerations. Consequently, DOE orders for ES&H and security often lack the precision, consistency, and clear implementing guidance necessary to translate the order's intent into practice. Not all sites have the same version of DOE orders for ES&H and security policy reflected in their contract. Indeed, there are sites that have both NNSA and DOE orders in their contract covering the exact same ES&H topic; although these orders may be similar, they can contain subtle, but crucial, differences.

The ambiguity in applicable standards compounds the problems of resolving issues among staffs who have unclear roles and authorities in DOE and NNSA headquarters and lack structured administrative procedures for decision making. In contrast, other regulatory bodies, such as the Nuclear Regulatory Commission or the Occupational Safety and Health Administration, have formal processes for clarifying the intent of their regulations and resolving issues as they arise, including disciplined risk analysis and risk acceptance procedures. Field participants see the lack of such processes for DOE or NNSA as a key impediment. As one laboratory participant stated, "Even if the lab has a rock-solid technical justification for its design, there is not a central point of contact in NNSA for adjudicating and getting a final decision on a safety-based design change." The frustration is evident: "This process takes a long time; it shouldn't be this hard. And, in this process, there is never any link to cost or mission."

The internal weaknesses in DOE's regulatory apparatus also have significantly weakened the DOE/NNSA's ability to engage effectively with the Defense Nuclear Facilities Safety Board. Congress chartered the DNFSB to provide independent oversight, by identifying safety concerns and raising issues with respect to the DOE's implementation of its own orders. At the same time Congress has recently stated that, "it is incumbent upon the Secretary to reject or request modifications to DNFSB recommendations if the costs of implementing the recommendations are not commensurate with the safety benefits gained."[18] Given the statutory role of the DNFSB as an independent oversight arm for public safety, and the lack of a DOE analytical capability to effectively evaluate options to respond to its recommendations, the DNFSB exerts a dominant influence over DOE's risk management in nuclear safety policies and programs, which at times leads to actions that do not reflect prudent risk management or safety concerns.

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18 "Joint Explanatory Statement to Accompany the National Defense Authorization Act for Fiscal Year 2014," *Congressional Record* 159: 176 (December 12, 2013), H7968.

3. Absence of Sound Management Principles

The panel's benchmarking activities identified a number of proven management characteristics common to successful high-risk, high technology operations. (See Table 2.) Prominent among these are a shared vision and mission priorities to chart the path ahead; the clear definition and disciplined exercise of roles, responsibilities, authorities, and accountability aligned to mission priorities; a technically competent workforce with the right skill mix and capabilities; clear plans with careful analysis of the resources needed to succeed; structured decision-making processes, with an emphasis on timely resolution of issues; and a structure and budget aligned to focus on customer deliverables.

Few of these requisites for success exist across the NNSA's management system--Naval Reactors is one exception. The observations here focus on ten areas where NNSA's management practices are inadequate. In their combined effect, these shortfalls undermine NNSA's leadership, impede accountability, and are corrosive to the culture. NNSA's inadequate resource management practices give rise to unreliable cost estimates and plans that have eroded NNSA's credibility and trust with DOD and Congress. Shortfalls internal to NNSA are compounded by the ill-defined relationships between NNSA and DOE headquarters staffs identified in the preceding section.

One senior NNSA official summed up the current situation for the panel as follows: "An effective management system is timely, accurate, and simple; our NNSA system is none of these." A major overhaul will be needed to align the structure, resources, and decision processes with mission priorities.

Table 2. Criteria for Success in High Reliability, High Tech Organizations

General	• Universally understood and accepted purpose • Effective culture developed over many years by transformative leadership and maintained by indoctrinating carefully selected personnel • Adequate visibility with external stakeholders
Structure	• Clearly established, codified, and reinforced lines of authority, responsibility, and accountability • Formal, inclusive, decisive, prompt, and documented decision-making processes • Deliberative body, such as a Board of Directors or Management Council, which obliges the organization to collectively engage in risk-based resource allocation decisions to accomplish mission • Separation of program/mission functions from institutional/support functions

Personnel	• Long-tenured director and/or senior leadership with extensive experience • Technically proficient and accomplished staff • Exceptional candidates recruited early to instill and sustain culture • Professional development programs emphasizing problem identification/solving, continuous learning, leadership, and the socialization of best practices
Commun-ications	• Mission priorities aligned with purpose and frequently communicated by senior leadership • Information flows freely and quickly up and down the organization, and decisions are made at the appropriate levels • Few if any obstacles (people or processes) prevent bad news from moving up the chain of command • Mechanisms exist for field oversight offices and site managers to communicate regularly and directly with the head of the organization
Planning and Budget	• Single strategic planning reference document guides all decisions • Unwavering adherence to a disciplined planning and budget process, which is comprehensive and detailed
Program Management	• In a government operation, government program managers oversee efforts, but contractors execute the work within established policies • Lean and authoritative site offices have sufficient technical and operational expertise to effectively oversee the work • Stakeholders are included early in project life cycle and strive to understand all requirements and regulations upfront • Technical and financial elements of programs are scrutinized in order to validate efforts and control costs • The more hazardous the operation, the more safety is considered part and parcel of mission performance • Specialized ES&H and security standards are used only when more generally accepted standards (e.g., industrial standards, OSHA standards) are shown to be inadequate or unclear
Contracts	• Contracts focused and evaluated on costs and mission performance, not award fees related to aspects other than meeting the mission • Contracts consolidated where appropriate to achieve economies of scale • Contracts competed Cost Plus Fixed Fee (very low) with no incentive/bonus awards or Fixed Price Incentive (based on mission performance), depending on the work being done

A. Lack of a Shared NNSA Vision, Mission Priorities, and Plans

Accountability, organizational alignment, and operating culture all must flow from a common understanding of vision and mission priorities. During the Cold War, the weapons program was driven by an ambitious but relatively predictable product delivery cycle of design, test, and build—which at its peak, delivered up to a thousand new nuclear weapons each year.

Today, there is no agreed-upon national plan for NNSA's future path with identified resources. This lack of clear plans with associated resources and mission priorities to focus

execution is perhaps *the* fundamental flaw in NNSA governance. NNSA and its customers have critical roles in developing the needed strategy, guidance, and resources.

B. Absence of an Effective Operational Culture and Workforce

The NNSA has not taken the steps necessary to build a cohesive culture that instills accountability for customer deliverables, nor has it instituted the personnel programs needed to build a workforce with the necessary technical and managerial skills for operations. The purposeful development of leaders, managers, and staffs is essential to any governance system. The effective organizations benchmarked for this study focus on personnel management to create a reinforcing virtuous cycle: proven leaders emerge from careful selection and decades of experience involving careful development and screening. Such leaders make a system work well. They also attract and inspire other high-caliber people to join and stay in their organizations.[19] As one example, the current Director of Navy Strategic Systems Programs (SSP) started his career within that organization as a junior officer, and almost all of his subsequent assignments have been in the command. In addition to deep familiarity resulting from a long career with the same organization, long command tours provide needed continuity and allow the Director to promulgate and sustain the desired culture. Recently, the tenure of the SSP's Director was extended from about four years to eight years to strengthen this benefit.

A key staffing issue for the NNSA is the lack of operational experience in headquarters. In the peak years of the nuclear weapons program, the operational core of the nuclear enterprise was located in the Albuquerque Operations Office. Albuquerque synchronized the cycle of design-test-build throughout the Cold War, until 1992, when the production of new weapons was suspended. Albuquerque was officially disbanded ten years later, in 2002. NNSA headquarters assumed Albuquerque's operating functions (which were greatly diminished by then since the U.S. had ceased producing warheads), and decades of operational experience, knowledge, and technical expertise within the Albuquerque staff was lost in the reorganization.[20]

Now, as the United States embarks on an intensive series of warhead life extension programs covering the entire stockpile, a leadership team with deep experience and continuity (such as the team in the Albuquerque Operations Office) would be an enormously valuable asset

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19 At benchmark organizations, the new entrants are carefully screened and selected, in part based on suitability for long-term careers within the organization. Employees tend to spend long careers within the organization. Promotion to the most senior levels (other than a political appointee) is usually from within, and these organizations favor those with broad-based career experience within the organization.

