

STOCKPILE STEWARDSHIP AND COMPLEX TRANSFORMATION

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Subcommittee on Strategic Forces

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Opening Remarks

Madam Chairman and Members of the Committee, thank you for the opportunity to provide my perspective on the continuing importance of the Stockpile Stewardship Program and the Preferred Alternative for transforming the nation's Nuclear Weapons Complex. I fully support transformation of the complex to make it more cost effective, smaller, safer, more secure, and responsive to stockpile requirements to meet 21st-century deterrence needs. I want to thank Congress and especially this Committee for your strong interest in the future of the nation's nuclear weapons enterprise, as evident from this hearing and your leadership in establishing the Congressional Commission on Strategic Posture of the United States. My testimony emphasizes three points:

- The Stockpile Stewardship Program is providing the basis for confidence that the nation's nuclear weapons stockpile remains safe, secure, and reliable without requiring nuclear tests. Sustaining the investments in stockpile stewardship is critical to both maintaining confidence in a likely increasingly smaller stockpile and providing the science and technology foundations that allow the Laboratory to confront the defining issues of the 21st century—the threats of proliferation and terrorism to global security and the needs for abundant energy and environmental quality, improved human health, and U.S. industrial competitiveness.
- The Preferred Alternative provides a vision for transforming the complex by consolidating missions and capabilities at existing sites. It is an ambitious undertaking, developed with recognition of the challenge of balancing investments between human capital and new facilities. Livermore is working toward the success of the Preferred Alternative and the specific goals identified for our Laboratory.
- The path forward for the Preferred Alternative will greatly benefit from timely agreement by the Administration and Congress on essential elements of a nuclear weapons policy, deployment strategy, and stockpile requirements. Actions required by the FY 2008 Consolidated Appropriations Act and the FY 2008 National Defense Authorization Act will help this process. With such agreement, NNSA can build on the Preferred Alternative to refine planned investments in manufacturing, maintaining, and dismantling nuclear weapons while sustaining the underlying intellectual and human capital.

Budget Realities and NNSA's "Preferred Alternative"

The future of NNSA's nuclear weapons program and Nuclear Weapons Complex builds on the successes of the Stockpile Stewardship Program. The program provides the basis for confidence that the nation's nuclear weapons stockpile remains safe, secure, and reliable in the absence of further nuclear testing. It has been successful to date because of

the continuing investment the nation is making in people and the tools needed to understand the underlying science and engineering issues central to nuclear weapons performance. This understanding is required to recognize issues as they arise in an aging nuclear weapons stockpile, decide how to deal with them, assess and certify without nuclear tests the performance of weapons after necessary modifications, and provide national leaders confidence in the assessment/certification processes and the weapons. This investment is critical regardless of the details of the path forward.

Continuing investments in stockpile stewardship are bringing on line vastly improved experimental and computational capabilities—tools that NNSA scientists and engineers are using to resolve arising issues about the stockpile, which will grow more challenging as weapons continue to age. Confidence in the stockpile relies on these scientists and engineers and their judgments. Failure to sustain these activities would over time erode nuclear weapons expertise and lower confidence in the stockpile.

The draft *Supplemental Programmatic Environmental Impact Statement (SPEIS)*, issued in January 2008, describes NNSA's vision for transforming the Nuclear Weapons Complex to become more cost effective, smaller, safer, more secure, and responsive to stockpile requirements to meet 21st-century deterrence needs.

The transformation aims to consolidate special nuclear materials to five sites by the end of 2012 and significantly reduce square footage and the workforce directly supporting the weapons program over the next decade. Duplicate facilities will be largely eliminated and more efficient and uniform business practices will be implemented across the complex. NNSA also aims to reestablish a plutonium-parts production capability and accelerate the dismantlement of retired weapons. The ambitious plan faces a variety of programmatic and technical challenges. Livermore is working toward the success of the Preferred Alternative and the specific goals identified for our Laboratory. In the Preferred Alternative, which features distributed centers of excellence with consolidation of missions and capabilities, Livermore shoulders key responsibilities. These include:

Center of Excellence for Nuclear Design and Engineering. Preserving the essential and highly successful two-laboratory approach, both Livermore and Los Alamos national laboratories are to serve as centers of excellence for nuclear design and engineering. They will provide necessary intellectual independence while coordinating programmatic work and sharing facilities, technical information, and best business and operations practices.

