WRITTEN STATEMENT SUBMITTED TO THE STRATEGIC FORCES SUBCOMMITTEE OF THE SENATE ARMED SERVICES COMMITTEE

LOS ALAMOS NATIONAL LABORATORY
DIRECTOR JOHN C. BROWNE
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Thank you Mr. Chairman and distinguished members of the Strategic Forces Subcommittee for the opportunity to submit this report on the status of the national security programs at Los Alamos National Laboratory. Los Alamos is one of three multi-program scientific institutions supported by the Department of Energy's National Nuclear Security Administration (NNSA), and has been operated by the University of California since its inception in 1943. Seventy percent of the work at Los Alamos supports the NNSA mission. Eighty percent of our work is directly related to national security. All of our work stems from our historic public service and national security mission. We appreciate the support this Subcommittee has given us in carrying out our mission.

The new threats of the 21st century—worldwide terrorism and the daunting possibility of the use of weapons of mass destruction—cannot be met by nuclear deterrence alone. With the formation of the Office of Homeland Security and the issuance of the Nuclear Posture Review and the Quadrennial Defense Review, our country is developing new national security policy directions for the 21st century that will require a broad array of scientific and technological innovations in the coming decades. The NNSA weapons laboratories will provide the nation with many of the needed science and technology capabilities that will support our nation's needs in nuclear deterrence, conventional defense and homeland security.

Our stockpile stewardship mission is directly linked to the urgent national security priorities of our country. We are aligned with the new nuclear strategy set forth in the 2001 Nuclear Posture Review (NPR) which outlines a deterrence strategy based on a new triad of non-nuclear and nuclear strike capabilities, a strong defense capability, and a responsive defense infrastructure. The active support of the new triad by healthy and responsive national laboratories, as well as the DoD, will be key to the success of this deterrence strategy. We are committed to:

- Ensuring the safety, reliability and responsiveness of the US nuclear-weapon stockpile;
- Reducing threats to US and global security, with a special focus on countering proliferation and possible terrorist acquisition, threats and use of weapons of mass destruction; and,
- Providing technical solutions to long-term national security problems in infrastructure vulnerabilities, energy, environment, and health.

We are as focused and committed today to our mission and purpose as we were 60 years ago. The stockpile stewardship mission—maintaining the safety and reliability of the enduring nuclear stockpile without nuclear testing—is one of the most difficult technical

challenges this nation has ever attempted. As our nuclear weapons age beyond their design lifetimes, Directed Stockpile Work—surveillance, assessment, and response—will increase. Certification of nuclear weapons in an environment without nuclear testing requires the best science in modeling and simulation, dynamic material behavior, special nuclear materials and explosives, and experimentation. Therefore, our weapons activities must focus on ensuring a balanced and sustainable stewardship—between direct stockpile work and the campaigns that support the underlying science needed to certify stockpiled weapons and to meet future nuclear weapon requirements —for this decade and beyond.

To meet the technical and operational challenges posed by our demanding mission, last September I appointed a new nuclear-weapon program management team and restructured the Laboratory to be more focused on execution and product delivery. There are several structural changes in the NNSA being implemented in the field and site offices. These changes should strengthen our partnership with the NNSA, at all levels, which already has markedly improved under General Gordon's tenure. The University of California (UC) has appointed a new Vice President for Laboratory Management and has increased its oversight and involvement in improving Laboratory performance and operations. We are operating under a new five-year contract between UC and DOE/NNSA that requires us to perform against rigorous technical and operational standards that will serve the nation well.

We have made great progress during this past year. I will highlight some major accomplishments in our stockpile stewardship program, our threat reduction program, and in our operations. I will also review key issues and challenges with respect to our mission that face us in the future--and to the science, the workforce and the infrastructure that underpin that mission. In the attached addendum, key elements of our nuclear weapon and threat reduction programs are addressed in greater detail.

PROGRESS AND ACCOMPLISHMENTS: HIGHLIGHTS

I. Stockpile Stewardship Program

In 1995, we were tasked to conduct a stockpile stewardship effort to sustain the enduring nuclear-weapon stockpile without nuclear testing. Sustaining the nuclear deterrent under these conditions continues to pose a grand challenge. It is my primary responsibility to position the Laboratory and provide the people and tools to ensure that we are equal to this challenge. The requirements of stockpile stewardship are technical, determined by the science of nuclear weapons, by the processes of aging affecting both the workforce and the weapons, and by required levels of confidence. It is essential that we meet these requirements. I would like to highlight a few of our achievements in meeting these requirements.