20 NNSA's needs more professionals with proven project management capabilities for the Life Extension Programs and nuclear facilities construction and for individuals with skills in costing and resource management are addressed in Sub-sections G and H, below.

for governing the enterprise. Creating and sustaining a personnel management system to build the needed culture, skills, and experience is a vital component of governance reform.

C. An Unenforced Chain of Line Management Authority

DOE/NNSA roles, responsibilities, authority, and accountability are not clearly defined, aligned, or enforced. As an example, NNSA undertook to draft a Functions, Roles, and Authorities Manual to clarify how the NNSA management system should work, but this manual has never been completed. Experts decry the corrosive effects resulting from the lack of understanding of responsibilities within NNSA headquarters and the field offices. Some mission-support organizations view their role as a mission rather than support functions under which the mission is to be performed. As a consequence, some organizations responsible for mission-support functions often operate independently of line management. The problems within NNSA are further aggravated by the confusing governance relationships with DOE headquarters staffs, as discussed in the previous section.

The confusion in roles and responsibilities is compounded by several other flaws in NNSA's operating model: the lack of systematic processes for decision making; the absence of sufficient authorities for program managers to be accountable for major deliverables; and the high degree to which budgets are partitioned across the enterprise. These related issues are discussed in turn.

D. Lack of Mechanisms for Timely, Informed Decision Making

Effective organizations employ structured decision-making mechanisms to clarify roles and responsibilities and to integrate the performance of mission-support functions with line management responsibilities. Such processes not only expedite decision making, they also clarify who can say yes and who can say no when decisions need to be made. Effective organizations systematically track issues. They document decisions and follow up. They empower people to take decisions as far down the management chain as is reasonable, and they have procedures for elevating issues up the chain when necessary. They measure timeliness of decisions, and they study and improve the decision-making process itself.

Few, if any, such decision mechanisms exist in NNSA today; NNSA lacks structured processes that ensure information is shared, problems are surfaced, and timely decisions are made. This creates operational problems across the enterprise. Field operators find they sometimes must petition numerous headquarters staff offices for answers on policy or resource issues.

E. An Inflexible Budget Structure that Undermines Mission Execution

The problems with decision making are amplified today by NNSA's attempt to manage the operating sites with detailed budgets and milestones. Historically, the Albuquerque Operations

Office integrated the execution of programmatic work for the weapons within and among the sites. Sites were funded to provide a level of capability, the Operations Office coordinated the work within that capability, and there was considerable flexibility to adjust within fairly broad budget categories. Close coordination between operations and budgeting officials enabled this approach to work well when DOE was producing hundreds of new weapons per year, and this demanding but fairly predictable workload provided the momentum for driving a cycle of work on new designs, testing, and manufacturing.

Effectiveness and efficiency have been undermined as the budget structure has become more detailed and the control of the budget has been dispersed across many NNSA headquarters' organizations. No doubt this provides a degree of control for NNSA offices, but it also creates a high degree of complexity for managers at all levels. The result is increased delay and bureaucratic friction, and reduced programmatic and operational flexibility.[21] The combination of detailed budgeting, diffused responsibility, and poor communications practically guarantees wasteful execution. Today there are thirteen Deputy and Associate NNSA Administrators with mission and mission-support functions. These offices are responsible for eighty-two congressional budget items, and they issue hundreds of more detailed budget reporting lines to the sites. (LANL reported that NNSA funds are provided with over 500 budget reporting lines and associated milestones; Pantex reported its number is 225. Other sites have comparable numbers.) If one believes in the adage, "the government is what it funds," then the NNSA is a collection of hundreds of weakly integrated projects.[22] The overlay of confused roles and responsibilities, in combination with highly detailed budgets, begets inefficient and ineffective mission execution.

Those in the field report that they often must act to integrate funding across the resource owners in NNSA. In many cases, sites are unable to focus resources on the enterprise's priorities because the budget and reporting lines are too detailed and they do not have the ability to move resources to where they are needed to meet those priorities; headquarters program managers will penalize them if they try or it may require a Congressional reprogramming. For example, one site was provided all the funding needed for a task within Directed Stockpile Work, but the site received only 75 percent of the funding needed to meet that task's associated security requirements. Indeed, in the case of Directed Stockpile Work, NNSA has some 1,000 budget

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[21] National Academy of Public Administration, *Positioning DOE's Lab's for the Future: A Review of DOE's Management of Oversight of the National Laboratories* (Washington, DC: National Academy of Public Administration, 2013).

[22] The site-specific impact of this is highlighted by other sources. "The budgetary controls that have led to the creation of thousands of 'funding buckets' significantly reduce the labs' flexibility; creates excessive administrative costs and burdensome reporting requirements; and impedes mission accomplishment." *Ibid*., 27; see also National Research Council, *Managing for High-Quality Science and Engineering at the NNSA National Security Laboratories* (Washington, DC: The National Academies Press, 2013), 4.

reporting lines. Budgetary inconsistencies such as this lead to substantial delays and undermine efficient mission execution.

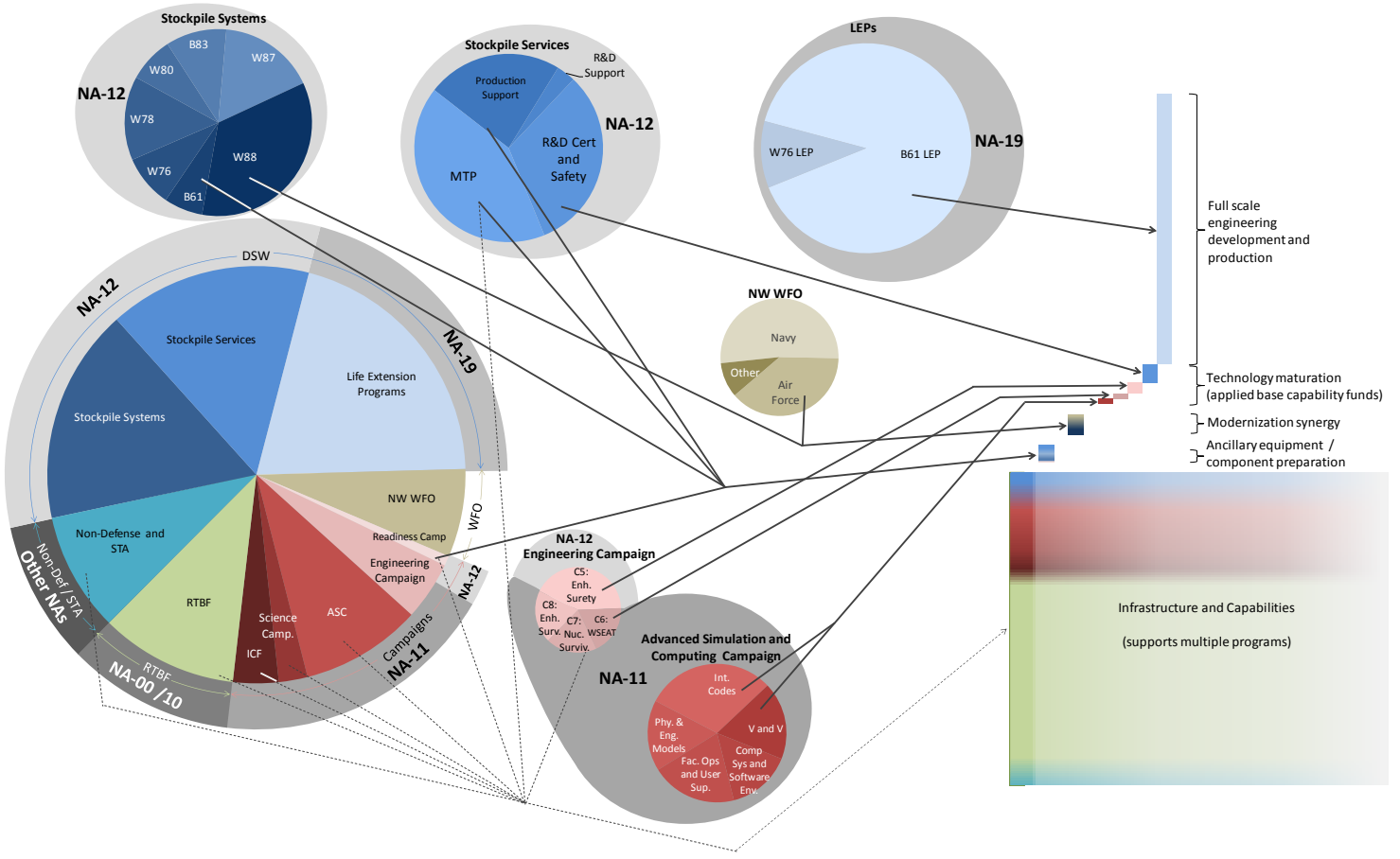
An example of the implications for program execution are illustrated in Figure 1. In FY13, B61-12 LEP work at Sandia was funded by more than twenty NNSA funding sources. Control of this funding is spread over numerous headquarters offices, and every budget category has several headquarters proponents involved in every decision related to that specific category. Managing funding at this level of detail creates major coordination demands: given the lead times associated with government budget cycles, the integration of resources across budget categories needs to be planned and allocated about a year in advance, and continual adjustments are necessary to integrate program needs and funding throughout program execution.

