THE RELIABLE REPLACEMENT WARHEAD AND THE FUTURE U.S. NUCLEAR WEAPONS PROGRAM

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I appreciate the opportunity to speak before you today. My remarks focus on the Reliable Replacement Warhead (RRW) program and our vision for the future nuclear weapons complex infrastructure—we call it Complex 2030. Initially, I will take a step back and describe how the period since the end of the Cold War has shaped where we are today, and where we are heading in the U.S. nuclear weapons program including efforts to "transform" the stockpile and supporting infrastructure. To set this context, I address five key questions:

- What was the nature of the nuclear weapons enterprise during the Cold War?
- What was our original strategy for sustaining the stockpile and supporting infrastructure?
- Why do we need to adjust that strategy and why now?
- What is our emerging game plan for a revised strategy? and
- How is our RRW strategy consistent with non-proliferation and arms control?

During the Cold War, nuclear weapons programs were undertaken in reaction to a clear and present danger to the nation's survival posed by a hostile Soviet Union. They involved large, multi-billion dollar, development and production programs for both nuclear weapons delivery systems and the warheads themselves. There was intense and sustained attention and scrutiny to these programs by senior government officials—both civilian and military. The uniformed services had a strong and prestigious career path for officers involved in nuclear weapons R&D, planning, and operations. There was sustained, widespread interest and support within Congress' leadership and rank and file. More generally, there was a reasonably robust bipartisan consensus that nuclear weapons, in large part, were essential to our nation's security, notwithstanding disagreements at the margins and strong debate on the details.

In regard to nuclear warhead development and production, the Department of Energy (DOE) and its predecessor agencies were replacing the stockpile on a 20 year cycle. Several major warhead system development efforts were underway at each of our national security labs at any one time. The stockpile was very large and diverse with many weapons types. Warhead designs were highly optimized to maximize nuclear yield in a minimum size and weight package so that many warheads could be deployed overall, with many warheads on each delivery system. There was a large and diverse warhead production complex producing up to 2000 warheads per year. On average, we were conducting about 20 nuclear tests per year at the Nevada Test Site both to develop new warheads, and to assure the safety and reliability of the existing stockpile.

As we near the close of the second decade since the Cold War's end, not one of the features that I have just described carries over today. We stopped new warhead production in 1991. We stopped underground nuclear testing in 1992. Our Cold War "design and build" strategy has evolved to one of "preserve and maintain". We have not designed and developed a new warhead in 20 years. As a result, some key capabilities the nation has asked us to maintain are in jeopardy. Today, the threats to the United States and its allies are more diffuse and uncertain. With the collapse of the Soviet Union, U.S. nuclear forces have been rightly deemphasized and no longer command the same attention from senior officials, or from Congress for that matter. The bipartisan consensus that we had about nuclear forces during the Cold War has evaporated.

The end of the Cold War was a welcome event, but as you can see it had enormous implications for nuclear weapons programs. In the years following the end of the Cold War, budgets for nuclear weapons programs were in "free fall"—funding was simply not available to sustain both R&D and production capabilities. A strategic decision was made to sustain and strengthen weapons program scientific and technical activities in order to ensure a future capability to certify the stockpile. While this was a reasonable decision given the limited resources at that time, in effect we mortgaged the present to ensure the future.

When the U.S. stopped nuclear testing in 1992, it sought to replace our ability to test with a Stockpile Stewardship Program (SSP) that emphasized science and technology coupled with a vigorous experimental program as a means to better understand the physics and chemistry of

nuclear weapons and their operation, and provided enhanced warhead surveillance tools so that we would have a much better chance of detecting the onset of problems in the stockpile.

The goal of stockpile stewardship has been to predict the effects of aging in our warheads so that we could replace aging components before they degraded overall system reliability. The end of the Cold War provided this opportunity—our focus was no longer on a continuous cycle of fielding new warheads to provide new military capabilities, but on sustaining existing nuclear capabilities.

We call this "life extension"—the process of observing the aging of individual components of warheads and replacing them before they fail. Consider this challenge. Your 1965 Ford Mustang, which you maintain as a collector's item, has been sitting in your garage for 40 years. You monitor it for such items as a clogged carburetor, corrosion in the engine block, battery discharge, etc. and you replace parts when you deem it necessary. However, you don't get to start the engine and take it for a test drive. The trick is to assure that if you do need it right away—to take your spouse to the hospital in an emergency—that it would work with certainty. That's what we have to do in a nuclear weapons "life extension program."

By the mid-1990's we had embarked on an ambitious program to acquire the new stockpile stewardship tools—advanced computing, high energy density physics capabilities, modern diagnostics facilities, and enhanced surveillance. We have since made good progress in acquiring and using these new capabilities. In 2001, when this administration took office, it inherited:

- A strong science base and surveillance program.
- A safe and reliable, but aging stockpile, with serious questions about the future.
- A plan for warhead life extension.