Annual Certification

For the sixth consecutive year, I have been able to certify to the Secretaries of Defense and Energy that the five Los Alamos designed weapons (B61 family, W76, W78, W80, and W88) in the US nuclear stockpile remain safe and reliable and that a nuclear test is not required at this time to resolve any of the issues that

exist for these weapons. Although I am concerned about a growing number of issues identified by our ongoing surveillance activities, to date we have been able to resolve most of the issues through assessments, changes in operating conditions, or refurbishment plans. In the past some of these issues would have required nuclear tests to resolve. The challenge we face is to have certification tools and trained people adequate to address these issues.

We have strengthened our certification approach each year since beginning this process in 1996. In the past year, Los Alamos and Lawrence Livermore National Laboratories reached agreement on an approach for certification that utilizes similar methodologies while maintaining independence for peer review purposes. In addition, we are planning to phase in internal "red teams" or "fresh-eye teams" at Los Alamos designed to look for the issues that might have been overlooked by the responsible warhead design/refurbishment team. Reports from both teams will be submitted to me for incorporation into my annual assessment of the stockpile.

Pit Manufacturing and Certification

One of our highest priorities at Los Alamos National Laboratory is to re-establish the nation's capability to manufacture plutonium pits, the heart of nuclear weapons. The W88 has been selected as the crucial prototype for restoring the nation's nuclear manufacturing capability. Producing a pit for a nuclear weapon involves two distinct but intertwined activities: manufacturing and certification. Significant progress in this program has been made in this last year. We are well along in establishing a limited manufacturing capacity for pits. Eleven developmental units have been produced to date. We are on schedule to deliver a certifiable W88 pit, defined as one that meets all manufacturing requirements and specifications, by April 2003.

Even though we will provide a key capability in a timely fashion, the Laboratory will not have sufficient capacity to meet envisioned future pit production requirements. We support NNSA's pit production strategy, which is based on an assessment of pit lifetime and numbers of weapons projected in the stockpile, to reestablish industrial-scale pit production in the longer term.

Certification of the pit is an extremely challenging process that requires both highly specialized equipment and expertise. Los Alamos has identified a series of laboratory and sub-critical experiments that are designed to test and validate our computer simulations that will be needed to ensure that the pit will perform as designed. Based on improved planning and better certification methodology we have been able to move up our schedule for certifying these pits for war reserve use from the previously scheduled date of 2009 to 2007.

Directed Stockpile Work

In addition to our pit manufacturing responsibilities, we are also responsible for Neutron Target Tube Loading, detonator fabrication for all the weapons in the

stockpile, Beryllium component manufacturing, pit and valve surveillance testing, and high fidelity mock pits for Joint Test Assemblies (JTA) used in flight testing.

In the area of stockpile Life Extension Programs (LEPs), we began engineering development for the Navy's W76 warhead and will proceed toward production development and certification with the first production unit (FPU) scheduled for 2007. Evaluation of the condition and life expectancy of the materials in the nuclear explosive package is being addressed. A major refurbishment is planned to support the extension of the lifetime of this warhead to 2042. We also have finalized plans with NNSA, Pantex, and Y-12 to begin refurbishing canned subassemblies of the B61 Mod 7 and 11 in 2006. In support of the Livermore National Laboratory W80 Life Extension Program, we are developing the Acorn gas transfer system with the Sandia—California site. With Sandia, we have completed the W80 Baseline program and continue to support knowledge transfer to LLNL.

As part of the Enhanced Surveillance program, Los Alamos continues to be a national leader in materials characterization and aging studies. We are developing non-destructive technologies for surveillance and diagnostics on components and systems that will help us improve our understanding of nuclear weapons aging.

Advanced Simulation and Computing

The Advanced Simulation and Computing (ASC) program of the NNSA is an essential element of the nuclear-weapons program. The objective is to provide greater computing power and to develop new computational models that will allow weapons designers and other nuclear weapons experts to use validated modeling and simulation to assess changes in the stockpile to determine if the existing weapons remain safe and reliable without nuclear testing.

We continue to make rapid advances in the ability to simulate nuclear explosions faster and with greatly increased detail. During this past year, we completed the first three-dimensional simulation of a full nuclear weapon system explosion using the LLNL 12 Teraops White computer. This calculation represents the first time that we have been able to compute a fully-coupled primary and secondary explosion to analyze weapon performance. It represents a breakthrough for the program and unprecedented detail for designers and analysts.

The Strategic Computing Complex (SCC) was completed on schedule and under budget. We are installing the first phase of 10 TeraOps of the 30 TeraOps computer that was purchased for this ASC program. We are installing the full capability in "phases" in order to facilitate performance testing to connectivity requirements. The computer will provide the computing power required to run the new computational tools to support the Stockpile Stewardship Program mission. These new weapon-system simulations will replace the less-predictive legacy based models.