F. Insufficient Authorities for Warhead Life Extension Program Managers

In effective organizations, the program manager controls the funds and staffs necessary to deliver on program commitments safely, on-time, on-cost, and in an environmentally responsible fashion. The program manager is accountable. The role of the mission-support staffs is to provide the support to line managers needed to assure that this is done. This model is not in place today within the NNSA. Warhead life extension program managers lack authorities and resource control; they serve as weak coordinators with no direct authority over the resources or personnel necessary to execute their programs.

Consider, for example, the question of who *has responsibility for* the B61 Life Extension Program (LEP). At the technical level, there is a well-defined set of responsibilities and accountability for managing individual LEPs, and a well-defined process—the 6.X process—that guides LEP development and production:

- The director of the laboratory responsible for the B61 physics package, in this case Los Alamos, is responsible for managing activities to generate engineering design information for the nuclear explosive package. This involves close coordination with Y-12 for secondary design and subsequent delivery to Pantex.
- The Director of Sandia is responsible for managing the non-nuclear component design, development, and testing and for integrating the nuclear explosive package and non-nuclear components into the bomb. This involves close coordination with component production activity at Sandia and Kansas City, and delivery of data and products to Pantex for assembly. For the B61 LEP, Sandia is also responsible for technically integrating the bomb with the DOD-provided bomb tail-kit assembly.



Source: Sandia Briefing to the National Security Enterprise Panel.

Figure 1. NNSA Organizations Controlling Budgets for B61-12 Work at Sandia

The shortfall in the current system is that there is no overall program manager to synchronize the full range of needed work across all the involved sites. The program manager must have the authority, staff, and resources necessary not only to ensure the labs and plants engage productively on the technical work, but also to ensure needed facility investments and ES&H approvals and permits are in place; and to re-allocate resources across activities and sites to keep a program moving. Whereas in a program-driven budget structure, the bulk of funding would flow through the responsible program offices, in NNSA a high proportion of funding control rests in mission support areas, each with a set of responsible managers and proponents whose objectives may not be aligned with those of the program manager.[23] As a result of the detailed budget allocations and dispersed control, program managers lack needed authority and mission-support staffs have substantial influence over resource decisions, independent of the line program managers. Execution requires program managers and field personnel to spend an inordinate amount of time negotiating transfers among NNSA stakeholders or to seek reprogramming authority from Congress. Lacking an empowered and accountable program manager, customers cannot have confidence in proposed plans or the ability to execute according to the plan.

G. Absence of Trusted Cost and Resource Analysis

A capability for independent cost estimates for major acquisition programs, coupled with a disciplined cost reporting system, is essential to effective program scoping and initiation, resource planning, source selection, and contract oversight and management. NNSA lacks expertise, data, and tools for independent costing, requirements evaluation, and program planning. Initial cost estimates for major NNSA programs have been found to be off not by 20−30 percent but by factors of nearly two to six:

- B61 LEP: An initial estimate (2010) assumed that the cost would be comparable to that of the W76 LEP in the range of $4 billion. However, lab experts, when engaged by NNSA, concluded that the B61 LEP would be much more complex than the W76. When the final B61 LEP cost report was completed, the estimate rose to $8 billion. DOD's Cost Assessment and Program Evaluation (CAPE) reviewed the program; it estimates the cost at over $10 billion. This estimate reflects still-unresolved differences between CAPE and NNSA on the timeline for LEP completion.
- Los Alamos plutonium facility (the Chemistry and Metallurgy Research Replacement, or CMRR): An initial estimate (2005) placed the ceiling at $975 million; by 2010 this

[23] For example, in the 2015 Budget Request the bulk of weapons activities funding can be found in three major categories (Directed Stockpile Work ($2.7 billion), Campaigns ($1.7 billion), Readiness in Technical Base and Facilities ($2.4 billion)).

ceiling had risen to $5.8 billion, with a three to seven year delay. Now, the project is being deferred five years, and the design is being reconsidered.

- Y-12 highly enriched uranium processing facility (UPF): An initial estimate (2004) placed the maximum at $1.1 billion; this was raised to $3.5 billion (2007), and then to $6.5 billion (2010). An independent review by the Army Corps of Engineers placed the maximum cost at $7.5 billion (2011). Recently discovered design flaws (the ceiling is too low) add an additional $0.5 billion. Now, the project is being delayed and the design is being reconsidered.
- Savannah River plutonium disposition facility (the Mixed-Oxide Fuel Fabrication Facility, or MOX): DOE approved a cost estimate of $4.8 billion (2007) and start of operations in September 2016. Although construction began in August 2007, NNSA subsequently increased the estimate to $7.7 billion (2012) with the start of operations delayed to November 2019. Now the project is in a strategic pause as DOE evaluates other options for plutonium disposition.

NNSA's poor track record of planning for and estimating the costs of these and other major projects is a major source of dissatisfaction among the national leadership and customers, and further undermines NNSA's credibility. Both NNSA and DOE are engaged in initiatives to create needed independent cost estimating capabilities, including the development of the requisite staffs, tools, and data. Success with these initiatives will help repair its damaged credibility, and will be an essential precondition for NNSA to regain trust with its critics.

H. Absence of Proven Practices for Project Management

Proven practices for project management have not been adopted. Program and project management is not supported at the staffing and funding levels that the private sector and other agencies have demonstrated are necessary to assure success, especially in the field, for the duration of major projects. Funding levels for reserves and contingencies are not even close to levels that have been demonstrated as necessary for major projects, especially recognizing the unique technical nature of many of the NNSA's projects. When projects or programs proceed from *design* stages to *production* stages, there is not adequate configuration control of designs and too many unnecessary subsequent changes are allowed.

The management practices for infrastructure upgrades and major facilities construction are also problematic. DOE's guidance for such projects is contained in DOE Order 413, which aligns with the management practices prescribed in OMB Circular A-11 for Capital Acquisition projects.[24] However, Order 413 is offered and viewed as *guidance* and not as required practice,

[24] Office of Management and Budget (OMB), *Preparation, Submission, and Execution of the Budget*, Circular A-11 (Washington, DC: Executive Office of the President, July 2013)

so adherence and enforcement are weak. For instance, rigorous planning processes at the front end of a project, such as Analyses of Alternatives, are lacking. Circular A-11 covers everything from roles and functions to legal framework to the actual transmission of White House policy in the budgeting process. OMB requires agencies to establish a disciplined capital programming process that addresses project prioritization between new assets and maintenance of existing assets; risk management and cost estimating to improve the accuracy of cost, schedule and performance provided to management; and the other difficult challenges posed by asset management and acquisition. In establishing its Acquisition and Project Management Office, NNSA is trying to bring such discipline to NNSA project management.

