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Testimony of Dr. Charles F. McMillan
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Subcommittee on Strategic Forces
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Chairman Udall and Ranking Member Sessions, thank you for inviting me to testify today. I am Dr. Charles McMillan, Director of Los Alamos National Laboratory. I am pleased to have the opportunity to testify before the Subcommittee on the health of Los Alamos.

As I have stated previously before the Committee, NNSA governance will play a key role in determining both our efficiency and effectiveness as we address mission and budget challenges. Over the past year I have interacted with both the Congressional Panel on NNSA Governance and the National Academy of Sciences. Should I be asked to participate in the review established by the FY14 Omnibus Appropriations Act, I will do so again. I am hopeful that theses panels will deliver recommendations that enable a successful nuclear program. Future success of the enterprise depends on governance as well as budgets and balancing of the program.

Today I will provide an update on: recent Los Alamos technical and scientific achievements; the proposed plutonium strategy under evaluation in numerous national security circles; and, Los Alamos budget realities that pose challenges to meeting our mission requirements.

Accomplishments:

Since I last appeared before you, our weapons and science programs have achieved significant technical breakthroughs, and our operations and environmental management organizations have delivered on significant commitments.

In regard to our weapons program, we again completed, on time, my letter to the Secretaries of Energy and Defense regarding the 2013 Annual Assessment. We successfully conducted two B61 hydrodynamic shots, which were executed as planned and within committed budget levels. Los Alamos executed the important subcritical experimental series, Gemini, and I am pleased that the FY15 request recognizes this success by including an increase for the Los Alamos subcritical experiments at Nevada (I'll note that the team was just recognized with the Department of Energy, Secretary's Achievement Award; their highest non-monetary award). The capabilities supported by the increase will provide an important new tool for stewardship, building on the success of the Gemini series, and filling a present gap in our technical understanding.

Also during the past year, we successfully completed production of three W87 development pits. We developed the Plutonium (Pu) Strategy in partnership with the National Nuclear Security Administration (NNSA), and worked with the Department of Defense (DoD) Cost Assessment and Program Execution organization and the Nuclear Weapons Council (NWC) on a business case analysis, which affirmed our strategy on plutonium infrastructure.

Over the course of the year, Los Alamos responded to several technical issues on the W76-1 that enabled continued production to remain on schedule. Los Alamos provided lead design agency support for the first successful lot of PBX 9502 (Insensitive High Explosive) produced in over 20 years that will benefit both DoD and the Department of Energy (DOE). Each of these demonstrates that weapons program mission execution remains our key focus, but I'd also like to spotlight some remarkable accomplishments from our scientists and engineers that go beyond our core mission.

We continue to excel at the science that underpins all of our mission assignments. Los Alamos scientists put several pieces of significant hardware and power sources on the Mars Curiosity Rover. One of the most impressive called ChemCam, which was developed by a team of collaborating institutions, has verified the presence of water on Mars and fired over 100,000 laser shots gathering unprecedented data that is still being assessed. The tremendous data capabilities for the technology do not stop there. The laser, which was originally developed for an environmental mission, is an example of technology that has been used in a variety of applications and then "spun into" one of the Lab's core missions. While the laser has now delivered results in the environmental and space realms, just this year it was repurposed for a nonproliferation mission application tool for inspection and diagnostics needs of the International Atomic Energy Agency (IAEA).

Members of our Earth Sciences team at Los Alamos have released research over the last several years outlining the causes of large scale forest mortality. This research is critically important because we all see the wildfires on the news every summer and question what droughts mean for our Western forests. Our research shows that as the West experiences increased temperatures; it is the warmth, not necessarily the lack of moisture, which will kill our forests because of the water evaporating out of the soils. Using our data, it is now possible to forecast forest health or mortality by decreasing or increasing ambient air temperatures. We also now have indicators of where the greatest fuels loads will be for wildfire preparation purposes.