Livermore will retain its special responsibilities for nuclear warhead design and development, including ensuring the safety, security, and reliability of its designated stockpiled weapons and certification of changes made through life-extension programs. With the aging of weapons, risks are growing that safety, security, or reliability issues will arise, and modifications to extend the stockpile lifetime of weapons are likely to become more complex and challenging to certify. The computational and experimental tools and methods used for weapons certification must continue to be refined to improve the quality of assessments. I strongly support implementation of a more comprehensive peer review process to strengthen the Annual Assessments process by having both Livermore and Los Alamos provide complete assessments of the entire stockpile.

Better assessments and certification of an aging nuclear weapons stockpile depend on increased knowledge of the details of nuclear weapons performance—in particular, key

issues about the performance of weapons in the nuclear phase that previously had only been accessible through nuclear testing: boost, energy balance, and secondary performance. Progress in resolving these “grand challenges”—and eliminating principal reasons why a future nuclear test might be needed—are only now possible with the computational and experimental capabilities that are now coming on line.

Supercomputing Platform Host Site. Outstanding successes in the Advanced Simulation and Computing (ASC) program are turning simulation into an exceedingly capable tool of predictive science. Key discoveries made through vastly improved simulations are reducing sources of uncertainty in weapon performance. Livermore’s Terascale Simulation Facility is home to two of the world’s most powerful supercomputers, ASC Purple and BlueGene/L. Livermore has pioneered the approach by which these machines are effectively being used by all three NNSA laboratories for stockpile stewardship.

Roadrunner (at Los Alamos) and Sequoia (at Livermore) are important investments for the future of ASC. These machines take different approaches to the difficult problem of integrating computer architecture and simulation codes. The need for further advances in simulation to resolve the remaining weapons performance issues and improve assessment capabilities is too great to pursue only one approach. Based on the successful BlueGene/L approach, Sequoia aims to achieve a higher level of performance than Roadrunner—10 quadrillion operations per second (petaflops) peak speed, with sustained performance of 1+ petaflop—and apply it to full weapons-physics simulation codes.

The National Ignition Facility (NIF) as a Center of Excellence. Construction of NIF and commissioning of its 192 laser beams will be completed in March 2009, and the first ignition experiments will begin in FY 2010. NIF is the only facility capable of creating in a laboratory the conditions necessary to experimentally access the physics regimes of all nuclear-phase operations important to modern nuclear weapons. The National Ignition Campaign (NIC), which includes a consortium of laboratories, encompasses all development activities for the ignition campaign and the transition of NIF to routine operations by 2012 as a user facility with unique, highly flexible capabilities. NIF will be used to explore high-energy-density physics (an important, exciting frontier area of science) and inertial confinement fusion as a possible future source of clean energy.

Because they are critical to the success of stockpile stewardship, continued support of NIF and NIC is crucial. Key uncertainties in the thermonuclear performance of weapons present grand challenges; their resolution depends on data and insights from NIF experiments to develop and validate simulation models. More generally, NIF experiments will teach critical skills and test the capabilities and judgment of the scientists and engineers that the nation will depend on to ensure the continued safety, security, and reliability of the nuclear weapons stockpile.

The High-Explosive Research and Development Center of Excellence. With the High Explosives Applications Facility (HEAF), Livermore will serve as a Center of Excellence for High Explosive Research and Development (in amounts up to 10 kilograms). HEAF is a state-of-the-art explosives research facility for formulating, characterizing, processing, and testing energetic materials. Some supporting activities currently conducted at Site 300, the Laboratory’s remote testing site, will require continuing support for consolidated set of facilities at Site 300 or construction of an annex to HEAF.

Plutonium Research and Consolidation of Special Nuclear Materials. Plutonium is an extremely complex material, fundamental to the performance of the U.S. nuclear stockpile, and understanding its detailed properties is a major scientific challenge. Livermore scientists will continue research activities to better understand plutonium, improve plutonium part manufacturing processes, and provide surveillance of stockpiled weapons. However, large-scale work with special nuclear materials at Livermore's Superblock will be phased out. Funding permitted, all Category I/II quantities of special nuclear materials will be removed from Livermore by the end of 2012 and consolidated elsewhere. Three shipments of material have already been completed. Category III amounts of nuclear materials will remain for small-scale experiments. To meet mission responsibilities, Laboratory researchers will use other NNSA facilities for larger-scale activities. To this end, it is essential that the nation proceed with the Chemistry and Metallurgy Research (CMR) Building Replacement Project at Los Alamos.

