The Stockpile Stewardship Program
at
Los Alamos National Laboratory

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<u>Opening Remarks</u>

Chairman Dorgan, Ranking Member Domenici, and distinguished Members of the Subcommittee, thank you for the opportunity to provide a statement on the status and future of the Stockpile Stewardship Program. Today, the three directors of the national security laboratories are testifying before Congress about the Stockpile Stewardship Program for the first time since 2002 and much has happened in the interim.

The Los Alamos National Laboratory remains committed to sustaining confidence in the United Statesô nuclear weapons stockpile through a more fundamental science-based understanding of weapons performance, safety, and security. I am keenly aware of the daunting technical challenges demanded by this mission, requiring the best science, engineering, and technology that we can muster. I am responsible for providing this set of capabilities and skills for today and, equally important, ensuring that they are sustainable over the long term.

The three Department of Energy / National Nuclear Security Administration laboratories and their employees, working with the National Nuclear Security Administration production complex, are the basis and key driver for the successes of the Stockpile Stewardship Program. I personally appreciate the strong, vital support this Subcommittee has provided over the years to enable us to execute our responsibilities.

Los Alamos National Laboratory in particular has been at the forefront of both nuclear weapons development and the Stockpile Stewardship Program. As you know, beginning with its designation as Site Y of the Manhattan Project, Los Alamos National Laboratoryôs core mission has been to conceive, develop, and sustain the U. S. nuclear deterrent. Currently, sixty one percent of the Laboratoryôs Fiscal Year 2008 budget is allocated to carrying out our stockpile stewardship responsibilities (and associated security activities) and this mission is our highest priority. As a national security science laboratory, Los Alamos also applies this same science and engineering expertise to reducing threats from the proliferation of weapons of mass destruction and terrorism, and to provide for the nation's energy security.

Today, I will focus my comments on our core mission and will shape my remarks around three main themes:

- A perspective on the evolution and content of the Stockpile Stewardship Program;
- An evaluation of the success of the Stockpile Stewardship Program over its twelve-year evolution; and
- An assessment of the critical challenges and risks posed to retaining confidence in the Nation's nuclear stockpile as we look to the future.

Development of the Stockpile Stewardship Program

My first key theme is that the Stockpile Stewardship Program has been the correct program for the United States, even though it presents extreme technical challenges.

With the end of the Cold War, the Nation was at a crossroads with regard to our nuclear deterrent. Was the nuclear stockpile still required for the national defense? How long could the nuclear test moratorium, which began with a decision in 1992 by the United States to voluntarily cease underground tests of nuclear weapons, continue?

In 1995, the United States embarked on an ambitious effort to sustain the nuclear weapons stockpile without nuclear testing, an effort for which we could not guarantee success. Many felt that maintenance of adequate confidence in the stockpile required following the scientific method with the ability to continue at least partial yield nuclear tests to address the inevitable issues that would arise. As one of the participants, I can tell you it was a very dynamic period, with much expert debate within the scientific and defense communities that considered a range of possible options. The policy decision was made for a moratorium on nuclear testing coupled with implementation of a science-based Stockpile Stewardship Program. This decision was a very significant policy shift because the scientific and engineering capabilities needed to confidently execute this program did not then exist.

Congress, the White House, the relevant Executive Branch agencies, and the national laboratories outlined a core set of requirements that would be needed to take on this challenge. All involved understood that it would take at least a decade to bring together all the complicated elements of the new Stockpile Stewardship Program. It was also understood that success was in no way guaranteed because of the unprecedented scale of cutting edge science needed to accomplish this mission.

The approach relies upon developing, and validating through inter-laboratory peer review, a more fundamental scientific and engineering understanding of the performance, safety, and security of weapon operations. This fundamental approach is based on a much more extensive range of nonnuclear above-ground testing and a vastly improved simulation capabilityð calculations with high resolution both in spatial description and in physical models. These calculations are necessary for addressing issues requiring extrapolation beyond tested regimes. The existing nuclear test database is used as a crucial resource for challenging the validity of these improved simulations. Ultimately, expert judgment and rigorous peer review assures that critical conclusions are drawn from the best available data, appropriate high-resolution simulation outputs, and results from the suite of evolving testing capabilities. Sound science is always at the core of our confidence.

