THE STOCKPILE STEWARDSHIP PROGRAM

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Opening Remarks

Mr. Chairman and Members of the Committee, thank you for the opportunity to provide a statement on the status and future prospects of the Department of Energy/National Nuclear Security Administration's (NNSA) Stockpile Stewardship Program to sustain the safety, security, and effectiveness of the nation's nuclear stockpile. My name is George Miller and I am the Director of the Lawrence Livermore National Laboratory (LLNL).

LLNL is one of NNSA's two nuclear design laboratories and a principal participant in the Stockpile Stewardship Program. National security depends greatly on the success of our stockpile stewardship efforts. I want to thank the Committee for your interest in and continued support for these activities.

In addition to stockpile stewardship, our Laboratory's nuclear security responsibilities include engaging in vital national programs to reduce the threats posed by nuclear proliferation and terrorism. The Laboratory also applies its multidisciplinary science and technology to provide solutions to a broader range of pressing national and global security challenges.

Introduction

From a scientific and technical viewpoint, I am confident that we can maintain a safe, secure, and effective nuclear deterrent through a science-based Stockpile Stewardship Program that is balanced, integrated, and sustained over time; this will require the support of successive Administrations and Congress and sufficient funding to meet mission requirements. Stockpile stewardship is a cornerstone of the nation's strategic deterrent for the future. As demonstrated by the program's achievements to date, I believe that the highly capable scientists and engineers at the NNSA national laboratories and production facilities will be able to address issues that arise in an aging, smaller nuclear stockpile by utilizing and further advancing our exceptional computational and experimental tools and employing the full range of life-extension program (LEP) options.

My optimism is tempered by recent funding trends in—what to date—has been a very successful Stockpile Stewardship Program. Continuing success in the program's scientific and technically challenging activities will require additional new investments in major facilities and particular attention to sustaining the skills of our workforce. Budget constraints to date have resulted in deferral of life-extension programs (LEPs) and slower warhead surveillance rates than is technically desired. These constraints have also delayed production schedules; postponed important deliverables in science, technology, and engineering; delayed resolution of identified stockpile issues; and hindered efforts to develop modern and efficient manufacturing processes. In addition, there are fewer highly skilled stockpile stewards supporting the program than were present as recently as five years ago. Our Laboratory now has 2,608 scientists and engineers—609 fewer than in May 2005. Concurrently, stewardship is becoming technically more challenging as weapons continue to age beyond their intended lifetimes. In my 2009 Annual Stockpile Assessment letter to the Secretaries of Defense and Energy and the Chairman of the Nuclear Weapons Council, I expressed concerns about the impact that these trends will have on sustaining confidence in the stockpile.

The FY2011 budget request seeks to reverse recent funding trends and reflects the need for increased investment to maintain sufficient capability to ensure the viability of the U.S. stockpile. The nation's nuclear strategy—with or without the planned stockpile reductions—requires a Stockpile Stewardship Program that is balanced, integrated, and sustained over time. NNSA has provided to Congress its Stockpile Stewardship and Management Plan, which is funded in the FY2011 Budget Request with a 9.8 percent increase ($624 million) compared to FY2010. This is a good start, but only a start. The increased level of investment must not only be sustained but grow over time to provide for construction of new facilities and support increased LEP activities.

My testimony emphasizes several key points about a balanced, integrated, and sustained Stockpile Stewardship Program:

- *Accomplishments*. Stockpile stewards have achieved many outstanding successes since the program began. These accomplishments give me confidence that the "science based" approach being pursued is a workable path forward for sustaining the safety, security, and effectiveness of the nation's nuclear deterrent.

- *A Sustainable Program*. Stockpile stewardship is scientifically and technically very demanding. It is a very active, integrated program and to sustain it, its interdependent facets must be adequately funded to progress in a balanced manner.

- *The Budget*. With the President's FY2011 budget, we can begin to reinvigorate the Stockpile Stewardship Program. The requested additional funds will enable greater progress on many fronts—from stockpile life-extension activities, to recapitalizing the infrastructure, improving assessment capabilities, and building the knowledge base required to answer increasingly difficult questions about weapon performance over its full life cycle.