Hydrodynamic Testing and Livermore's Site 300. Hydrodynamics testing provides valuable data to diagnose the performance of primaries in weapons before they enter the nuclear explosive phase of operation. In accordance with a National Hydrotest Program, such experiments are currently conducted at the Contained Firing Facility (CFF) at Site 300 and the newly commissioned Dual-Axis Radiographic Hydrodynamic Test Facility (DARHT) at Los Alamos. Long-term plans call for significantly reduced NNSA support for Site 300 and closure of CFF in the 2015 timeframe when its use for hydrotesting is no longer programmatically necessary. Livermore scientists and engineers will then carry out their hydrodynamic experiments at other sites. Accordingly, it is critically important that there be sufficient funding to fully utilize DARHT's new capabilities.

Facility and Infrastructure Consolidation. NNSA anticipates a 30 percent reduction in support for buildings and infrastructure at the Laboratory's main site (up to 90 percent at Site 300) over the next decade. The Laboratory has been consolidating facilities and is accelerating the process through a Strategic Space Consolidation Initiative. The goal is to remove up to two million gross-square-feet (of 7.2 million) by the end of FY 2010.

Workforce Reductions. A complex-wide 20 to 30 percent reduction in employees supported by NNSA Defense Programs is expected over the coming decade. Livermore has already downsized considerably. From a workforce of nearly 9,600 in FY 2003, LLNL will decline to approximately 7,000 heads by the end of FY 2008. Nearly 2,000 of these reductions have come in the last two years. Our focus is on reducing support costs and preserving programmatic capabilities, yet more than 500 of those that have recently left the Laboratory are highly-trained scientists and engineers.

Livermore's strategy for absorbing further reductions in the NNSA Defense Programs-supported workforce includes two key elements. First, the Laboratory is striving to increase operational efficiency and workforce productivity to provide sponsors high-quality work at lower cost. Second, Livermore is striving to expand its existing programs that support other pressing national needs in areas that build on and contribute to the core missions and strengths of the Laboratory. In doing so, Livermore will apply its unique capabilities in multidisciplinary, large-scale science to support our nation's defense, energy, environmental, and economic security. These strategies will take time to implement, and further dramatic cuts in the Laboratory's workforce in the near term could irreparably harm our ability to execute our nuclear weapons mission.

Challenges and the Path Forward for NNSA's "Preferred Alternative"

The path forward for Nuclear Weapons Complex transformation faces many challenges, largely stemming from resources constraints and the need to recapitalize enduring production facilities while sustaining investments in human capital—the stockpile stewards whose analyses and critical judgments provide the basis for confidence in the nation's nuclear deterrent.

A key step in the path forward will be the Administration and Congress reaching an agreement on essential elements of nuclear weapons policy, deployment strategy, and stockpile requirements that define the composition and size of the “new/modified weapons stockpile.” The size and/or makeup of the “new/modified weapons stockpile” must be such that the cost of sustaining the stockpile and the underlying human capital, tools, and capabilities will fit within the provided budget.

Agreement on the essential elements of the “new/modified weapons stockpile” will permit detailed planning, the design of new facilities, the phasing of personnel actions, and transfer of operations within the complex in a timely manner. In particular, NNSA can build on the Preferred Alternative to refine planned investments in manufacturing, maintaining, and dismantling nuclear weapons while sustaining the level of stockpile stewardship activities necessary to sustain confidence in the stockpile. The phasing of the new facilities and re-structured site missions can be integrated, planned, and executed over a 10+ year period and appropriately meshed with stockpile stewardship requirements to remain within budget constraints.

At the NNSA laboratories, the demands on the workforce and human capital planning will be extraordinary. The challenge of sustaining confidence in the nation's aging nuclear weapons stockpile in the absence of nuclear testing remains difficult. There is much to be done: sustain advances in weapons physics; support the Centers of Excellence; conduct rigorous assessments/certification; address issues arising in the stockpile; pursue life-extension programs or develop reliable replacements as required; continue to develop highly qualified staff; and provide intellectual leadership in determining how to most effectively meet stockpile requirements through advanced technologies and improved manufacturing processes.

With the projected continued decline in nuclear weapons support for the underlying fundamental science and technology, maintaining core competencies and a skilled workforce at the NNSA laboratories will require a strategic partnership across the country's broad national security enterprise. The laboratories have unique capabilities that are being broadly applied to the nation's most pressing issues. These efforts can be strengthened and expanded as priorities evolve—but only if the underlying science and technology “infrastructure” is sustained. Sustaining this infrastructure or capability is in my view the most significant challenge for the Preferred Alternative.

Livermore is supportive of the vision of transformation and prepared to face the challenge. Our success in meeting transformation goals will depend on your continuing support for our Laboratory and our important national security missions.