Statement of Dr. Paul J. Hommert
President and Director
Sandia National Laboratories

United States Senate
Committee on Foreign Relations
July 15, 2010

Introduction

Chairman Kerry, Ranking Member Lugar, and distinguished members of the Senate Foreign Relations Committee, thank you for the opportunity to testify. I am Paul Hommert, President and Director of Sandia National Laboratories. Sandia is a multiprogram national security laboratory owned by the United States Government and operated by Sandia Corporation[1] for the National Nuclear Security Administration (NNSA).

Sandia is one of the three NNSA laboratories with responsibility for stockpile stewardship and annual assessment of the nation's nuclear weapons. Within the U.S. nuclear weapons complex, Sandia is responsible for the design, development, and qualification of nonnuclear components of nuclear weapons. It is also responsible for the systems engineering and integration of the nuclear weapons in the stockpile. While nuclear weapons remain Sandia's core mission, the science, technology, and engineering capabilities required to support this mission position us to support other aspects of national security as well. As a multiprogram national security laboratory, Sandia also conducts research and development in nuclear nonproliferation, nuclear counterterrorism, energy security, defense, and homeland security.

The policy framework outlined in the 2010 *Nuclear Posture Review* (NPR) *Report*, the high-level implementation plan established by the *FY 2011 Stockpile Stewardship and Management Plan* and the *Report in Response to NDAA FY 2010 Section 1251, New START Treaty and Nuclear Force Restructure Plans* (to be referred to as *Section 1251 Report*), and the funding profile described in the *Department of Energy FY 2011 Congressional Budget Request* weave the fabric of a compelling strategic future for U.S. nuclear weapons policy. In this context and in view of the New START Treaty, my statement today will address five closely related issues: (1) the U.S. nuclear stockpile today and in the future; (2) stockpile surveillance; (3) the life extension programs; (4) a retrospective of stockpile stewardship; and (5) verification technologies.

The U.S. Nuclear Stockpile Today and in the Future

As noted in the *Nuclear Posture Review Report*, "The fundamental role of U.S. nuclear weapons, which will continue as long as nuclear weapons exist, is to deter nuclear attack on the United States, our allies, and our partners" (p. vii). Since the end of the Cold War, the stockpile has become smaller in total numbers and comprises fewer weapon types, and its size will continue to decrease. It is natural that nuclear weapons policy in the post–Cold War era should be reevaluated in light of

[1] Sandia Corporation is a subsidiary of the Lockheed Martin Corporation under Department of Energy prime contract no. DE-AC04-94AL85000.

21st century threats. The Administration's joint objectives of maintaining a safe, secure, and effective nuclear arsenal and, at the same time, strengthening the global nonproliferation regime and preventing nuclear terrorism provide a challenging, significant role for Sandia and, indeed, for all those involved in the nuclear weapons program.

Within the context of the nuclear weapons policy outlined in the *Nuclear Posture Review Report* and the collective guidance for implementation provided in the *FY 2011 Stockpile Stewardship and Management Plan*, the *Section 1251 Report*, and the *Department of Energy FY 2011 Congressional Budget Request*, and under the New START Treaty terms, I am confident that Sandia can fulfill its responsibilities in support of the nation's nuclear deterrent. That confidence comes from our assessment of the stockpile management requirements against our mission and product space and our capabilities. In their totality, the documents describing the future of the U.S. nuclear deterrent represent a well-founded, achievable path forward, which I understand and support. However, as we stand on the threshold of the next era of stockpile stewardship and management, we must recognize the challenges inherent in this framework. A significant body of work is required to sustain the deterrent into the next two decades, and we must ensure that the resources are commensurate with the requirements and expectations. Specifically, I can be confident that the totality of the stockpile management and deterrent policy can be supported only if the FY 2011 budget is authorized and appropriated at the level of the Administration's request and the national significance of our mission is sustained.

Mission and Product Space

Sandia is responsible for the systems engineering and integration of the nuclear weapons in the U.S. stockpile. As systems integrator, we are responsible for numerous unique and challenging assignments, including the engineered interfaces from the warheads to the delivery platforms and surveillance management at the weapon system level for the nuclear weapons complex—both flight testing and system-level ground testing.