Los Alamos biologists continue to play a key role in the development of a vaccine for the AIDS virus. The considerable diversity and adaptability of HIV worldwide represents a critical challenge for designing an effective HIV vaccine. Through work done at Los Alamos, it appears that a vaccine computationally optimized for immunologic coverage of global HIV diversity, called a mosaic vaccine, confers protection from infection in an animal model. HIV mosaic vaccines are being moved into human trials, and the approach has the potential to be groundbreaking in the

global fight to combat this deadly disease. This research has been done in collaboration with several universities and has been funded by the federal government and non-profits like the Gates Foundation.

In addition, Los Alamos has recently made progress on two key operational issues related to our Plutonium facility that have now been either resolved or are well on their way to resolution:

- Nuclear Materials Safeguards and Security Upgrades Project (NMSSUP) II: This complicated, multi-layered technology security project challenged the Laboratory on many dimensions. But I can tell you today that working with NNSA, we have completed this important upgrade. The new integrated security systems are now operable and protecting assets.

- We are making significant progress in resolving the criticality safety concerns at our plutonium facility that caused us to pause operations. We have improved our criticality safety posture and are in the process of resuming our important activities and deliverables.

Finally, the environmental management cleanup campaign to remove 3,706 cubic meters of transuranic waste from the site by June 30, 2014 has been one of the largest and most complex waste cleanup challenges the Laboratory has undertaken. As of February when the Waste Isolation Pilot Plant (WIPP) experienced issues and suspended incoming shipments, we were at 85% Campaign completion. Today, box and drum processing is complete for the remaining 120 shipments, and we have identified alternate temporary storage for them. Shipment to Waste Control Specialists in Texas commenced the first week of April and completion of the 3,706 m^3 Campaign by the deadline is again on track. We will continue to support WIPP in their investigation efforts so this important resource will once again be available in the future.

I am very proud of the hard work put forth by the Laboratory staff to achieve these impressive successes. What I hope will continue to be a positive story is the next update regarding our proposed alternate Plutonium strategy.

Plutonium Strategy:

Last year in testimony before this Subcommittee I outlined the structure of an alternate Plutonium Strategy that would provide the country with critical plutonium capabilities, including pit production, in the absence of the Chemistry Metallurgy Research Replacement-Nuclear Facility (CMRR-NF) at Los Alamos. Over the past year, we have worked hard to turn these ideas into a plan.

The Strategy proposes a three-phased approach. The phased approach is designed to manage both safety and programmatic risk in the near, mid, and longer term

timeframe and to address risks in the timeworn Chemistry and Metallurgy Research (CMR) Facility and Plutonium Facility (PF)-4 respectively. I believe the current plan, if fully implemented, will both preserve our critical plutonium capabilities once the CMR building is finally shuttered, and it will greatly extend the life of our existing Plutonium processing capability at Technical Area (TA)-55. This plan is effective, efficient, and timely, and is the best fiscal solution for this country.

Getting more out of our existing facilities and breaking up new construction projects into small achievable pieces, reduces many of the problems associated with prior "big box" nuclear construction projects. Issues such as large annual funding requirements and decades-long acquisition periods will be scaled down to manageable levels and will be adaptable to future changes in requirements.

The three key elements of the current plan involve modifying CMRR-Radiological Laboratory Utility Office Building (RLUOB) so we can slightly increase the amount of material in the facility per revised guidance, while keeping it as a radiological facility (thanks to the efforts of NNSA in updating regulations to bring the facility into alignment with modern safety standards). The ability to increase the materials from about the mass of one nickel's worth of weapons grade material, to about two nickels' worth of mass may not sound like much, but it is significant. We are currently in the process of outfitting RLUOB with equipment that will enable us to take advantage of the increased material allowed in the building.

However, I believe that RLUOB is not a silver bullet because we still must have the capability to handle kilograms of material not just the gram quantities currently allowed at the facility. The requirements lead us into our proposed Phase II recommendation which is to better utilize our existing high hazard nuclear space in PF-4.