I. Shortfalls in Facilities and Infrastructure Modernization

The enterprise is failing to plan for, fund, and execute required nuclear facilities and infrastructure modernization. Aside from the needed capital investments in major nuclear facilities, touched on in the preceding section, there is an ongoing need to maintain, upgrade, and modernize facilities across the operational sites. The enterprise comprises: 2,160 square miles (including 8,000,000 feet of fencing and 2,540 total lane miles of paved road)—roughly the size of Delaware. It includes approximately 3,800 facilities. About 54 percent are over forty years old, 29 percent are over sixty years old, and 12 percent are no longer in use.

While customers of the enterprise widely recognize the need to recapitalize the enterprise's equipment and facilities, investments in infrastructure do not receive the same priority as program work. The enterprise's deferred maintenance, along with long-delayed capital construction projects, are looming problems. Current estimates place immediate deferred maintenance requirements at $3.5 billion. Throughout the enterprise, the panel heard evidence of failing infrastructure, lack of sufficient funding, and no clear path forward. Examples include

- the Microelectronics Lab (tool failure leads to risks in the LEP/Alteration schedule and cost);
- Tonopah Test Range (equipment issues and potential failure pose a risk to the B61-12 schedule and cost);
- Weapons Evaluation Test Laboratory (centrifuge failure risks impact on surveillance program); and
- the Perimeter Intrusion Detection and Assessment System (PIDAS) at Pantex needs updating. (Effective security at Pantex is essential for all stockpile work.) [25]

[25] The current plan is estimated to cost about $350 million, which would replace and modernize PIDAS in Zones 4 and 12. Pantex's original plan called for an option costing $1 billion or more, but they modified the design and substantially lowered the cost.

One root problem is a lack of a capital budgeting process for systematically planning and funding investments within NNSA. No successful U.S. private sector company would seek to operate without a capital budgeting process. A second problem is the unreliability of NNSA cost estimates, as discussed previously. One workaround used for modernizing infrastructure that DOE/NNSA might consider more often is private, third-party financing for new facilities that are operated under long-term leases. This approach was employed to acquire the new production facility for the Kansas City Plant and two new office buildings at the Y-12 site.

J. Poor Communications

NNSA's leadership is not communicating effectively—with national leaders, its customers, or internally. Among staffers and Members of Congress, NNSA has lost credibility, undermining efforts to provide a coherent enterprise-wide message. Staffers choose to,or are driven to, engage a number of sources throughout the enterprise to obtain accurate information about programs and issues; they have cited a need to always *pull*, because there is no effort by the NNSA to *push* requisite information. They also indicate that the story is often inconsistent from one source to the next. Staff members in the Executive Branch shared similar concerns. In addition, interlocutors on Capitol Hill and inside DOE indicated that leaders in the field, including M&O leadership, have engaged directly with Members of Congress, without coordination with headquarters. Staffers and Members also indicate they have been surprised during formal hearings with new information about cost projections and budget requirements.

Within the NNSA, there is clear evidence of communication gaps, both upward and (especially) downward. People in the field spoke of the length of time required to obtain an answer from headquarters. Headquarters staffs spoke of difficulties caused when field staff have not shared information or have circumvented headquarters with needed information. Such poor communication up and down the chain is contrary to benchmarking examples in which well-run organizations highlight the importance of quickly reporting bad news to higher authorities, without running the risk of retribution. High performing organizations enforce discipline in effective communications; if there is a penalty, it occurs when a subordinate fails to report bad news.

Customers spoke of needing to go directly to field staff to obtain answers on program status instead of hearing it from NNSA headquarters, and field personnel spoke of needing to hear about requirements directly from customers instead of from headquarters. Field staff also noted instances when headquarters reached down to the working level, circumventing the field managers, to provide instruction on what it wanted done, with little regard or appreciation for the implications that such direction would have for the overall program.

For the enterprise workforce, there is a need to clearly communicate mission and objectives, to include how enterprise missions are knit together around a central nexus of national security. A recent in-person visit by a key NNSA leader to a number of field sites was

described as the first time in many years any leader of such stature had made time to visit worksites and talk to rank-and-file workers.

4. Dysfunctional Relationship between Government and Management and Operating (M&O) Partners

Strong industrial and academic partners and a healthy working relationship are vital to the success of the nuclear security enterprise. There is concern across the NNSA complex that the needed relationships have eroded over the years, and have become more of an arm's length contracting relationship than the needed partnership.

In effective organizations, the government sponsor decides *what* is needed and the M&O partner, in particular the Federally Funded Research and Development Center, decides *how* to meet that need. This theory of respective roles and responsibilities is summarized in Table 3. Put in the simplest terms, the government should identify the work to be done; identify the best performer to do the work; provide adequate resources; and hold the performer accountable. Under this construct, a competent M&O partner is relied upon to provide the expertise, corporate culture and leadership sufficient to execute the work, and meet the government's operating standards.

Changes in mission priorities, performance expectations, and cultures have worked to erode the partnership between the government and its M&O contractors established during the Cold War. After the Berlin Wall fell on November 9, 1989, mission priorities underwent major transformation, while in parallel the nation's demands in the areas of environmental management, workplace health and safety, and security grew significantly.[26] Two actions that profoundly affected the nuclear enterprise were President George H.W. Bush's decisions in 1992 to stop producing new nuclear weapons and to suspend underground nuclear testing. These actions ceased the well-established weapons complex product delivery cycle of design-test-build that had organized work throughout the Cold War. In the early 1990s, the DOE identified Science Based Stockpile Stewardship as the strategy for sustaining the reliability and safety of the nuclear warheads, while simultaneously sustaining weapons research and development through investments in key stewardship capabilities, including advanced computing, fusion

[26] In response to growing public concern over environmental hazards and nuclear safety (Three Mile Island occurred in March, 1979; Chernobyl occurred in April, 1986), significant actions were taken to tighten the regulation of weapons complex facilities and operations. Congress established the Defense Nuclear Facilities Safety Board (DNFSB) in 1988. The board was created to provide an independent observer and advisor on nuclear facilities safety. Admiral James Watkins became the Secretary of Energy in March 1989. In June of that year, Watkins announced the Ten-Point Plan to strengthen environmental protection and waste management activities at the U. S. Department of Energy's production, research, and testing facilities. Included in the plan was the creation of "Tiger Teams" to identify possible environment problems and violations across the DOE complex. Watkins also modified contracts to provide stronger incentives to address ES&H matters. On November 9, 1989, Watkins established the Office of Environmental Restoration and Waste Management. The joint FBI-EPA raid on the Rocky Flats plutonium facility in June of that year was perhaps the most publicly visible demonstration of the shift in focus.

research, materials properties research, and non-nuclear component testing. But the weapons production complex was allowed to deteriorate to the point where today's NNSA is carrying out warhead life extension work at facilities that were commissioned shortly after the Manhattan project.

Table 3. Roles and Responsibilities

Government	M&O Partner
• Selects M&Os • Assigns tasks; Sets standards – Mission deliverables – Operating standards for ES&H, Security, other functions • Provides resources • Accepts deliverables – Also, validates practices are consistent with operating standards • Holds M&O accountable – Incentives: fee, contract extension, future tasks and resources assigned • Acts as landlord – Provides for the weapons complex facilities and infrastructure – Holds permits and owns the associated facilities and infrastructure risks • Ultimately owns the overall risk	• Provides for management and capabilities for executing national security enterprise tasks • Advises government sponsors in the areas of its expertise • Applies corporate leadership, culture, processes, and discipline to ensure efficient operations – Validates that corporate management practices meet functional standards (ES&H, Security, Finance, Human Capital, etc.) • Executes tasks and delivers – Science, Engineering, Manufacturing • Stands accountable for performance and designated operational risks

The changes in mission priorities from design and production to stewardship, and heightened regulatory oversight, overturned accepted priorities within the nuclear weapons program and radically altered the well-understood relationships between line managers and mission-support functions within the government as well as between the government and the M&O contractors. In the view of one long-tenured laboratory leader: "Historically the job was to accomplish the mission safely and securely. Beginning with Secretary Watkins' Tiger Teams, the job began to change to 'Make sure nothing bad ever happens'—with little regard to the ability to accomplish NNSA's missions."

