Testimony of the Honorable Elizabeth Sherwood-Randall
Deputy Secretary of Energy
"Nuclear Deterrence in the 21st Century"
Before the House Armed Services Committee
June 25, 2015

Introduction

Chairman Thornberry, Ranking Member Smith, and Members of the Committee, thank you for providing me with this important opportunity to discuss the Department of Energy's (DOE) role in supporting U.S. nuclear deterrence in the 21st century. The Secretary and I appreciate the attention and focus of this Committee on nuclear matters given their significance to our national security and the priority that the President has placed on ensuring the safety, security, and effectiveness of our nuclear weapons as we seek to reduce global nuclear dangers and the role and number of nuclear weapons.

I am honored to testify before you today alongside two of my close colleagues from the Department of Defense (DOD). Together, the Departments of Energy and Defense have a solemn responsibility for delivering the nuclear deterrent, and we work on this in tandem – with DOE providing the weapons and DOD providing the delivery systems. Our cooperation is strong and deliberate, as you will hear today. As the post-Cold War landscape becomes more complex and challenging, we must remain vigilant and prepared to ensure the protection of the American people and our allies and partners around the world against a wide range of current and evolving threats. Today we look forward to discussing our preparations to meet those challenges in our ongoing effort to build a strong national consensus on the role for and management of the nuclear deterrent.

Strategy

From the outset, this Administration set forth a clear two-pronged nuclear strategy: (1) reduce the threat of nuclear proliferation; and (2) maintain a safe, secure, and effective nuclear deterrent even as we pursue the safety and security of a world without nuclear weapons. At DOE we are charged with the mission to implement both elements of the nuclear strategy by providing a safe,

secure, and effective nuclear deterrent without nuclear explosive testing, while also preventing, countering, and responding to proliferation and nuclear terrorism around the world. I have been involved in both dimensions of this strategy since joining the Administration on its first day in January 2009.

The President set forth this strategy in April 2009 in Prague, when he stated the "threat of nuclear war has gone down, but the risk of nuclear attack has gone up." This strategy, developed to address the changed realities of the post-Cold War world, was most recently outlined in the Administration's 2015 National Security Strategy:

> No threat poses as grave a danger to our security and well-being as the potential use of nuclear weapons and materials by irresponsible states or terrorists. We therefore seek the peace and security of a world without nuclear weapons. As long as nuclear weapons exist, the United States must invest the resources necessary to maintain—without testing—a safe, secure and effective nuclear deterrent that preserves strategic stability. However, reducing the threat requires us to constantly reinforce the basic bargain of the Nuclear Non-Proliferation Treaty, which commits nuclear weapons states to reduce their stockpiles while non-nuclear states remain committed to using nuclear energy only for peaceful purposes.

With American leadership, our North Atlantic Treaty Organization (NATO) allies have consistently endorsed this strategy. For example, in the 2010 Strategic Concept, NATO commits to "the goal of creating the conditions for a world without nuclear weapons—but reconfirms that, as long as there are nuclear weapons in the world, NATO will remain a nuclear Alliance."

Policy Guidance

Guidance consistent with this strategy was initially laid out in the 2010 Nuclear Posture Review (NPR). The NPR identified five objectives and set forth a plan to achieve them. These objectives are:

1. Preventing nuclear proliferation and nuclear terrorism;
2. Reducing the role of U.S. nuclear weapons in U.S. national security strategy;
3. Maintaining strategic deterrence and stability at reduced nuclear force levels;
4. Strengthening regional deterrence and reassuring U.S. allies and partners; and
5. Sustaining a safe, secure, and effective nuclear arsenal.

While the NPR focused principally on steps to be taken in the next 5 to 10 years, it also considered the path ahead for U.S. nuclear strategy and posture over the longer term. Achieving these objectives and making sustained progress to reduce nuclear dangers, while ensuring security for ourselves and our allies and partners will, as the NPR noted, "require a concerted effort by a long succession of U.S. Administrations and Congresses. Forging a sustainable consensus on the way ahead is critical." This Committee's role in convening this hearing and others like it is critical to achieving that goal, for without public support the investments that are required will not be sustained.