Hydrodynamic Testing

The nuclear weapon primary is the most critical component of the weapon. Understanding its performance is essential to confidence in the safety and reliability of the stockpile. Hydrodynamic tests of primary systems—non-yield experiments measuring the implosion characteristics of primary systems using simulated nuclear materials—enable us to evaluate some crucial aspects of nuclear weapon performance. Completion of the first axis of the Dual Axis-Radiographic Hydro-Test (DARHT) facility has enabled us to perform these tests with outstanding spatial resolution of the imploding surrogate pit. We performed five major hydro tests (four at DARHT) in the last quarter of FY01 directly related to stockpile systems and in support of certification activities and plan six more later this year. Following commissioning and optimization of the second axis of DARHT, the facility will provide an enhanced diagnostic capability in FY04. We are also continuing to develop proton radiography as an advanced capability in order to maintain our ability to certify the refurbished nuclear weapons, and to validate the predictive capabilities of next-generation designers.

Test Readiness

The Nuclear Posture Review has called for enhanced test readiness. We support test readiness through a number of collaborations with the Nevada Test Site. The most prominent collaboration is that of sub-critical, non-yield, underground tests that address key dynamic materials issues and exercise the infrastructure required should a return to underground nuclear testing be needed. In February, we conducted a successful collaborative sub-critical experiment in Nevada that yielded significant data. Although we see no reason to do a nuclear test today, we support General Gordon's direction to reduce the timescale required to resume nuclear testing as a prudent measure.

Advanced Concepts

The Nuclear Posture Review identified a need for the nuclear-weapons design laboratories to maintain their design expertise through the study of advanced concepts that could meet changing weapon requirements in the future. These studies include new and extended concepts (those that may have been developed and tested in the past, but not deployed). At Los Alamos, we have an NNSA-approved effort evaluating robust earth-penetrating weapons and a small study group looking at past R&D efforts that could be developed to meet changing national needs for nuclear deterrence. If the country requires a vigorous effort, we will need explicit support and funding for such advanced concepts.

II. Threat Reduction Program: Non-proliferation, counter terrorism, homeland security, and defense transformation

As a result of shifting national security priorities since September 11, the newly created Office of Homeland Security has been charged with protecting the United States from terrorist attack. We are strongly committed to supporting this effort and are participating

with Lawrence Livermore and Sandia National Laboratories in an effort to defend the U.S. against nuclear, chemical and biological terrorist attacks.

For example, our pioneering work on sequencing the Human Genome helped not only to develop technologies and breakthroughs, but also to grow a unique bioscience base at the Laboratory. Because we had developed this capability, in the aftermath of September 11 we were able to play a key role in analyzing DNA of anthrax samples from the mail attacks. We were able to determine that these samples came from the common Ames strain, which assisted in efforts to respond to and treat victims. With Livermore, we deployed a biological agent detection system at the Salt Lake City Olympics. The Multi-spectral Thermal Imager (MTI) satellite, developed in a joint project with Sandia National Laboratories, was re-deployed to help analyze the destruction and the dispersal of potentially harmful debris from the attacks on the World Trade Center.

We currently are working with Sandia to develop a critical infrastructure analysis capability, which derives from an innovative simulation and modeling approach originally developed for understanding and improving large-scale transportation networks. The National Infrastructure Simulation and Analysis Center (NISAC) will use this approach for government planning and analysis of vulnerabilities and responses to terrorist attacks.

We have provided the nation with our expertise and special equipment for over 25 years in addressing threats of stolen or improvised nuclear devices through our NEST teams that continue to serve today. We also have been working since the early 90's to help secure vulnerable nuclear materials in Russia, and have supplied technologies for decades to help the International Atomic Energy Agency and other governments control nuclear materials.

III. Laboratory Operations

During the past year, we rigorously continued our efforts to integrate safety and security into our programmatic work. We have fortified our physical and cyber security, and have increased security still further since September 11. Our guard force is over 500 with a large contingent of SWAT teams; our defense against a terrorist attack has been significantly enhanced; our special nuclear materials are in a safe and secure configuration. Because of the rapid pace of change in technology, maintaining an appropriate level of support for cyber security will be critical to our ability to meet the challenges presented by this continuing threat.

Laboratory safety performance has markedly improved compared to national benchmarks—total recordable incidents have decreased over the past four years from over 4.0 per 200,000 hours worked to less than 2.0 this year. In the same time frame, lost workday cases have decreased from over 3.2 per 200,000 hours worked to 0.90. Waste generation and radiation exposures have all been significantly reduced, and we have moved some of our transuranic waste off site from Area G to WIPP, although I believe that the DOE could increase the priority to ship more waste.

