



Taking the Long View in a Time of Great Uncertainty

The New NNSA Strategic Vision to Modernize the U.S. Nuclear Stockpile

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In previous columns, we have discussed the challenges that the U.S. Nuclear Security Enterprise (NSE) faces to ensure a safe, secure, and reliable nuclear stockpile.¹ These challenges include meeting the requirements identified in the U.S. Nuclear Posture Review (NPR) of 2018;² revitalizing the infrastructure associated with the NSE National Laboratories and production sites, much of which is decades old; addressing the “gray tsunami”—the significant departure of the baby boomers who represented the first generation of nuclear stewards—an event expected earlier but now being driven by the inevitable aging of the workforce; and the issues addressed by recent critical reviews of the governance and management of the NSE.³ As all of those challenges are being addressed, the new technologies that are beginning to wrap around the nuclear deterrent—including artificial intelligence, additive manufacturing, cybersecurity, and hypersonics—bring additional uncertainties to the future of deterrence as we know it. In many ways, these challenges intersect with the top-level strategic issues identified by Institute membership at the special “Global Nuclear Materials Stewardship Challenges” interactive session held during the closing plenary of the 2018 Annual Meeting.⁴

What Is Modernization?

All nuclear states are currently “modernizing” their nuclear deterrents. The

traditional definition of modernization includes the following:

- Upgrading, improving, and enhancing nuclear weapons capabilities, to include nuclear weapons, delivery systems (bombers, intercontinental ballistic missiles, and submarines and cruise missiles), and command and control instrumentation;
- Maintenance, repair, and replacement of aging facilities and related infrastructure;
- Educating the next generation of “nuclear stewards”;
- Legacy management.

However, in the context of today’s complex world, modernization discussions can also include the following:

- Adaptation to a new global environment of proliferation and terrorism;
- Diplomacy, arms control treaties, nonproliferation, and counterproliferation;
- Stockpile reductions;
- Humanitarian impacts; and
- The concept of Global Zero.

In this complex environment, the pendulum often swings from one extreme to the other, and despite the major reductions in total nuclear weapons in the world from more than 70,000 in 1986 to less than 15,000 in early 2019,⁵ the reality of the remaining destructive power in the

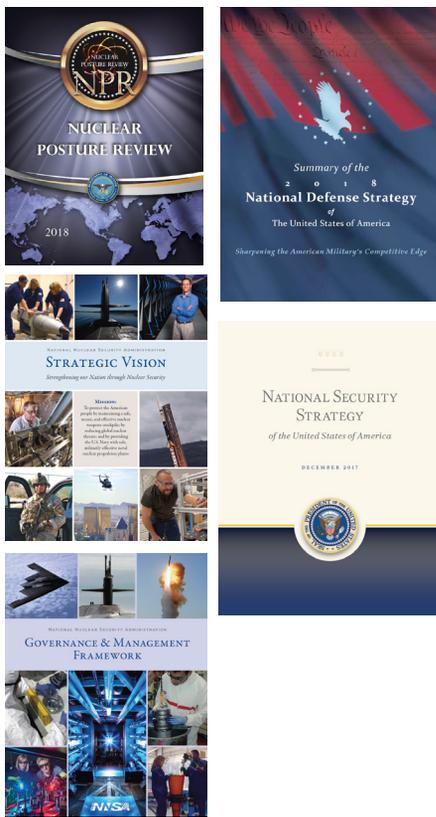
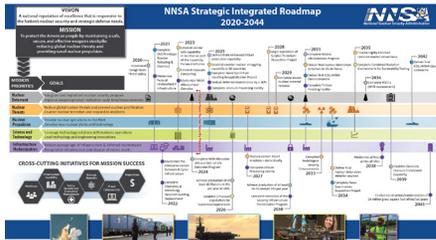
hands of nuclear-armed nations is difficult to grasp. The overwhelming number of nuclear weapons in the world is still held in the United States and in Russian stockpiles,⁶ but the proliferation of nuclear weapons knowledge and the advancement of advanced technologies portend a future to modernization that is more characteristic of science fiction stories where even non-nation states could represent existential threats to nations and even the future of mankind.

