Statement of
Dr. Michael R. Anastasio
before the
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Subcommittee on Strategic Forces
on the
FY12 Budget Request of the National Nuclear Security Administration

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Introduction

Chairman Nelson and Ranking Member Sessions, I would like to thank you for your invitation to appear before the Subcommittee on the "challenges and tasks confronting the laboratories in fiscal year 2012 and the out-years." I am pleased to appear today along with National Nuclear Security Administration (NNSA) Administrator Tom D'Agostino, Director for Naval Nuclear Propulsion Admiral Kirk Donald, Deputy Administrator for Defense Programs Dr. Don Cook, and my fellow laboratory directors from Lawrence Livermore and Sandia National Laboratories. I am currently in my 31st year in the weapons program and in my ninth year as a laboratory director, having served first as director of Lawrence Livermore and now since 2006 at Los Alamos (LANL). As you likely know, I will be retiring as director this summer, and I wanted to take this opportunity to thank this Committee for all its support of the Laboratory and the NNSA mission over the years.

Los Alamos is one of the nation's two nuclear weapons design laboratories. Although the Laboratory and its mission evolve over time, the primary focus of LANL remains to ensure the U.S. nuclear weapons stockpile is safe, secure, and effective. More broadly, Los Alamos is a national security science Laboratory. We conduct work in the national interest in a broad range of areas including nonproliferation, support to the intelligence community and homeland security, and energy security and the science that underpins all these mission areas.

Per the request of the Subcommittee, I will focus my remarks today on the health and vitality of the Laboratory as it relates to our ability to meet the national security requirements of the nation. Since I last appeared before the U.S. Senate in July 2010 much has happened here in Washington which will potentially have profound impacts on the future of Los Alamos. With the passage of the New START Treaty last December and the preceding debate on the health of the United States' nuclear weapons complex and strategic stockpile, a baseline strategy was formed.

The Administration announced a nuclear policy in the form of its Nuclear Posture Review (NPR) in April 2010 and a budget outline to support it, through the so-called 1251 Report, which was released in May 2010 and then updated later that year in November. Along with my colleagues from Livermore and Sandia, we issued a statement on the NPR in April, parts of which I include here: "We believe that the approach outlined in the NPR, which excludes further nuclear testing and includes the consideration of the full range of life extension option's (refurbishment of existing warheads, reuse of nuclear components from different warheads and replacement of

nuclear components based on previously tested designs), provides the necessary technical flexibility to manage the nuclear stockpile into the future with an acceptable level of risk."

I addressed these issues further in my testimony before this Committee in July 2010, where I stated in general that I was encouraged by the policy, and I said further that I viewed, "the NNSA's FY11 budget request as a positive first step…" However, I added that, "…I have concerns about sustaining the focus and an appropriate budget over the several decades for which it will be required." As I will discuss further in my testimony today, this continues be a concern.

The three laboratory directors were once again asked our opinion of the updated 1251 Report, when it was released in November 2010. In response to a December 2010 letter from the Chairman and Ranking Member of the Senate Foreign Relations Committee, the three of us stated that "We are very pleased by the update to the 1251 Report, as it would enable the laboratories to execute our requirements for ensuring a safe, secure, reliable and effective stockpile under the Stockpile Stewardship and Management Plan." We continued further that, "We believe that, if enacted, the added funding outline in the Section 1251 Report update—for enhanced surveillance, pensions, facility construction, and Readiness in Technical Base and Facilities (RTBF), among other programs—would establish a working funding level for a balanced program that sustains the science, technology and engineering base."

I recognize, however, that in the interim, the country is now confronting some very significant financial challenges. My comments today recognize that situation and are cognizant that all Federal programs will be facing budget constraints in the months and years ahead.

Health and vitality of the Laboratory in support of the national mission

When I testified before the Senate last July, the focus of my remarks was on the ability of the Laboratory to execute the new national strategy based on the funding in the President's FY11 budget submission. At the Subcommittee's behest, I would like to outline what I believe are key elements for maintaining a healthy and vital Los Alamos, one that can support the national needs of the country. At the fundamental level, the Laboratory needs the best scientists, engineers, technicians and support staff that can work in multi-disciplinary teams on national security science challenges facing the country. In order for us to be able to attract and retain the best people, I believe that the following elements form a strong foundation for the Laboratory:

- A strong national commitment to compelling national security missions;
- Stable and adequate funding;
- Diverse and broad cutting-edge scientific programs, which attract the best and brightest scientific talent; and
- Tools, facilities and infrastructure to accomplish the above, such as: the Los Alamos Neutron Science Center (LANSCE), the proposed Matter Radiation Interactions in Extremes (MaRIE) facility, and exascale computing, among others.