Sandia is the nonnuclear component design agency for NNSA. The components that we design ensure that the weapons will perform as intended when authorized through the U.S. command and control structure, and that they remain safe and secure otherwise. These critical functions are provided through our core products of arming, fuzing, and firing systems (AF&Fs), neutron generators, gas transfer systems, and surety systems. We are responsible for literally hundreds of major components in the stockpile. Our products are highly specialized electrical, microelectronic, electro-mechanical, chemical, and explosive components with extremely high reliability specifications and unique, very harsh environmental requirements. For example, an "intent stronglink" is a component that prevents a nuclear weapon from being armed until a unique string of code is entered indicating human intent. Even in the most recent designs, there are more than 200 parts in a component the size of a cell phone. We are also responsible for "weaklink" components, which are designed to fail in a manner that precludes inadvertent nuclear detonation in accident scenarios such as those involving fire or lightning. These safety components must meet stringent requirements.

Sandia designs, engineers, and integrates these specialized products into the nation's nuclear arsenal through the efforts of a world-class workforce and highly specialized tools, facilities, and equipment. However, to fulfill our responsibilities for the deterrent into the future, we are facing new challenges.

Consider first that most of the weapons in the current stockpile were designed at a time when long design life was not typically a high-priority design requirement. The radar for the first B61 bomb, for example, was originally designed for a 5-year lifetime; today there are B61s in the stockpile with components manufactured in the late 1960s. It is a credit to our Stockpile Stewardship Program that we have the technical knowledge base to support continued confidence in these weapon systems as they age. Indeed, it is also a credit to those who designed the current stockpile that it has lasted well beyond original design lifetimes. Now we are working to provide solutions that will extend the lifetime of our nuclear arsenal for another 30 years.

The state of the stockpile is reported to the President through the annual assessment process. Through this process, we have been, and remain, able to assess the nation's stockpile as safe, secure, and reliable. That said, as we move forward with the challenging business of extending the lifetimes of U.S. nuclear weapon systems, we must address stockpile aging and degradation, as well as technology obsolescence. In addition, long weapon lifetimes will become a specific design objective.

While the options to refurbish, reuse, and replace are applicable to the nuclear explosive package, almost all of Sandia's life extension work will involve replacements with modern technologies. Nonnuclear components, by their very nature, are subject to a whole range of potential aging and failure modes. Although we may be able to reuse some of the original components, doing so uniformly would be a fundamentally unwise option when their service life must be extended by another 30 years. In addition, only modern technology will enable introduction into the stockpile of the safety and security required by the *Nuclear Posture Review Report*.

Stockpile Surveillance

Stockpile surveillance and assessment play a crucial role in assuring the nuclear deterrent. Through these activities, we develop knowledge about the safety, security, and reliability of the stockpile. This knowledge provides the technical basis for our annual assessment findings and recommendations regarding the state of the stockpile. It also informs decisions made about the stockpile: from deployment and targeting to safe handling operations (routine or otherwise) and from there to development of new component and system design options. In their 2009 annual assessment letters, all three NNSA laboratory directors highlighted concerns about inadequate progress toward surveillance transformation. Former Sandia Laboratories Director Tom Hunter said, "I believe that the level of commitment to a tailored and balanced stockpile evaluation program for our aging, smaller stockpile is inadequate." Indeed, the JASON panel reached the same conclusion in their 2009 life extension study.

The *Department of Energy FY 2011 Congressional Budget Request* places high priority on stockpile surveillance, and we understand and agree to strengthen our knowledge and confidence in the current stockpile. The Surveillance Transformation Plan was established to better align our surveillance program with the challenges of an aging and smaller stockpile. The plan aims to shift the surveillance program's focus from finding defects to acquiring deeper scientific understanding of stockpile performance margins, distributions, and trends by creating higher fidelity diagnostics and physical and computational simulation capabilities. In this new framework, we will be better able to anticipate stockpile performance degradation and to schedule required actions. Yet, although essential, a strong surveillance program is only one component of stockpile management into the future. The life extension programs are another component.