In 2013, the President followed up on the NPF by issuing revised Nuclear Employment Guidance in the form of a Presidential Decision Document. This document provided guidance to DOE and DOD regarding the actions needed to ensure our nuclear posture is aligned to address 21st century threats. It also reinforced the need to maintain strategic stability, strengthen regional deterrence, and assure our allies and partners, all while reducing the overall size of the U.S. nuclear weapons stockpile, reducing the reliance on nuclear weapons in our national strategy, and continuously improving the safety, security, and effectiveness of our nuclear arsenal. In essence, the President directed that we work to become more effective as we move toward a smaller arsenal that maintains the full range of military capabilities required to meet any threat to the United States and our allies. In the work that led up to this new guidance, the Administration carefully evaluated the changing nature of the threat to ensure that the country is appropriately postured for the future.

In addition to maintaining a safe, secure, and effective nuclear arsenal, the NPR highlighted the necessity of preventing nuclear proliferation and terrorism. In particular, DOE is focused on three critical policy goals:

1. Preventing non-state actors and additional countries from developing nuclear weapons or acquiring weapons-usable nuclear materials, equipment, technology, and expertise; and preventing non-state actors from acquiring radiological materials for a radiological threat device.
2. Countering the efforts of both proliferant states and non-state actors to acquire, develop, disseminate, transport, or deliver the materials, expertise, or components necessary for a nuclear or radiological threat device or the devices themselves.
3. Responding to nuclear or radiological terrorist acts, or accidental/unintentional incidents, by searching for and rendering safe threat devices, components, and/or radiological and nuclear materials.

Implementation

Within the Department of Energy, NNSA is responsible for implementing central elements of the nuclear strategy, including the Stockpile Stewardship and Management Program (SSMP), the Naval Reactors program, and the Nuclear Nonproliferation, Emergency Response and Counterproliferation programs.

Although we have an aging stockpile and an even more aged nuclear complex, we have started to lay the foundations to ensure that we can maintain the safe, secure, and effective arsenal for the future through Life Extension Programs (LEP) and a modernized nuclear complex. The Department has made substantial progress, but we must continue working to maintain the cutting-edge scientific expertise and facilities to ensure our continued success into the future – for as long as nuclear weapons exist. Your support for LEPs and modernized infrastructure is critical to our national security.

We are also responsible with the Navy, through the joint Naval Reactors program, for developing new reactor plants for the Navy's nuclear-powered aircraft carriers and submarines, which provide delivery and propulsion systems important to our conventional and nuclear deterrent.

Finally, DOE is a key agency charged with implementing the mission to reduce nuclear threats that emanate from the unfortunate spread of fissile materials around the world. We fulfill this mission through our work to prevent, counter, and respond to a wide range of nuclear threats and terrorism.

In all that DOE does to implement the nuclear strategy, we depend on our unparalleled science and technology base. This base includes all of the Department's 17 national laboratories, including the three National Nuclear Security Administration (NNSA) laboratories, the Naval Reactors laboratories, the NNSA production facilities, and the Nevada National Security Site. Across this country, we have a workforce that invests every day in delivering on this vital mission. The synergy between all aspects of the nuclear mission is essential for the United States to ensure the preeminence of its nuclear weapons and nuclear threat reduction capabilities. DOE also leverages these capabilities to meet other complex and high-risk national security challenges facing our interagency partners including the Departments of Defense, State, and Homeland Security.

Given the centrality of our partnership for fulfilling the nuclear mission, DOE and DOD have worked hard through the Nuclear Weapons Council (NWC) to strengthen communication, foster collaboration, and increase transparency. This concerted effort has significantly improved the relationship between the Departments to the betterment of both and to the benefit of American national security. In the past few years, DOE and DOD have made substantial progress via the NWC in integrating cost, scope, and schedules for the entire nuclear system, including delivery platforms, warheads, and production infrastructure. The process ensures that DOE's warhead and infrastructure plans are linked up with DOD delivery platform schedules and operational requirements.

Stockpile Stewardship

One of our most remarkable achievements of the past two decades is the success of the SSMP. With the scientific and engineering capabilities developed under this program, and the dedication of a world-class workforce, we have maintained the nuclear stockpile without nuclear explosive testing for over 20 years.