- *Life-Extension Programs*. Options for life-extension programs (LEPs) will be based on previously tested nuclear designs. We will consider, on a case-by-case basis, the full range of LEP options (refurbishment, reuse, and replacement) to provide findings and technical recommendations for engineering development decisions.

- *The Workforce*. The Stockpile Stewardship Program's most valuable and irreplaceable assets are the unique individuals who sustain it. Confidence in the stockpile ultimately depends on confidence in the stockpile stewards at the NNSA laboratories and production facilities. We must attract top talent to the program and sustain over time specialized technical skills and expertise, which provide the basis for judgments about the stockpile and stewardship actions taken, through mentoring and hands-on experience.

Science-Based Stockpile Stewardship Accomplishments

The science-based Stockpile Stewardship Program was launched on the premise that by developing a much more thorough understanding of the underlying science and technology that governs nuclear weapons performance, the country could maintain confidence in the stockpile without requiring nuclear testing. The knowledge gained must be sufficiently detailed to assess with confidence the safety, security, and effectiveness of the stockpile. We must have the ability to deal with whatever issues arise using existing nuclear test data together with advanced computational and experimental tools. Very ambitious goals were set to expeditiously develop increasingly sophisticated tools and apply them to arising issues in an aging stockpile.

We have made significant progress since the Stockpile Stewardship Program began. Use of the many tools and capabilities developed since the end of nuclear testing has greatly increased our understanding and knowledge of the stockpile. These tools and capabilities, together with the existing nuclear test database, have enabled the NNSA laboratories to annually assess and, as required, extend the life of the warheads in the U.S. stockpile. Some highlights—featuring work at LLNL—include:

High-Performance Computing. At its onset, the Stockpile Stewardship Program set the extremely challenging goal—many thought unachievable—of improving scientific computing performance by a factor of a million over a decade. That goal was achieved with the delivery of the 100-trillion-operations-per-second ASC Purple supercomputer to LLNL in 2005. The machine has served as a workhorse for all three NNSA laboratories, performing very demanding 3D weapons simulations. This highly successful partnership between NNSA and the high-performance computing industry continues with the 20,000-trillion-operations-per-second Sequoia machine, which is on track to become operational at LLNL in 2012.

High-Fidelity Weapons Physics Simulations. Laboratory physicists and computer scientists stepped up to the challenge of developing weapons simulation codes that model the physics with far greater fidelity and run efficiently on computers with thousands of processors working in parallel. In 2002, LLNL scientists performed the first-ever complete 3D simulation of a nuclear weapon explosion—with a level of spatial resolution and degree of physics realism previously unobtainable. Supercomputers have also been used to gain valuable insights into the properties of materials at extreme conditions and details about the formation and growth of hydrodynamic instabilities. These improved capabilities have made possible expeditious development of LEP design options and their certification.

Vastly Improved Experimental Capabilities. Thoroughly diagnosed non-nuclear tests are used to gather input data for weapons physics simulation models and validate their performance. Experiments at LLNL's Contained Firing Facility and the Dual-Axis Radiographic Hydrodyanamic Test (DARHT) Facility at Los Alamos National Laboratory (LANL) have provided key hydrodynamic performance information for applications ranging from LEPs to weapon safety studies. Data from the Joint Actinide Shock Physics Experimental Research (JASPER) gas-gun experiments were instrumental in the very successful plutonium aging study, and tests conducted at LLNL's High Explosives Applications Facility (HEAF) enable improved modeling of aging high explosives. With commissioning of the National Ignition Facility (NIF) in 2009, stockpile stewards now have an experimental facility capable of creating the temperatures and pressures necessary to study the physics of the nuclear phase of weapons performance.