The Life Extension Programs

The B61 Life Extension Program

The *Nuclear Posture Review Report* concluded that the United States will "proceed with full scope life extension for the B61 bomb including enhancing safety, security, and use control" (p. xiii). This is the most immediate stockpile challenge for Sandia. For this life extension, we are deliberately building multidisciplinary teams of both highly experienced staff and new talent, sustaining the necessary knowledge in the management team, providing an optimal teaming environment, ensuring that facilities are ready for the work, and piloting new processes that will benefit our life extension work.

Nevertheless, we find ourselves in a state of urgency, with a demanding schedule and expansive product requirements. The primary driver for the schedule of the B61 LEP is the fact that critical nonnuclear components are exhibiting age-related performance degradation. For example, the radar in the B61, which includes the now infamous vacuum tubes, must be replaced. In addition, both the neutron generator and a battery component are fast approaching obsolescence and must be replaced. A secondary driver for the schedule is the deployment of the F35 Joint Strike Fighter, which requires a new digital interface for the B61. Replacing the three aging components and adding the new digital interface represent the absolute minimum approach to this LEP. However, it is my judgment that we need to approach this LEP with a resolute commitment to replace old nonnuclear components and field a nuclear weapon system that employs modern technologies to improve safety and security and to extend service life.

The weapon systems addressed through the LEPs of the coming two decades will be in our stockpile well into the second half of this century. The "full" scope for the B61 LEP called for in the *Nuclear Posture Review Report* is a prudent approach to this life extension that addresses aging concerns, obsolete technologies, and enhancements in safety, security, and use control. Notably, the scale of this LEP will be much larger than that of the W76 Trident II SLBM warhead LEP, which is now in production. Whereas the W76 LEP involved redesign and replacement of 18 major Sandia components, the B61 LEP involves 46 such components.

To extend the lifetime of the B61, the requested FY 2011 funding is critical. We must complete the design definition in FY 2011 to create a firm understanding of system requirements and thus fully establish future-year budget needs. Total cost estimates for the B61 LEP are subject to change until the design definition and requirements are finalized.

We also have considerable technology maturation work to perform in FY 2011. Technology maturation is a rigorous approach we apply to developing new technologies, from the earliest conceptual designs through full-scale product realization and ultimately insertion into the stockpile. We use a construct of technology readiness levels, first implemented at the Department of Defense and then NASA, and implement a series of technical and programmatic reviews to ensure that new technologies reach the appropriate maturity level before they are used in a life extension baseline design. For the B61 LEP, we have 13 major categories of technology maturation work underway. Our cost estimates for FY 2011 in this area depend heavily on the progress we are trying to make in FY 2010. I am therefore concerned that, if the requested FY 2010 reprogramming is not implemented, significant additional risk will be introduced into our FY 2011 efforts on the B61 LEP. For example, we began FY 2010 by staffing up our B61 LEP team to position ourselves for strong performance in FY 2011. Specifically, we started FY 2010 with 139 full-time equivalent employees for the B61 LEP, and that number peaked in April at 192. Now the numbers are declining in the absence of FY 2010 reprogrammed dollars and concern over FY 2011 continuing resolution. Unless this situation changes, we will enter FY 2011 with roughly 50 percent of the staffing level that was originally intended for this critical program.

The possibility of a prolonged continuing resolution for FY 2011 is a real concern. The funding growth required for the B61 LEP from FY 2010 to FY 2011 is so essential that a continuing resolution funding level referenced back to FY 2010 will almost surely require removing staff from the program, a slip in the FY 2017 target for first production unit, or even a down-scoping of the program. The LEP schedule and scope are also, of course, heavily dependent on the appropriated funding in FY 2012 and beyond. FY 2011 funding is needed to get this program off to a good start, but enduring multiyear sustained funding is required to bring this program to successful completion. The success of the B61 LEP also requires a fully supported production complex with particular importance placed on the Kansas City and Pantex Plants.

