NATIONAL NUCLEAR SECURITY ADMINISTRATION (NNSA) MANAGEMENT OF ITS NATIONAL SECURITY LABORATORIES IN REVIEW OF THE DEFENSE AUTHORIZATION REQUEST FOR FISCAL YEAR 2014 AND THE FUTURE YEARS DEFENSE PROGRAM

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OPENING REMARKS

Mr. Chairman and Members of the Committee, I am Parney Albright, Director of the Lawrence Livermore National Laboratory (LLNL). I thank you for the opportunity to provide my perspective on the President's FY 2014 Budget Request and its impact on the important Stockpile Stewardship Program activities carried out at LLNL and our efforts to sustain over the long term a healthy, vibrant Laboratory, advancing and applying science and technology to meet the country's most important national security needs.

As one of the Department of Energy's (DOE) National Nuclear Security Administration (NNSA) national security laboratories, we are responsible for helping sustain the safety, security, and effectiveness of our nation's strategic deterrent. In addition to our stockpile stewardship efforts, we leverage our capabilities to develop innovative solutions to major 21st century challenges in nuclear security, defense and international security, and energy and environmental security. I thank the committee for your continuing support for the important work we do.

INVESTMENTS IN STOCKPILE STEWARDSHIP AND ACCOMPLISHMENTS

Beneficial Increased Attention. The Stockpile Stewardship Program (SSP) has benefited from the attention given to it by Congress and the Administration since the 2010 Nuclear Posture Review (NPR). The review reemphasized the need to "sustain a safe, secure, and effective nuclear arsenal as long as nuclear weapons exist." It also recognized that "significantly increased investments" were required to modernize an aging stockpile and to sustain the capabilities, knowledge, and skills in the underpinning science, technology, and engineering base. *Both types of investments are essential for effective deterrence*, especially as the nation strives for further worldwide reductions in nuclear arms. As noted in the NPR, a key enabler to stockpile reductions (such as those associated with New START) is a healthy nuclear weapons complex. A complex with sustained nuclear-weapon design and production capability is a key component of our nation's deterrent and serves as a strategic hedge against technological surprise and a changing national security environment.

Considerable progress has been made in developing a strategic vision for the stockpile, and we are beginning to implement it. NNSA and the Department of Defense (DoD) are undertaking a needed set of life-extension programs (LEPs) to modernize the aging stockpile, with consideration being given to enhanced safety and security and interoperability among delivery systems in order to reduce the overall size of the stockpile. LEP-related activities at LLNL serve extremely important multiple benefits of exercising critical skills in program management, weapons design and development, and weapons engineering that the Laboratory must sustain and pass on to future generations of stockpile stewards.

We also are enhancing computational and experimental capabilities to assess and certify aging weapons, conduct significant finding investigations, and develop options for LEPs. These tools are also vital for training and honing the skills of current and future generations of stockpile stewards. I will highlight accomplishments at LLNL, including our work on the W78/88-1 LEP and concept development for the Long Range Standoff weapon. In addition, Livermore has brought two powerful tools—the Sequoia supercomputer and the National Ignition Facility (NIF)— into full operation and describe their application to the SSP.

Budget Challenges. Sustaining progress on SSP priorities through a balanced set of investments is especially challenging at a time of budget austerity. Because weapons in the stockpile continue to age beyond their intended service life, timely execution of planned LEPs is vitally important, with the objective of implementing over time the Nuclear Weapons Council's "3+2" strategy for the future stockpile. Concurrently, we need to invest in the infrastructure of the NNSA enterprise—production capabilities and the people and tools that provide the science, technology, and engineering underpinning of stockpile stewardship.

Work on LEPs is job #1 for NNSA, although funding constraints are pushing out completion of planned LEPs about as far as is acceptable. However, LEPs are not the only job. As noted earlier, a healthy complex is a crucial component of the nation's strategic hedge against technological surprise or changing world conditions. Some things are going well. Plans for the Uranium Processing Facility (UPF) at Y-12 are moving forward. We are also fully supportive of the revised plans to provide modernized plutonium research and pit production capabilities at Los Alamos National Laboratory (LANL) and make use of the Superblock facilities at LLNL. However, a consequence of these important investments is highly constrained funding for the all-important science and technology base of stockpile stewardship. That is a source of considerable concern to me because of its immediate impacts on our Laboratory in particular in FY 2014 and because of the long-term effects on the health of stockpile stewardship.

