

**NUCLEAR DETERRENCE SUMMIT—February 21, 2013**

**Ensuring a Viable Future for the Weapons Laboratories:  
Overcoming Management, Funding, and Policy Challenges**

Good afternoon, ladies and gentlemen,

My objective today is to give a simple answer to the question, “What does it mean to us, at Sandia National Laboratories, to perform on our nuclear security mission safely, securely, cost-effectively, and with technical excellence?”

I will start by establishing the overall context for our current nuclear weapons work. Yesterday, Don Cook showed status of various modernization efforts, in particular the B61 Life Extension Program (LEP) and the W88 Alt. It is my view that, with the Nuclear Weapons Council’s recent decisions and the beginning of the full-scale engineering development work on the B61 LEP, we have entered a new era of our nation’s nuclear deterrent, an era characterized by three major imperatives:

- Sustain a smaller and increasingly older legacy stockpile for many years to come.
- Modernize and reshape our nuclear deterrent as national policies evolve and ensure that the requisite infrastructure supports this task.
- Continue to advance and utilize the tools of stewardship, which are critically important to the successful execution of the first two imperatives and to mitigating the long-term risk of technology surprise.

These three imperatives play out in an overall national security environment that is dramatically more complex today than ever before. We cannot pick and choose among them. We must simultaneously make progress on all three, in support of Departments of Defense and Energy priorities. Clearly, the nuclear weapons enterprise faces a unique situation that creates a challenging and stressful environment.

Such an environment lends itself easily to speculation on how the enterprise will perform. At Sandia, we have been faced with some of that speculation as well, and so today I will provide some facts against the speculation as they relate to Sandia’s modernization program.

But let me first contrast the current environment with a much earlier one, with which you all are familiar. I'm referring to the Cold War era of the nuclear deterrent, which was characterized by high visibility, budget flexibility, rapid weapon development, and capability advancement. During that time, the stockpile came into being that forms the basis for the work we have going forward.

After the Cold War, we moved into the stewardship era, during which the quintessential challenge was the loss of underground testing. The sustained support received for stewardship has allowed us to make enormous progress in our understanding of nuclear weapons function in the absence of underground testing and has enabled us to attract talented staff. We must continue to apply and further the tools of stewardship during today's modernization era.

The challenging era in which we find ourselves today applies to Sandia as it does to the other parts of the nuclear weapons enterprise. So now, I would like to spend the rest of my talk on how we are approaching and progressing on the challenges we face. Let me begin by reminding you of what our job is.

Within the U.S. nuclear weapons complex, Sandia is responsible for the design, development, and qualification of nonnuclear components that ensure the weapons perform as intended when authorized and remain safe and secure otherwise. We are responsible for hundreds of highly specialized components with extremely high reliability specifications and unique, often very harsh, environmental requirements. At the same time, we are responsible for the systems engineering and integration of the nuclear weapons in the stockpile.

It is also our job, along with that of the other two National Nuclear Security Administration laboratories, to be responsible for stockpile stewardship and the annual assessment of the nation's nuclear weapons.

As a consequence of these mission responsibilities and the rapidly changing technical base of our components, we are conducting a large part of the modernization demands. And now, I will consider the key challenges we are facing:

- Program and cost management
- Management of human resources
- Leveraging our broader national security work in support of the modernization effort without compromising the key capabilities we bring to the nation by addressing other key national security missions

We fully recognize that we are not executing the modernization program during the Cold War era of greater financial flexibility. We have therefore focused on improvements to our program and cost management and have already made significant progress, but more is needed and planned.

Let me illustrate what I mean by significant progress in cost management with a familiar example for all of you, and that is estimating the cost of the B61 LEP.

It is interesting to note that there has been much discussion about growth in cost estimates for the B61. Sandia has participated in only two rigorous cost estimates of the B61, and those have resulted in a substantial reduction in the cost estimate.

In August 2011, we estimated the cost for a design option that met the set of military requirements at that time for the B61-12. In the final stages of our work, we recognized that this option was likely unaffordable in the face of fiscal constraints and in the overall context of the program.

Following this realization, we thought innovatively about alternative ways to approach the life extension program. This process led to a recommendation involving partial component reuse. When coupled with top-down cost management principles and a number of development builds and qualification testing, this approach resulted in an overall cost estimate roughly 40% lower than the first one. This option was endorsed by the Nuclear Weapons Council with a first production unit in 2019. The overall cost of the B61 LEP includes approximately \$3B for Sandia over a 12-year period.

Of course, that is cost estimation. What about actual cost performance? As has been pointed out, there are risks to cost performance, such as unplanned-for growth in labor costs, schedule delays, or technical risks.