Other Life Extension Programs

The B61 bomb is our current focus, but certain reentry systems in our stockpile also require near-term life extension activities. The *Nuclear Posture Review Report* recommended "initiating a study of LEP options for the W78 ICBM warhead, including the possibility of using the resulting warhead also on SLBMs to reduce the number of warhead types" (p. xiv). The *Department of Energy FY 2011 Congressional Budget Request* includes funding for a W78 LEP. Based on the guidance in the *Nuclear Posture Review Report*, the planning for this LEP will also examine the opportunities and risks associated with the resulting warhead referenced above.

At the request of the Office of the Secretary of Defense, we completed a feasibility study for a common integrated arming, fuzing, and firing (AF&F) system. Using an envelope of the requirements for the W78 and the W88, and even the W87 and the U.K. system, our study concluded that this approach was technically feasible, including improvements in safety and security enabled by miniaturization of electronics. Savings in weight and volume, at a premium in reentry systems, can be used for those additional safety and security features. The study results have been briefed to the Nuclear Weapons Council and are being used to inform decisions regarding the scope, schedule, and interplay between the W78 and W88 life extensions.

A Retrospective of Stockpile Stewardship

My confidence in our ability to successfully execute the life extension programs is based on the suite of tools and capabilities that have resulted from the investments made in stockpile stewardship. For the first 15 years of the Science-Based Stockpile Stewardship Program, creating the scientific tools and knowledge required in the absence of underground nuclear testing was a compelling grand challenge for the U.S. nuclear weapons program. While the moratorium on underground nuclear testing had a more direct impact on Los Alamos and Lawrence Livermore National Laboratories than on Sandia National Laboratories, hundreds of experiments have been run on Sandia's Z accelerator, providing critical experimental data that are tied directly to the milestones of NNSA's Predictive Capability Framework road map. Advances in our pulsed power capabilities are supporting the Advanced Certification, Dynamic Materials Properties, and Primary and Secondary Assessment Technologies programs.

At Sandia, the primary impact of the moratorium on underground nuclear testing was the need to create tools and acquire the knowledge necessary to sustain confidence in the radiation hardness of our designs. We created advanced stockpile stewardship tools and effectively applied them to our annual assessment of the stockpile and to the qualification of the W76-1 life extension program. Those tools gave us the understanding and knowledge to assess with confidence the state of the stockpile. Advances in our computational tools and improved experimental capabilities, coupled with high-fidelity diagnostics for model validation and improved characterization of test results, provided this new understanding.

Looking back at the Science-Based Stockpile Stewardship Program, it is clear that we collectively understood the magnitude of the change that needed to occur in the nuclear weapons program to address the moratorium on underground nuclear testing. What we at Sandia perhaps did not fully appreciate at the time was the impact that the end of the Cold War would bring to the vitality of our system and component design community. During the Cold War, we were pursuing simultaneously as many as 14 full-scale weapon development programs. Since 1992, we have had a total of only two programs of similar scale: the W76-1 and the W80-3 LEPs. The latter was cancelled in 2005. Thus, as we began to implement stockpile stewardship in the early 1990s, our weapon systems development workload dropped dramatically, and that meant less work for systems engineers and component designers. At the same time, technological advances were happening that would bear directly on the products within Sandia's responsibility.

As stated earlier, the products Sandia designs and engineers are highly specialized for the unique demands of nuclear weapons; however, they are related to commercial products because of similarities in underlying technologies. To express this idea differently, our components have a point of reference in commercial technology. This reality bears directly and significantly on Sandia's responsibilities as we embark on the next era of stewardship.

The pace of technological advances in recent decades has been staggering. Let me give just one example. In 1983, we were embarking on the full-scale design and development for the W88 Trident II submarine-launched ballistic missile (SLBM) warhead, which is the last newly designed warhead to have entered the stockpile, and it took advantage of the microelectronics available at the time. That year, the cell phone industry, also relying on microelectronics, was proud of the first network in the United States: 7,000 phones, each weighing about 2 pounds. In the time that has passed since, miniaturization and functional density of microelectronics have taken a quantum leap. Today there are about 285 million cell phones, each weighing about 3 ounces. Such technological advances mean simply that some of the technologies on which Sandia products are based have become radically more advanced than they were the last time we built a large number of nonnuclear components for weapons.