Stockpile Stewardship Accomplishments at LLNL. SSP efforts at LLNL in FY 2012 and early FY 2013 have resulted in numerous key accomplishments supporting the SSP. Highlights include:

- *Annual Assessment.* We completed Cycle 17 of the annual assessment process and the second cycle of the Independent Nuclear Weapon Assessment Process (INWAP), in which LLNL applies its unique approach to nuclear weapons assessment to the systems for which LANL has primary responsibility, and vice versa. These assessment activities greatly benefited in quality and increased scientific rigor due to improvements in weapon physics simulations.

- *The W78/88-1 LEP and concept development for the Long Range Standoff (LRSO) weapon.* NNSA and DoD launched the Phase 6.2/6.2A activity on the W78/88-1 LEP in FY 2012. The considerable progress to date is supporting an early down-select of a preferred option for the LEP. LLNL weapons experts are evaluating options to incorporate enhanced safety and security features. Options for interoperability of the nuclear explosives package with the U.S. Navy's W88 warhead are also to be considered as part of the study. In support of an Air Force-led LRSO study, Livermore developed a spectrum of nuclear-explosives-package design approaches. More generally, LLNL made significant progress on maturing technologies to enhance manufacturability (to lower costs) and improve safety and security options for future LEPs.
- *Sequoia*. Livermore brought into operation for NNSA's Advanced Computing and Simulation (ASC) Program the IBM Sequoia supercomputer. With 1.6 million cores working in parallel, the machine has performed record-breaking simulations. All three NNSA laboratories have run large unclassified simulations to test the machine and optimize performance. Sequoia transitioned to classified use in April 2013 and has begun running detailed simulations of nuclear weapons physics, in support of stockpile stewardship.
- *NIF as a national user facility.* NIF began operation as a national user facility at the beginning of FY 2013. In FY 2012, NIF conducted 332 system shots in support of the SSP, other national security applications and fundamental science. NIF has successfully supported important milestones and resolved key issues for the SSP. The laser system demonstrated that it exceeded performance requirements with precision delivery of energy in excess of 1.8 megajoules (ultraviolet) and 500 terawatts of power.
- *SSP experiments*. In addition to SSP experiments at NIF, LLNL conducted three technically challenging integrated weapon experiments (hydrotests) at the Contained Firing Facility, carried out the 100th special-nuclear-material experiment at the JASPER (Joint Actinide Shock Physics Experimental Research) facility, and reported new results from ongoing plutonium aging studies that indicate that the material continues to age gracefully.
- *Deinventory of high-security special nuclear materials (SNM).* In September 2012, the last of the SNM items that require Security Category I/II operations were removed from the Livermore site. Through a concerted effort, deinventory of these items was completed two years ahead of the original schedule and the Laboratory has transitioned to lower-cost Category III operations with related security operations downsizing and savings for the enterprise.

SUPPORT FOR STOCKPILE STEWARDSHIP SCIENCE AND TECHNOLOGY

The Foundation of Simulations and Experiments. The SSP fundamentally depends on the expert judgment of the people in the program—their skills and ability to resolve with confidence difficult questions about the performance of aging weapons, and to provide LEP options with interoperability and enhanced safety and security features. The SSP is founded on the premise that the knowledge and expert judgment about nuclear weapons developed over generations of constantly designing and testing new weapons can be replaced by succeeding generations who rely instead on theory, detailed simulations, and laboratory experiments as a basis for stockpile assessments and certification of LEPs. In the past, the paradigm was the empiricism of nuclear testing and use of "rules of thumb" where detailed understanding was lacking; now it is science-based stockpile stewardship with the rules of thumb being replaced by a much better understanding of the underlying physics of nuclear weapons.

Experts at the NNSA laboratories now rely on state-of-the-art computer simulations that are tested and verified with experimental capabilities (and past nuclear test data) to do their job. Their understanding of nuclear weapons design and functioning is continually improved through the cycle of theory, simulation, and experiment that is at the core of the scientific method and the SSP. We still have much work to do.

