Statement of Dr. Thomas O. Hunter
President and Director
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Committee on Appropriations
Subcommittee on Energy and Water Development
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INTRODUCTION

Mr. Chairman and distinguished members of the Committee, thank you for the opportunity to testify. I am Tom Hunter, 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).

Sandiaôs core role in the nationôs nuclear weapon program is the design, development, qualification, and certification of non-nuclear subsystems of nuclear warheads. As a multiprogram national security laboratory, Sandia also conducts research and development in nuclear nonproliferation, energy security, intelligence, defense, and homeland security.

My statement today addresses the appropriation request for the Department of Energy (DOE) programs that fund activities at DOE national laboratories and specifically at Sandia National Laboratories. I will discuss the stockpile stewardship program and the laboratory capabilities at Sandia that are essential to sustain it. I will suggest how the NNSA laboratories can help respond to the challenges of the emerging global nuclear future, including nonproliferation issues. I will comment on programs in energy security and for the Office of Science. Finally, I will also bring to your attention my concern that a larger role for these laboratories in a broader national security context will be important, so that the best solutions for critical national needs may be achieved. My written statement includes an addendum of specific issues of concern that I offer for the attention of the Committee.

THE U.S. NUCLEAR DETERRENT

The U.S. nuclear deterrent remains an essential element of the nationôs security. Sandia serves NNSAôs long-standing mission to maintain and enhance the safety, security, and reliability of the U.S. nuclear deterrent.

Development of Stockpile Stewardship in the Post–Cold War Era

The end of the Cold War was a pivotal moment in the history of the U.S. nuclear weapon program. By 1992, all in-progress and planned nuclear weapon programs for new systems were either canceled or suspended, and arms reduction initiatives signaled a smaller nuclear weapon program in years to come. Also in that year, the United States committed itself to a moratorium

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

on nuclear testing, which had been fundamental to the nuclear weapon development program since its inception.

It was clear that a different framework for maintaining the stockpile would be required. The Department of Energy implemented a new approach called ñscience-based stockpile stewardshipò and invested in a comprehensive suite of capabilities and programs, which included experimental facilities and high-performance computers. By 2002, the NNSA Administrator and laboratory directors were able to report to Congress that science-based stockpile stewardship was meeting expectations.[2]

Today, ñscience-basedò stockpile stewardship could be considered a redundant phrase. Stockpile stewardship assumes and requires the scientific competencies and resources that have been developed over the last decade.

Since 1996 the stockpile stewardship program has performed twelve successful annual assessments of the safety and reliability of each weapon type in the stockpile. The assessments include peer reviews and red team challenges, and they provide the basis for each of the laboratory directorsô annual reports to the Secretaries of Energy and Defense as well as the Secretariesô subsequent annual report to the President on the condition of the stockpile. As I have reported in my recent assessments, numerous aging issues in nuclear weapon components have been discovered; to date, we have been able to provide sufficient confidence in the safety and reliability of our stockpile to support national policy requirements.

The advanced facilities and capabilities developed in the stockpile stewardship program enable our successful execution of the life extension program for the W76 warhead. In May 2007 Sandia completed the designð and NNSAôs Kansas City Plant initiated production ofð the new integrated arming, fuzing, and firing subsystem for this warhead. The radar fuze development costs were approximately 30 percent of the cost of the fuze we designed and produced for the W88 warhead in the late 1980s, while meeting similar requirements for survivability in the severe radiation environments of a nuclear detonation.

Sandiaôs Microsystems and Engineering Sciences Applications (MESA) facility was essential for the design, qualification, and fabrication of the radiation-hardened integrated circuits used in the W76 arming, fuzing, and firing subsystem. Advanced computational and physical simulation tools were used extensively in the design and qualification of key components, which will enable us to confidently place this life-extended warhead in the stockpile without underground nuclear testing.

In todayôs stockpile stewardship program, radiation tests using aboveground simulators provide adequate radiation effects testing for most spectra of concern to Sandia. We take the parameters derived from such tests and incorporate them into computational models that calculate system performance over a broader and more intense range of conditions. This achievement is possible using the capabilities and tools developed in the stockpile stewardship program.

In my view, the stockpile stewardship program today has advanced to the point where the preferred approach would be to rely on numerical simulation and test facilities for certification of non-nuclear subsystems in the stockpile. This approach will, however, include some risk. We must maintain facilities, qualified people, and modeling and simulation capabilities that allow us to

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[2] House Armed Services Committee, Subcommittee on Military Procurement, *Hearing on the Safety, Security, Reliability and Performance of the Nuclear Stockpile,* 107th Cong., 2nd sess., June 12, 2002.

assess with confidence. We will continue to be concerned with certain issues in the stockpile for the indefinite future. However, I am confident that we will be able to perform our assessment and design responsibilities successfully if the national investment in a robust stockpile stewardship program is sustained in years ahead.