The strong tie between the products developed by Sandia and those developed by the private sector is both a challenge and an opportunity—a challenge, because we must have the right set of people, skills, production equipment, and an up-to-date technology base at a time when budgets are not predictable; yet an opportunity, because it keeps us agile, adaptable, in tune with the needs of the nation and because modern technologies provide opportunities for improvements in stockpile safety and security. This strong tie manifests itself in several ways. To reduce cost and whenever the required functionality is available from a trusted supplier in the commercial sector, we incorporate commercial off-the-shelf (COTS) parts into our products. Furthermore, for the parts we must manufacture (for example, specialized microelectronics), only modern production tooling and equipment can be readily maintained. Perhaps most important is the fact that we can attract the best and brightest new graduates when we can offer them challenging innovative projects that use the latest technologies, which they understand and on which they have been trained.

Cyber risk is another aspect of technological advances that we must consider. Since the 1980s Sandia has pioneered the use of vulnerability assessments to determine systematic cyber weaknesses in command and control and surety systems. We believe it is vital to the next generation of life extension programs that cyber risk be assessed and capabilities developed to mitigate the dangers.

Workforce

The demographics within Sandia's nuclear weapons program clearly reflect both the strengths of the Stockpile Stewardship Program and the challenges of a period with few full-scale weapon design programs. We have attracted the very best scientists, engineers, and technologists to the laboratories with large-scale science-based engineering programs that bring together computational with experimental test capabilities. However, retaining talent in our weapon and component design community has been challenging. The uncertainty surrounding the requirements for the future stockpile resulted in programmatic instability and lack of full-scale engineering development programs. In their recent life extension study, the JASON panel noted that a "lack of program stability" threatened the continued strength of the stewardship program.

While we must rise to meet near-term challenges of the Stockpile Stewardship Program, we also must establish the basis for long-term stability. For Sandia, stability should be viewed in the context of three pillars: people, infrastructure, and broad national security work. The *Nuclear Posture Review Report* highlighted the importance of the first two of these: "In order to remain safe, secure, and effective, the U.S. nuclear stockpile must be supported by a modern physical infrastructure…and a highly capable workforce" (p. xiv).

Today, 37 percent of the experienced technical staff in Sandia's weapon system and component design organizations are over the age of 55. Their remaining careers will not span the upcoming life extension programs. This reality puts a huge premium going forward on stable, multiyear, large-scale LEPs that provide opportunities for our new technical staff to work closely with our experienced designers on a full range of activities—from advanced concept development to component design and qualification, and ultimately to the production and fielding of nuclear weapon systems. The team we are assembling for the B61 LEP is representative of the new multidisciplinary approach we will take to ensure that (1) the powerful stewardship tools developed through our nation's investment and applied effectively to stockpile assessment are adapted going forward to meet the needs of the design of weapon system architectures and components and (2) the latest technologies and innovative designs are coupled with rigor that comes from experience. To give only one example, recently validated thermal models developed by the Stockpile Stewardship Program were applied to the design of thermal batteries for the B61 LEP. These models allowed us to identify a nearly twofold increase in battery run time that could be achieved with a simple material substitution.

New tools and modern technologies, coupled with our management vision for the engineering environment required for success, will foster innovation; lead to safety and security for the upcoming LEPs; and provide foundational technical and scientific strength to support the stockpile over the long term.

Essential Capabilities and Infrastructure

Sandia's capabilities are essential to its full life cycle responsibilities for the stockpile: from exploratory concept definition to design and qualification, and ultimately through ongoing stockpile surveillance and assessment. Let me point out a few examples.

The NNSA complex transformation plan designated Sandia as the Major Environmental Test Center of Excellence for the entire nuclear weapons program. The facilities and equipment we have in this area are extensive: (1) twenty test facilities at Sandia-New Mexico; (2) the Tonopah flight test range in Nevada; (3) the Weapon Evaluation Test Laboratory in Amarillo, Texas; and (4) the Kauai test facility. We use environmental test capabilities to simulate the full range of mechanical, thermal, electrical, explosive, and radiation environments that nuclear weapons must withstand, including those associated with postulated accident scenarios.