Working through the NWC, DOE's NNSA and DOD maintain a safe, secure, and effective nuclear stockpile, and ensure that the delivery platforms are aligned with the stockpile. NNSA's share of this task is performed through a rigorous and formal annual surveillance process, by which we assess, maintain, and certify the existing stockpile systems. Even as the United States has foresworn the building of new nuclear weapons, the 2010 NPR provided the latitude and direction to consider the full range of LEPs including refurbishment, reuse, and replacement of the nuclear components. Through the LEPs and alterations ("ALTs"), NNSA extends the capability of weapons that have reached the end of what was anticipated to be their normal lifespan, or that have degraded parts to ensure their continued safety and effectiveness. NNSA accomplishes this objective by conducting extensive surveillance and modernizing, through LEPS, including replacing or repairing nuclear and non-nuclear components, while maintaining operational capability. These tasks require intensive human effort, backed up by DOE's substantial computational capabilities. Consistent with the 2010 NPR, the United States does not develop new nuclear warheads.

Each year DOE's NNSA sets forth its plans to maintain the stockpile in the annual Stockpile Stewardship and Management Plan. This plan is a comprehensive, interagency-coordinated plan for NNSA weapons activities that articulates the scope of work and required resources for the next 25 years. It covers in substantial depth the five-year period of the President's budget request.

A concrete example of how the current interdepartmental planning process is working effectively on behalf of the Nation is the decision to accelerate the schedule for the Long Range Stand Off (LRSO) cruise missile warhead. The decision to accelerate LRSO resulted from a detailed and deliberate interagency process that considered the future threat environment. Ultimately, DOE's NNSA and DOD recommended this acceleration via the NWC and it was approved in the context of the President's Budget Request for Fiscal Year (FY) 2016. While the Air Force is accelerating the design and development of the new cruise missile, DOE's NNSA is accelerating the LEP for the W80-4 warhead for the LRSO from a First Production Unit (FPU) date in FY 2027 to FY 2025.

We are also making significant progress in the full set of LEPs with which we are charged. DOE's NNSA has now passed the halfway mark in the production phase of the W76-1 LEP, which will support the U.S. submarine-launched ballistic missile (SLBM) capability. When completed, the W76-1 will have an extended life of approximately 30 years, and will enable the reduction of the total number of W-76 warheads currently in the inventory by approximately half.

NNSA is also making good progress in the engineering development phase of the B61-12 LEP, which remains on budget and on schedule. This program is critical to modernizing the nuclear gravity weapon stockpile while ensuring the sustainment of the Nation's strategic and non-strategic air-delivered nuclear deterrent capability. The development activities of the B61-12 LEP will also be highly leveraged in subsequent life extension activities. Once complete, the B61-12 LEP will enable the United States to retire the B83 bomb, the last megaton class nuclear weapon in the U.S. arsenal.

Working with the Air Force, we successfully completed environmental flight tests on the F-15, F-16, and B-2 aircraft on or ahead of schedule. These tests ensure that the B61-12 is compatible with analog fighters like F-15s and F-16s and digital fighters like the F-35, as well as the B-52. The B61-12 LEP program will enter Phase 6.4 Production Engineering in 2016 and remains on track to deliver the FPU in FY 2020. The B61-12 LEP will refurbish both nuclear and non-nuclear components and extend the life of the system by approximately 30 years. When complete, the B61-12 will allow consolidation of all of the variants of the B-61 currently in the inventory, with the exception of the B61-11, into a single variant and reduce the amount of nuclear material in the current B61 variants by 80 percent in the total mass of nuclear material. The B61-12 LEP will also allow a reduction by a factor of two in the number of air-delivered gravity bombs in the total inventory by consolidating the strategic and non-strategic capabilities, all while improving surety. All of these changes will be accomplished while meeting military requirements set out by the NWC.