Improved Understanding of Materials Aging and Weapons Performance. A long-term study by LLNL and LANL concluded that the performance of plutonium pits in stockpiled weapons will not sharply decline due to aging effects—a result with important implications in planning the future of the production complex. Through simulations and experiments, we have a much deeper understanding of the behavior and aging properties of weapons materials ranging from plutonium and high explosives to crystalline metals and polymers. Recently an LLNL scientist received an E.O. Lawrence Award for breakthrough work to resolve a previously unexplained 40-year-old anomaly that was one of the factors that drove the need for continued nuclear testing. Now, in simulation codes, a physics-based model can replace the use of an ad hoc calibration factor that had to be adjusted depending on weapon design specifics and nuclear test data. The effort involved combining high-fidelity non-nuclear experiments, the latest simulation tools, and re-examination of archival nuclear test data. Experiments at NIF are serving to confirm the model.

Successful Life-Extension Program. In 2004, NNSA successfully completed its first program to extend the lifetime of a stockpiled weapon without resorting to nuclear testing. Refurbishment of the W87 ICBM warhead—the design in the stockpile with the most modern safety features—extends the weapon's life by thirty years. LLNL (with Sandia National Laboratories) developed and certified the engineering design and worked closely with the production facilities to ensure the product quality. The program has served as a model of the processes to be followed by subsequent and future LEPs. Today, the NNSA, its laboratories, and production facilities have continued this success with a major program to extend the life of the very important W76 Trident II SLBM warhead.

The successes to date have also given us insight into the better tools that are needed and science and technology areas that require continued work. These improvements will put our annual assessment of the stockpile on the firmest footing and provide us the insight and tools to make wise decisions and ensure the safety, security, and effectiveness of the stockpile as we move forward. For instance, from simulations performed to date, we have learned that we will need at least exascale—1,000,0000 trillion operations per second—to fully resolve the phenomena we have discovered.

A Balanced, Integrated, and Sustained Stockpile Stewardship Program

Stockpile Stewardship Program accomplishments to date give us confidence that the "science based" approach being pursued is a workable path forward to sustaining the safety, security, and effectiveness of the nation's nuclear deterrent. Stockpile stewardship is scientifically and technically very demanding, yet the high-caliber experts at the national laboratories have proven themselves worthy of this major challenge time and time again.

Since 2005, the buying power of NNSA's Defense Programs has declined approximately $1B. Yet, the program will grow even more demanding as nuclear weapons continue to age far beyond their intended lifetime. As the stockpile continues to be downsized, even more pressure will arise to understand the state of each individual weapon. More difficult manufacturing issues are arising in life-extension programs (LEPs) and we have largely exhausted available options to improve performance margins through changes external to the warhead package.

There is growing widespread recognition that the Stockpile Stewardship Program—its workforce and facilities—must be reinvigorated to sustain a safe, secure, and effective nuclear arsenal over the long run. Reports commissioned by Congress (e.g., *America's Strategic Posture* and the *Stockpile Stewardship and Management Plan* prepared by NNSA) and reviews pursued by the Executive Branch (e.g., the 2010 Nuclear Posture Review (NPR)) have concluded that significantly increased investments are needed to support (in the words of the NPR) "a modern physical infrastructure—comprised of the national security laboratories and a complex of supporting facilities—and a highly capable workforce with the specialized skills needed to sustain the nuclear deterrent."

A balanced and sustainable Stockpile Stewardship Program integrates stockpile support activities—which include weapons surveillance, assessments, and as necessary, life-extension programs—with investments to modernize facilities and efforts to greatly improve scientific understanding of the details of nuclear weapons components and their performance. The many facets of the program are tightly interconnected. Even with stable overall funding at an adequate level of support, long-term success requires judicious balancing of evolving priorities and appropriate levels of effort.

Weapons Surveillance—to predict and detect the effects of aging and other stockpile issues. We need to step up the rate of stockpile surveillance and continue to become more proficient at detecting and predicting potential problems early. The use of embedded sensors, which we are developing, would enable persistent surveillance and improve our knowledge of the specific state of each stockpiled weapon. Data would be indicative, for example, of aging and degradation, mechanical integrity, and exposure to harsh environments. In addition, we are developing ever more sophisticated tools to study how aging alters the physical characteristics of weapon materials and how these changes affect weapon effectiveness and safety.