The Stockpile Today and Future

The nationôs nuclear weapon policy has changed significantly since the end of the Cold War. The stockpile is smaller in total numbers and comprises fewer weapon types. It is natural that nuclear weapon policy in the postï Cold War era should undergo revision to address the threats of the 21st century. I understand and support the need for stockpile transition.

But the fact is, the legacy stockpile is composed of weapons tailored for the threats and strategies of the Cold War. Whether the designs of the legacy stockpile are appropriate for the 21st century, and can be maintained indefinitely, is problematic. It is important that Congress and the Executive agree on how the nuclear deterrent should be sized and shaped for the future and what role it should play in the larger context of national security. We need to establish the path forward for the deterrent, recognizing the reality of a changed global situation and fiscal constraints. We need a commitment to a robust stockpile stewardship program and an infrastructure appropriately configured to support it.

In looking at future options for the stockpile, I believe it is important to continue to investigate a replacement strategy for legacy Cold-War era warheads. Aging issues in the stockpile will require a measure of stockpile refurbishment as long as those systems remain in stockpile. In the long term, a revived Reliable Replacement Warhead (RRW) program would offer advantages for ease of manufacture, maintenance, and assessment, and especially enhanced safety and security. I support the NNSAôs request to fund the RRW Program so that the laboratories can complete their feasibility studies, including cost estimates.

Simply put, the current stockpile will require continued maintenance and a laboratory/ production complex configured around the past, with all its cost, complexity, and inherent risk. We must balance modernizing the stockpile with providing assurance to the world that we stand for an enhanced nonproliferation regime. The desired result would be a right-sized stockpile that maintains a balanced deterrent but is smaller, safer, more secure, and can be maintained more effectively.

Complex Transformation

In January NNSA released its draft Supplemental Programmatic Environmental Impact Statement (SPEIS) for transforming the nuclear weapon complex. Complex Transformation is a vision for a smaller, safer, more secure, and less expensive nuclear weapon complex. The SPEIS outlines a Preferred Alternative utilizing distributed centers of excellence, and it would consolidate missions and facilities within the existing NNSA sites.

Under the Preferred Alternative, Sandia would continue to be the center of excellence for science and engineering for warhead non-nuclear systems and components and for major non-nuclear environmental testing. Sandia would also cease operations at the Tonopah Test Range and would have a different role in NNSAôs high-performance computing program. Sandiaôs California laboratory would continue to support the Lawrence Livermore National Laboratory with non-nuclear systems engineering, but would transition to a multi-agency resource. We are developing a plan to guide that transition.

We have long supported and see great benefit in the Preferred Alternativeôs proposal to consolidate Category I and II special nuclear materials (SNM). We are so committed to that concept, and to the improvements in security posture and the complex-wide cost savings associated with it, that we recently completed the removal of all discrete Category I and II SNM from Sandia sites. As of the end of February 2008, Sandia no longer possesses SNM in quantities that require a Category I or II security posture. This has made it possible for us to implement cost savings in our security protective force, which we have achieved through normal attrition and a thoughtful program of job transitioning and retraining.

A problem of worker displacement may arise in many job classifications as the Preferred Alternative is implemented. NNSA has set a goal of reducing the nuclear weapon complex workforce by 20 to 30 percent over ten years. At Sandia we have sought to do our part by responsibly managing our workforce size. We have reduced our direct nuclear weapon workforce by 18 percent since 2004, largely through retirements and by redirecting engineers, scientists, and technicians to other national security programs. It is important to recognize and account for the fact that those organizations that have already made progress toward achieving their goals should not be subject to even further reductions.

We at Sandia recognize the need for changes in the nuclear weapon complex. We support NNSA in its effort to transform the complex into an efficient enterprise for stewardship of the nuclear deterrent. Implementation of the Preferred Alternative must be carefully managed so that essential capabilities remain robust and workforce impacts are mitigated.

THE GLOBAL NUCLEAR FUTURE

As the demand for energy increases in the United States and worldwide, nuclear energy must be part of the solution. New nuclear power plants are now being proposed in the United States and worldwide. New reactor designs are likely to be part of the expansion of nuclear power. There will be technical issues, safety issues, and waste disposal issues associated with the expansion of nuclear energy, and the Department of Energy national laboratories can play a useful role in assisting with their solution.