Investments in Supercomputing. In April 2013, the Sequoia supercomputer made the transition to classified work for the SSP. This is a tremendous success for NNSA's ASC program and a major advance in high-performance computing (HPC) capabilities. The machine's extraordinary capabilities are needed to improve models of weapons physics, particularly in the areas of hydrodynamics, radiation transport, and the properties of materials at extreme pressures and temperatures. In addition, Sequoia is able to run large suites of calculations designed to characterize uncertainties in weapon performance resulting from small variations in the weapon system and uncertainties in the physics models used. Improved capabilities for uncertainty quantification (UQ) are essential for assessing the impact on performance of physical changes in aging weapons and for certifying LEPs.

Sequoia provides "entry-level" capabilities to run suites of three-dimension weapons physics simulations for UQ. Even more capable computers are needed to run large suites of high-fidelity simulations to fully map out the impact of uncertainties. Greater capability is also needed to develop predictive models of boost physics and thermonuclear burn processes in nuclear weapons. It is vitally important for the future of stockpile stewardship—as well as to national competitiveness—that we continue to work with industry and the DOE Office of Science to expeditiously advance HPC capabilities, both in the near term and in the development of next generation (i.e., exascale) architectures.

Investments in Nuclear Weapons Experimental Science. Of the experimental facilities supporting stockpile stewardship, NIF is especially important because of its ability to provide data pertaining to nuclear weapon performance that is otherwise inaccessible in the absence of nuclear testing. Some of the experiments provide necessary data as input to simulation models; others provide validation of the performance of models.

NIF is a core experimental capability of the SSP, needed to ensure confidence in the reliability of its nuclear stockpile without a return to nuclear testing. In particular, NIF uniquely makes accessible regimes of pressure, density, and temperature relevant to the operation of a nuclear weapon. NIF experiments provide data and insights that challenge our modeling and simulation capabilities. The ability to experimentally test the theory and assumptions embodied in our simulation of nuclear weapons is fundamental to stockpile stewardship.

NIF has successfully supported important milestones and resolved key issues for the SSP, and currently has more requests from the SSP community for experimental shots than it has the capacity to provide. In addition to its role in the SSP, NIF executes experiments for NNSA nonproliferation and Department of Defense (DoD) applications, and supports fundamental science. One important consequence of the efforts of the academic community on NIF experiments is the pipeline of young researchers that come to the Laboratory and ultimately to the SSP. NIF began operations as a user facility for high-energy density science in FY 2013.

NIF is one of the largest scientific construction projects successfully completed by the DOE, an accomplishment validated by the prestigious International Project of the Year Award in 2009. The laser system meets or exceeds all of its performance specifications and NIF is the world's leading scientific facility for high-energy-density science and inertial confinement fusion (ICF) research. It is worth noting that every major nuclear power that has abjured nuclear testing (other than the UK, which uses the NIF)—Russia, China, France—has a NIF-like facility either under construction, or planned. Laboratory experimental access to the conditions present in an operating nuclear weapon cannot be currently achieved any other way.

NIF has made steady progress towards demonstrating fusion ignition; realizing this goal is important to more fully understand key aspects of nuclear weapons physics, and also for retiring the physics issues associated with inertial confinement fusion energy (IFE). The ongoing experimental program at NIF balances experiments for stockpile stewardship—work on ignition and other experiments that do not require ignition—as well as experiments for other national security missions and for fundamental science.

Our efforts on ignition are guided by *NNSA's Path Forward to Achieving Ignition in the Inertial Confinement Fusion Program*, the November 2012 Report to Congress issued by NNSA as requested by the U.S. Senate Committee on Appropriations, Subcommittee on Energy and Water Development. This guidance on the path forward is based on the technical judgment of the broad nuclear weapons and ICF community. The report stresses the importance to the SSP of achieving ignition *or if concerted efforts do not succeed, understanding in detail why the goal is out of reach*. The ignition plan calls for over 400 shots over 36 months and critical new capabilities. The pre-sequestration NIF FY 2013 budget could have enabled considerable progress towards meeting the goals of the *NNSA Path Forward* plan.