In addition, enhancements to our weapon surveillance tools to accurately characterize the status of the weapons and the continued support of the production complex to extend the life of aging weapons were critical. The Stockpile Stewardship Program was described not as something with a fixed end-point, but as a new way of maintaining the Nationôs nuclear weapons deterrent into the future.

Tools of Science-based Stockpile Stewardship

With the loss of the ability to test the integrated operation of a weapon, more technically sophisticated and more frequent nonnuclear above-ground tests were essential. We judged at the time that these tests should include at a minimum:

- subcritical experiments to elucidate the dynamic behavior of plutonium driven by high explosives (now proceeding at the U1a facility at the Nevada Test Site);
- advanced radiographic experiments with multiple images and enhanced spatial resolution to provide multiple sequential views of high-explosive implosion dynamics with very fine detail (e.g., Dual Axis Radiographic Hydrotest Facility);
- ignition experiments to explore the fusion process crucial to the operation of modern warheads (e.g., National Ignition Facility); and
- enhanced surveillance tools for destructive and nondestructive testing and analysis to characterize the status of the stockpile.

At the same time, we judged that our computer simulations would need to be enhanced at least one million times in order to incorporate the known physics and scientific resolution. We judged that this computational requirement was the minimum necessary to model subsystem behavior and predict integrated weapons safety, reliability and performance without underground testing.

All of these capabilities were first-of-a-kind, requiring technical advances beyond the existing state of the art at the time. Because of technical challenges and funding limitations, all of these needed capabilities are still not yet fully in place 13 years later.

Production Complex and Life Extension Programs

Hand in hand with all the above capabilities was the need to have a production complex, working together with the laboratories, which could respond to any potential issues discovered through the weapons systems surveillance process. In addition, weapons would be returned for remanufacture to their original specifications in order to extend their life into the future so that they would regain their original characteristics. This requires the full suite of Cold War production capabilities.

I am convinced that the Stockpile Stewardship Program has been the right program for the United States. What the Nation committed to over a decade ago is a very challenging set of integrated scientific capabilities that provide a means to validate the reliability of our strategic deterrent. For success, a balanced funding profile, between near-term actions and long-term capability investment was needed. A compromise of any one of the Stockpile Stewardship components will have significant consequences on the overall program. We have been able to sustain confidence in the nuclear deterrent through a program whose elements were beyond the state of the art at the programøs inceptionð a remarkable testament to the people throughout the National Nuclear Security Administration complex.

<u>The Stockpile Stewardship Program Has Been a Success</u>

My second key theme is that the Stockpile Stewardship Program has been extremely successful since its inception.

Annual Assessment

President Clinton stated on August 11, 1995,

> ñIn this regard, I consider the maintenance of a safe and reliable nuclear stockpile to be a supreme national interest of the United States. I am assured by the Secretary of Energy and directors of our nuclear labs that we can meet the challenge of maintaining our nuclear deterrent under a CTB through a science-based stockpile stewardship program without nuclear testing.ò

For the 12^{th} consecutive year in September 2007, the Laboratory Directors each signed their annual assessment letter reporting that there was no requirement for nuclear testing at this time to maintain the certification. I have had the honor to be involved each of these twelve years, personally signing a letter on five occasions. Today, these letters also include the additional assessments required by Section 3141 of the Fiscal Year 03 National Defense Authorization Act.

My 2007 assessment was based on the following comprehensive data set analysis:

- The details contained in the joint Los Alamos National Laboratoryï Sandia National Laboratories 2007 annual assessment report based on the ongoing theoretical, analytical, experimental, and computational activities throughout the year.

- Assessments by applicable Los Alamos National Laboratory technical experts and managers on the adequacy of science-based tools and methods, tools and methods employed by the manufacturing infrastructure, and nuclear test readiness.
- An evaluation of the health of the stockpile by my Directorӧs Red Team for annual assessment, an independent group of technical experts from Los Alamos National Laboratory, Lawrence Livermore National Laboratory, and Sandia National Laboratories.
- The extensive and detailed technical reviews that I personally conducted of each warhead with technical experts on the Los Alamos National Laboratory warhead design and engineering teams.

Equally important, I assessed the current status of each weaponӧs nuclear package, the health of the overall Stockpile Stewardship Program, and the areas of significant risk.