Assessments—to analyze and evaluate effects of changes on weapon safety and performance. The Stockpile Stewardship Program includes a comprehensive set of activities to annually assess each weapons system and to address issues that arise. It is particularly important, in my view, for processes to actively engage both centers of nuclear design expertise—LLNL and LANL—to provide independent assessments. This is much like having a serious illness: advice from more than one independent source is crucial to the decision making process. As we move further and further from a workforce that has actually tested a nuclear device, the independence of the two design centers is increasingly important. Our assessments are also benefiting from the development of Quantification of Margins and Uncertainties, a methodology that is increasing the rigor of weapon certification and the quality of annual assessments. To the extent possible, our assessments require rigorous scientific and engineering demonstration and evaluation. As described below, we have been acquiring increasingly powerful tools to do so.

Life-Extension Programs—to sustain the stockpile through refurbishment, reuse, and/or replacement. The laboratories must work closely with production facilities to integrate the production of parts with the development of new materials and manufacturing processes. Manufacturing is a particularly demanding challenge because the plants have to overcome extensive infrastructure and operational challenges and production technologies need modernization. Options for LEPs must be thoroughly analyzed to present decision makers with low risk, cost efficient alternatives to consider.

Science and Technology Foundations—to provide stockpile support through a thorough understanding of nuclear weapon performance and sustain the necessary base of specialized skills. In "keystone question" areas such as boost physics and energy balance, Predictive Capability Framework campaigns utilize our advanced stockpile stewardship tools to fill gaps in knowledge about nuclear weapon performance relevant to existing or expected issues about stockpiled weapons. These activities integrate the use of state-of-the-art high-performance computers, high-fidelity simulation models, and data gathered from exceptional experimental facilities. This cutting-edge research both provides data for stockpile stewardship and enables the retention of nuclear weapons expertise in a staff that increasingly will have no nuclear test experience. We must nurture and exercise the scientific judgment of stockpile stewards.

Modernized Facilities and Infrastructure—to replace major facilities for processing plutonium and uranium and upgrade the physical infrastructure of the weapons complex. NNSA's plans are to pursue the Chemistry and Metallurgy Research Replacement-Nuclear Facility (CMRR-NF) project at LANL and build a new Uranium Processing Facility (UPF) at the Y-12 Plant in Oak Ridge, Tennessee. Currently, these more-than-50-year-old facilities for processing plutonium and uranium are oversized, increasingly obsolete, and costly to maintain. They are also safety, security, and environmental concerns. These two are high priority and the most costly of numerous infrastructure modernization projects throughout the complex. Because of these projects, substantial increases above the FY2011 budget will be required to sustain a balanced, integrated overall program. As the cost baselines are better defined, the changes that occur must be accommodated without upsetting overall program balance—the balance among science, technology, and engineering; life extensions of the stockpile; and recapitalization of the infrastructure.

Implications of the President's FY2011 Budget Proposal

NNSA has provided to Congress its 10-year Stockpile Stewardship and Management Plan, developed as a complement to the NPR and New START. The plan is funded in the FY2011 Budget Request with a 9.8 percent increase ($624 million) compared to FY2010. This is a good start and will address a number of immediate needs for FY2011. It is noteworthy that the plan calls for significant increases in the out years, as increasing levels of funding will be required for the LEPs and construction of major facilities. The FY2011 Budget Request will serve to meet most needs in the three overarching areas:

Science, Technology, and Engineering—for technical assessments and certification of the stockpile. Assessments of the condition of weapons and certification of the engineering design of implemented LEPs depend on the critical judgments of stockpile stewards and their nuclear weapons expertise. Both are developed by hands-on experience working challenging nuclear weapons science, technology, and engineering issues. In addition to supporting stockpile needs and building expertise, this work also advances our fundamental understanding of nuclear weapons performance so that future stockpile stewards will be able to tackle even more difficult issues as they arise. The increased funding from FY2010 levels will provide a critically needed boost to activities:

- *Stockpile Assessments*. The funding increase in FY2011 will support implementation at the NNSA laboratories of a new dual validation process that was established in the FY2010 National Defense Authorization Act. The Independent Nuclear Weapon Assessment Process (INWAP) will strengthen annual assessments. Two sets of challenge teams (one from LLNL and SNL and the other from LANL and SNL) are being formed. Both the challenge team and the "home team" will have access to all relevant data and analysis about a weapon system—to be applied to annual assessments and peer reviews of significant finding closures and LEP certifications.