Significantly, capabilities originally developed in Sandia's nuclear weapons program also support other national needs. For example, the Thermal Test Complex, one of our major environmental test capabilities, is a $38M world-class suite of facilities supporting a full spectrum of technical research: from the basic studies of fire chemistry and model validation, to full-scale highly instrumented simulations of weapon system safety performance in fuel fire accident scenarios. The Thermal Test Complex was funded by Test Capabilities Revitalization (TCR) Phase 1, came online in 2006, and immediately provided necessary capabilities for the W76-1 LEP. Interestingly, expertise in flow visualization, plume evaluation, thermal sciences, and fire sciences developed at the Thermal Test Complex was recently also used in an area unrelated to nuclear weapons: the BP oil disaster.

Today, TCR Phase 2 funding is needed to renovate our suite of mechanical environment test facilities, many of which were commissioned in the 1950s and 1960s. These facilities will support the design and qualification of the B61 life extension and subsequent LEPs.

Another unique capability that Sandia stewards for the nuclear weapons program and also for DOE's nonproliferation payloads is the microelectronics research and fabrication facility, where we design and fabricate an array of unique microelectronics, as well as specialty optical components and microelectromechanical system, or MEMS, devices. This capability includes a national "trusted foundry" for radiation-hardened microelectronics. We have been providing microelectronic components to the nuclear stockpile at the highest level of trust since 1978 and to DOE's nonproliferation payloads since 1982. In 2009, Sandia received Class 1A Trusted Accreditation (the highest level of accreditation) from the Department of Defense for Trusted Design and Foundry Services and is the only government entity with this accreditation for both design and foundry operations. We must recapitalize the tooling and equipment in our silicon fabrication facility, much of which dates back about 15 years in an industry where technology changes almost every 2 years. Recapitalization will ensure production of the radiation-hardened components required by the upcoming reentry-system life extension work.

Expertise in materials science is required to engineer new materials for future stockpile applications, create the physics-based understanding of material aging in the current stockpile, and project potential performance impacts. Our materials science capabilities are essential to our national security mission. And yet, past funding constraints in Sandia's nuclear weapons program led to significant erosion in materials science. That erosion might have been even more serious had Sandia not successfully leveraged materials science research in support of its broader national security role. We are currently working with NNSA on centralizing our nonnuclear materials science funding and thereby enabling a more integrated capability.

We also have a critical but eroding capability in radiation effects sciences. It is my belief that the U.S. strategic arsenal should continue to maintain its requirements for radiation hardness. By its very nature, U.S. nuclear deterrence requires a nuclear arsenal that cannot be held at risk or denied by any adversary. Relaxation in the strategic hardness of our designs could be interpreted as a weakening of our deterrent posture.

Nuclear survivability is best addressed through intrinsic design properties and cannot be added through modifications to the stockpile once a threat changes. During the era of underground nuclear testing, we exposed Sandia components to nuclear environments as part of the qualification process. Today, in order to create a fundamental understanding of the phenomena and failure mechanisms of concern, we simulate nuclear environments in aboveground test facilities, create computational models of the experiments, and then validate the computational models with experimental results.

However, experimental and modeling and simulation capabilities that allow us to assess with confidence must be sustained. In the recent past, funding in this area has been erratic, resulting in difficulties managing the program and sustaining the critical skills of our staff in the important area of nuclear effects simulation.

Broad National Security Work

Today, national security challenges are more diverse than they were during the Cold War. The NNSA laboratories are uniquely positioned to contribute solutions to these complex national security challenges. In the new environment, synergistic work supporting other national security missions is crucial. Indeed, as mentioned in the *FY 2011 Stockpile Stewardship Management Plan Summary*, "while NNSA nuclear weapons activities are clearly focused on the strategic deterrence aspects of the NNSA mission, they also inform and support with critical capabilities other aspects of national security" (p. 7).

I will refer to only one of many success stories at Sandia (others come from materials science, microelectronics, and computer science), showing how capabilities for the nuclear weapons program benefit from synergy with other national security programs. It is the story of our work in radars.