The resulting tension in defining the roles of the M&O contractors and the Federal mission-support officials has created significant friction in the government-M&O relationships, especially at the laboratories. This friction has been exacerbated by the more recent transition to for-profit M&O contractors at the laboratories, leading to a heightened, if incorrect, perception on the part of Federal personnel that the M&Os are driven by profit first and national service second. As a result, DOE/NNSA has increasingly moved toward detailed direction and regulation of the M&Os.

A 2012 National Resource Council of the National Academies study concluded there is little trust in the relationship between the laboratories and NNSA. NNSA has lost confidence in the ability of the laboratories to "maintain operation goals such as safety, security, environmental responsibility and fiscal integrity."[27] The panel finds that this lack of trust is manifested in three ways: NNSA's use of increasingly inflexible budgets and milestones to control work at the operating sites, the continued reliance on transactional regulation and oversight to enforce behavior, and the exclusion of M&O executives from NNSA headquarters deliberations in setting strategic direction. This management approach is costly, unwieldy, and counterproductive as further discussed in sub-section D. It creates a high degree of management complexity, puts detailed decisions in the hands of headquarters personnel who lack a complete understanding of field operations or technical requirements, undermines accountability, creates incentives to focus attention on administrative matters over program substance, and incurs excessive costs in administering the relationship.

A. Breakdown of the Federally Funded Research and Development Center (FFRDC) Model

The FFRDC model for the NNSA labs has been lost. Historically, the Federally Funded Research and Development Centers—the laboratories—have played a key strategic role as *trusted advisors* in informing the government regarding effective execution of the mission. The historic, statutorily-defined relationship between the FFRDC and its sponsor includes[28]

- Comprehensive knowledge of sponsor needs—the mission, culture, expertise, and institutional memory regarding issues of enduring concern to the sponsor
- Adaptability—the ability to respond to emerging needs of their sponsors and anticipate future critical issues
- Objectivity—the ability to produce thorough, independent analyses to address complex technical and analytical problems
- Freedom from conflicts of interest and dedication to the public interest—independence from commercial, shareholder, political, or other associations
- Long-term continuity—uninterrupted, consistent support based on a continuing relationship

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[27] National Research Council, *Managing for High-Quality Science and Engineering at the NNSA National Security Laboratories*, 5.

[28] Source: Defense Acquisition University.

- Broad access to sensitive government and commercial proprietary information—absence of institutional interests that could lead to misuse of information or cause contractor reluctance to provide such information
- Quick response capability—the ability to offer short-term assistance to help sponsors meet urgent and high-priority requirements

The benefit is that an FFRDC can function as an independent, trusted advisor and honest broker. The FFRDC is answerable only to the government customer and has no vested interest in particular technologies or solutions.

The transition to for-profit contractors, combined with laboratory competition to increase their work for other agencies, has called into question the assumptions regarding their objectivity and the primacy of the public interest in their operations. Consequently, the FFRDC role has increasingly been replaced by one whereby the laboratories are perceived as *contractors* rather than as *partners* who are relied upon to help resolve issues and successfully deliver the mission. Laboratory Directors expressed their central challenge as the lack of any forum for *strategic dialogue* between NNSA leadership and their labs.[29] Indeed, one executive reported that his team learned about the site's FY14 budget through the trade press, rather than from NNSA headquarters.

B. Blurred Responsibility for Risk

Ambiguous relationships blur the responsibility for risk at the operating sites. The panel finds that the respective roles and responsibilities of the government and M&O contractors are not consistently and clearly stated or understood. Rather, they are unique to each site and evidently have emerged over time from the cumulative interactions of government and M&O personnel. Indeed, the panel has been told many times that the relationships between the M&Os and government personnel can vary from site to site and from issue to issue, depending largely on the personalities involved. While a certain degree of difference across sites is understandable, there is a need for leadership to impose consistent policies and procedures across the enterprise. The panel recognizes that NNSA's new Infrastructure and Operations Office is trying to achieve greater consistency in procedures across the enterprise, but its integration with other policy and program offices remains unclear.

Ambiguity is pronounced when it comes to the fundamental question, "Who owns the risk?" In the case of the Kansas City Plant, for example, the Field Office and Plant manager

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[29] The laboratory leadership views were expressed in the "Tri-Lab Letter," which provides their characterization of the degraded relationship and recommended changes. See Penrose C Albright, Charles F. McMillan, and Paul J. Hommert, "The Model for the National Nuclear Security Administration and its Laboratories: Recommendations for Moving Forward" (April 17, 2012).

stated unequivocally that they co-owned the risk. At the Savannah River Site, the contractor has taken ownership of the risk and conducts routine internal management reviews to find the right balance in the operation of its activities. Generally, multiple individuals in the government and the M&O contractor will lay claim to owning the risk, but the sense of responsibility and explanations differ from site to site. Additionally, there is no mechanism for integrated decision making with respect to enterprise-wide risks.

C. Costly and Ineffective Transactional Oversight

Transactional oversight is expensive and counterproductive.[30] From the perspective of the field looking up at headquarters, the effect of NNSA's ever-changing organizational structure is layered oversight, created by the rise of unaligned and confusing mission-support staffs. The operating entities of the enterprise face a phalanx of oversight agencies, exacerbated in part by the flawed DOE/NNSA governance structure discussed earlier. The result is uncoordinated efforts to address the mission's safety and security and environmental stewardship without regard to effectiveness, cost, schedule, risk, or mission impact. In turn, the view from headquarters looking down to the field shows a complex, dispersed set of sites, each with its own constituencies and agendas. Its current configuration raises the inevitable question: what is the appropriate future organizational structure (to include infrastructure capacity) for the enterprise?

Excessive and uncoordinated inspections, audits and data calls fuel inefficiencies and generate little value added; in fact, they may detract from the desired safety or security outcome. Under the current system, elements in the field are subject to review of their programs by Federal Field Office staffs; NNSA functional staffs; DOE's Health, Safety, and Security office; the DOE Inspector General; the DNFSB; and OSHA. At Sandia in FY13, for example, there were seventy-eight external audits. There also were four Work for Others (WFO) external audits conducted with overlapping scopes. In FY12, there were eighteen reports by the Government Accountability Office or DOE Inspector General; in FY13 the number rose to twenty-nine. This is in addition to approximately thirty internal audits. At Y-12, the Uranium Processing Facility project averages three external reviews per month. These audits, reviews and assessments all consume time and energy to prepare for, conduct, and then follow up on any actions.

When asked why a person holding line responsibility can't say no to these external reviews, the reply was "many of these are mandated by Congress, so we cannot push back. There is no

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30 As described by one former laboratory director, "Transactional oversight entails setting precise steps to be followed and examining implementation of each step with more than 100 Federal employees at each site and hundreds of external audits annually. By its very nature, this process is extremely conservative, risk-averse, and avoids appropriate cost-benefit considerations." George H. Miller, Director Emeritus, Lawrence Livermore National Laboratory, "Opening Remarks and Summary," Hearing of the Armed Services Committee Strategic Forces Subcommittee, U.S. House of Representatives (February 16, 2012), 2, accessed April 3, 2014, http://armedservices.house.gov/index.cfm/files/serve?File_id=619ff080-e877-43f6-918f-66be678ef721.

gatekeeper of these reviews." There are also multiple and duplicative inspections and data calls. This multiplicity of inspectors and overseers is not rationalized or synchronized. There is insufficient integration of findings to determine the overall impact on mission or risk acceptance.

Witnesses note that the focus on compliance checklists can actually divert attention from the substance of safe and secure mission performance. The Y-12 security incident illustrates this problem. In this case, the security contractor was highly rated by DOE just prior to the incident in which an octogenarian nun and several activists penetrated the security barrier. The contractor had met the compliance criteria, but that did not ensure the facility was secure, and long-standing complacency regarding false and nuisance security alarms along the perimeter fencing led to what can at best be described as a poor response. A major security review had been undertaken shortly before this incident, yielding a clean bill of health at the site. In the case of the Uranium Processing Facility (again at Y-12), none of the many external reviews uncovered a major design flaw (the building height is too low to accommodate needed equipment), which is now being fixed. Hence, multiple layers of process cannot ensure zero risk and high confidence in mission performance. Indeed, such activities can generate late changes in requirements that are costly and excessive. In another case, the panel was told of a requirement that LLNL purchase large safes to store small arms (22 caliber) ammunition, but these were then located within a vaulted space where tens of kilograms of high explosives were handled routinely, which would appear to be an illogical decision.