Life Extension Programs

For most stockpile issues, the application of the Stockpile Stewardship Program tools has allowed the laboratories to resolve anomalous conditions with no impact to safety, reliability, or performance. For other issues that cannot be resolved in a timely manner through the Stockpile Stewardship Program, the following options are available:

- exceptions, limitations, or changes to the Military Characteristics or Stockpile to Target Sequence;
- component replacement or warhead refurbishment;
- introduction of more robust components that sustain the reliability of the stockpile;
- selective retirement of individual warheads or a warhead type;
- decertification; or
- nuclear testing.

In the past, all of these options have been employed. Today, we routinely use all options except decertification or nuclear testing to maintain the certification of warheads in the stockpile. In particular, we have completed the W87 Life Extension Program (LEP), achieved first production units on Alt 357 for the B61-7 and B61-11, as well as numerous smaller changes to gas transfer systems and nonnuclear components or subsystems to allow us to extend the life of these systems where possible. The first production unit for the W76-1 was not achieved on schedule as a result of a difficult materials production issue. Los Alamos National Laboratory is providing significant on-site technical assistance and coordination between the plant and Laboratory materials experts. The Laboratory also is working with the National Nuclear Security Administration to develop a recovery plan consistent with Department of Defense needs.

Reestablishing Pit Capacity

In 2007, Los Alamos National Laboratory produced the first war reserve pit manufactured in the United States since the Rocky Flats Plant was closed in 1989. By the end of Fiscal Year 07, the Laboratory had manufactured 11 W88 pits (one more than required) and delivered six pits to the Pantex Plant for use in stockpile warheads. One of these has been assembled into a war reserve W88 warhead with the new 4T Terrazzo gas transfer system. The 4T was delivered for use and certified over one year ahead of schedule, a remarkable achievement that reflected excellent coordination among all sites in the nuclear weapons complex. As W88 warheads with Los Alamos National Laboratory manufactured pits enter the stockpile, warheads returned for surveillance will be available for disassembly and inspection, correcting a long-standing weakness in the W88 surveillance program.

Advanced Simulation and Computing (ACS)

Of all of the elements of the original Stockpile Stewardship Program this area has shown the most progress. Los Alamos, Lawrence Livermore, and Sandia National Laboratories have led the way in developing the worldôs fastest supercomputers and then harnessing that power into tools needed to simulate our baseline weapons performance. This capability allows us to integrate our component level understanding into overall system performance. We have already enhanced our computing speed by more than a factor of one million with the ASC Purple machine at Livermore. The return on investment in this area has been high for the United States. For example, we are now able to confront the most challenging weapons physics questions that have plagued us for decades.

Los Alamos National Laboratory, in a partnership with IBM, has completed the installation of the first phase of the Roadrunner supercomputer for computations in support of national security science. Roadrunner is expected to become the worldôs first system to achieve a sustained performance level of a petaflopð a quadrillion calculations per secondð early this summer. All three National Nuclear Security Administration laboratories will use Roadrunner for advanced physics simulations and predictive simulations of complex scientific processes.

Advanced Radiographic Experiments

Beginning in December 1999, warhead designers were able to see the clearest views ever made of the inside of an imploding, mock-weapon, test object with the successful operation of the first axis of the Dual Axis Radiographic Hydrotest Facility (DARHT). The images helped to validate new descriptions of high-explosive driven physics used in computer simulations of weapons performance.

With the advent of the Stockpile Stewardship Program, the decision was made to enhance the capability of the DARHT second axis to a 4-pulse machine. This enhancement required a completely new accelerator design that went far beyond what had ever been attempted before. Now in 2008, DARHT has met, and in many cases far exceeded, all of its technical requirements and expectations. We expect that this month it will officially become "dual" with the formal completion of the project for the second axis, adding both new capability and higher energy to this unique accelerator facility. The first use of this full capability in an implosion test of a mock weapon will take place later this year. The ability to produce multiple pulses with varied intensities in a preset time sequence allows warhead designers to specify what they want to see and DARHT will be able to deliver.