The global nuclear landscape is changing significantly. The expansion of nuclear power generation internationally raises the potential for growing stockpiles of separated plutonium and spent nuclear fuel; and the spread of nuclear technology and material augments concern over smuggling and the threat of nuclear terrorism. Policy development and technology development have not kept pace with the accelerating changes in the global nuclear security landscape. The nonproliferation regime established by the Treaty on the Non-Proliferation of Nuclear Weapons has been challenged. Sandia and other laboratories have been very active in programs for nonproliferation, verification, and cooperative threat reduction for many years.

Reclaiming U.S. Leadership

It is in the security interests of the United States to assert leadership in the development of a safe and secure global nuclear future. We need an integrated policy framework that will provide for safe, secure expansion of nuclear energy while minimizing proliferation risks.

The United States must reclaim the technical leadership to support the development of proliferation-resistant nuclear energy expansion, control of nuclear materials, and verification regimes for future international agreements. The NNSA laboratories are unique in that they possess competence in both military and civilian uses of nuclear energy. I believe an opportunity

exists to engage these laboratories in the development and implementation of solutions that deal with the larger nuclear context. To address gaps that have emerged as a result of both changing threat conditions and lagging investment, it will be important to strengthen the NNSA laboratoriesô capabilities to address the security challenges related to malicious or clandestine use of nuclear material or facilities.

Global Nuclear Energy Partnership (GNEP)

Part of the approach of the United States to support safe and proliferation-resistant nuclear power throughout the world is the Global Nuclear Energy Partnership (GNEP), which is contained in the budget for the Department of Energyôs Office of Nuclear Energy. This program focuses on research and development to reduce the volume and toxicity of high-level waste, reduce the proliferation threat posed by civilian inventories of plutonium in spent fuel, and provide proliferation-resistant technologies to recover the energy content in spent nuclear fuel. Sandia leads the safety, security, and regulatory elements of the GNEP program. We are focusing our efforts on defining the regulatory framework and the data requirements to support licensing of fast reactors and recycling facilities. We at Sandia stand ready to support the Department of Energy and the Congress in deployment of this important program.

Nuclear Waste

An acceptable solution for radioactive waste management is critical to the expansion of safe nuclear power in the United States. Yucca Mountain was intended to be the nationôs long-term repository for spent nuclear fuel and high-level radioactive waste. These materials are currently stored at numerous sites around the country.

Sandia completed its portion of the Yucca Mountain license application early and provided it to the Department of Energyôs Office of Civilian Radioactive Waste Management (OCRWM). As the lead laboratory for repository systems, Sandia managed the technical effort to develop much of the license application safety analysis. This work was accomplished despite a severely reduced budget in fiscal year 2008 and the consequent loss of some staff. We brought together the best talent available from among the Department of Energy national laboratories, research universities, and technical contractors. We endeavored to produce a license application that will be credible among technical peers, defensible before the Nuclear Regulatory Commission, and respected for the integrity of its science.

We have already begun to prepare for the license applicationôs defense, which will enable the Department of Energy to respond to technical questions from the Nuclear Regulatory Commission and requests for additional information throughout 2009. Public hearings and evidentiary hearings before the Atomic Safety Licensing Board are expected to last two to three more years.

Looking ahead, the nation should establish a path forward that enables an environment where nuclear energy can realize its full potential as a safe, environmentally friendly source of energy. Confidence in a nuclear waste management solution remains a critical element of the nuclear fuel cycle and is critical to the expansion of nuclear power in the near term. Yucca Mountain could be made consistent with an approach that includes recycling and interim storage in a phased approach to nuclear waste disposal. In my view, we should seek ways to get the most from the investment in Yucca Mountain.

There are many options for managing the waste from current and future nuclear reactors, but all options ultimately rely on geologic disposal. The high-level waste from defense reprocessing will also need such a disposal method. The policy and resulting program for waste disposal need to be addressed now. My organization and I stand ready to support the Administration and the Congress in the development of a revitalized approach to this important national issue.

LABORATORY CAPABILITIES

Sandia National Laboratories maintains an array of multidisciplinary capabilities at world-class levels to support its mission work for the Department of Energy and synergistic programs for other agencies. The research and development disciplines we require cover most of the physical sciences and engineering specialties recognized today, as well as the computational and supporting technologies needed for modern scientific investigation.

Essential Capabilities for the Stockpile

Sandiaôs essential capabilities for stockpile stewardship support our programôs core products, which include engineered and integrated warhead systems; arming, fuzing, and firing systems; neutron generators; gas transfer systems; and surety systems.