Evidence of the high costs of transactional regulation and oversight is provided by the gains achieved from the successful reform of regulation at the Kansas City Plant. Beginning in 2005, DOE exempted the Kansas City Plant from DOE orders in areas where there were relevant commercial or industrial standards. The reforms moved the Kansas City Plant under industrial best practice standards (e.g., International Organization for Standardization (ISO) standards) with validation from external expert bodies. Kansas City Plant officials estimate that this initiative reduced the DOE-specific regulatory requirements on the facility by about 55 percent. These changes, coupled with internal business process improvements, have generated steady increases in workplace performance along with reduced mission-support costs. The plant reports that its safety record has improved under the reformed regulatory regime, and is about six times better than U.S. industry averages.[31] A 2008 independent audit following the reforms estimated

[31] In 2012, the total reportable cases of workplace injuries for the Kansas City Plant were .4, for the weapons complex .9, and for U.S. industry 2.4. (Total reportable case rate = cases per 100 full-time employee work years (200,000 work hours)).

an overall personnel savings of about 12 percent.[32] In parallel, the NNSA site office was able to reduce its staff by 20 percent, from fifty to forty staff.

An internal NNSA Enterprise Re-Engineering Team concluded that the "Kansas City model" of relying on applicable industrial standards could be much more widely applied for non-nuclear functions within the enterprise, and targeted an initial expansion for Sandia and the Nevada National Security Site. However, initiatives to adopt elements of the "Kansas City model" at these sites have thus far been denied by DOE/NNSA headquarters staff. Nonetheless, this remains a significant governance reform opportunity.

D. Misguided Contract Incentives

Contract incentives reinforce the transactional nature of the relationship and undermine the FFRDC partnership with the NNSA laboratories. Significant award fees combined with mission-support-oriented performance evaluation criteria are troublesome in that they reinforce DOE/NNSA's emphasis both at headquarters and in the field on functional compliance and not mission performance.

Contractual arrangements also can limit the contributions of the M&O contractor parent organizations. At some sites, the parent organization is exerting a strong influence: the Kansas City Plant offers an example in which the parent company is aggressively driving a proven corporate culture into the workplace. However, several issues that have hindered the broader realization of these objectives need to be considered in clarifying future roles: First, in the limited liability corporation (LLC) model, the winning team brings an executive management team to the role of the M&O contract, but the existing workforce stays in place to perform the work while the senior executives come from and frequently rotate back to their parent companies after a few years. The LLC teaming approach can limit the influence of corporate culture if there is no dominant culture within the multi-company construct. Second, fully exploiting reach-back to the large parent companies that comprise the LLC, a purported benefit of the LLC contracting approach, frequently cannot be pursued due to conflicts of interest or restrictions embedded in the contract itself. At the same time, even without contract constraints, there is limited evidence of LLC partners exploiting their corporate reach-back potential to improve operations at the sites. Third, the ability of an LLC partner to contribute its culture and practices is contingent on how closely its core competencies parallel the needs of the laboratory or production plant. Industrial best practices and the *business* of large contractors often do not translate into the operations of a national weapons laboratory.

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[32] J.W. Bibler and Associates, "Kansas City Site Office Oversight Plan: Assessment of Implementation Cost Savings" (January 2008). More recently, the plant management reported to the panel that the headcount of ES&H specialists in the M&O was reduced by 81 percent (between 1995 and 2012)

Last, and most important, performance evaluation criteria that focus incentives on compliance do little to encourage building a strong M&O leadership team. The recent transition to Strategic Performance Evaluation Plans could help catalyze the shift away from transactional oversight, but this transition will require a sweeping cultural change at NNSA and its Field Offices and a redesign of the weighting of the performance objectives to better capture M&O contributions to mission priorities.

It is clear that the recent acting NNSA Administrator recognized the problems with the government-M&O relationships. He has been working to clarify roles and responsibilities, focusing on the relationships among the NNSA Administrator, the Field Office Managers, and the M&O executives. In the field, there is evidence of improved communication and collaboration between the M&Os and the NNSA Field Offices, especially at the plants. They have demonstrated a willingness to share information and otherwise communicate and collaborate, embracing the concept that they are a team ultimately working toward the same purpose. Much more attention to clarifying and managing these relationships will be needed.

5. Insufficient Collaboration with Customers

The panel examined the relationships between NNSA and weapons customers in DOD, as well as other customers in DOD, Department of State, Department of Homeland Security, and the Intelligence Community. The most serious collaboration issues are with the DOD weapons customers. On the whole, other customers who currently are working with the NNSA laboratories and plants say they are satisfied. Even here, however, detailed oversight of transactions impedes partnerships; a more strategic collaborative approach could strengthen capabilities and improve the services provided.

Collaboration between NNSA and the weapons customers in DOD occurs primarily through the Joint DOD-DOE/NNSA Nuclear Weapons Council, its subordinate Standing and Safety Committee and staff "action officer" working groups, as well as through the Project Officer Groups responsible for each type of nuclear weapon in the inventory.[33] These are deliberative or advisory bodies with no formal decision-making authority.

The DOE/NNSA-DOD relationship has been significantly stressed over the past several years, due largely to failed attempts to converge on a plan for modernizing nuclear weapons and nuclear facilities. Within the past two years, at the behest of the Chairman of the Nuclear Weapons Council and under the leadership of U.S. Strategic Command, the DOD has produced the "3+2 Strategy," outlining DOD's warhead and delivery platform needs over the next three decades and the NNSA infrastructure required to support DOD's needs.[34] The Nuclear Weapons Council has vetted and endorsed the conceptual underpinnings of this approach, but agreement on the details remains elusive within DOD as well as between NNSA and DOD. Furthermore, it is important to note that the agreement on the conceptual underpinnings does not dictate decisions in the budget processes of the two departments.

The stress in the DOE/NNSA-DOD relationship reflects the ongoing give-and-take in determining an affordable mix of programs for modernizing delivery platforms, nuclear weapons, and nuclear infrastructure and for synchronizing the delivery of these capabilities over

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33 The USD(AT&L) is the chairman of the Nuclear Weapons Council. The other four members are: Vice Chairman, Joint Chiefs of Staff, Undersecretary of Defense (Policy), Commander, USSTRATCOM, and Under Secretary for Nuclear Security of the Department of Energy (Administrator, NNSA). The Services and other staffs are invited to participate as observers.

34 "3+2" is a concept that outlines the types and timing for the warheads required in the stockpile over the next three decades, in accordance with current policy guidance. It seeks to synchronize the necessary life-extension programs with the planned delivery platform recapitalization efforts. It also seeks to describe the reduction of warhead types via consolidation and retirements thereby making the management of the stockpile more efficient. The concept, if and when it is fully realized, will narrow the number of warhead types to "3" for ballistic missile delivery systems and "2" for air-delivered delivery systems.

the coming decades. The efforts to converge on the needed plan will continue: statements in the DOD's FY15 budget submission and in the *Quadrennial Defense Review* describe the DOD commitment to invest in modernizing its delivery platforms, nuclear weapons, and supporting infrastructure "in collaboration with the Department of Energy."[35] Many DOD witnesses have expressed frustration with the lack of progress, and have suggested to the panel that the Nuclear Weapons Council mechanism should be strengthened to drive the needed convergence between DOD and DOE/NNSA on mission priorities and resource plans. Other witnesses have countered that these mechanisms work well for their intended purposes.

While there is commitment to progress among all parties, several specific issues remain to be addressed.

A. Lack of Effective Joint Planning and Budget Coordination

Although there is currently some agreement between DOD and DOE/NNSA on the long-term concept for modernizing the stockpile, they have not converged on a long-term resource plan, nor have they converged on near-term mission and budget priorities. There remain fundamental differences in views on the appropriate composition of the weapon life extension program and the timing of deliverables. Additionally, coordination suffers from the departments' differing resource management systems, the lack of joint program reviews, and the lack of coordination in the timing of their budget submissions. Lastly, their coordination mechanism—the Nuclear Weapons Council—lacks enforcement authority for the agreements reached within its deliberations.