Ignition Experiments

The National Ignition Facility (NIF) is a critical piece of the Stockpile Stewardship Program and, arguably, is the most complicated and complex part. Developing a more detailed understanding of the fusion reactions that take place inside a weapon system remains one of the great challenges in the field of weapons science. Until the National Ignition Facility becomes operational, significant uncertainties will remain. I understand how difficult this project has been and am also acutely aware of the immense contributions that the full capacity of NIF will make to the overall Stockpile Stewardship Program. My conversations with Director Miller lead me to believe that this project is tantalizingly close to fruition.

Stockpile Surveillance

The weapons in the stockpile are not static. The chemical and radiation processes inside the nuclear physics package induce material changes that limit weapon lifetimes. We are seeing significant changes that are discussed in detail in my Annual Assessment letter.

The improvement in efficiency at Pantex helped us understand the present state of the stockpile and has greatly reduced our disassembly backlogs. This improvement allows us to get up-to-date technical information on the condition of weapon materials. We use the stewardship tools to evaluate the changes that continue within the stockpile. Using more detailed data from enhanced surveillance tools, we now have a better understanding of the major sources of stockpile issues:

- ***birth defects***ð flaws introduced into the warhead resulting from the manner in which it was produced, manufactured, or assembled;
- ***design limitations***ð warhead design decisions that were made that limit conditions under which a warhead can reliably operate because of incomplete scientific understanding of physics performance; and
- ***aging effects***ð changes in the stockpile that constantly take place and reduce the operating ranges or reliability of the warheadsð effects that will continue to grow as the stockpile ages.

Los Alamos and the nuclear complex continue to make great strides in being able to both discover and correct these problems through advanced surveillance and nondestructive testing. As potential concerns are discovered, commonly referred to as SFIs or significant finding investigations, we are now able to use our new tools to rapidly assess, simulate, and model potential effects. At Los Alamos, we have dramatically reduced the number of open, unresolved SFIs over the last few years. Further, we are using our increased understanding to reduce the sampling rate for surveillance, while focusing on the important aspects for each warhead system.

Other National Security Applications of Stockpile Stewardship Tools

Additional important national benefits derive from these capabilities. Los Alamos applies this same science and engineering expertise to reduce threats from the proliferation of weapons of mass destruction and terrorism, and to provide for the nationĝs energy security. The Laboratory works on the front lines and behind the scenes to prevent the use of nuclear or radiological materials as threats to national or international security. The Nuclear Nonproliferation Program and its predecessors originated nuclear safeguards and created most of the technology used to monitor and measure nuclear materials to assure their use in legitimate, peaceful purposes.

Recent Los Alamos Threat Reduction Accomplishments

- We delivered the fully integrated Cibola Flight Experiment space vehicle for launch with an orbiting computer capable of performing more than one trillion operations per second. This matches the performance of the best supercomputers from a decade ago, yet weighs only 40 pounds and requires only 80 watts of power.
- We rapidly and effectively supported the national response to the North Korean nuclear test. We provided the sole technical support from the Department of Energy at the Six-Party talks in Beijing on implementation of the North Korean denuclearization commitments.
- We recovered more than 1,750 U.S.-origin radiological sources in Fiscal Year 07, including the first-ever disposal of Radium-226 sealed sources.

Recent Los Alamos Science and Energy Security Accomplishments

- We garnered over 102 major science awards from major external organizations.
- We developed the first high-resolution climate model for ocean circulation that allows us to better understand climate effects like El Niño and La Niña.
- We completed the one-hundredth genetic sequence for the Joint Genome Institute.

These accomplishments represent a different application of the science underlying our core nuclear weapons mission. For example, many of the same people who would help us deal with potential nuclear terrorism incidents are our experts from the nuclear weapons program. Our global climate change expertise developed out of our need for knowledge on nuclear winter effects tied to the nuclear weapons program, and our supercomputer expertise was developed to simulate nuclear explosions. The dual-use aspects of our scientific capabilities allow for greater national return on investments, discovering other important applications for the stockpile stewardship tools. This broader use can often enhance their application for our core mission.

Even though all the elements of the Stockpile Stewardship Program are not yet in place and there are certain science processes that we do not understand yet, it is clear that there have been and continues to be significant accomplishments emanating from the scientists and tools of this program. This program has allowed us to sustain the necessary level of confidence in the stockpile. At the same time, we have much greater insight into the risks we face for the future.