- *Keystone Science Issues*. Science campaigns in the Stockpile Stewardship Program aim at filling major gaps in our knowledge about nuclear weapon performance—for example, in the areas of energy balance and boost physics. The goal is to remove "adjustable parameters" in our simulations and replace them with first-principles physics models. Such improvements are critically important to providing high confidence in the difficult decisions that might arise in sustaining an aging stockpile.

  This extremely challenging research calls for a concerted effort that combines continuing advances in high-performance computing with well-diagnosed experiments at the laboratories' unique experimental facilities. We have a golden opportunity to dramatically advance our knowledge base. Progress, in particular, depends on effective use of NIF (allowing stockpile stewards to experimentally explore the physics of nuclear phases of nuclear weapons performance), DARHT, JASPER, and our other smaller scale experimental facilities. Importantly, efforts to support these keystone science issues are increased in the FY2011 budget request.

- *Research and Development on Technology Advances for Stockpile Support*. An important responsibility of the NNSA laboratories is to explore what is technically possible in nuclear design. Exploratory studies hone the skills of stockpile stewards and help us to avoid technical surprise from other nations' nuclear weapons activities. In addition, we develop advanced technologies that could be applied to the U.S. stockpile, consistent with the goal of no new weapons or improvements in military capabilities. These include means for substantially improving weapon safety and security that could be implemented as part of an LEP. The proposed budget increases will help accelerate progress in this area to ensure availability of these technologies as LEPs are proposed and carried out over the coming decade.

- *Advances in High-Performance Computing*. We have made remarkable advances in high-performance computing and simulations, yet it is imperative that we continue to make rapid progress. Early success in the Stockpile Stewardship Program brought us "terascale" computing (trillions of operations per second); we now reached "petascale" (thousands of trillions); and we need "exascale" (millions of trillions) for two reasons. Petascale makes 3D high-fidelity simulations of weapons performance practical. However, better models of boost physics and thermonuclear burn processes still need to be developed (in concert with experiments). That will require much greater computing horsepower. Secondly, as mentioned above, the underpinning of our assessment and certification is uncertainty quantification. Rigorous implementation of the methodology for each weapon system requires the running of many thousands of high fidelity 3D simulations to map out the impact of uncertainties on weapon performance; hence, the need for much greater computing power.

  The proposed FY2011 budget adequately supports computer center operations at LLNL and acquisition of the 20-petaflop Sequoia machine, which will become operational in 2012. More than a factor of ten faster than the current best, it is the next major advance in high-performance computing. Now is the time to start planning and preparing for the next step toward exascale, which is a grand challenge requiring additional resources.

An Active LEP Effort together with Aggressive Surveillance. As mentioned below, a number of stockpile systems require LEPs in the next one-to-two decades. Over the past two decades, two LEPs have been completed. Over the next ten years, plans call for the the completion of one in progress, start of two full-scope LEPs, and preparation activities for additional LEPs the following decade. In addition to LEP support, funding needs to be increased from FY2010 levels to address current surveillance shortfalls and mature safety and security technologies for production readiness for future LEPs. We look forward to participating in a study to identify and evaluate LEP options for the W78 Minuteman III ICBM warhead, which is planned to begin in FY2011. NNSA has announced its intention to assign the W78 LEP to LLNL. The FY2011 budget request provides adequate support for our B61 LEP peer review responsibilities as well as our responsibilities to support existing LLNL-designed stockpile systems.