However, it also inherited a deteriorating or non-functioning manufacturing complex characterized by:

- Protracted underfunding
- Inability to produce plutonium or uranium parts

- Inability to produce/extract tritium
- Key facilities falling apart and an aging workforce.

Despite problems with the production infrastructure, substantial reductions in the size of the nuclear stockpile were achieved. But, because we couldn't produce warheads when and if they were needed—to hedge technical problems in the stockpile or adverse geopolitical changes—we still had to maintain a larger stockpile than desired. What we needed was a functioning and responsive manufacturing complex. To achieve it, we restored balance in our program by restoring lost production capabilities and modernizing others as required.

In recent years, we have made substantial progress including initial steps to achieve the Complex 2030 vision for modernizing the nuclear weapons infrastructure.

- We restored tritium production and extraction,
- We restored key uranium operations at Y-12,
- We are implementing plans to ramp up to an interim plutonium pit production capacity of 30-50 pits per year at Los Alamos by 2012,
- We are reducing the number of sites with large quantities of special nuclear materials (SNM), and
- We are dramatically accelerating dismantlement of retired warheads.

Yet we still have not reached agreement with Congress for a facility to restore production of plutonium components in sufficient quantity to support the long-term needs of the stockpile.

In 2003, we "took stock" of ten years of the SSP and came to some important conclusions. The main conclusion was that as we continue to draw down the stockpile, we have become concerned that our current path—successive refurbishments of existing warheads developed during the Cold War and to stringent Cold War specifications—may pose an unacceptable risk to maintaining high confidence in system performance over the long-term.

The evolution away from designs certified with underground nuclear tests, resulting from inevitable accumulations of small changes over the extended lives of these highly-optimized systems, is what gives rise to the concerns.

While we are confident that the stockpile stewardship program is working and that today's stockpile is safe and reliable, it is only prudent to explore alternative means to manage risk in seeking to ensure stockpile reliability over the long term.

The impetus for our work on RRW, therefore, is to sustain the military capabilities provided by the existing stockpile, not to develop warheads for new or different military missions.

A second major driver was the realization after 9/11 that the security threat to our nuclear warheads had fundamentally changed. The security features in today's stockpile are commensurate with technologies available during the Cold War and with threats from that time. Major enhancements in security are not easily available via retrofits to the legacy stockpile.

More broadly, the RRW program is examining the feasibility of providing replacement warheads for the legacy stockpile. Relaxing Cold War design constraints that sought maximum yield in a minimum size/weight package will allow the design of replacements that are easier and less costly to manufacture, are safer and more secure, eliminate environmentally dangerous materials and increase design performance margins, thus ensuring long-term confidence in reliability.

RRW, therefore, also offers a means to transform to a much more efficient and responsive, much smaller, and, we believe, less costly nuclear weapons infrastructure.

In 2005, an RRW design competition was initiated involving two independent teams from our nuclear weapons design labs—Lawrence Livermore and Los Alamos, both working with Sandia. Preliminary designs were provided last spring and an intensive peer review was completed.

Last November, the joint DoD-DOE Nuclear Weapons Council concluded that RRW was a feasible strategy to sustain the nuclear stockpile over the long term.

In March of this year, the NNSA and DoD jointly announced the results of the design competition. The Lawrence Livermore/Sandia design was selected, and an integrated design team led by those two labs will head up efforts to develop a replacement warhead for a portion of the nation's sea-based nuclear deterrent. I must emphasize that this announcement addressed selection of a baseline design for RRW; it was not a decision to begin engineering development of a warhead.

NNSA and the Navy will now work together over the next 9-12 months to develop a detailed project plan and cost estimate for developing and fielding the system. This work will support a future decision to seek congressional authorization to proceed into engineering development and subsequent production.

We are often asked: If today's stockpile is safe and reliable, why start on RRW now? Why not wait a few years when you know more? The need to start now is driven by two basic reasons.

First, the introduction of the RRW system provides the benefit of additional diversity in the nation's sea-based nuclear force. RRW will replace a portion of W76 warheads deployed on the Trident system. That particular warhead comprises a high percentage of our planned future strategic nuclear deterrent force under the Moscow Treaty. Although we have not uncovered any problems with the W76, it is prudent to hedge against a catastrophic failure of that system by introducing a genetically-diverse warhead design into the submarine launched ballistic missile force.

Second, the RRW effort has provided an opportunity to ensure the transfer of nuclear design skills from the generation that honed these skills with nuclear testing to the generation that will replace them. In five years, nearly all of that older generation will be retired or dead.

Many of you have heard about the study released last month by the American Association for the Advancement of Science (AAAS) on the role of RRW in the future U.S. nuclear weapons program. Let me offer a few comments about how we in NNSA view the report.

Overall, the AAAS report provides valuable input that highlights the challenges and opportunities inherent in the RRW program and related efforts to transform the nuclear weapons infrastructure. Much of the press coverage, however, has centered on a short section of the report addressing policy recommendations, including those relating to international implications of our programs. I want to highlight a few points that were not well covered in press reports.