The capabilities that we recognize as essential for this program include systems integration, major environmental testing, radiation effects science, computational simulation, microsystem technologies, materials science, and the engineering sciences. Many of these capabilities are synergistic with those in industry and at research universities but do not exist in those sectors in the specialized or unique forms required for stockpile stewardship, and rarely as an integrated enterprise. Our essential capabilities are integrated with the core products that we design and support for the nuclear weapon stockpile.

Microsystems and Engineering Sciences Applications (MESA) Complex

The MESA complex at Sandiaôs New Mexico site is the cornerstone of NNSAôs initiative to address the need for microelectronics and integrated microsystems to support a certifiable stockpile for the future. Further, it is a unique, world-class capability for the integration of modeling and simulation into design and product realization of specialized components for national security applications. It is a major investment on the part of the agency to retain the mission capability for designing and fabricating radiation-hardened microsystems. MESA will meet that requirement for future decades.

We have established in MESA the ability to develop, design, and produce if necessary, unique integrated microsystems for weapon safety and security. This capability includes a national ñtrusted foundryò for radiation-hardened microelectronics. We have applied approximately forty thousand such products to the stockpile and nonproliferation missions of NNSA and for other national security customers. MESA is developing many new nano-enabled microsystem technologies for broad national security applications

The MESA facility is a landmark achievement for our laboratory. It is especially noteworthy as an example of project management excellence. MESA construction is effectively complete, three years ahead of schedule and $40 million below the original baseline. A dedication ceremony was held in August to celebrate the opening of MESAôs Weapons Integration Facility, the final building of the MESA complex.

High-Performance Computing

Sandiaôs high-performance computing capabilities are vital tools for NNSA mission responsibilities in stockpile surveillance, certification, and qualification, and they have proved to be indispensable in our work for other agencies, especially elements of the Department of Defense. NNSAôs decades-long investment in high-performance computing at Sandia revolutionized modern supercomputing and its application to science and engineering.

Since 1992, Sandia has been a pioneer in massively parallel processing (MPP), which employs special software to control thousands of low-cost processors configured as a single machine. Sandia was the first to shatter the world computational speed record by exceeding one trillion floating-point operations per second (one teraflop) with MPP. We achieved this milestone on the ñRedò supercomputer that we developed with Intel under the Department of Energyôs Accelerated Strategic Computing Initiative in 1996.

Sandiaôs current supercomputer, ñRed Storm,ò also has been highly successful in terms of performance, effective cost for computing capability, and improvements achieved after initial operation. Sandia led the development of the architecture and associated applications of this machine. Our partner, Cray, Inc., developed its XT family of supercomputers based on the Red Storm design and now has 36 installations at 20 sites worldwide. Based on this significant heritage, Sandia claims the most cost-effective approach to supercomputing.

Application of these computing capabilities has allowed Sandia to address technical problemsð previously thought to be impossibleð in support of nuclear weapon qualification activities. Further, in several cases other federal agencies have asked us to address computational problems that could not be addressed by any other institution. The impact of these calculations is hard to overstate; they have allowed resolution of formidable science and engineering challenges in support of national security.

Under the Preferred Alternative for complex transformation, NNSA plans to consolidate its high-performance computing platforms at the Lawrence Livermore and Los Alamos sites, principally due to the NNSA investments in computing facilities at those institutions. In order to remain a key participant in NNSAôs high-performance computing program, Sandia has negotiated a memorandum of understanding with Los Alamos that will bring together the two laboratoriesô computer science and operational capabilities for high-performance computing. Under this agreement, Sandia will lead in providing the architecture and engineering expertise for capability platforms, and Los Alamos will lead in deployment and operations. Teams will be formed from both laboratories to provide an unparalleled computational resource for future NNSA capability platforms.

This partnership is not without risk to both institutions. It is essential for NNSA to execute a platform strategy that supports the Sandia/Los Alamos partnership with a platform procurement in fiscal year 2010 and meets the established requirements for maintaining and refurbishing the nuclear weapon stockpile. These requirements clearly identify the need for replacing the existing NNSA Purple and Red Storm platforms by fiscal year 2010.

Support for the Weapons Activities Engineering Campaign

I am concerned about erosion in the Weapons Activities Engineering Campaign. This campaign contains much of the science and technology foundations supporting Sandiaôs ability to assess and sustain the stockpile. This science-based campaign advances the engineering

competencies that are the basis for assessing components and subsystems and improving weapon safety and reliability. This program suffered a 40 percent reduction between fiscal year 2004 and 2007; the fiscal year 2008 appropriation was still 35 percent below the 2004 mark, and the 2009 request is about the same. Chronic under-funding of this campaign may diminish the advanced engineering capabilities at the laboratories over the long term. These capabilities are essential for maintaining confidence in the assurance stewardship activities for the stockpile.