The New Reality

Nuclear weapons and the threat of using them has taken on a new reality in today’s world, amid public discussion of new delivery systems using hypersonic vehicles, large autonomous underwater nuclear torpedoes, and even nuclear-powered cruise missiles.^{16,7} Unknown, and unspoken, is research that may be occurring in new weapons technologies and effects, despite the current “observed” nuclear test ban.⁸ Against that backdrop, the United States has embarked on a modernization plan initiated during President Obama’s administration and fully engaged during the current Trump administration. Congressional Budget Office estimates are that \$1.3 trillion will be needed over the next 30 years to achieve the goals set by our current NPR.⁹



A New Vision for the National Nuclear Security Administration (NNSA)



NNSA issued a new *Strategic Vision*,¹⁰ *Governance & Management Framework*,¹¹ and *Strategic Roadmap (2020–2044)*¹² in early May 2019 to address the challenges of modernization and other issues. More than a year in the making, these new documents create a path forward for the NSE, addressing not only the requirements of the NPR, but also the related issues of infrastructure, workforce, governance and management, and risk management.

These new strategic documents are driven by U.S. national planning documents, including the *National Security Strategy*,¹³ *National Defense Strategy*,¹⁴ and NPR, overseen by the Nuclear Weapons Council (NWC)¹⁵ that serves as the focal point for interagency activities to maintain the U.S. nuclear weapons stockpile. The NWC is a joint Department of Defense (DoD) and Department of Energy (DoE) activity responsible for facilitating cooperation and coordination, reaching consensus, and establishing priorities between the two departments as they fulfill their dual-agency responsibilities for U.S. nuclear weapons stockpile management.

The mission priorities and strategic management challenges identified in these new NNSA strategic planning documents include the following:

Mission Priorities

- Maintain the safety, security, and effectiveness of the nation’s nuclear deterrent
- Reduce global nuclear security threats and strengthen the nuclear enterprise
- Provide safe and effective integrated nuclear propulsion systems for the U.S. Navy
- Strengthen key science, technology, and engineering capabilities
- Modernize the national security infrastructure

Strategic Management Challenges

- Workforce
- Infrastructure capability
- Safety and security
- Strategic materials
- Emergency management
- Information technology and cybersecurity
- Acquisition

These strategic documents also describe corporate expectations for federal program, functional, and field offices, as well as the contractor partners and corporate parents of the management and operating (M&O) contractors, creating “one NNSA” to achieve the aggressive goals set by the NPR.

The Future of Deterrence

The intersection of these modernization efforts and the Institute’s newly identified strategic priorities can be seen particularly in these areas discussed in last quarter’s *JNMM* column⁴:

- Lack of political progress on nuclear disarmament;
- Ability to interfere with safety systems at facilities;
- Connecting policy and technical communities to develop solutions;
- Artificial intelligence/machine learning.

So striking is the change in technologies that the literature has begun to speculate where deterrence might be headed with the intersection, for example, of hypersonics and artificial intelligence,¹⁶ leading to scenarios seen only in science fiction movies, where autonomous systems are justified to ensure a timely retaliatory response. How the nations of the world continue to modernize their nuclear stockpiles in the context of these rapidly evolving technologies is yet to be understood. This is the future the world now faces with more than 13,000 nuclear weapons still in stockpiles.

This column is intended to serve as a forum to present and discuss current strategic issues impacting the Institute of Nuclear Materials Management in the furtherance of its mission. The views expressed by the author are not



necessarily endorsed by the Institute but are intended to stimulate and encourage JNMM readers to actively participate in strategic discussions. Please provide your thoughts and ideas to the Institute's leadership on these and other issues of importance. With your feedback, we hope to create an environment of open dialogue, addressing the critical uncertainties that lie ahead for the world, and identify the possible paths to the future based on those uncertainties that can be influenced by the Institute. Jack Jekowski can be contacted at jjjekowski@aol.com.

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