Reconfiguring PF-4 would allow us to accommodate the analytical and materials chemistry capabilities that cannot be transferred to the CMRR-RLUOB (see attachment 1). Over the past decade, many of our planning assumptions that were valid when CMRR was designed have changed, allowing us to reclaim about 10 percent of the valuable lab space in PF-4. In combination with Phase 1, this space can enable us to terminate operations in the CMR Facility for less than the overall cost compared to constructing CMRR-NF. This reduced cost profile also comes with limits to manufacturing capacity and lacks a long term vault, but near term requirements have changed to the point where this is a reasonable compromise for the near term.

We have plutonium recovery requirements that were implemented during the Cold War to preserve as much of our limited supply of this vital metal as possible. We now have an abundant supply of the material, so if we reduce the recovery requirement and eliminate the redundant equipment needed for these operations, we now have very valuable vacant existing space. This space can be converted over the span of a few years for missions of far greater consequence. Also, from a cost

and regulatory perspective, it is typically less expensive and faster to create new missions inside an existing permitted workspace.

Finally, there will be an unavoidable need to construct new high security, nuclear workspace because it is simply not possible to indefinitely meet program requirements with the available space. Here again, we have come to a conclusion and are proposing to NNSA, that smaller, segmented, or modular facility additions will be the most effective path forward. Whether it is a plutonium storage vault, a pit processing facility, or a radiological diagnostic suite, we will need space for these operations after we determine which is least appropriate for inclusion in our existing plutonium facility. These modest steps should be sufficient to preserve our plutonium capabilities into the future and hopefully avoid some of the pitfalls we have experienced trying to construct very large multipurpose nuclear facilities over several decades. These additions are intended to "scale", not solve, most of the past acquisition challenges with "big box" nuclear projects and be adaptable for a broad range possible futures – not just at Los Alamos. Another significant benefit to moving operations to modules would be to extend the life of PF-4 for several decades.

I would like to touch on the recent Pit Production report by the Congressional Research Service (CRS). Many of the ideas in the report were originally contemplated by Lab staff as they began to look at alternatives to CMRR-NF. While the report is comprehensive, it fails to recognize many of the risks and challenges certain options would face.

The report envisions sending analytical and materials chemistry work that supports the production mission, around the complex to take advantage of existing capabilities. This is an approach that we still believe to be valid should we need some type of bridging capability. However, in the long-term, there will be increased risk by the additional shipments of samples through commercial shipping vendors, and increased risk in the timeliness of completing the work. In our expert opinion, the country needs analytical and materials chemistry capabilities to reside at the same place where pits are produced.

The NNSA and Laboratory's Plutonium Strategy plan does not envision the kind of massive upgrade or legislative acceptance of much greater risk contemplated by the CRS report. The report suggests that Los Alamos could somehow massively upgrade our RLUOB facility to a Hazard Category II facility. Nuclear facilities are designed from the ground up for their intended purpose. RLUOB was designed as a radiological facility, not a Hazard Category II facility. Under the CRS upgrade scenario, the proposal would necessitate improvements in security, seismic reinforcement, air handling, fire suppression, and other systems that were not designed to nuclear facility standards, and therefore unable to ultimately address the nuclear safety basis requirements. I believe that Los Alamos has the most credible and cost effective path forward that could potentially be completed to meet the proposed 2019 closure timelines for the CMR Facility.

Before moving on I would like to mention one more issue related to our plutonium mission. With the future Life Extension Programs (LEP) schedule delayed, you will likely hear that the need to produce pits is no longer on the same timeframe. I think it would be a mistake for the country's pit production capabilities to be tied to the future of any one-weapon system. In my opinion, it is critical that our country maintain this capability and continue to develop a stable and responsive pit production infrastructure. We need to heed past lessons learned: when this capability was incapacitated for a short period, then exorbitant time, energy, and money was spent to bring it back on line when the country was again in need. This will always be a cornerstone capability, no matter the weapons modernization strategy of the time.

Regardless of the nuclear weapons systems the United States decides to move forward with or when, if we do not rejuvenate our limited plutonium capabilities, we will have few options going forward. This scenario would be particularly troubling should an unforeseen problem emerge in our existing systems or if there was a dramatic technological or geopolitical surprise with another nuclear armed country. Because of delays in project start-up since the decision to defer CMRR-NF, I am concerned that we will miss the target date to terminate program operations in CMR by 2019. Should we be forced to terminate CMR operations before they can be transferred to CMRR-RLUOB and PF-4, our ability to execute plutonium missions will be jeopardized.