Several of the report's recommendations reaffirm NNSA's plans to move forward with the RRW concept and efforts to transform the infrastructure. In particular, the report:

- Identified risks in both approaches to sustaining the nuclear weapons stockpile, that is, extending the life of legacy warheads versus replacing them with RRWs. It concluded that, "Pursuing the initial stages of this [RRW] path could be a prudent hedge against the uncertainties of an all-legacy future and an opportunity that might result in the creation of a better long-term posture."

- The report noted that the initial RRW design, given a strong emphasis on designs evolved from past nuclear tests and with more favorable performance margins, and a rigorous implementation and demonstration process for certification, "could lead to a final design that is certifiable without a nuclear test."

- The report pointed out that substantial improvements are needed to the nuclear weapons production complex, that the challenges are considerable, and that RRW "could be a useful catalyst for transforming the complex."

- Finally, the report recommended that changes were needed at "the [Pantex Plant] to accommodate the weapons throughput necessary for a reasonable range of stockpile options and development of a plutonium strategy that can produce pits in reasonable quantities on a timely basis." We are already implementing these recommendations. Specifically, our Pantex Throughput Improvement Plan has substantially increased capacity for warhead assembly and disassembly operations and will lead to a 50 percent

> increase this year in the dismantlement of Cold War-era nuclear warheads. Moreover, this year we will deliver the first production-certified plutonium pit for stockpile use in nearly two decades.

The report urges that Congress and the Administration seek broader consensus on the role of nuclear weapons in the post-Cold War, post 9/11 world and I agree. Indeed, the transformation of the nuclear weapons complex will take decades and require strong bipartisan support throughout this period for success. But we need not, and should not, as some suggest, defer our effort over the next 12 months to develop a detailed project and cost plan for the reliable replacement warhead pending resolution of these broad policy questions.

In the near-term, we will continue warhead life extension programs (LEPs). They remain an essential element of our overall strategy to manage risk.

Nevertheless, we will begin now and demonstrate by 2012-14 the ability to design, develop, produce, and certify RRW options optimized for:

- Increased performance margins so we can continue to certify without nuclear tests, and
- Ease of manufacture, and enhanced safety and security.

We will reduce the stockpile further as we gain confidence with RRW and make progress on Complex 2030.

While some would argue that the RRW program undermines U.S. nonproliferation goals, we see the overall RRW strategy as having positive implications for nonproliferation.

These warheads, by design, will not provide a new role for nuclear weapons or new military capabilities but will help sustain the military capabilities of the existing nuclear arsenal.

Because these warheads would be designed with more favorable performance margins, and be less sensitive to incremental aging effects, they would reduce the possibility that the United

States would ever be faced with a need to conduct a nuclear test. This supports overall U.S. efforts to dissuade other nations from conducting nuclear tests.

In fielding RRWs, we will not be increasing the size of the stockpile. These warheads will replace existing warheads. Indeed, RRW will provide opportunities for further reductions. Once a transformed production complex demonstrates that it can produce replacement warheads in a timely way to respond to emerging geopolitical threats or to technical problems in the stockpile, then we can go much further in eliminating spare warheads—further reducing the nuclear stockpile and thereby further demonstrating our commitment to Article VI of the Nonproliferation Treaty (NPT).

Our near-term strategy includes an increased rate for dismantling warheads that are retired from the stockpile. Warhead dismantlements ensure that stockpile and infrastructure transformation is not misperceived by other nations as "restarting the arms race." Indeed, our commitment to a smaller stockpile is made concrete by our record of accelerated dismantlements.

Finally, a safe, secure and reliable U.S. nuclear deterrent, credibly extended to our allies, supports U.S. non-proliferation policy because allies that are confident in U.S. extended nuclear deterrence guarantees will not be motivated to develop and field their own nuclear forces. This non-proliferation role of U.S. nuclear weapons is often underestimated. Our nuclear guarantees to allies such as Turkey, South Korea and Japan take on renewed emphasis given the weapons programs of North Korea and Iran.

Conclusion

Let me conclude by summarizing my basic message:

- To meet its own security needs and those of its allies, the United States will need a safe, secure, and reliable nuclear deterrent for the foreseeable future. We will achieve this with the smallest nuclear stockpile consistent with our nation's security.
- We see increased risk, absent nuclear testing, in assuring the long-term reliability of today's stockpile—i.e., the legacy warheads left over from the Cold War.

- Today's nuclear weapons complex is not sufficiently "responsive" to technical problems in the stockpile or to possible adverse geopolitical change.
- Our task is to work to ensure that the U.S. nuclear weapons enterprise, including the stockpile and supporting infrastructure, meets long-term national security needs.
- Our approach is to develop and field replacement warheads for the legacy stockpile as a means to transform both the nuclear stockpile and supporting infrastructure.
- These warheads will have enhanced safety and security features.
- We intend to accomplish all of this without requiring underground nuclear tests.