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Introduction

Chairman Tauscher, Ranking Member Everett, and Members of the Subcommittee, thank you for the opportunity to appear before you today to discuss the Transformation of the Nuclear Weapons Complex. I am Dr. Michael Anastasio, the director of the National Nuclear Security Administration's Los Alamos National Laboratory, and it is a pleasure to be before you again this year. Our earlier February briefing on the status of our nuclear weapons stockpile presented to you the issues that we face as NNSA laboratory directors working to assess the stockpile, and that briefing serves as an effective backdrop for today's topic of how best to transform the Complex.

The entire weapons enterprise must transform itself into a more efficient operation that can continue to maintain the nation's strategic deterrent while minimizing the need to return to underground nuclear testing.

This morning, I will briefly describe my view of transformation, focusing first on the overall Complex and then discussing its effects on Los Alamos. Second, building on our briefing from February, I will discuss the challenges that we face in our annual assessment of the nuclear stockpile, because this process helps determine the requirements for transformation. And, last, I will highlight what I see as the major challenge for the enterprise in the future: sustaining the science of the Complex as a whole, and of Los Alamos.

Part I: The Need to Transform the Complex

I fully support NNSA's vision to transform the Nuclear Weapons Complex into a smaller, safer, more secure, more modern, more agile, and less expensive complex that leverages the scientific, technical, testing, and production capabilities of its workforce. By achieving this vision and, for example, demonstrating that the enterprise can respond rapidly to stockpile problems, the United States can potentially further reduce the number of reserves in the nuclear weapon stockpile.

To implement this vision, it is important to understand that the Complex is largely a fixed-cost enterprise. This means that no matter the size of the nuclear weapons stockpile, whether it is a few weapons, or thousands of weapons, the nation needs to support an overall capability to ensure the safety, security, and reliability of the stockpile. And as long as we have a legacy Cold War stockpile we must retain the full Cold War production capabilities. From this standpoint, we really don't have a choice but to seek ways to reduce costs by avoiding duplication and operating more efficiently within a shrinking budget. The NNSA plan for Complex Transformation will take important steps to do just this.

At LANL, we are providing significant leadership in NNSA's effort to achieve integration across the Complex, e.g., encouraging NNSA-wide business processes for increased efficiency. Internally, we have spent the past two years working toward consolidation and high efficiency. We face considerable challenges with our infrastructure in that we maintain more than 9 million square feet of facilities, with over one-third of that space more than 40 years old. We are working to reduce our physical footprint by roughly 2 million square feet (more than one-quarter of the reduction has been completed in the last year and a half). We are consolidating the number of high-explosive firing sites across the Laboratory. We have internally absorbed the higher

operating costs associated with the new contract structure. We will continue these efforts and more as part of Complex Transformation.

The Laboratory has also had to make tough decisions and significant reductions in staffing levels. Since the beginning of fiscal year 2006, the overall Laboratory workforce has been reduced—through attrition, limited hiring, and a voluntary reduction program—by more than 2,100 individuals, 46 percent of whom were part of the technical workforce.

From the national perspective, the NNSA preferred alternative selection confirms that Los Alamos is first and foremost a national security science R&D laboratory. Specifically, NNSA's preferred alternative calls for LANL to continue its role, along with Lawrence Livermore, as the country's nuclear weapons design and engineering laboratory, and as a center of excellence in supercomputing. Additionally, the plan calls for LANL to serve as the nation's center of excellence for plutonium research, development, and manufacturing.

NNSA's preferred alternative also will reduce Complex-wide the workforce supported by weapons activities funding by 20-30 percent over the course of a decade or so. At Los Alamos, we have already seen our nuclear weapons program personnel reduced by nearly 15 percent since Los Alamos National Security, or LANS, LLC started operations in June 2006.

Los Alamos is committed to carrying out our role in the preferred alternative. Critical to establishing LANL as the nation's plutonium R&D center is the nuclear infrastructure required for this mission, namely maintaining the Laboratory's ability to conduct plutonium chemistry and metallurgy R&D, which is currently done at our aging Chemistry and Metallurgy Research facility (CMR). As laboratory director, one of my most critical infrastructure priorities is to replace the CMR building. The CMR building was completed in the early 1950s to support scientific research of plutonium and other actinide elements. Work in this facility supports not only the nation's nuclear deterrent but also space exploration, energy research, nuclear nonproliferation, and nuclear counterterrorism.