Mr. Chairman, our world is becoming more unpredictable. It would be a mistake to take our current capabilities for granted. For the most part, the infrastructure that supports our stockpile was built during the early years of the Cold War. Upgrades to our facilities and supporting infrastructure continue to be delayed. There will be a period when the infrastructure fails and it will take time and significant funding to replace.

Budget:

In that vein, I am particularly concerned about the latest budget guidance we have received from the Office of Infrastructure and Operations in NNSA. Their planning direction would significantly reduce our facility operations and maintenance budgets in FY15 by $56M, an 18 percent cut compared to FY13, with additional reductions planned for FY16. It will be very difficult to deliver on mission requirements if our already-aging infrastructure is further undermined, and there will undoubtedly be scope impacts to our mission deliverables.

The past few years have seen deferral of CMRR-NF and reductions in the funding available to operate and maintain our aging buildings. Such trade-offs can be made in the short term, but over the long term they will inevitably be detrimental to our ability to field experiments and preserve or build capabilities with metals such as plutonium that further our understanding of the stockpile and prepare us to

respond with future LEPs or other solutions. Simply put, within the existing budget allocation, the plutonium sustainment, infrastructure and science, and engineering campaigns need attention and a significant increase in priority.

We are living in a period in which we are underfunding our science, technology, and engineering base (ST&E). As evidence, both physics laboratories are seeing flat or declining budgets at a time period in which the NNSA's overall budget has increased by 26% (FY09 compared to FY15 Request). This stagnation has removed all the flexibility we once had to manage our way through budget challenges. This gives me serious cause for concern as I contemplate the body of science needed to continue assessing the safety and reliability of the stockpile in the future.

Regarding mission funding, I am encouraged by the national consensus surrounding the B61 LEP effort, and believe that the nation needs to sustain the momentum associated with full funding, consistent with the nation's treaty commitments to our allies.

However, it is increasingly clear to me that there is a growing divide between the annual funding allocations and the requirements placed on us by our partners. The B61 LEP is possible only because we invested many years into capability research and development. As we move forward, the funding needs for short-term deliverables should not come at the expense of the underlying science and engineering base and at the expense of our infrastructure to serve tomorrow's mission needs. These are again, trade-offs that can be made for limited periods of time, but they are not sustainable in the long term. The LEP is the eventual deliverable, but multi-year capability investments enable such an outcome.

A plutonium manufacturing capability to sustain newly-manufactured pits for the Design Agencies takes many years of investment. These capabilities, together with plutonium devices for scaled subcritical experiments such as the Gemini series, are essential components of our deterrence, as well as critical technologies for enabling the confidence to move towards a smaller stockpile.

As I have stated on previous occasions, it is the ST&E base in combination with first-class computational and experimental research facilities that will guarantee that we will attract and retain the workforce needed to address complex stockpile issues in the future. There is no single budget line for "sustain knowledge-based deterrence", but let me assure you that this knowledge base will be the foundation on which our future deterrence will rest, particularly as our underground testing program passes into the realm of a historical artifact.

I recognize that everything in the nuclear weapons complex typically comes with significant funding requirements attached to it; however, the things we need funding for are getting reduced and our suggestions to reduce some costs are tabled. I have real, operational, working insight on actions that would reduce costs in Pu processing, line item projects, and risk/cost analysis in a number of areas. If we

could get leverage for these ideas and get decisions made, it would make a big difference. In the interim, our NNSA mission and performance requirements are increasing and there is no reprieve that could be provided by prudent management and decisive actions.

To give you some example, we have seen very little relief in the mountain of oversight reviews we must support. Risk aversion among our partners is driving our safety mandates to the point where actually doing work is becoming increasingly difficult. More generally, simply trying to gain permission to build a facility or execute a work scope has become problematic because the many layers of permissions now routinely generate a "non-concur" that stops the process.