Increasing Risks to the Future Success of the Stockpile Stewardship Program

Today I have confidence in the United States nuclear deterrent and believe that within the next few years we will put in place the essential tools we envisioned at the outset of the Stockpile Stewardship Program. But I have increasing concerns as I look to the future. The stockpile continues to change because of aging and the necessity to remanufacture Cold War weapons through the Life Extension Program approach. The accumulation of these changes, whose combined effects are difficult to quantify, will increase our uncertainties and pose increasing risk.

At the same time, there are ever-increasing standards imposed by environmental management, safety, and security requirements driving up the costs of the overall infrastructure. When coupled with a very constrained budget, the overall effect is exacerbated, restricting and, in some cases eliminating, our use of experimental tools across the complex. This puts at risk the fundamental premise of Stockpile Stewardship. At a time when our uncertainties are increasing, we should have a more vigorous program of nonnuclear, above-ground testing development and use, capabilities that allow us to validate and augment our developing predictive simulation tools. Regrettably, we are moving in the opposite direction.

Tough Challenges Ahead – Los Alamos National Laboratory

I will first address specific challenges at Los Alamos National Laboratory. The risks at Los Alamos are similar to those that we face nationally.

Commitment to Science

Although available science-based tools and methods, both the large-scale facilities discussed above and the laboratory-scale capabilities that are the workhorse of our programs, have been adequate to address current issues in the stockpile, use of these tools is particularly at risk.

Los Alamos is one of the oldest sites in the nuclear complex whose facilities are difficult to maintain. Several of our aging facilities are nuclear facilities with extremely demanding standards for the environment, safety, and security. At the same time, the National Nuclear Security Administrationôs preferred alternative for complex transformation designates Los Alamos as the national center for plutonium R&D and production, further concentrating nuclear operations on our site. This increased responsibility for nuclear facilities and operations must be viewed in the context of a reduction in purchasing power of approximately half a billion dollars over the last five years Moreover, from our preliminary planning discussions with the National Nuclear Security Administration, we anticipate further erosion of our purchasing power by about four hundred million dollars over the next five years, assuming inflation and a flat level of appropriated dollars.

The growing costs of our infrastructure in this declining budget environment puts science at risk, especially our ability to execute and develop large-scale and laboratory-scale experiments. As the questions arise from a stockpile that inevitably continues to undergo change, we will be increasingly constrained in our ability to gather the data essential to assess those changes and to assure the efficacy of the recommended actions that must be made.

There are equally important consequences for the long term as well. All of the above near-term pressures constrain our ability to renew our aging infrastructure, which becomes more expensive to maintain the longer this renewal takes. Nationally, the program has become more focused on implementing near-term solutions at the expense of longer-term investments. The overall risks in the Stockpile Stewardship Program will be growing in the future. A balance of long-term investments in science and engineering with near-term actions will best serve the success of the program.

Commitment to the Scientists

Key to the ability of Los Alamos to respond to national needs over the long term is maintaining our technical skillsð our people make us a premier national security science laboratory. We must be able to recruit and retain the best and brightest scientific talent. Los Alamos, like all the other national laboratories, draws and retains scientists because of the unique capabilities and opportunities we offer.

Part of what attracts people to a science laboratory such as Los Alamos, are the unique capabilities that are hard to find elsewhere. LANSCE, our neutron accelerator, has been a prime example of such a capability. Part of the future that we see for this facility is to transform it into the worldôs premier materials science and test capability, MaRIE (Matter-Radiation Interaction in Extremes). MaRIE will be designed to create and exploit extreme radiation fluxes and probe matter to achieve transformational materials performance through predictive multi-scale understanding. This facility would draw scientists to Los Alamos because it would represent a one-of-a-kind user facility whose scientific and practical applications could not be duplicated, and it would also be a key facet to the weapons program. When coupled with modern facilities and equipment and our role as a high-performance computing center (Roadrunner is the latest example), this facility would help ensure our access to the best scientific talent well into the future.

Because there is no advanced training program for nuclear weapons physics and engineering at our colleges and universities, the National Nuclear Security Administration laboratories need the right tools to attract scientists and engineers from the traditional disciplines and then teach them the true art of what we do. Without the continuing commitment to exceptional science, Los Alamos National Laboratory will not be able to provide the incredible diversity and depth of talent we require.