Our work in the CMR is safe and secure, and our Laboratory staff has done a remarkable job further reducing risks by closing several wings in a short time. However, this will become ever-more challenging as we must meet the increasing safety and security expectations. Congress and the NNSA have authorized and appropriated funds to begin construction of the new CMR Replacement, known as CMR-R, which, when complete, will be more than 100,000 square feet smaller than the existing facility.

I should highlight that the new CMR-R is <u>not</u> planned to be used as a pit production facility. It will allow for the consolidation of category I and II special nuclear materials from Lawrence Livermore National Laboratory. CMRR will also enable the nation to continue to train IAEA inspectors, provide power sources for U.S. satellites, research and build next-generation nuclear detection equipment, and train various United States personnel on how to prevent and deal with the potential for nuclear terrorism.

Another infrastructure priority for the future of Los Alamos, as called out in NNSA's Complex Transformation plans, is the refurbishment of our linear accelerator, the Los Alamos Neutron Science Center, or LANSCE. We rely heavily on the capabilities that are available only from LANSCE, including proton radiography, fundamental cross-sections, and properties of classified

subsystem materials under extreme conditions. LANSCE also enables us to carry out a broad range of basic science that supports everything from biology to nuclear forensics and attribution. The refurbishment of LANSCE, known as LANSCE-R, will allow the facility to continue to support the nation for another 20–30 years, as well as form the foundation for a new science facility to attract and retain the next generation of scientists.

Part of the future that we see for LANL in experimental science is focused on 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 tackle the toughest materials challenges, ranging from weapons aging to improved solar cells to longer-lasting nuclear fuel rods. When coupled with modern facilities and equipment and our role as a high-performance computing center (our Roadrunner supercomputer is the latest example), this facility would help ensure our access to the best scientific talent well into the future.

Part II: Maintaining the Legacy Stockpile

Transforming the Complex now is critical because facilities are aging and in need of recapitalization, while the overall budget is shrinking. To make matters more challenging, the nuclear weapons laboratories have determined that the aging stockpile needs increasing attention in the future to ensure its safety, security, and reliability.

As the NNSA laboratory directors discussed back in February, it is increasingly difficult to sustain the legacy stockpile, which is characterized by high yield-to-weight systems with relatively low-tolerance margins and exotic materials. Exact remanufacture of warheads cannot be done for a variety of reasons ranging from today's environmental constraints and changed production processes to loss of specialized knowledge. In fact, many of the processes and technologies used originally to manufacture the warheads no longer exist. As we introduce small changes into the warheads, we move further away from the "as-tested design," adding additional risks and challenges to our understanding of warhead safety and performance.

The approach of Stockpile Stewardship, begun in 1995 as an ambitious effort to sustain the nuclear weapons stockpile while minimizing the need for nuclear testing, relies on developing and validating through interlaboratory 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 aboveground testing and a vastly improved simulation capability. Ultimately, expert judgment and rigorous peer review assure that critical conclusions are drawn from the best available data, appropriate high-resolution simulation, and a suite of evolving testing capabilities. Sound science is the core of our confidence.

I remain confident in the United States nuclear deterrent and believe that the tools envisioned for the Stockpile Stewardship Program have so far provided the data needed to assess the state of the U.S. stockpile. The programmatic successes have been a major factor in allowing the United States to reduce overall the size of the nuclear stockpile by roughly 75 percent from its peak to a level below that during the Eisenhower administration.

These increasing risks for the future to confidence in the legacy stockpile require sustained efforts to utilize and advance our basic scientific and engineering understanding. Yet with the needs to recapitalize the infrastructure and the growing operational costs from the ever-increasing safety, security, and environmental standards, it is extremely difficult to maintain, use, or enhance the Stockpile Stewardship tools so necessary to preserve our deterrent.

Compounding my concerns is the decline in the number of technical staff at Los Alamos, and within the complex, especially for those who have significant experience in weapon design, manufacture, and production. Our capability ultimately resides in the experience, knowledge, and skills of our scientists and engineers. The ability to maintain a pipeline of the best scientific and technical staff through robust programs and facilities is essential.