Recapitalization of Plant and Laboratory Infrastructure. Recapitalization is necessary to build a responsive infrastructure able to meet program and production needs. This includes fulfilling science, technology, and engineering program objectives and production requirements. Such an infrastructure is essential to the complex's ability to respond in a timely manner to technical issues and/or emerging threats. In addition to planning for and construction of new facilities (including the very major investments in CMRR-NF and UPF), adequate investments are needed for Readiness in Technical Base and Facilities (RTBF) for operations in and maintenance of existing facilities. My direct concern at LLNL is obtaining sufficient funding in FY2011 to support operations at HEAF, which is a one-of-a-kind facility for research and development in high explosives and energetic materials, and to support Site 300, the Laboratory's remote experimental site which is home to the Contained Firing Facility.

Life-Extension Programs

Warhead life-extension programs are undertaken to address issues discovered through surveillance and review processes supporting annual assessments. The role of the LEP is to fix issues that impact overall system effectiveness and extend stockpile life.

Effectiveness is influenced by many factors. Nuclear weapons are not static devices; their chemical and physical properties or characteristics change over time. While plutonium pits have been determined to have a very long service life, aging affects the performance of a number of important components including metals other than plutonium, polymers, neutron generators, and gas transfer systems. In addition, there are many other potential causes of decreased confidence in effectiveness—ranging from design flaws to material compatibility issues. Experience has shown that at least one major new and unanticipated issue is discovered approximately every five years.

Thus far, we have been able to retain confidence in warhead safety and effectiveness by offsetting identified increased uncertainties with corresponding increases in performance margins. They have been obtained by changes external to the nuclear explosives package or by relaxing or eliminating military requirements (in coordination with the Department of Defense). Options to further improve these margins have largely been exhausted.

Several LEPs activities are in progress and/or recommended by the NPR, and they are supportable with the proposed FY2011 budget. The W76 Trident II SLBM warhead LEP is well underway. The initial design activities began in FY2000 and the final refurbished weapon is expected to be delivered in FY2017. In FY2011, concept development is scheduled for completion in preparation for a full-scope LEP for the family of B61 nuclear bombs. The first production unit is planned for FY2017. In addition, a study to identify and evaluate LEP options for the W78 Minuteman III ICBM warhead will begin in FY2011. The NPR proposes that this study consider the possibility of having the resulting warhead be adaptable to multiple platforms in order to provide a cost effective hedge against future problems in the deployed stockpile. The first production unit is projected in FY2021.

These plans for future LEPs are based on consideration of weapon system age and early indicators of impending issues that will need to be addressed. LEP activities formally start with a Phase 6.1 (or Phase 6.2) study conducted jointly with the DoD, which follows processes and procedures that were established for developing weapons during the Cold War and have been adapted for LEPs. These joint concept development efforts consider military requirements and explore LEP options to meet the requirements. They involve extensive supercomputer simulation efforts and supportive experimental activities, thorough interactions with the NNSA production facilities and DoD contractors, and extensive peer review.

Within the Laboratory, we consider the full range of technical options to address military requirements that need to be balanced—for example, form fitting and functioning with an existing delivery system while providing enhanced safety (e.g., insensitive high explosive). In doing so, we consider tradeoffs that emphasize one requirement over another. The output of these evaluations is a set of recommended options for the U.S. government to consider in deciding on the specific LEP option to proceed to engineering development (Phase 6.3). After a decision to proceed to full-scale development is made, we follow a very disciplined engineering process that involves the design agencies, production agencies, and the responsible military service.

LEPs provide the opportunity to consider adding new safety and security features without degrading overall effectiveness or introducing new military capabilities. Some of these safety and security improvements are ready for deployment now and would make a significant improvement; other even more effective approaches require further research. Considered features would be based on previous nuclear tests. Intrinsic surety, which incorporates the safety and security features inside the nuclear explosives package, provides the highest level of safety and protection against terrorist threats. Examples range from enhanced fire safety to technologies that make acquisition of special nuclear materials from U.S. nuclear weapons of little-to-no-value to a terrorist.

The decision to add surety features is up to the U.S. government, and the technical feasibility of specific safety and security features depends on the weapon and approach taken to extend its life. The current LEP approach (refurbishment only) limits the range of safety and security features that can be incorporated into certain weapons systems.