The rationale for NIF, as espoused by DOE (and later NNSA) from the beginning was primarily for its role in stockpile stewardship. However, that rationale also acknowledged NIF's importance to fundamental science, and for addressing the physics issues associated with IFE production. A recently issued National Academy of Sciences study stated there is "*a compelling rationale for establishing inertial fusion energy R&D as part of the long-term U.S. energy R&D portfolio."* The study also noted that *"planning should begin for making effective use of the NIF as one of the major program elements in an assessment of the feasibility of IFE."* Significantly, the path toward achieving ignition does not depend on whether the goal is assuring the safety, security, and reliability of the nuclear stockpile, or creating a sustainable source of clean energy.

Reductions to NIF in the FY 2014 Budget Request will cause real harm. The President's Budget Request cuts $80 million from the unsequestered FY 2013 operating budget for NIF—a nearly 25% reduction that comes on top of a $30 million reduction that occurred in the prior year. The proposed reductions are based in part on an operational and business model for NIF operations that is neither founded on standard practice for the use of scientific facilities, nor founded on an informed analysis of NIF operations and costs.

The business model proposed—a "pay as you go" model for users—fundamentally differs from the best practices employed at DOE Office of Science user facilities and other national and international leading-edge-science experimental facilities, and differs as well from the Readiness in Technical Base and Facilities (RTBF) approach routinely followed by NNSA. The scientific facility operations model recommended by a 1999 National Research Council (NRC) report and adopted by DOE for all of its scientific user facilities found that *"… history has demonstrated that if core operations and maintenance become dependent on dispersed funding, the entire facility operation may be threatened by the reduction or withdrawal of support by a single component."* Adherence to this principle has been critical to DOE's strong record of success in operating major scientific user facilities. This NRC-recommended model is also used by the National Science Foundation (NSF) and other federal agencies such as the National Aeronautics and Space Administration (NASA).

Analysis demonstrates fundamental flaws with the approach. Importantly, the vast majority of users on NIF are from the SSP, funded by NNSA. The plan for FY 2013 shots is instructive: over 90% are in support of SSP. The non-SSP shots support NNSA non-proliferation, DoD, and the fundamental science community. It is important to note that the fundamental science community simply cannot afford to pay, so their research will simply not get done. Moreover, DoD and non-proliferation users have not included those costs in their planning. This is why under the NRC model, scientific user facility operations are funded separately—and fully. Hence, the proposed model for NIF would eliminate use of NIF by the science, DoD, and non-proliferation communities. While the impact of this is high for national security and science, the cost avoidance is small—roughly $6 million per year. Again, it is important to note that the fundamental science community in high-energy-density science and ICF research represents a key pipeline for the future SSP workforce.

A further rationale that we have heard for the $80 million cut to NIF is that an added emphasis on non-ignition-related SSP experiments significantly reduces the cost of operations at NIF. This too is incorrect. The SSP shots are not uniformly lower in energy and power; and hence the resultant cost saving in optics is marginal. Furthermore, the complexity of these SSP shots has been steadily increasing and is equivalent to or greater than those for ignition, often requiring significant new facility capabilities. As such the integrated cost impact of emphasizing non-ignition SSP experiments to the overall program is not significant.

It should be noted that these rationales were not developed in consultation with LLNL management, and hence were not based on experience with the NIF experimental program or operations. If enacted, our current best estimate is that proposed reductions to NIF operations and LLNL's ICF Program budget included in the FY 2014 President's Budget Request will lead to substantial staff reductions at the Laboratory (approximately 500 staff members down from the level at the beginning of FY 2013), and operational cutbacks that mean that nearly 70% of the SSP shots planned for in FY 2014 will not be conducted.

We are acutely aware of the limited resources in our current fiscal environment. However, drastically reducing the budget at a time when the demand for shots from SSP and other NIF user communities far exceeds available shot time is not a prudent use of this great national resource, and the investment that has been made in it. NIF has achieved "full steam" operations in the past year; building the facility and then substantially limiting its use as a user facility is not logical. To significantly cut back operations, disrupt the world-class team supporting those operations, and deplete the NIF user community so soon after completion of the facility, after decades of effort, would not only damage the nation's national security and scientific credibility, but also lead to a loss of U.S. leadership in this important field. There is also a wider message such a budget cut would send—the message to prospective scientists that might be drawn to a career at an NNSA laboratory to pursue high-energy density science and weapons physics; to nations that might grow to question the U.S. long-term commitment to ensuring an effective nuclear deterrent; and to stakeholders eager to find out whether IFE might be a path to energy security.