Part III: Health of Science

In Part I, I discussed the infrastructure issues that Los Alamos faces and the similar issues across the Complex. Coupling those with the increasing effort that must be devoted to the legacy stockpile creates the biggest challenge for Complex Transformation and for the future of the Complex. In addition to CMRR, NNSA must address how to fund several other major nuclear facilities including the Uranium Production Facility (UPF), the Pit Disassembly and Conversion Facility (PDCF), and the Mixed Oxide Fabrication Facility (MOX). All of these requirements are hitting at the same time that the available budget will be shrinking.

My concern is that we will continue to see funding for nuclear weapons science, and hence science in general, squeezed at the national laboratories. This is the same science infrastructure that enables our success in helping address other national security and emerging energy security challenges. This concern applies both at Los Alamos and nationally.

When we started Stockpile Stewardship, it was clear that in order to reduce the likelihood of having to return to testing, we would need to do more science, not less. Now, we see that many of the investments of Stewardship are coming to fruition, notably the Dual-Axis Radiographic Hydrotest Facility (DARHT) at Los Alamos, NIF at Livermore, and the MESA facility at Sandia. Just as the nation needs to reap the benefits of these investments, we are not able to fully utilize those tools to solve the latest challenges of Stewardship.

From a Los Alamos perspective, I am concerned about the future of science. And, it's essential to understand the very tight linkage between nuclear weapons funding and our ability to carry out a broader set of scientific research and development efforts to meet other national needs. Approximately 55 percent of our funding comes from NNSA's Office of Defense Programs, but it is virtually the only source of infrastructure investment. So the weapons program builds facilities and capabilities critical for nuclear weapons work, which can also be used to meet other needs of the country. A current example is our new Roadrunner supercomputer, which will be applied in its first six months to unclassified problems ranging from climate change to better understanding disease.

Let me emphasize again that the squeeze on science funding jeopardizes the future of the Laboratory because it is this strong science base that enables us to attract and retain the best and brightest scientists. I want to highlight just a few of our recent scientific accomplishments at Los Alamos:

- Working with the Air Force, we developed and fielded a wide-area persistent surveillance capacity called Angel Fire for the U.S Marine Corps. The system provides warfighters with real-time situational awareness.
- We demonstrated the potential for increases in solar energy efficiency using nano-scale semiconductors through an effect called carrier multiplication.
- 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 2007, including the first-ever disposal of radium-226 sealed sources.
- We won more than a hundred major science awards from major organizations.
- We developed the first high-resolution climate model for ocean circulation, which allows us to better understand such climate effects as El Niño and La Niña.
- We completed the one-hundredth genetic sequence for DOE's Joint Genome Institute.
- We've received 107 R&D 100 awards over the past 30 years. The two that we earned this year were for developing the 3-D tracking microscope that can follow the motion of nanometer-sized objects process and for the Laser-Weave to synthesize high-strength inorganic fibers.

When I talk about science being squeezed at the laboratories, I am concerned about our primary nuclear weapons mission but also about other areas where we have capabilities to serve the nation. Because of our ability to address complex scientific problems, LANL is poised to assist the nation further with larger concerns such as global climate change and energy security. I see Los Alamos taking a leading role in understanding global climate change through detailed modeling and validation, developing the next generation of energy storage technology, and studying ways to verify carbon emissions worldwide. These are areas where we already do work, but I believe we can do more to meet the nation's needs.

Conclusion

In conclusion, I want to reiterate my support for the vision of NNSA's Complex Transformation plan, and I believe that Los Alamos can serve the nation well as a national security science laboratory, focused on nuclear weapons design and engineering, supercomputing, and plutonium R&D and manufacture.

I am very proud of the role and accomplishments of Los Alamos National Laboratory in protecting the national security interests of this country. I remain concerned, however, that science is being squeezed out, which increases future risks to our confidence in the stockpile and our ability to support other national missions.

I look forward to further engaging with Congress and the national policymakers as a new path is charted for the Nuclear Weapons Complex. I believe that the backbone of our capability as a nation is the science and technology base embodied in the national laboratories. Los Alamos stands ready to continue to provide the science that underpins our strategic deterrent, as well as the science that can be applied to the many challenges the nation now faces in energy, climate, nonproliferation, defense, and intelligence.