Project management improvements at Los Alamos continue to build on a strong foundation we established three years ago. We presently have three (3) major construction projects that either have finished or will finish significantly ahead of schedule and under budget.

MAJOR CHALLENGES: ENSURING THE FUTURE

I. Science: Achieving Program Balance

The biggest challenge facing the Stockpile Stewardship Program is developing a balanced program within the budgets provided by the Congress. The balance that must be struck is between warhead life extension programs, infrastructure maintenance and recapitalization, sustaining a preeminent capability in weapons-relevant science and experimentation, test readiness, and exploration of advanced concepts. The Future Years National Security Plan (FYNSP) that NNSA submitted to Congress this year is a good start toward providing a process for achieving this balance. At present, scientific investments needed to ensure that the next generation of weapons designers will be able to certify the stockpile in future decades are under stress due to the focus on the refurbishment of three weapons systems in the coming decade. The predictive assessment tools currently available to certify these planned LEPs are not yet adequate for the scope of these refurbishments. The addition of new production facilities, such as the modern pit facility, will add to that stress unless the future year budgets accommodate such large expenditures.

II. Threat Reduction

NNSA, working with LANL and the other NNSA laboratories, has had many successes with the existing Chemical and Biological National Security Program (CBNP), but the important research in this area needs to be expanded to include a broader range of biological threats. On the nuclear side of the equation, however, no CBNP-like program currently exists. Because of the threat posted by nuclear and radiological terrorism, we believe that creation of a broad-based nuclear threat program is critical to meeting the challenges in this area. A new program within NNSA could be modeled upon the already successful CBNP program. Lastly, in order to tie all of these activities together, I believe that NNSA should take on a major responsibility for homeland security research and development.

III. Workforce

A large number of personnel at Los Alamos are nearing retirement, and it is critical that we effect the transfer of technical and programmatic knowledge that they embody. We must attract and retain the next generation of stockpile stewards. We are planning to hire approximately 1000 employees during FY02—600 to meet workload requirements and 400 to address attrition. We are aggressively recruiting, and are strategically focusing these hiring efforts to attract 80% of new hires at the entry-level. To date, this fiscal year we have hired over 300 new employees. To attract the most outstanding scientists, engineers, technicians, and support personnel we must focus our efforts on sustaining and improving the quality of life for our employees. We must redouble our efforts in areas

that impact our ability to attract and retain a diverse and high quality workforce—by ensuring that we retain our ability to pursue cutting edge science and research, by improving our infrastructure and facilities, and through a continued focus on and investment in education, the environment, and economic development.

Laboratory Directed Research and Development (LDRD) is a key tool that I have available to help attract and retain the best scientists and engineers. LDRD is a well-managed program as indicated by a recent GAO audit of the program. I strongly recommend that Congress continue its strong support for LDRD. Continued support of the Los Alamos schools and Los Alamos National Laboratory Foundation also is key to employee recruiting and retention, as well as to education and economic development in the region.

IV. Infrastructure

We continue to experience deterioration of our infrastructure and facilities, which may serve to undermine our long-term ability to fulfill stockpile stewardship objectives. We have developed a Ten Year Comprehensive Site Plan that NNSA has approved as a guide for prioritizing maintenance and facility replacement at our site. In addition, I have chartered an external review of our facilities and infrastructure to determine where and how we might shrink our footprint for today's mission.

In particular, we need your support for the replacement of our 50-year-old Chemistry and Metallurgy Research (CMR) building, which is planned for relocation within an Integrated Nuclear Complex at our TA-55 site. We strongly support General Gordon's 10-year Facilities and Infrastructure Revitalization Initiative. Congress provided an initial appropriation last year ($200M), but this will continue to be a critical issue in FY03 and the out years. Without your continuing and strong support of this initiative, we will not be able to carry out either the manufacturing or certification efforts for the stockpile.

CONCLUSION

For more than a half a century, the nation's investments in Los Alamos have helped ensure our national security. We face ongoing and new challenges— a new Nuclear Posture with fewer deployed nuclear weapons, certification of an aging stockpile without nuclear testing; the need for a balanced program ensuring science in our programmatic endeavors; and the need for new technologies to address non-proliferation, threat reduction and counter-terrorism. We are committed to meeting these challenges to our nation's security.

In conclusion, I would like to thank you for your past support. Your continued support is critical to our ability to meet the technically demanding and vital national security challenges we face today and in the future.