There are also significant process issues that need to be addressed. The Nuclear Weapons Council process has been unable to achieve the integrated teamwork and staffing required before decisions are prepared for Council meetings, despite many attempts at establishing disciplined staff processes and follow up. Representatives of customer organizations designated to facilitate communication with the NNSA testify that they often are unable to obtain consistent answers from their NNSA counterparts, prior to briefings at the Nuclear Weapons Council.

B. Lack of Information-Sharing and Trust

NNSA's unreliable planning and cost estimating, combined with its lack of openness, has engendered significant distrust within the DOD. Beginning in 2010, the DOD has worked with DOE/NNSA to transfer funds from DOD's proposed budget to the NNSA account for weapons activities essential for sustaining deterrence capabilities—including LEPs, stockpile surveillance, Chemical and Metallurgy Research Replacement (CMRR), and UPF.

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[35] DOD, *2014 Quadrennial Defense Review, p. 32.*

NNSA and DOD staffs spent much of 2012 working to achieve a common resource plan for the enterprise that would be geared to meeting DOD's needs. This effort led to a tentative agreement in early 2013 on an NNSA program and budget that would be in line with the "3+2 Strategy," and DOD agreed to contribute additional funding to execute the program in FY14. In total, DOD has agreed to transfers of nearly $12 billion over multiple years in budget authority to DOE.

During this period, a series of NNSA budget shortfalls were reported. These resulted most significantly from significant cost growth in the DOE programs. Other contributing factors included reductions in the overall NNSA budget—due to Continuing Resolutions, congressional marks, the Budget Control Act, and the effects of sequestration.

DOD has been frustrated by these continuing shortfalls, delays in agreed-upon programs, and requests for additional funding. DOD officials also have been frustrated by the limited budget and cost information provided by DOE/NNSA, and they have pressed for information on budgeting and program management processes in order to track the execution of the transferred funds. A satisfactory degree of visibility has not been achieved. Although these transfers were included in the President's Budget, visibility of the funds was lost during the Congressional appropriations process. It appears the net effect of the *transfer* is that DOE budgets have increased by less than the amount by which DOD budgets have decreased.

The cycle of DOD-NNSA engagement continues through the Nuclear Weapons Council, with additional attempts to reach convergence on realistic program and infrastructure plans that can guide NNSA budgets. There remain significant procedural issues that will need to be resolved to repair this relationship. Considerable work remains to be done: the Nuclear Weapons Council has a central role to play in creating an executable plan for the future stockpile agreed on by the two departments. This responsibility will require an orderly process for the Nuclear Weapons Council's working groups to serve its principals and greater transparency between the two departments.

C. Unnecessarily Complex Processes for Interagency Work

Beyond DOD, the enterprise has many other customers from across the government, such as the Intelligence Community, Department of State, and the Department of Homeland Security, who make use of the organic science and technology (S&T) capabilities of the NNSA's national security laboratories. The customer provides the funds needed to accomplish a mutually agreed program of work on an agreed schedule. This program has been called Work for Others (WFO) and is transitioning to a new name, Interagency Work (IW). The growth in IW demonstrates that the three NNSA laboratories have transitioned from strictly nuclear weapons labs to nuclear national security labs, as reflected in the *Strategic Posture Commission Report*.

While the descriptions of Interagency Work convey the impression that this work is done on the margin, or is an ancillary duty for operational sites, this work in fact has become essential

to the enduring science and technology base that supports the weapons program. Conversely, this important work would not be possible without the long-standing and substantial investments of the nuclear weapons program. As the three lab directors argued in their April 2012 letter on governance issues, the IW is "an essential element" in sustaining the nuclear weapons mission because it helps attract high-quality personnel, keeps them scientifically sharp, and helps provide stability for the enterprise.[36] The IW efforts have yielded breakthrough developments in combatting improvised explosive devices, weapons of mass destruction (WMD) detection technologies, and advanced conventional munitions. IW has also served to nurture and hone capabilities synergistic to the weapons program in areas such as weapons design, materials science and radiation hardening technologies to enhance survivability. These contributions to national security technology are also important for hiring and developing needed talent.

In the main, these other customers are pleased with the quality of science and engineering, and the final product, they receive from the enterprise. The 2010 establishment of the Mission Executive Council (MEC), via four-party Governance Charter by the Secretaries of Energy, Defense, Homeland Security, and the Director of National Intelligence, is intended to facilitate interagency collaboration on long-term planning and investment in the enterprise's skillsets. The MEC provides a forum for coordinating shared, long-term planning for the critical, and often unique, capabilities resident in the DOE National Laboratories (not just NNSA laboratories) that are of cross-cutting strategic national security interest. The MEC, however, has not yet fulfilled its promise to (1) identify unique capabilities at the laboratories that are at risk as a result of reduced support to the weapons programs, and (2) formulate a multi-agency strategic plan to sustain those capabilities so that they are available when DOD and other agencies need them in advancing the nation's security.

Given the overall success of the interagency projects, the panel did not focus deeply on the enterprise's relationships with its interagency customers. Nevertheless, experts identified several issues for the panel's consideration. One is the tactical approach taken by many customers: much of this work for external sponsors is accomplished using annual task orders with no long-term commitment. There is also a range of areas where working relationships could be simplified and improved:

- Interagency tasks are typically quite small and each laboratory manages hundreds of such tasks. (For example, LLNL reported it manages about 800 interagency tasks, many providing a few tens of thousands of dollars in support.)

[36] Albright, McMillen, and Hommert, "The Model for the National Nuclear Security Administration and its Laboratories: Recommendations for Moving Forward," p. 1.

- Approval processes are needlessly cumbersome. Tasks are reviewed and approved individually. Even small, routine contracts require multiple levels of approval and can take weeks.
- Delays are not uncommon in the movement of funds from sponsors to the labs. In some cases, technical efforts may be put on hold pending arrival of funds.
- Year-to-year uncertainty in funding makes it difficult to forecast demand and manage professional staffs.
- Recapitalization of scientific and other physical capital is not addressed. While external funding covers the overhead costs immediately associated with the work being accomplished, it does not cover the cost of refurbishing and replacing the unique lab capital equipment and facilities used in some tasks.

Some customers have found ways to resolve some of these challenges by employing interagency agreements with DOE/NNSA in which the external funding organization makes a standing commitment to funding support at a specified level of effort.[37] While necessarily subject to the availability of annual appropriations, this eliminates most of the uncertainty, enabling the nuclear weapon labs to better align and manage professional staffs and plan and conduct technical work. Capital investments to develop needed capabilities for interagency customers are a more difficult challenge, but they too have been overcome in limited cases. NNSA has had to approach this challenge on a facility-by-facility basis.

[37] Homeland Security Act of 2002, Sec. 309, authorizes DHS use of DOE national laboratories and sites via joint sponsorship, direct contract, or "work for others." Labs and sites perform such work on an equal basis to other missions at the laboratory and not just on a noninterference basis. DHS does not pay costs of DOE or its contractors in excess of the amount that the DOE pays. DHS' position is that it strongly prefers using authorities given it in law to allow it to work across the DOE complex in response to proposals.

6. Conclusion

This interim report summarizes the panel's observations on the governance of the nuclear security enterprise. The panel is continuing to clarify and document the issues identified here. Recommendations to address the problems are being developed. The panel's interim findings indicate that fundamental reform will be required to reshape an enterprise that is capable of meeting all of the nation's needs. The changes will be difficult regardless of where the enterprise is located within the government, since the fundamental problems are cultural more than organizational. Organizational change, while not unimportant, is only a small portion of the changes that must be made. The panel believes lasting improvements are possible, but they will demand strong and sustained leadership and proactive support from Congress, the White House, and engaged Departmental Secretaries.