NIF was built to support stockpile stewardship and continues to provide essential support to the SSP with a variety of experiments. The data from these experiments fundamentally expands our understanding of the performance of nuclear weapons. So we all have a stake in NIF realizing discoveries about materials at high energy density, ignition, and thermonuclear burn—this is what it is designed to do. Severe budget cuts that curtail achieving such understanding are not the path to success.

The FY 2014 President's Budget Request also potentially impacts the W78/88 -1 effort, especially in the years following FY 2014. We are concerned that the funding contained in the FY 2014 request for W78/88-1 is not sufficient to support an early down select of the Nuclear Explosives Package (NEP) design for the W78/88-1 and also conduct the technology maturation efforts essential to provide reliable cost estimates for the Phase 6.2A cost study. This early down select will help reduce the scope of the 6.2 effort; Livermore fully supports this activity, and is working with LANL and the NNSA to achieve this goal. But even with an early down select of the NEP, investments in technology maturation during the 6.2 Phase are key to informing warhead down-select decisions, limiting risk mitigation options that would otherwise need to be carried forward into Phase 6.3, improve cost estimates of the down selected design, and increase confidence in successful delivery of the LEP in 2025.

PROVIDING NATIONAL SECURITY IN THE GLOBAL CONTEXT

National security requires not only an effective nuclear deterrent, sustained through the SSP, but also vital efforts aimed at preventing the proliferation or terrorist use of nuclear weapons and other weapons of mass destruction (WMD) or disruption, strengthening the capabilities of our military forces, and bolstering the nation's energy security and economic competitiveness. At LLNL, the capabilities we have developed for our stockpile stewardship work are leveraged to address these other pressing national security issues, and, in so doing, add depth, breadth, and strength to our scientific and technical base and the expertise of our workforce.

Highlights of recent activities for DOE and NNSA non-Defense Programs, other federal agencies, and non-federal sponsors include:

- *Treaty verification and nuclear explosion monitoring.* LLNL led the modeling and data analysis for the "Pele" test, which was conducted to assess the ability of various technologies to distinguish signatures for weapon development from other activities and determine which techniques could be used for effective treaty verification and monitoring. LLNL is the leader in ground-based nuclear detonation detection and develops improved methods for identifying small explosions amid the background clutter of earthquakes and mining blasts. Our analytic techniques were called into action on February 11, 2013, as seismic signals were detected within minutes of the later announcement by North Korea that it had conducted a nuclear test.
- *Support for the U.S. military.* LLNL continues to play a leading role in advanced conventional munitions development (which was reported to this Committee last year); our conventional weapon designs are being used today in the field and also are supporting emerging new capabilities. Many other examples of our support to the warfighter can be cited: LLNL began development of a novel carbon-nanotube-based material designed to repel chemical and biological agents; LLNL's Counterproliferation Analysis and Planning System (CAPS) is an exceptional tool to assist in planning missions against facilities that support WMD production, and the CAPS capability was called upon scores of times in the past year to provide technical assistance to Combatant Commanders and to U.S. troops in the field.
- *Foreign nuclear weapons analysis.* As recent developments in North Korea and Iran have shown, accurate, comprehensive, and timely assessments of foreign nuclear weapon capabilities are critical. LLNL deploys its extensive expertise on these and other countries of concern, and we provide analysis that contributes to decision making at the highest levels, including National Intelligence Estimates (NIEs). We also develop technologies and systems to help the Intelligence Community meet its data collection and information exploitation needs.