Commitment to Modern Facilities

Los Alamos is one of the oldest sites in the nuclear complex. With many old, high-consequence mission facilities, our Laboratory is very expensive to maintain. The

Laboratoryǿs main focus for infrastructure reinvestment priorities is replacing the Chemistry and Metallurgy Research building (CMR) and refurbishing our LANSCE accelerator facility. The CMR building was built in the late 1940s and early 1950s to support scientific research of plutonium and other actinide elements. But after more than 50 years of service, it will be very difficult for the CMR to continue to meet modern safety, security, and operational requirements. Several sections have been closed to help manage risk, and the remaining laboratory space is harder and more expensive to use. As part of the National Nuclear Security Administrationǿs preferred alternative for complex transformation, the CMR would be replaced by a new facility called the Chemistry and Metallurgy Research-Replacement (CMR-R) project.

The CMR-R project will include two buildings, one a light lab and administration building and the other a high-security R&D and storage building. Together these two structures will have a smaller footprint then the old CMR facility, and will be safer and more secure. The first phase of the CMR-R project, currently under construction, is the Radiological Laboratory Utility Office Building (RLUOB), a modern laboratory facility that will include 19,000 square feet of laboratory space, offices for 350 people, and a training facility. The second phase of the CMR-R project is the Nuclear Facility and construction will begin in the first quarter of 2010. The Nuclear Facility is being designed to provide 22,000 square feet of laboratory space, mostly dedicated to plutonium research, and will include a vault capable of storing six metric tons (6,000 kilograms) of plutonium. Neither the RLUOB nor the Nuclear Facility will manufacture pits. Regardless of whether the Nation elects to sustain the existing stockpile or transform it to a different configuration, congressional support of the CMR-R will be essential to conduct the fundamental research that supports the use of actinides in weapons and in other critical applications.

As I mentioned earlier in my statement, the Laboratory has developed a plan to sustain our long-term scientific capability in materials science through the experimental facility MaRIE. This plan could realistically take about a decade to reach full completion. A critical first step in evolving LANSCE, a fully functional but aging facility, into the MaRIE capability would be to start refurbishing the base accelerator within the next year with the help of Congress. LANSCE-R, as we refer to the refurbishment project, is an immediate critical step if Los Alamos is to continue using this facility for our classified weapons research activities. LANSCE is the only facility of its type in the country that can support both classified weapons research and unclassified scientific experiments. The weapons program relies heavily on capabilities derived from LANSCE, such as proton radiography, to interrogate fundamental physics cross-sections, the properties of various classified subsystems, and materials under extreme conditions.

Controlling Costs while Maintaining Mission Capability

I believe it is incumbent on my management team to focus on aligning overall costs with the mission requirements while at the same time finding efficiencies for more effective use of overall programmatic funding. At Los Alamos, we are actively working to reduce our physical footprint by roughly two million square feet (over one-quarter of the reduction has been completed in the last year and a half). We have internally absorbed the higher operating costs associated with the new contract structure. At the same time, we are providing significant leadership in the National Nuclear Security Administrationŏs effort to achieve complex integration. Los Alamos is also working with the National Nuclear Security Administration and the Department of Energy in developing a third-party financing proposal to build a new science complex to help further consolidate our overall facilities footprint. This proposed new facility would eliminate over 450,000 square feet of existing substandard scientific space and house over a 1,500 scientific staff in the main Technical Area of the Laboratory.

The Laboratory has also had to make tough decisions and significant reductions in overall staffing levels. Since the beginning of Fiscal Year 06, the Laboratoryŏs total headcount has been reduced by over 2,100 individuals, about forty six percent of whom were part of the technical workforce. Matching the Laboratoryŏs workforce to the size of our budget is my responsibility, but I am deeply concerned that with the loss of mission experienced scientists and engineers and the current budget outlook Los Alamosô ability to execute our mission is at risk for the future.

In summary, it is my view that it is in the national interest that we continue to develop and nurture the Laboratoryŏs scientific talent and to invest in and rebuild our infrastructure in order to preserve Los Alamos National Laboratory as a premiere scientific institution. To achieve these critical outcomes, we need the help of Congress to ensure a stable, forward-looking, balanced budget profile to plan for the future.