As noted above, at the November 2010 Lisbon Summit, and again in NATO's 2012 Deterrence and Defense Posture Review, the allies reaffirmed the role of nuclear deterrence in NATO's security strategy. The B61 bomb, deployed with NATO dual-capable aircraft, provides the cornerstone of our extended deterrence commitment to NATO and other regional allies. Particularly since retirement of the nuclear-armed tomahawk cruise missile (TLAM-N), the B61 has similar importance to our Asia/Pacific allies. To sustain our nonproliferation goals, we must demonstrate to our non-nuclear allies that extended deterrence is real and that they do not need to pursue their own nuclear weapons programs. The B61 LEP reaffirms our commitment to maintain the capability to forward-deploy nuclear weapons with heavy bombers and dual-capable aircraft in support of extended deterrence and assurance of U.S. allies and partners.

In the past year, based on results from the ongoing surveillance of the nuclear weapons stockpile performed by our laboratories and plants, the NWC decided that it was prudent to expand the planned W88 ALT 370 to include replacement of the conventional high explosive (CHE) in the warhead. NNSA's goal is to add the new CHE and still keep the FPU date of 2020. This is an aggressive plan, but it is important to both the U.S. Strategic Command and the Navy to keep this expanded ALT on schedule. NNSA recently submitted a notification of intent to reprogram funds in support of this new scope of work and to keep the LEP on schedule. The Secretary and I respectfully ask the Committee to help us finalize this reprogramming action as soon as possible.

Science and Engineering

Science underpins everything we do, including our core responsibility to certify the safety, security, and effectiveness of the nuclear stockpile in the absence of nuclear explosive testing. NNSA is successfully performing its mission to certify the stockpile and ensure our military forces have the nuclear deterrent capabilities they need. DOE's world-class research, development, testing, and engineering are the key to this success. Through the science-based SSMP we have fielded a suite of innovative experimental platforms, diagnostic equipment, supercomputers, and modern codes that build on past nuclear explosive test data to simulate the dynamics of nuclear weapons. The combination of supercomputing and highly resolved experiments is powerful.

The Department uses its technical and scientific expertise, experimental facilities, and subcritical experiments, together with advanced simulation and modeling capabilities, to predict problems before they occur, diagnose them when they do, design the fix, and ensure it works. The experimental fidelity and greater predictive capability being achieved today is higher than it has ever been, with important results generated by the Z machine at Sandia, the National Ignition Facility at Livermore, the Omega laser at the University of Rochester, the Dual-Axis Radiographic Hydrotest facility at Los Alamos, and the JASPER gas gun and U1a subcritical capability at Nevada. Based on these data, today we have improved capabilities to model the effects of aging on our stockpile, as well as the effects of replacing individual components, as we extend the service life of the existing weapons in the nuclear stockpile.

Infrastructure

DOE's NNSA is also responsible for the nuclear security enterprise infrastructure necessary to sustain the stockpile. Although many aspects of the infrastructure are modern, such as the experimental capabilities and the support to the computational, simulation, and modeling tools discussed above, some of the infrastructure dates back to the days of the Manhattan Project. Much of it is degrading, has exceeded its useful life, and is in need of substantial maintenance or replacement.

Building a responsive infrastructure means investing wisely in new facilities, especially for plutonium and uranium, as well as high explosives, non-nuclear component production, and requisite office and laboratory workspace for our personnel. We must also work to maintain our aging facilities by stabilizing deferred maintenance. Infrastructure shortcomings can increase operating costs, decrease productivity, increase risks to safety, and shutdown program work. Having a modern, responsive infrastructure would allow the United States to reduce the nuclear stockpile even further, while also ensuring the safety of our people and our allies, as we could eliminate hedge weapons that we currently keep in case of geopolitical risk or technical failure of a weapon system. The Secretary and I have made reducing deferred maintenance a key part of the Department's overall infrastructure strategy, and we seek your support for this approach.

We recognize that these goals will not be met quickly, and that arresting the declining state of NNSA infrastructure will require steady commitment at all levels of the organization over many years, far beyond the duration of this Administration.

Prevent, Counter, Respond—Addressing Nuclear Proliferation and Terrorism

As noted at the outset of my testimony, DOE plays a central role within the U.S. Government in implementing nuclear threat reduction activities. Our portfolio of work aimed at preventing, countering, and responding to global nuclear threats is rooted in our capabilities to develop and sustain the U.S. nuclear stockpile, and enables us to implement this important dimension of the President's Prague Agenda. These efforts contribute significantly to U.S. national security and the security of our allies and partners; they can best be described as "defense by other means."