If all the above elements are in place, the nation will be able to reap the benefits of a healthy Los Alamos. As director, I am responsible to ensure that this is as true fifteen years in the future as it

is today, even though no one can predict what then will be the compelling challenges facing the country. I will address the current status of each of these elements below.

Strong national commitment to compelling national security missions
The Obama Administration in April 2010 released its NPR that updated the nation's nuclear weapons policy. One of the five key objectives of the NPR was "sustaining a safe, secure, and effective nuclear arsenal." The NPR discussed that this would be accomplished by studying "options for ensuring the safety, security, and reliability of nuclear warheads on a case-by-case basis, consistent with the congressionally mandated Stockpile Management Program. The full range of LEP [Life Extension Program] approaches will be considered: refurbishment of existing warheads, reuse of nuclear components from different warheads, and replacement of nuclear components." The NPR provided further detail on the fact that the "U.S. nuclear stockpile must be supported by a modern physical infrastructure…" and that the "science, technology and engineering base, vital for stockpile stewardship as well as providing insights for non-proliferation, must be strengthened."

The NPR was followed by a program plan and funding profile (the revised 1251 Report) with an accompanying request for substantial funding increases in the FY11 and FY12 budget submissions. These policies and plans commit the NNSA's national security enterprise to an aggressive body of work for the next 20+ years that includes completion of the current Life Extension Program (LEP) for the W-76, starting studies to complete LEPs of the B61, W78, and W88 and the construction of the Chemistry and Metallurgy Research Replacement facility (CMRR) at Los Alamos and the Uranium Production Facility (UPF) at the Y-12 plant.

The workforce at LANL is excited and energized to meet these challenges which are daunting. Certifying the stockpile in the absence of the ability to test (the last U.S. nuclear test was in 1992) has provided one of the greatest technical challenges to ever face the nuclear weapons complex and led to the creation of the science-based Stockpile Stewardship Program (SSP). At a high level, the SSP is critical both to the annual assessment of the stockpile, as well as to maturing the next generation of tools and technologies that will support certification of future LEPs. It requires powerful experimental capabilities to probe key questions facing an aging stockpile, as well as the most capable supercomputers in the world to integrate our new knowledge from experiments and validate this through comparison with the data that we have from our underground test history.

I want to stress that we have learned a great deal about the science and engineering of weapons and the detailed phenomena that have to occur for a weapon to function properly. Contrary to what some have argued, we are definitely not "done" with science—there are many significant areas of work that remain to be done. There are critical open questions that remain to be solved to retain our confidence in the stockpile, and we cannot fully predict the scientific challenges that are still ahead as it continues to age and goes through modernization. As a nuclear weapons enterprise, we need to be fully utilizing the tools of Stockpile Stewardship that are now online, ranging from the Dual Axis Radiographic Hydrodynamic Test (DARHT) facility and LANSCE at Los Alamos, to the National Ignition Facility (NIF) at Livermore.

We also need to continue what will likely be a decade long march to the next level of supercomputing performance, known as "exascale computing." One of the largest successes of Stockpile Stewardship has been our advances in supercomputing capability, and specifically our ability to model the complex phenomena that occur in a weapon. What we have discovered is that with each improvement in simulation performance, we see greater fidelity and develop an improved understanding, as well as a further awareness of what we still do not understand. Thus, moving to the next generation of computing is not a luxury or simply speed for the sake of speed. It is essential to our understanding of the challenges we face with the stockpile, in particular as we move further away from our underground test experience.

If funded according to the profile in the 1251 Report, this program of work constitutes national commitment to a compelling national security mission.

Stable funding

Stable funding is another sign to the workforce that there is a national commitment to the mission. In the national security science area and weapons activities in particular, scientists of necessity become involved in classified research and development (R&D). Consequently, they disappear from the traditional forums of publication and conferences that lead to advancement in their fields and once out of sight it is very difficult to find opportunities to reenter this very competitive arena. Before forgoing this career path, scientists must judge if there is an opportunity for a career over several decades and the best of them have many other choices available. A national commitment and stable funding to go with it are essential elements to enable that personal decision.