Security requirements are another interesting microcosm. I am worried about proposed funding reductions to our physical, cyber, and information security budgets as we update our assessment of threats to reflect current reality and try to operate within more stringent requirements. I have already asked NNSA for permission to reduce the size of my physical security staff to meet these reduction targets, but our risks will be increased as a result. In addition, our information and cyber security budgets are barely staying flat, yet cyber-attacks on our computer systems continue to accelerate.

This is one area that keeps me awake at night because as we have seen across this country, cyber intrusions are getting more complex and more damaging within both the commercial and government worlds. Again, I believe that we could better manage our security needs through realistic assessment of risk and make prudent management decisions to balance that risk and available funding.

Nuclear Security Activities:

Ensuring broader mission delivery in a dynamic and changing world is an important part of what the National Laboratories do – and this mission delivery is at risk in the present budget. The broad topics of nuclear proliferation, nuclear counter proliferation, emergency response, and nuclear terrorism are key elements of this nuclear security strategy and mission. For example, nuclear counter proliferation is a set of activities designed to defeat the development and use of nuclear weapons and improvised nuclear devices by sub- or extra-national groups, as well as states of proliferation concern. In our examination of the national NCP context we see Lines of Operation that include identification and prediction of nuclear threats, monitoring and detection of proliferation and nuclear terrorism activity, upstream defeat of nuclear threat pathways, defeat of nuclear weapons of mass destruction (WMD) threats, and attribution of the nature and pathway of developing nuclear WMD proliferation.

Although there is no single US Government Department or Agency responsible for all of these lines of operation, NCP is a particular focus of Los Alamos because the work is consistent with the objective of preventing nuclear terrorism and

proliferation that was placed at the top of U.S. Nuclear Policy agenda by the Nuclear Posture Review, and because countering nuclear threats requires exquisite expertise in nuclear weapon design, global monitoring, nuclear intelligence, and technical nuclear forensics.

In order to respond to threats or incidents of a certain type, DOE/NNSA is required to provide technical assessments, based on nuclear design principles, to tactical, operational, and national-level decision makers. Los Alamos has a lead role in doing so based on years of investment intended to make our nuclear weapons program capability available in a tactical, operational environment. Although our nuclear weapons program capability is directly applicable to defeating nuclear WMD, the materials, processes, and phenomena that may be present in nuclear threat objects can be significantly different than the US stockpile.

Therefore, special attention and effort is required to address this mission and we can do so in a way that is also synergistic with the stewardship of technical capabilities for the US stockpile. However, funding within the Counterterrorism and Counter-Proliferation Programs and Nuclear Counterterrorism Incident Response components of the NNSA's Weapons Activities account has been volatile recently and may not adequately address the requirement to provide technical assessments based on nuclear design principles for aspects of the NCP mission. It is yet another example where national requirements for which we have responsibility are at significant risk of not being met.

I bring these budget and risk issues to your attention because in past years I would look for ways to mitigate the funding repercussions without impacting my mission requirements, but this year I believe we are cutting it too close. The US nuclear policy related to weapons systems, critical facilities, and commitments to maintain core defense and science capabilities is in a period of transition that translates into program risk and ultimately a national security risk.

Conclusion:

Mr. Chairman, as I look to the future, if these requirements and budgets persist, I have significant concerns about the health of the weapons program and the skills and capabilities of Los Alamos. We need weapons design work to exercise our weapons scientists, we need appropriate nuclear facilities to work in, and we need to sustain the broader science base required at Los Alamos to feed our national security programs.

Without some coordination of our mission requirements to our funding allocations, and dexterity in management, we are going to see an accelerated loss of capabilities because my technical staff will continue to be pursued by those in private industries offering better opportunities to exercise their drive and innovation. It is only through the steadfast commitment, hard work, and utmost dedication of our people

to serving the nation that we experience our successes and achievements, so retention of this talent is a priority.