Attracting and Retaining Technical Talent

We are very deliberate about preserving critical skills in our workforce. Through strategic hiring and mentoring of top graduates, especially from key universities throughout the country, and through a formal knowledge preservation program, we believe we can ensure that the smaller workforce of tomorrow will have access to the technical knowledge and lessons learned that will be needed for the future.

We have been able to attract new talent largely because of the diversity of missions and professional challenges at the laboratories. System engineering programs, technology development, and advanced scientific and engineering research are essential for sustaining career interest and commitment. The opportunity to support national security needs beyond the nuclear weapon program is motivating to prospective staff.

NNSA Capabilities Going Forward

My biggest concern with the long-term future of NNSA is that science and engineering capabilities may be relegated to a subordinate role as we strive to right-size the nuclear weapon complex and necessarily confront the fiscal realities of today. In my view, an essential characteristic of the Cold Warôs resolution and a fundamental element of deterrence going forward is the strength and resiliency of the NNSA laboratories. Their scientific capabilities have deterred our adversaries, contributed mightily to the nationôs technological leadership, and seen many unparalleled applications in support of national security.

ENERGY SECURITY

By 2030, world energy demand and carbon emissions are expected to increase by 60 percent. The nation needs a credible plan for transitioning from todayôs carbon-based energy and transportation infrastructure to a system that is less dependent on fossil fuels. Nuclear energy will be a major part of that solution, but other approaches to low-carbon energy generation and conversion will also be important.

The Department of Energy and its national laboratories are exploring bold new ways of translating research into deployable solutions to have more impact, sooner, particularly to achieve goals related to reducing oil and gas imports and lowering emissions. We are working on a plan to leverage several key Sandia capabilities with academia, a few other laboratories, and industry, to dramatically increase the effectiveness of transformative energy research in transportation systems.

Consistent with the Preferred Alternative for complex transformation, we are exploring a research thrust in energy security to be centered at Sandiaôs California site. The initiative would focus on low-net-carbon alternative fuels, accelerated electrification of transportation infrastructures, and combustion efficiency, which is a long-standing competency of the successful Combustion Research Facility in California. I believe a unique opportunity exists to apply existing

facilities at Sandiaôs California laboratory to basic and applied research in support of our energy needs. This will serve to bring together the fundamental research efforts of the Department of Energy Office of Science with the applied energy programs of DOE. This will include university and industrial participation and draw on the entrepreneurial capabilities that are so strong in the San Francisco Bay area.

More intensive use of modeling and simulation through high-performance computing can accelerate the contributions of renewable energy technologies. Sandia is currently working toward an agreement with the National Renewable Energy Laboratory (NREL) to establish a partnership in which Sandia would provide capacity computing for NREL programs. NREL and Sandia bring extensive capabilities to the renewables mission and are focused on meeting this challengeð from understanding renewable resources for energy, to the conversion of these resources to electricity and fuels.

PROGRAMS FOR THE OFFICE OF SCIENCE

I am increasingly concerned that the nationôs investment in science and engineering is not receiving the attention the nation requires. This is one of the most significant challenges that will define the nationôs future. While legislation like the America COMPETES Act[3] provides a statement of good intent, in my view it is essential for the federal government to make real investments in people, education, and programs across a broad spectrum of science and engineering.

The Office of Science is the steward for a significant fraction of the fundamental physical science research in the United States, both at the Department of Energy laboratories and in universities around the country. Its portfolio and those of a number of other agencies are central to American competitiveness, as argued in the ñGathering Stormò report of the National Academies.[4] In addition, many of the Office of Science research directions promise revolutionary advances in scientific areas vital to our national security. Despite the importance of a strong physical science foundation for future U.S. competitiveness, the history of investment in the Office of Science is not consistent with the Department of Energyôs prominent role and potential for the future.

Sandia has a presence in four of the Office of Scienceôs programs: Basic Energy Sciences (BES), Fusion Energy Sciences, Advanced Scientific Computing Research, and Biological and Environmental Research. BES represents the lionôs share of our work and includes research in materials, chemical sciences, combustion, geosciences, and nanotechnology.