- *Cyber security.* LLNL has created new cyber security capabilities that provide real-time situational awareness inside a large computer network using a distributed approach to monitoring for anomalous behavior. Through our Network Security Innovation Center, we work with private partners to counter the constant attack on commercial, infrastructure, and national security networks and protect critical operations and to develop the next generation of cyber defenders. As the sophistication and intensity of cyber attacks against the U.S. continue to increase, these and other cyber security projects are more important than ever.
- *Tracking space debris*. As part of the quest to provide space situational awareness, a "nano-satellite" was launched in September 2012 that contains an LLNL-developed optical system for tracking space debris. A constellation of such nano-satellites is projected to be able to track pieces of space debris with a precision ten times greater than currently possible, which would greatly reduce the false alarm rate for possible collisions with U.S. satellites.
- *New radiation detection materials*. LLNL developed new materials for improved radiation detection and discrimination, including a new high-resolution scintillator material that operates at room temperature and that is inexpensive, easily field-deployable and that can be manufactured in large volumes. LLNL, working with NNSA, DHS, and DoD, continues to lead the nation in the development of new capabilities that improve discrimination (important for determining whether a source is benign or a threat), and replace legacy (and poorly performing) systems.
- *Biodetection and countermeasures*. Licensing of the Lawrence Livermore Microbial Detection Array (LLMDA) will enable law enforcement, food-safety professionals, physicians, and others to detect within 24 hours any of thousands of bacteria, viruses, or toxins that have been sequenced. New insights into the interactions of potential drugs with pathogens, gained through modeling using LLNL's world class high performance computing resources, are helping speed the development of medical countermeasures to biothreat agents.
- *Energy security, HPC, and industrial partnering*. LLNL is partnering with industry to accelerate the development of energy technologies. Of particular note is that we are working with the California Public Utilities Commission, through the California Energy System for the 21st Century (CES-21) project, to leverage LLNL's (unclassified) high performance computing resources deployed at the Livermore Valley Open Campus in a five-year collaborative effort with the utilities to improve the state's energy grid.

These efforts sustain the vitality of the Laboratory by extending existing core competencies and building new strengths in multidisciplinary science and technology, which in turn benefit the stockpile stewardship mission and national security.

Attention to the long-term health and vitality of LLNL is an overarching responsibility of mine. We are working to expand these efforts, which is a significant challenge at a time of austere federal budgets and limited economic growth. Actions to help lower operating costs at the NNSA laboratories and simplify the processes for arranging inter-agency work would be greatly beneficial.

OVERSIGHT AND GOVERNANCE

There have been a considerable number of studies and discussion over the past few years about the oversight and governance of the NNSA laboratories. Most recently, the 2013 National Defense Authorization Act established a Congressional Advisory Panel on the Governance of the Nuclear Security Enterprise to examine this issue. I applaud this action and offer up some broad observations for consideration.

Policies governing the laboratories have many masters. Disparate offices in NNSA and DOE HQ and the Field Offices (with at times conflicting voices) all generate the policies regarding the conduct of operations at the laboratories and production plants. The laboratories and sites could function more efficiently with a single determining voice on policies regarding safety, security, legal, accounting, etc. That voice needs to be close to the *mission* in order to appropriately weigh the impact of policy on mission delivery. Any oversight and governance construct could be tested with this key question: how and at what level is the impact of policy on mission performance weighed against the resultant proposed risk reduction?

To the extent possible, policy should be made by exception in those cases where federal, state, and local laws and regulation, or international standards apply. This is how DoD manages its federally-funded research and development centers (FFRDCs). The large majority of rules the laboratories operate under have little if anything to do with nuclear operations, and my remarks especially focus on those areas. To the extent that policies are required to supplement broader federal, state, and local laws and regulation, or international (e.g., ISO) standards, the policies that are necessary should not be prescriptive in terms of how they are to be implemented, but rather in terms of desired goals. Furthermore, policies or directives should be accompanied by a cost benefit analysis, and conducted in partnership with Laboratory management. Specific implementation should be left to laboratory management, which in turn should be held accountable (provided adequate resources are provided for implementation). Performance against these goals should be audited centrally to ensure uniformity across the complex.

It is important that any construct for governance provide a credible advocate for the mission to DoD, the White House, and Congress. The governing agency needs a robust planning, programming, and budgeting system integrated over its portfolio of programs. Furthermore, that function should include a credible independent cost estimation capability. In analogy with how DoD operates with the military services, the cost estimation capability would not be a substitute for the process led by the laboratories, but rather ensure that the right questions get asked. An effective budgeting and planning function is essential for establishing credibility with the various stakeholders. In my view, that capability needs to be implemented immediately, and aggressively.