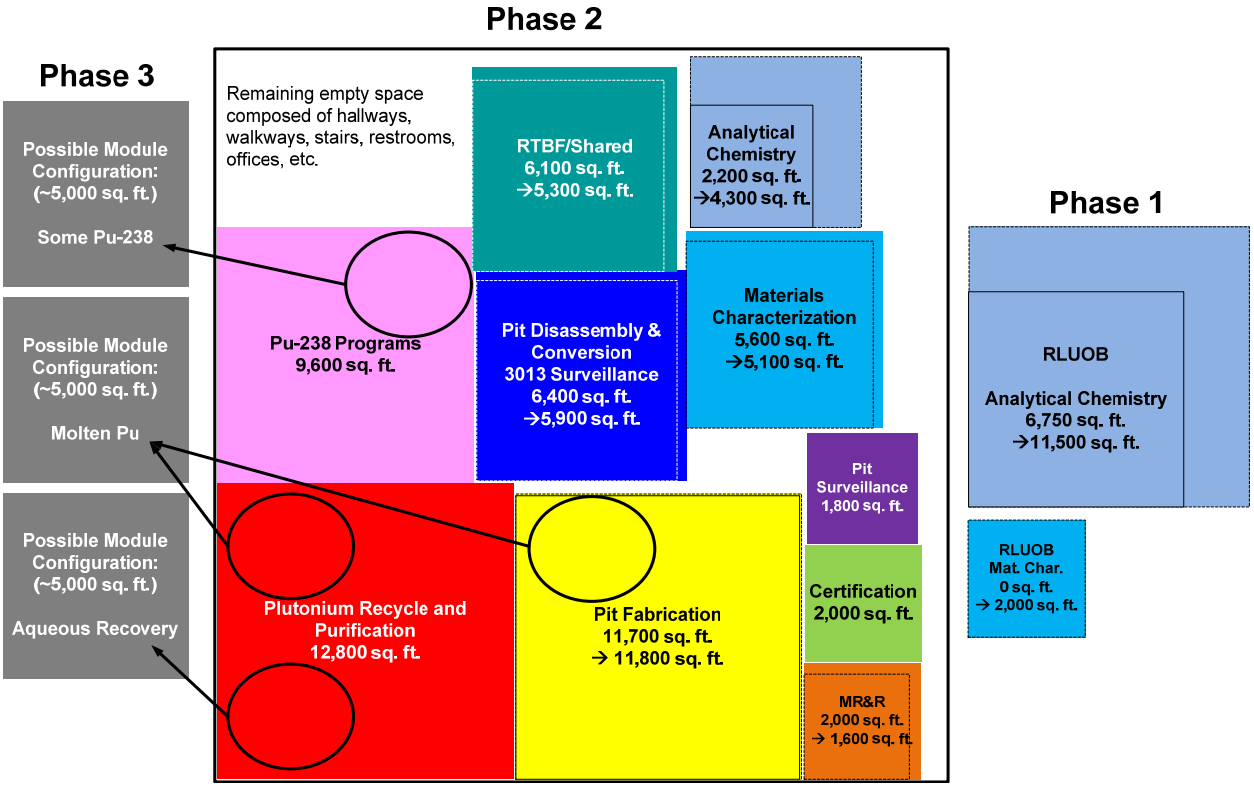
The Congress and the Administration need to develop an agreement on what our nuclear facilities strategy will be as we enter an uncertain future in a landscape we have not dealt with since the Cold War. We need decisions on appropriate funding levels that can be sustained for the complex through the out years, and decision on what role a broader science and engineering base has at the NNSA Laboratories.

Thank you Mr. Chairman for the opportunity to testify today and I would be happy to answer any questions.

Attachment 1

Current PF-4 and RLUOB Laboratory-Floor Space Allocation by Program/Activity*
PF-4 is approximately 280-ft on a side

Phase 1: RLUOB space modifications shown as dashed lines [total RLUOB laboratory space (19,500 sq.ft.) or total laboratory-floor space (40,000 sq. ft.) not shown]
Phase 2: PF-4 space modifications shown as dashed lines
Phase 3: Provides three possible module uses



*The placements of the space-blocks represent, to scale, the space allocations but are not representative of geographic location within PF-4.

MR&R = Materials Recycle and Recovery
RTBF = Readiness in Technical Base and Facilities
RLUOB = Radiological Laboratory Utility Office Building