The Office of Scienceôs Center for Integrated Nanotechnologies (CINT) core facility was completed in 2006 and is jointly operated by Sandia and Los Alamos National Laboratories as a Department of Energy user facility available to university and industrial researchers. CINT is devoted to establishing the principles that govern the design, performance, and integration of nanoscale materials. Leadership in the science and engineering of nanotechnology will be important for U.S. competitiveness in the decades ahead.

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[3] *American COMPETES Act,* Public Law 110-69, *U.S. Statutes at Large* 121 (2007): 572.

[4] Committee on Prospering in the Global Economy of the 21st Century, *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future* (National Academy of Sciences, National Academy of Engineering, Institute of Medicine, 2007), http://www.nap.edu/catalog.php?record_id=11463.

Sandia is a major partner in the Joint BioEnergy Institute (JBEI), a research center funded by the Biological and Environmental Research Program. The research focus will be on understanding how to reengineer biological processes to develop efficient methods for converting plant materials into ethanol or other biofuels. This five-year effort may help make biofuels production truly cost-effective on a national scale.

The synergy between programs in the Office of Science and other parts of the Department of Energy is very important. The investment across all of these programs must be balanced in order to assure a steady stream of scientific advances that can be translated into technologies of benefit to the American people. NNSA programs and all aspects of energy research and development gain from the fundamental science available in Office of Science programs. It would be beneficial for the Congress to support the funding levels contained in the fiscal year 2009 budget submission. This support would stimulate the kind of productive collaborations across programs that are so helpful. In addition, I am aware of efforts to strengthen the fiscal year 2008 budget by considering a supplemental appropriation for the Office of Science. I would encourage your consideration of that matter.

FUTURE OF THE NNSA LABORATORIES IN NATIONAL SECURITY

During the Cold War, the nuclear weapon laboratories benefited from a designated core mission that for fifty years had furnished the rationale for their exceptional technical foundations. The unambiguous importance of that mission assured sufficient funding to sustain an effective technology base.

Today, the national security challenges are more complex than they were during the Cold War. The NNSA laboratories are uniquely positioned to contribute to the solutions of these complex national security challenges. However, the NNSA Administrator and the laboratory directors face a formidable problem of how to maintain technical competenciesð especially in nuclear weaponsð in an era of limited resources, a smaller program, fierce competition for talent, and widespread public and political uncertainty toward the program. In this new and difficult operating environment, synergistic work supporting other national security missions is crucial. We depend on other national security activities to support and stabilize our critical capabilities and science base. It makes sense, therefore, to encourage more extensive use of the NNSA laboratories by multiple agencies and sponsors, thereby exercising and enhancing the competencies we require for stockpile stewardship.

We are working with DOE and NNSA to establish a strategy and approach that provides enhanced access to the unique facilities at these laboratories that will significantly benefit the nationôs responsiveness to broader national security problems.

An Example of Multiprogram Synergy: Radar

Sandiaôs capabilities for the nuclear weapon program benefit from synergy with other national security programs. An excellent example of this synergy is our work in radars.

Competency in specialized radar applications is a required capability for the nuclear weapon program. As a result of initial investments in radar fuze capability for nuclear weapons, we began working on miniature radars based on synthetic aperture concepts in 1983 for other national security applications. In 1985 we became involved in a special-access program for the Department of Defense to develop a one-foot-resolution, real-time synthetic aperture radar (SAR) suitable for use in unmanned aircraft. Sandia flew the first real-time, one-foot-resolution, 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 have now been used for real-time surveillance by every U.S. military command.

In this example, the original radar competency of the nuclear weapon 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 in the nuclear weapon program. This updated fuzing system would not have been possible without the competency that was maintained by work for the Department of Defense.

Broad National Security Engagement

Today, nuclear weapon activities constitute about 42 percent of Sandiaôs funding. Department of Energy programs in nonproliferation, energy security, and science provide another 20 percent, while agencies other than the Department of Energy furnish 38 percent of our total operating funds.

The work-for-others (WFO) process that has been in place for many years for accepting non-DOE work into the NNSA laboratories should be streamlined for the future. Many agencies could benefit from a reimbursable system that would give them direct access to the Department of Energy laboratories, and DOE would benefit from the additional programmatic activity and institutional support. In order to enhance our ability to serve the nation, it may also be useful to explore innovative governance options to promote shared agency investment.

There are questions that naturally arise as the laboratories take on important national security assignments from agencies other than the Department of Energy. It is important to recognize that other agencies do contribute more than the direct program costs of their activities. In fact, they pay the overhead rates that all programs pay, and those payments help provide support for operational and infrastructure costs and for the Laboratory-Directed Research and Development Program. A portion of our overhead rates is utilized for capital improvements, and in some cases other agencies have paid directly for the construction of buildings and the purchase of capital equipment. It is important to recognize that while operational costs and some capital improvements are currently being addressed, there is still a need for more substantive investment in the science and engineering fabric of the laboratory.