Competency in specialized radar applications is a required capability for the nuclear weapons program. As a result of initial investments in radar fuze capability for nuclear weapons, in 1983 we began working on miniature radars based on synthetic aperture concepts for nuclear weapons and broader national security activities. In 1985 we became involved in a program for the Department of Defense to develop a high-resolution, real-time synthetic aperture radar (SAR) suitable for use in unmanned aircraft. Sandia flew the first such SAR prototype in 1990. Follow-on work sponsored by the Department of Defense reduced the size and cost of SAR systems, improved resolution, and significantly expanded the applications and military benefits of radar. Partnerships with industry have transitioned each generation of the technology into field-deployable systems. Sandia-designed airborne SAR systems are now widely used for real-time surveillance by the U.S. military.

In this example, the original radar competency of the nuclear weapons program was improved by this work for the Department of Defense. The resulting advanced radar competency made it possible to apply new technology to the updated fuzing system for the W76-1 life extension. This updated fuzing system would not have been possible without the competency that was maintained and advanced by work for the Department of Defense.

Verification and Monitoring

Sandia has had a long tradition of ingenuity and engineering excellence in developing technologies for verification and monitoring to support efforts in nonproliferation and nuclear security as demonstrated, for example, by our successful record of involvement with international treaties: from the VELA Satellite Programs (1960s) to the Intermediate-Range Forces Treaty (INF, 1987) and from there to the Strategic Arms Reduction Treaty (START, 1994). The New START Treaty signed in Prague in April 2010 aims to enhance predictability and stability and thus security, and verification activities will monitor compliance with limits and other obligations set forth in the treaty.

While details of Sandia's activities in verification can best be presented in a classified environment, I will state here that we have carefully reviewed the New START Treaty and understand the limits and obligations as well as the changes to the inspection protocols. Sandia will continue to support the government by providing the best technical solutions and expertise required. The current language of the New START Treaty mentions the radiation detection equipment, which was developed and manufactured at Sandia and used in the previous START, as a key piece of equipment for verification purposes under the terms of the new treaty. In addition, between September 2009 and April 2010, two Sandia experts served as technical advisors on the delegation that negotiated the New START Treaty.

Conclusions

As stated in the *Nuclear Posture Review*, "as long as nuclear weapons exist, the United States will maintain a safe, secure, and effective nuclear arsenal" (p. iii). The upcoming decade will be demanding as we conduct a number of life extension programs under compressed schedules, modernize our aging facilities, and invest in human capital.

Within the context of the nuclear weapons policy presented in the *Nuclear Posture Review Report* and the collective guidance for implementation provided in the *FY 2011 Stockpile Stewardship and Management Plan*, *Section 1251 Report*, and the *Department of Energy FY 2011 Congressional Budget Request*, and under the New START Treaty terms, I am confident that Sandia can provide the required support for the nation's nuclear deterrent. That confidence is based on our assessment of the stockpile management requirements against our mission and product space and our capabilities.

The New START Treaty, if ratified and entered into force, would not constrain or interfere with the upcoming stockpile life extension imperatives. It would not change our planned approach or the tools we will apply. It would not limit the required introduction of modern technologies into existing warhead designs and the realization of the attendant benefits. However, it would reinforce the imperative to ensure a modern stockpile and a strong, responsive infrastructure as we move toward a smaller nuclear arsenal.

As a whole package, the documents describing the future of U.S. nuclear policy represent a well-founded, achievable path forward, which I understand and support. However, as we stand on the threshold of the new era of stockpile stewardship and management, we must recognize the challenges inherent in this framework. A significant body of work will be required to sustain the deterrent into the next two decades, and we must ensure that resources are commensurate with the requirements and expectations. The Administration's FY 2011 budget request reflects a strong alignment among the White House, the Department of Defense, and the NNSA, and it recognizes the magnitude of our future work scope. And the fact that the three national security laboratory directors were invited to speak before you today is a clear indication of the leadership role of Congress in authorizing a path forward for U.S. nuclear deterrence. Our success in sustaining the stockpile rests on program stability, multiyear sustained funding, a clear national commitment to the U.S. nuclear deterrent, and the opportunity to perform innovative technical work in the service of the nation.