For a laboratory like Los Alamos, stable funding allows institutional workforce planning to ensure that the right mix of skills with the right mix of experience are available to the programs to execute work today and into the future. With funding uncertainty and the associated worries about downsizing coupled with pay freezes, increased contribution to pension and medical plans, the best of our workforce is difficult to retain. Currently for Los Alamos, with the uncertainty in the FY11 and FY12 budgets, I don't know what actions I should be taking—increasing the size of the workforce or decreasing the size of the workforce.

Broad and diverse science portfolio that can attract the best and brightest

Over the years, I have engaged the national leadership about my concern that the scientific capability that underpins the nuclear weapons program has been squeezed by eroding funding, increasing costs for facilities and security, and uncertainty over the future of the program. This squeeze has impacted our ability to advance the science to address the gaps in our understanding that must be closed for our continued confidence in the nuclear deterrent. For example, we have had to forgo some areas of research and have not fully utilized our major experimental facilities like DARHT, LANSCE, and NIF. Additionally, we have not consistently provided the most capable diagnostics and instruments for our research. It is the knowledge developed from this broad range of experimentation that is essential to validate our simulation tools that forms the basis for confidence through the science-based SSP.

In order to mitigate the consequences of these shortfalls in support for our scientific capabilities, we have consciously found funding from other sponsors that utilize some of the same science as that needed by the weapons program, and in that way sustain and enrich our capabilities that reside in the more than 2,500 PhDs that are the core of our science base. For instance, our technical staff does work that is competitively selected for the Department of Energy's (DOE) Offices of Science and Nuclear Energy, and NNSA's Office of Nuclear Nonproliferation, that is, of course, very important in its own right. Our researchers fare well in these competitions as they are recognized as among the top scientists in the country, by numerous measures, including the number of peer-reviewed publications. These non-weapons programs serve to both attract top scientists to the Laboratory, and they also build up fundamental scientific capability that can then be further leveraged and applied to our core weapons program work.

In the case of Los Alamos, the intellectual seed corn has to be attracted and incentivized to join our staff because of our remote location and the heavy recruitment of U.S. citizens with technical degrees from large corporations and research universities. As a March 25, 2011, *New York Times* article highlighted, we have tough competition from today's Silicon Valley that can provide high salaries, stock options and free iPads to new recruits. The good news is that typically once we get the scientific talent to the Laboratory, they tend not to leave because of the diverse set of scientific opportunities we are able to offer. This is particularly true when our early-career scientists develop a better understanding of our national security missions in nuclear weapons, conventional explosives, materials research, radiography, intelligence activities, and actinide chemistry and plutonium science, to name just a few.

One common example of the path that many of our employees take from newly hired postdoctoral candidate to highly trained weapons engineer or designer can be found at our linear accelerator LANSCE. LANSCE is a DOE national user facility, the largest such facility at an NNSA site, as measured by the number of visits. LANSCE is a perfect microcosm of the overall Laboratory. The facility is a proton accelerator supported by NNSA. This single accelerator, however, among other things supports Office of Science-funded work at our neutron scattering facility (Lujan Center) and our isotope production facility; Weapons Activities work at a proton radiography center, as well as at the Weapons Neutron Research facility; and work for the Office of Nuclear Energy. A new physicist will be hired to do unclassified science at LANSCE on the fundamentals of materials, for instance, and then over time they have the opportunity to start working on elements of our classified national security activities. The people who remain in the program do so because they believe in its scientific challenge and importance.

This same underlying science that supports the weapons program is applied to other real national challenges, whether it is analyzing data from radiation detectors in Japan to help understand the status of the reactors and spent fuel rods or responding to the Gulf of Mexico crisis. For example, our staff experienced in radiography were able to immediately deploy to the Gulf of Mexico last year and quickly develop a new capability to x-ray the Deep Horizon blowout preventer. At more than a mile beneath the surface, we provided imagery using a sealed source to help national decision makers better understand what was occurring inside that device.

Tools, facilities and infrastructure
The nation has invested billions of dollars over many decades in the scientific tools, facilities and infrastructure at Los Alamos. The reality, though, is that much of that infrastructure has aged, and more than 50% of our facilities are more than 40 years old. Los Alamos has been working closely with NNSA to build strategies that update the site's aging infrastructure.