Critical Crossroads for the National Stockpile Stewardship Program

Since the moratorium on nuclear testing began in 1992, the Stockpile Stewardship Program has successfully maintained the nuclear weapons stockpile; however, it has become increasingly difficult and costly to sustain our legacy stockpile, manufactured in the 1960s, 1970s, and 1980s through refurbishment projects. The full Cold War infrastructure required to support the older technologies and processes embodied in weapons developed during the Cold War is expensive, not fully functional, and does not provide an agile response to evolving needs. The overall cost of the weapons complex is dominated by growing infrastructure costs, relatively independent of the number of weapons in the stockpile.

The continuing accumulation of small changes from stockpile fixes, life extension activities, and agingð with combined effects that are difficult to quantifyð will result in larger performance uncertainties and pose increasing risk to the certification of low-margin legacy warheads.

With growing costs of the full Cold War infrastructure and the prospects for a declining budget, it is becoming more difficult to maintain, use, or enhance the Stockpile Stewardship tools we have put in place. At the same time, there is a continued decline in the number of people in the complex who have direct experience with the design, manufacture, and testing of an actual weapon. Yet with the increasing risk to certification noted above, we should be moving in the opposite direction. To assess the impact of larger performance uncertainties with low-margin warheads we need a more detailed technical understanding of key, fundamental, technical issues to manage these uncertainties. This requires the more frequent use and further development of advanced laboratory-scale and large-scale capabilities and the simulation tools that can predict these results. The combinations of these factors cause me to conclude that the basic tenets of the Stockpile Stewardship Program are at risk.

With increasing risks to certification, I urge us to implement a more comprehensive inter-laboratory peer review process as part of Annual Assessment. Only one design laboratory would have certification responsibility for each nuclear package, but all the information for each would be readily available to both design laboratories. This would include, for example, the original nuclear test data, and all current data from surveillance and nonnuclear testing. Each would then execute a comprehensive assessment of the current nuclear package status and share that with the certification responsible design laboratory that would inform their final assessment. This approach is a near-term step that could mitigate the increasing certification risks and also provide more opportunities to build workforce expertise at both laboratories. In the past two years, Lawrence Livermore and Los Alamos have taken a step in this direction where the two directors are jointly briefed on the status of all the nuclear packages.

The Stockpile Stewardship Program has provided a much better understanding of both the stockpile status and the key technical issues that control performance and reliability. This insight has opened up the possibility of alternate paths forward beyond the current Life Extension Program approach. Such a path could include a transformed stockpile with increased performance margins, reducing risk. By also eliminating difficult materials it could permit a transformed complex, reducing infrastructure costs. It is clear to me that it is time to start making decisions about how to best accomplish this transformation.

Los Alamos fully supports the National Nuclear Security Administration in the development of a more cost-effective, lower-risk, and more responsive nuclear weapons complex infrastructure. A replacement warhead strategy, such as the Reliable Replacement Warhead concept, would have greater margin against performance uncertainties and would use design options with materials and components that would be less complex, safer, more secure, and easier to manufacture and maintain. Additionally, if the Department of Defense can have greater confidence in the National Nuclear Security Administration complex and its products, then that could lead to even further reductions in the stockpile.

Concluding Remarks

Los Alamos National Laboratory is committed to providing our technical expertise as part of the national effort to sustain confidence in a viable nuclear deterrent, while minimizing the risk for a return to nuclear testing, with the smallest number of weapons consistent with national policy goals.

The Stockpile Stewardship Program has been the right approach for the United States. We knew at the outset that it would be a very challenging program as the required scientific capabilities necessitated advances beyond the existing state of the art. There was no guarantee of ultimate success.

Over the last decade, there has been excellent overall progress with many examples of remarkable accomplishment. Among them is a much better understanding of the status of the current stockpile.

I am concerned about the risks to success for the future. First, the long-term vitality of science at Los Alamos to support our national security missions is at risk. Second, the continuing accumulation of changes to the stockpile will increase performance uncertainties and pose increasing risk in low-margin legacy Cold War designs.

It is time for the nation to set a path for the future that will address these risks.

Thank you for this opportunity to testify. I would be pleased to answer any questions you may have.