The laboratories and NNSA should be encouraged to develop a realistic approach for maintaining the excellence of our scientific and engineering foundations well into the future. I believe we can succeed only as national security laboratories in a broad sense, serving the needs of multiple agencies for mutual benefit and shared excellence in national service.

Thank you, Mr. Chairman.

ADDENDUM

ISSUES OF CONCERN

The following specific issues of concern to Sandia National Laboratoriesð some of which were addressed in my statementð are summarized for the attention of the Committee.

Implementation of Complex Transformation

We support NNSA in its effort to transform the complex into an efficient enterprise for stewardship of the nuclear deterrent. Implementation of the Preferred Alternative must be carefully managed so that essential capabilities remain robust and workforce impacts are mitigated.

High-performance computing will remain an essential competency for Sandia. There is significant risk that the skills acquired by Sandiaôs system computing team will be lost over time without a high-performance computing platform on site. Sandia is committed to cooperating with the implementation of complex transformation and will monitor the implementation process to assure that capabilities are fairly integrated.

A problem of worker displacement may arise in many job classifications as the Preferred Alternative is implemented. NNSA has set a goal of reducing the nuclear weapon complex workforce by 20 to 30 percent over ten years. At Sandia we have sought to do our part by responsibly managing our workforce size. We have reduced our direct nuclear weapon workforce by 18 percent since 2004, largely through retirements and by redirecting engineers, scientists, and technicians to other national security programs. It is important to recognize and account for the fact that those organizations that have already made progress toward achieving their goals should not be subject to even further reductions. Normal attrition should allow for appropriate workforce restructuring, but we may need a thoughtful program for job transitioning and retraining for those instances in which workforce dislocations are acute.

Support for the Weapons Activities Engineering Campaign

The Weapons Activities Engineering Campaign advances the competencies that are the basis for assessing engineered components and subsystems and improving weapon safety and reliability. This program suffered a 40 percent reduction between fiscal year 2004 and 2007; the fiscal year 2008 appropriation was still 35 percent below the 2004 mark, and the 2009 request is about the same. Chronic under-funding of this campaign may erode the advanced engineering capabilities at the laboratories over the long term. These capabilities are essential for maintaining confidence in the assurance stewardship activities for the stockpile.

Cyber Security

The United States relies extensively on information technology in the form of computers, chips embedded in all forms of products, communication systems, and military capabilities. There are growing indications that the security of our society is increasingly vulnerable to attacks on these systems. A national initiative in cyber security deserves increased attention, and that is beginning to happen. The Department of Energy and the NNSA laboratories have much to offer in assisting with solutions in this area.

During the past several years, the NNSA laboratories have experienced an increase in the level, intensity, and sophistication of network attacks directed against computer resources. Offensive capabilities for cyber warfare and cyber espionage have advanced by leaps and bounds worldwide. Other nations have been working assiduously to neutralize the cyber advantages that the United States has enjoyed for two decades and to exploit weaknesses in our cyber architecture as an asymmetric vulnerability for U.S. national security. These developments cause us to worry that the sophistication of the threats is growing at a faster rate than we are able to respond in hardening our systems against intrusions.

NNSAôs request for cyber security in fiscal year 2009 is $122.5 million, an increase of 22 percent over 2008. This increase is essential to help us continue to harden our infrastructures against cyber attacks. But it should be recognized that this is a first step toward the kind of comprehensive effort needed to deal with this growing threat. Additionally, there is a need to bring in other parts of the Department of Energy in a more significant way, particularly the Office of Science.

Safeguards and Security Funding Offset for Reimbursable Programs

The fiscal year 2001 appropriation for Weapons Activities created a direct-funded budget for safeguards and security at NNSA sites. The conference report directed the Department of Energy to obtain funds from non-DOE customers in 2002 and beyond to offset a portion of the security appropriation. The laboratories have been collecting that offset via an overhead charge applied to work-for-others (WFO) projects. This practice has been called into question. Accordingly, the fiscal year 2009 budget execution guidance provides for direct funding only. Thus the funds formerly collected via the WFO offset will be lost, which at Sandia will cause a shortfall of several million dollars in funds available for safeguards and security.

Program Enhancements That Would Be Possible with Additional Funding

Full Utilization of the Refurbished Z Pulsed Power Accelerator.