A key element of that infrastructure, in terms of the required national capability, is the replacement facility for the Chemistry and Metallurgy Research (CMR) facility that was completed in 1952 and was discovered years later to reside on a seismic fault. The CMRR will provide the infrastructure required for the nation's ongoing plutonium work, just as the Uranium Production Facility (UPF) at Y-12 will provide the nation's ability to work with uranium. The currently operating plutonium and uranium facilities have both served our country well over the last 60 years. However, with evolving safety and security standards, these aging buildings now need to be replaced with more efficient structures designed to meet modern-day requirements.

It is important to recognize, especially when I look at the overall health and vitality of the Laboratory, that the infrastructure needs at Los Alamos are much broader than just CMRR. Clearly, CMRR will be one of the biggest line-item projects in front of this Subcommittee, but other smaller investments will be required that will help maintain the science at the Laboratory. One example of this is LANSCE. We have been working with this Subcommittee, as well as with NNSA to ensure a path forward for the enhanced maintenance of this machine that supports not only NNSA's Defense Programs, but also our efforts with DOE's Offices of Science and Nuclear Energy. We have been charting a path with DOE and NNSA for the future of LANSCE and a follow-on materials science capability called MaRIE. As I discussed earlier, it is the broader set of science programs that enable us to attract the next generation of scientists. Absent these types of tools, we will be hard pressed to accomplish our recruitment goals.

Challenges
We at Los Alamos, like most Americans, appreciate the significant fiscal constraints we are facing as a nation. However, I am increasingly concerned about the final outcome of the FY11 budget process and whether proposed reductions below the 1251 baseline will be enacted, and if so, whether that will be a trend into FY12 and beyond. At Los Alamos alone, the differential in funding shifts that may arise from the current debate in Congress amounts to the equivalent of 20% of our annual budget. Absorbing such a contraction beyond FY11 would undoubtedly result in workforce actions, not to mention the destabilizing effect that would take years to correct.

Pressure from mounting pension requirements and on carryover balances have left very little flexibility remaining should our budget fall below the 1251 Report guidance. This concern is compounded, if not amplified, by the proposed funding reductions to the DOE's Science and Energy programs and NNSA's Nuclear Nonproliferation programs which would have significant negative impacts on the capabilities supporting the weapons program at Los Alamos, and the overall health of the Laboratory. As I discussed above, our research base is very broad, and we have significant crosscutting activity that provides additional support apart from the weapons program. A significant loss of funding in these areas will have impacts on our R&D workforce in the areas that the weapons program has not been able to fully support. It is the aggregate

expertise and varied capabilities derived from multiple sources that comprise this great institution's technical strength in addressing issues of national importance.

In addition, the re-commitment to the nuclear weapons enterprise embodied in the NPR has, I believe, engendered a sense of stability and dedication in our workforce over the past year. To reverse course and curtail our modest hiring efforts at this point will result in losing that momentum and, I predict, will result in a drain of technical experts via retirements and the pursuit of careers in institutions that can offer that stability. I would offer that the people, infrastructure and science that underlie our nuclear defense represent an expertise that warrants stability over the long term, independent of short-term fiscal constraints.

Conclusion

With all the turmoil and uncertainty in the world, now more than ever, the nation needs a strong national defense. Los Alamos is proud of the contributions we have made for more than 65 years, providing innovative and effective science and engineering to confront a broad range of the country's evolving security challenges. For our nuclear deterrent, the nation has a clear policy together with a program of work and a funding profile for its execution. Regrettably, at the same time, the Federal budget is under tremendous strain. The uncertainty in the budget process and its eventual outcome puts that policy and program, as well as the health of the Laboratory, at risk. The disconnect between the budget, on the one hand, and the policy and program on the other, leads to instability and the inability to ultimately meet the goals.

Los Alamos is prepared, as always, to do its very best to deliver on our missions with our most creative science and engineering. However, aligning the budget with a program balanced across near-term goals and the underlying science will be essential for success. If the budget cannot support the current program then the policy framework and program to carry it out must be revisited.

Mr. Chairman, I again want to thank you for the opportunity to come before the Subcommittee and outline my concerns. I would be happy to answer any questions you might have.