As with the nuclear deterrent, science underpins everything we do to counter nuclear proliferation and nuclear terrorism. The scientific, technical and engineering expertise resident in our laboratories, production plants, and sites allows us to apply scientific solutions to some of the world's most pressing national security problems, including understanding and responding to global nuclear proliferation and terrorism threats.

DOE's work to prevent nuclear proliferation and terrorism falls under four broad categories, which are reflected in the FY 2016 reorganization of NNSA's Defense Nuclear Nonproliferation program. These categories are: Material Management and Minimization; Global Material Security; Nonproliferation and Arms Control; and Research & Development.

The Material Management and Minimization (M3) program works globally to achieve permanent threat reduction by minimizing and, when possible, eliminating excess weapons-usable nuclear materials and by ensuring sound material management principles are applied in the peaceful use of remaining nuclear materials. To date, M3 has converted or confirmed the shutdown of 92 research reactors and isotope production facilities worldwide; has safely and securely removed or confirmed the disposition of over 5,359 kilograms of highly enriched uranium (HEU) and plutonium – enough material for more than 200 nuclear weapons – and removed all HEU from 26 countries plus Taiwan. Additionally, over 146 megatons of HEU

declared excess to the U.S. weapons program has been down-blended to low-enriched uranium (LEU), which represents enough for more than 5,800 nuclear weapons.

The Global Material Security program (GMS) works with partners worldwide to seek to ensure that all nuclear and radiological materials are secured, protected, under control, and accounted for, and that illicit movement of nuclear weapons, proliferation-sensitive materials, and radiological sources are deterred, detected, and investigated. While more work remains to be done, GMS has made significant progress. GMS has secured over 1,800 buildings that house radiological materials, and installed over 3,100 radiation portal monitors at over 500 sites since the beginning of the program.

The Nonproliferation and Arms Control (NPAC) program engages international partners to prevent the proliferation of weapons of mass destruction-related materials, equipment, technology, and expertise, by improving nuclear safeguards and export controls and enabling verifiable nuclear reductions. Since 2010, NPAC has supported over 100 safeguards training courses and workshops with international partners. It has transferred over 40 safeguards tools to international organizations and partner countries since 2008, partnered with 35 countries to implement national export control systems, and overseen implementation of the United States-Russia HEU Purchase Agreement, which converted about 20,000 nuclear warheads equivalent of Russian, weapons-origin HEU to LEU.

And the Research and Development (R&D) program pursues novel technologies to discover foreign nuclear weapons development activities, to detect nuclear detonations, and to strengthen the monitoring and verification of foreign commitments to nonproliferation and arms control treaties and agreements.

Together, these activities enable NNSA to prepare for the future by anticipating the technical aspects of possible nuclear terrorism scenarios. Furthermore, NNSA uses its deep knowledge of nuclear weapon design to characterize, detect, and defeat the range of nuclear or radiological devices potentially available to a rogue state or non-state actor. Based on this analysis, the teams that would ultimately respond to an incident can confidently assess and render safe any possible

threat. DOE participates in planning and exercises to ensure readiness, and also ensures the availability of scientists to provide real-time technical back-up to the responders in the field.

We also contribute to other countries' efforts to develop plans and capabilities to respond effectively and mitigate the consequences if a nuclear or radiological device results in a radioactive release.

Conclusion

As DOE works to prepare for the evolving and dynamic global security environment of the future, we will need to adapt and innovate in response to evolving and emerging threats. We must maintain a responsive nuclear infrastructure that is able to adjust our capabilities to respond to these trends. DOE will continue to work collaboratively with DOD to modernize a safe, secure, and effective deterrent through approved LEPs. We will continue to engage international partners to prevent, counter, and respond to nuclear dangers. Our capabilities will be based on our unique science and technology capabilities, our people, and our infrastructure across an integrated NNSA nuclear security enterprise within DOE.

The changing strategic context, including foreign strategic capabilities as well as technological developments, will continue to be key factors in our planning and drive innovation across the nuclear security enterprise. We are proud of the many contributions that our skilled workforce makes every day to the security of the American people and our friends and partners around the world. In conclusion, thank you again for giving me the opportunity to testify today on these important priorities before your Committee.