Although we are in the early days of the B61, we do have some data. For example, the cost of a typical engineer working on the B61 at Sandia grew 0.5% from FY12 to FY13, which is less than the growth we used in the formal cost estimate. I mention this reality not because I believe that controlling labor costs is easy in the face of pressures such as medical benefits, fee changes, or several inflationary trends, but rather to indicate that we do recognize that challenge and are focused on cost management.

With respect to unforeseen schedule delays, those will be largely controlled by the congressional budget process. Regarding technical risks, I would just highlight that we are designing primarily to upgrade technology and not to accommodate new military requirements.

While it is a fact that the cost of the B61 modernization program is significant, compared with Sandia's overall budget of maintaining a nuclear deterrent, the B61 and W88 modernization cost is less than 20% for the entire decade. Therefore, when we consider modernization, together with the imperatives of maintaining the current stockpile and applying and furthering the tools of stewardship, the cost of modernization is not out of balance with the entirety of our work to support the deterrent. I must also recognize that our approach to stewardship, which has evolved over two decades, has proved to be an efficient and cost-effective means of ensuring the safety and security of the enduring stockpile.

For us, another challenge is, "can we staff the B61 program and, if so, can we staff it with the right people?"

Here are a few facts about the way we have been managing human resources for the B61 LEP. At the end of FY12, we had 465 total labor equivalents (TLEs), and as of the end of December 2012, we have 546 TLEs, growing to what we hope will be about 600 TLEs at the peak.

As you can see, we are well on our way to staffing the program, but then the question arises, "did we hire the right people?"

Getting the right mix of people needed for the B61 modernization effort has been a priority. To illustrate our strategy, I will give you a staffing example from FY12. Roughly one-third of the staff hired on the B61 came from Sandia's non-NW programs. This group of people, which represents the highest source of hiring, brought a high level of expertise in program management gained from work on large programs that require high levels of rigor. They also brought technical expertise. Without these people, executing the B61 LEP would be very difficult.

One-fourth of the B61 LEP staff moved from other parts of Sandia's nuclear weapons program where they had been largely engaged in stewardship activities. They bring the tools of stewardship—such as advanced simulation and new technology—to the modernization effort.

We have also hired externally: 10% were experienced hires with relevant product development experience and 17% were early career hires (mainly electrical and mechanical engineers). We feel that this ratio of early career employees is right, when we know that we must train the new generation of stewards of the nation's nuclear deterrent. Finally, approximately 16% of the staff hired was made up of external weapon contractors and staff augmentation contractors.

I have already alluded to the challenge of leveraging our broader national security work in support of the modernization effort without compromising the key capabilities we bring to the nation by addressing other key national security missions.

Our Lab has no confusion that nuclear weapons are our core mission, but the science, technology, and engineering capabilities required to support this mission position us to support other aspects of national security as well.

At Sandia, we have developed a symbiotic relationship between the nuclear weapons mission and broader national security missions. This relationship prevents insularity and creates a challenging, vigorous scientific and engineering environment that attracts and retains the new talent we need. Let me give you two examples that highlight the way in which this symbiotic relationship works.

First, I will give a technology example. Sandia has led the development of real-time processing and high performance-to-volume ratio technologies for synthetic aperture radar (or SAR). Both technologies were made possible by our extensive design and development work for radars for nuclear weapon fuzing. The technologies have been leveraged and are currently used by the Department of Defense. The extensive SAR work has sharpened our radar design competencies and kept Sandia aligned with advances in radar technology, such as radio-frequency integrated circuits. We are now applying these modern technologies to the design of the replacement radar for the B61 LEP, the W88 ALT, and the Mk 21 fuze with a high degree of commonality, which leads to cost savings.

My second example is Sandia's satellite program, which spans about five decades and has grown steadily with numerous customers. This program, which provides our nation with critical national security capabilities, has brought with it a very rigorous program-management environment for moving advanced technology within tight schedule requirements. We have leveraged the knowledge accumulated in these areas to our nuclear weapons program.

I strongly believe that today it is no longer imaginable that my Laboratory could deliver consistently on the commitments to the nuclear weapons program without the synergistic interagency work that attracts top talent, hones our skills, and provides stability through the cycles of the nuclear weapons program.

Government commitment to the broad national security work of the laboratories is essential for the United States to ensure the preeminence of our nuclear weapons and to enable multidisciplinary

technical solutions to other complex and high-risk national security challenges. In no way does our interagency work detract from our focus to execute our core nuclear weapons mission.

Having said all this, we continue to recognize the need to improve. At the same time, we are aware of the scrutiny we will receive and welcome it. We are prepared. We are positioned. We are executing the program, and so far, we are on budget and schedule.

Finally, I want to reaffirm our commitment to the three imperatives I defined at the beginning of my talk. We are simultaneously moving all three forward in support of the priorities of the Departments of Defense and Energy. The scope of our work is significant, and there is an expectation of a high rigor in all aspects of cost, schedule, and performance. We are committed to exceptional results for the nation.

Thank you very much for your attention.