The options studied for LEPs will be based on previously tested nuclear designs. To best manage risk, we will consider, on a case-by-case basis, the full range of LEP approaches characterized by the three discrete options along the spectrum of possibilities:

- *Warhead Refurbishment*—Nuclear explosive package (NEP) composed of existing or newly manufactured components originally designed for that warhead.

- *Warhead Component Reuse*—NEP composed of components previously manufactured for the stockpile (includes new production of previously manufactured components).

- *Warhead Replacement*—NEP component <u>not</u> previously produced for the stockpile (based on tested designs).

All potential approaches—or, more likely, combinations of approaches—need to be examined because the areas of most significant risks vary, and often times, have to do with costs, manufacturing issues, the importance of improvements in margins, safety and security, and long-term maintenance and surveillance. These factors differ from system to system, and the various LEP approaches differ in the degree to which they provide flexibility to manage identified risks. They also differ in the degree to which they exercise the skills and capabilities of our people, which is an important consideration in sustaining an experienced workforce. Assessment and certification challenges depend primarily on design details and associated margins and uncertainties rather than the type of LEP approach considered.

Consideration of the full range of LEP options provides the necessary technical flexibility to manage the stockpile with an acceptable level of risk. Our findings and recommendations in studies of options will be based solely on our best technical assessments of cost, risk, and ability to meet stockpile management goals. In decisions to proceed to engineering development, the U.S. government can consider a number of factors for particular LEP approaches.

The Importance of People

Long-term success in stockpile stewardship fundamentally depends on the quality of people in the program. If the nation is not confident in the expertise and technical judgments of the stewards, the nation will not have confidence in the safety, security, and effectiveness of our nuclear deterrent. Over the years, exceptional scientists and engineers have been attracted to LLNL by the opportunity to have access to the world-class facilities, to pursue technically challenging careers, and to work on projects of national importance. A Stockpile Stewardship Program that is stable, technically challenging, and of recognized importance to the nation is critical to the future success of the program—and to the Laboratory in carrying out its national security responsibilities.

The specialized technical skills and expertise required for stockpile stewardship, which come through mentoring and hands-on experience, take a long time to develop. Program stability is critically important, and it requires a balanced, integrated Stockpile Stewardship Program that has sustained bi-partisan support and is sufficiently funded over the long term. We welcome a strong affirmation by the Administration and Congress of the importance of the NNSA laboratories' work in maintaining the U.S. nuclear deterrent through stockpile stewardship.

An important benefit of a strong Stockpile Stewardship Program is that this foundational program helps the NNSA laboratories in meeting broader national security objectives. Clearly, nuclear weapons expertise is directly applicable to the nuclear security challenges of proliferation and terrorism. Other areas of national defense, domestic and international security, and energy and environment security also benefit from LLNL's broad scientific and technical base and international leadership in areas such as high-performance computing.

These activities further strengthen our science and technology workforce, add vitality to the Laboratory, spin new ideas and additional capabilities into the weapons program, and serve as a pipeline to bring top talent to LLNL so that we continue to provide the nation outstanding stockpile stewards. A broader base of national security programs at the NNSA laboratories is not a substitute for a strong Stockpile Stewardship Program; neither is it a distraction from our defining mission and responsibilities to sustain the nation's nuclear deterrent.

Closing Remarks

My testimony describing the successes and future challenges in stockpile stewardship supports and amplifies a joint statement my fellow NNSA laboratory directors and I issued when the Nuclear Posture Review was released. We made two key points:

First, that a Stockpile Stewardship Program which "…includes the consideration of the full range of life extension options (refurbishment of existing warheads, reuse of nuclear components from different warheads, and replacement of nuclear components based on previously tested designs), provides the necessary technical flexibility to manage the nuclear stockpile into the future with an acceptable level of risk."

Second, that "We are reassured that a key component of the NPR is the recognition of the importance of supporting 'a modern physical infrastructure —comprised of the national security laboratories and a complex of supporting facilities—and a highly capable workforce with the specialized skills needed to sustain the nuclear deterrent."

Finally, I would like to again thank the Committee for your interest in and continued support for stockpile stewardship.

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