The FFRDC construct that has served the nation so well for decades has been stood on its head. In principle, the FFRDC concept distributes responsibility and accountability to the contractor for serving the sponsor's (today, NNSA's) mission with excellence, in a secure and safe manner, and consistent with state, local, and federal laws and regulations. Hence, the need for equivalent responsibilities and accountabilities on the government side is largely obviated. That is, under this construct, the role of the government is limited: manage the contract consistent with Federal Acquisition Regulations (and DOE FARs, or DEARs) to ensure performance objectives are met; set standards (e.g., require compliance with ISO or other international standards); advocate for the mission within the government; develop, implement, and rationalize a budget; make capital investments; and take those actions needed to assure the excellence and sustainability within existent policy and budgetary constraints.

Under this construct the FFRDC is held accountable, and the government is expected to hold regular financial and performance audits and reviews. If there are too many security or safety incidents, the employees concerned are disciplined or let go, and/or the institution fined. If concerns arise within a particular institution regarding mission performance, or if it appears to have systemic issues, the government can demand that the FFRDC change leadership or in extreme cases, the government can recompete the Management and Operations contract. This philosophy guides how DoD works with its FFRDCs, which is in part demonstrated by the fact that the DoD FFRDCs and University Affiliated Research Centers (UARCs) are overseen with greater than one order of magnitude fewer government employees, and very few specific rules and regulations.

What has instead happened within DOE is that the FFRDCs believe they have the responsibilities and accountabilities noted above, but there are also many in DOE/NNSA who also think they have those responsibilities and accountabilities. We have to meet standards for safety and security, but we are also told prescriptively how we should do so. Orders and directives are substituted for perfectly applicable international standards, and laws and regulations. In all too many cases, we are told who we can hire, what we pay them, and how we should manage our workforce. Any governance construct needs to be tested against the consequent mix of roles, responsibilities, authorities, and accountabilities between the FFRDC and the government.

There has been a breakdown in trust between the FFRDC partners and the government. This lack of trust—highlighted last year by the National Academy of Sciences—should concern us all. The FFRDCs ensure that the work of DOE gets done—we do the mission planning and execution, provide corporate memory, and comprise the dedicated and professional workforce that is the enduring backbone of the enterprise. The FFRDCs are not simply "contractors" but rather are partners (and have been without interruption for decades) to the government. This difference is well understood within DoD and NASA. DoD and NASA treat their FFRDCs and UARCs as trusted mission partners, in sharp distinction to how they work with their industrial base. The relationships are enduring, and not limited by the time frame of a particular contract.

A crucial question against which governance constructs should be tested is how the current culture (embedded across the DOE government ecosystem: DOE HQ, NNSA HQ, and the Field Offices) will be affected. The existing culture is one of highly intrusive oversight of Laboratory operations. It would be dilatory if the result of a new governance model is to simply change the organization chart while keeping embedded the culture and approach that has now been in place for over a dozen years.

Any governance construct should be evaluated in terms of the fundamental relationship between the FFRDCs and the government—in particular, will it foster a dynamic where the government sees itself as one side of an enduring relationship with partners that execute a shared national security mission?

The above observations are offered with the goal of revitalizing the relationship between the laboratories and our governing agency. To succeed in our important mission as we face numerous technical, programmatic, and budgetary challenges, we need a more trusted relationship. We should be operating in a productive partnership with more efficient and effective governance and oversight, a clear understanding of roles and responsibilities, and a shared vision and clear focus on mission. I am ready to work hand in hand with my colleagues in the government and across the complex to forge a stronger partnership.

CONCLUSION

At LLNL, we are undertaking a challenging set of activities to modernize an aging stockpile and sustain a healthy nuclear weapons complex. Effective deterrence requires investments in *both* LEPs and the supporting science, technology, and production base for stockpile stewardship. We are implementing a strategy for moving forward that is budget constrained. One vital piece of the overall SSP is particularly constrained in the President's FY 2014 Budget Request: operation of NIF to collect vitally needed data pertaining to the nuclear phase of the function of a nuclear weapon. For the long-term health of the program, it is important to rectify that imbalance.

It is also important that we revitalize the partnership between the government and its laboratories. Many shortcomings in governance and oversight have been identified in independent studies. It is time to act on recommendations that have been offered, guided by the deliberations of the newly formed Congressional Advisory Panel on the Governance of the Nuclear Security Enterprise.

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