Appendix A. Sources

Table A.1. Testimony to the Panel and Fact-Finding Interviews

Current Members of the Enterprise and Government Officials	Name	Organization
	Atkins-Duffin, Cindy	Office of Science and Technology Policy, Nuclear Matters
	Barton, Matthew	DHS, Domestic Nuclear Detection Office
	Beausoleil, Geoffrey	Sandia
	Benedict, Terry	US Navy, Strategic Systems Program (SSP)
	Cook, Donald	NNSA
	Creedon, Madelyn	OSD Policy (Global Strategic Affairs)
	Dearolph, Douglas	Savannah River
	Elliott, Michael	The Joint Staff
	Epstein, Jon	SASC Staff
	Erhart, Steven	Pantex and Y-12
	Gentile, Chris	Kansas City Plant
	Harencak, Garrett	US Air Force, Strategic Deterrence & Nuclear Integration
	Held, Bruce	DOE, NNSA
	Holecek, Mark	Kansas City Plant
	Hommert, Paul	Sandia
	Juzaitis, Ray	Nevada Nuclear Security Site

Current Members of the Enterprise and Government Officials	Name	Organization
	Kendall, Frank	OSD, Acquisition, Technology and Logistics
	Khol, Curl	OSD CAPE
	Knapp, Bret	Lawrence Livermore
	Kusnezov, Dimitri	DOE
	Lawrence, Steven	Nevada Nuclear Security Site
	Lebak, Kimberly	Lawrence Livermore
	Limage, Simon	DOS, Bureau of International Security & Nonproliferation
	McMillan, Charles	Los Alamos
	Moniz, Ernest	Secretary of Energy
	Moody, III David	Savannah River
	Morrison, Timothy	HASC Staff
	Poneman, Daniel	DOE
	Reis, Vic	DOE
	Soofer, Robert	SASC Staff
	Spencer, Chuck	Y-12
	Tomero, Leonor	HASC Staff
	Trautman, Steve	Naval Reactors
	Walter, Drew	HASC Staff
	White, William	Los Alamos
	Winokur, Peter	DNFSB
	Woolery, John	Pantex

Current Members of the Enterprise and Government Officials	Name	Organization
Former Members of the Enterprise and Former Government Officials	**Name**	**Organization**
	Beckner, Ervert	DOE
	Brooks, Linton	NNSA
	Browne, John	Laboratories
	D'Agostino, Thomas	NNSA
	Davis, Jay	DOD
	Deutch, John	DOD
	Guidice, Steve	NNSA
	Harvey, John	DOD-NNSA
	Hunter, Thomas	Laboratories
	John, Mim	Laboratories
	Kuckuck, Robert	DOE
	Lehman, Ronald	DOD-NNSA
	Miller, George	Laboratories
	Miller, Neile	NNSA
	Nanos, George	Laboratories
	Ostendorff, William	NNSA
	Przybylek, Charles	DOE
	Robinson, Paul	Laboratories
	Selden, Robert	DOD-NNSA

Current Members of the Enterprise and Government Officials	Name	Organization
	Smolen, Robert	DOD-NNSA, NSC staff
	Tegnelia, James	DOD
	Younger, Steven	Laboratories
Other Subject Matter Experts	**Name**	**Organization**
	Baker, Michael	British Defense Staff
	Chiles, Hank	Lead, Previous NSE studies
	Foster, John	Lead, Previous NSE studies
	Howanitz, John	Bechtel
	Johnson, Ray	Lockheed Martin
	Mackinder, Andy	British Defense Staff
	Madsen, Michael	Honeywell
	Mara, Glenn	University of California
	Overskei, David	Lead, Previous NSE studies
	Patel, C. Kumar	National Academy of Science
	Pinfield, Lynsey	British Defense Staff
	Schwitters, Roy	JASON
	Shank, Charles	National Academy of Science
	Taylor, Paul	British Defense Staff
	Welch, Larry	Lead, Previous NSE studies

Table A.2. Fact-Finding Interviews

Organization	Department/Section
AFL-CIO	
Civil nuclear power industry	Various (on non-attribution basis)
Congress	
Members:	Congressman James Cooper
	Congressman Michael Rogers
	Senator Jefferson Sessions
	Congressman Adam Smith
	Senator Mark Udall
Committees:	Appropriations
	Energy and Commerce
	Energy and Natural Resources
	Energy and Water subcommittee
	Oversight and Investigations
	Strategic Forces subcommittee
Defense Nuclear Facilities Safety Board (DNFSB)	
Department of Defense	Joint Chiefs of Staff
	OSD, Acquisition, Technology and Logistics
	OSD, Cost Assessment and Program Evaluation
	OSD, Global Strategic Affairs
	OSD, Nuclear, Chemical and Biological Defense Programs
	OSD, Nuclear Matters
	OSD, Policy
Department of Energy	Chief Financial Office

Organization	Department/Section
	Environmental Management
	Health, Safety and Security
	Human Capital
	IG
	International Affairs
	International Nuclear Energy Policy
	Health, Safety, and Security
	Human Capital
	Nuclear Energy
	Office of Management
	Office of Science
	S&T Advisor
Department of Homeland Security	Domestic Nuclear Detection Office
	Office of National Laboratories
	Science & Technology
Department of Health and Human Services	Centers for Disease Control and Prevention
Department of Justice/Federal Bureau of Investigation	Weapons of Mass Destruction Directorate
Department of State	Arms Control and International Security
	Arms Control, Verification and Compliance
Federal Aviation Administration	Air Traffic Organization
National Aeronautics and Space Administration (NASA)	
Navy	Naval Reactors (NR)

Organization	Department/Section
	Strategic Systems Programs (SSP)
NNSA – headquarters	Office of the Administrator
	NA-00
	NA-10
	NA-20
	NA-40
	NA-80
	NA-APM
NNSA – Field (Sites and Field offices)	Kansas City
	Lawrence Livermore
	Los Alamos
	Nevada National Security Site
	Oakridge Y-12
	Pantex
	Sandia
	Savannah River
Nuclear Regulatory Commission	
Office of the Director of National Intelligence	National Counterproliferation Center
Office of Management and Budget (OMB)	
Occupational Safety and Health Administration (OSHA)	
Office of Science and Technology Policy	

Appendix B Acronyms

AFL-CIO	American Federation of Labor and Congress of Industrial Organizations
CAPE	Cost Assessment and Program Evaluation
CMRR	Chemistry and Metallurgy Research Replacement
DHS	Department of Homeland Security
DNFSB	Defense Nuclear Facilities Safety Board
DOD	Department of Defense
DOE	Department of Energy
DP	Defense Programs
ES&H	Environment, Safety, and Health
FBI	Federal Bureau of Investigation
FFRDC	Federally Funded Research and Development Center
FY	Fiscal Year
HASC	House Armed Services Committee
HSS	Health, Safety and Security (DOE)
ICBM	Intercontinental Ballistic Missile
IDA	Institute for Defense Analyses
ISO	International Organization for Standardization
LANL	Los Alamos National Laboratory
LEP	Life Extension Program
LLC	Limited Liability Company
LLNL	Lawrence Livermore National Laboratory
LRSO	Long-Range Standoff
M&O	Management and Operating
MEC	Mission Executive Council

MOA	Memorandum of Agreement
NA-APM	NNSA - Acquisition & Project Management
NA-00	NNSA - Infrastructure & Operations
NA-10	NNSA - Defense Programs
NA-20	NNSA - Defense Nuclear Nonproliferation
NA-40	NNSA - Emergency Operations
NA-80	NNSA - Counterterrorism and Counterproliferation
NASA	National Aeronautics and Space Administration
NNSA	National Nuclear Security Administration
NNSS	Nevada National Security Site
NR	Naval Reactor
OMB	Office of Management and Budget
OSD	Office of the Secretary of Defense
OSHA	Occupational Safety and Health Administration
PF-4	Plutonium Facility at Technical Area 55 (TA-55), LANL
PIDAS	Perimeter Intrusion Detection and Assessment System
R2A2	Roles, Responsibilities, Authorities, and Accountabilities
S&T	Science and Technology
SASC	Senate Armed Services Committee
SLBM	Submarine-Launched Ballistic Missile
SNL	Sandia National Laboratories
SSP	Strategic Systems Programs, U.S. Navy
START	Strategic Arms Reduction Treaty
UPF	Uranium Processing Facility
WFO	Work For Others
Y-12	Y-12 National Security Complex, Oak Ridge, Tennessee