The Z pulsed-power facility provides data for nuclear weapon primaries, secondaries, and non-nuclear components essential for stockpile stewardship. Experiments on Z also explore advanced concepts and study alternative approaches to fusion energy. Full single-shift utilization is the most efficient way to maximize the return on the value of the recent refurbishment of Z. Operations are currently funded jointly by NNSAôs Science and Inertial Confinement Fusion (ICF) Campaigns.

A new approach to creating high-current pulsed-power devices, known as a Linear Transformer Driver (LTD), has recently been demonstrated at Sandia. LTD is more than twice as efficient as traditional pulsed-power devices. This advance is likely to be the future of large-scale sub-microsecond pulsed-power devices. It is also the simplest technological approach to fusion energy. Additional funding would enable Sandia to accelerate the maturation of this game-changing technology.

B61 Life Extension

The B61 bomb has several versions and is one of the oldest weapon systems in the legacy stockpile. Many of the technologies used in the B61 are old, several components are reaching end-of-life, and the system would require upgrades to be compatible with new digital-interfaces

for future delivery systems. Modern technologies and redesigned architectures would permit upgrades to this weapon without providing a new military capability. B61 refurbishment should be implemented as soon as possible to sustain the nationôs gravity-delivered nuclear weapon capability.

Discovery Science and Engineering Innovation Institutes

The America COMPETES Act passed last year authorized the establishment of Discovery Science and Engineering Innovation Institutes at Department of Energy national laboratories. Discovery Institutes would be catalysts for transformation by helping to develop the next generation of science and engineering leaders to address national challenges and meet industrial needs to compete globally. An appropriation for the Discovery Science and Engineering Innovation Institutes at national laboratories would enable this initiative to proceed.

Nuclear Waste

An acceptable solution for radioactive waste management is critical to the expansion of safe nuclear power in the United States. Sandia National Laboratories has developed significant waste-repository expertise through its work with both the Waste Isolation Pilot Plant and the Yucca Mountain Project. There are many options for managing the waste from current and future nuclear reactors, but all options ultimately rely on geologic disposal. The high-level waste from defense reprocessing will also need such a disposal method. The policy and resulting program for waste disposal need to be addressed now. My organization and I stand ready to support the Administration and Congress in the development of a revitalized approach to this vital national issue.

WITNESS BIOGRAPHY

Thomas O. Hunter, Ph.D.

Dr. Thomas (Tom) O. Hunter is director of Sandia National Laboratories, with principal sites in Albuquerque, New Mexico, and Livermore, California. Dr. Hunter joined Sandia in 1967 and became president and director in April 2005. His responsibilities include managing the Laboratoriesô $2.2 billion annual budget and approximately 8,400 employees.

Before assuming his role as director, Dr. Hunter was the senior vice president for defense programs. His management role included oversight of research programs in microelectronics, materials science, engineering science, computer science, and pulsed power; nuclear weapon engineering; information systems and technology; and production and manufacturing. He also had responsibility for the Laboratoriesô effort in advanced computing, computational science, environmental testing, corporate information systems, and systems integration.

From October 1995 to March 1999, Hunter served as vice president of Sandiaôs California laboratory. Responsibilities included managing programs in nuclear weapon research and development, nonproliferation, advanced manufacturing technology, information systems, environmental technology, and energy research. He also served as corporate leader for the development of nonproliferation, arms control, and materials management programs.

Earlier in his Sandia career, Dr. Hunter directed Sandiaôs activities in energy development and environmental quality and emphasized international energy and environment development and supporting information systems. Hunter had a leadership role in establishing cooperative programs in the former Soviet Union to support nuclear nonproliferation. He also directed Sandiaôs nuclear waste management and transportation programs and activities for the Yucca Mountain Project, as well as the Waste Isolation Pilot Plant.

Dr. Hunter is a member of the Engineering Advisory Board for the University of Florida, Council on Foreign Relations, American Nuclear Society, and the U.S. Strategic Commandôs Strategic Advisory Group. He has served as a member and chair for the Board of Visitors for the dean of the College of Engineering at the University of California, Davis, on various review groups with other Department of Energy laboratories, guest lecturer at Massachusetts Institute of Technology on nuclear waste management, and as an adjunct professor at the University of New Mexico. He is the author of numerous technical papers and presentations. He is a recipient of the 2007 New Mexico Distinguished Public Service Award.

Dr. Hunter earned a bachelor of science degree in mechanical engineering from the University of Florida, a master of science degree in mechanical engineering from the University of New Mexico, and masterôs and Ph.D. degrees in nuclear engineering from the University of Wisconsin.