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NNSA's Role in the Biden Nuclear Posture Review

John R. Harvey
John R. Harvey is former Principal Deputy Assistant to the Secretary of Defense for Nuclear, Chemical and Biological Defense Programs and former Director, Policy Planning Staff of the National Nuclear Security Administration. His comments below were delivered at a webinar sponsored by the Advanced Nuclear Weapons Alliance and the Mitchell Institute for Aerospace Studies on November 18, 2021.

I am pleased to discuss NNSA's role in connection with President Biden's review of U.S. nuclear policies, posture and programs. My remarks focus on NNSA's weapons' mission and less so on its other major line of business involving arms control, non-proliferation and threat reduction. In setting the context for discussion, I address four NPR "must dos" for NNSA:

1. Complete ongoing modernization programs, including recapitalization of degraded warhead production infrastructure, on time and cost.
2. Continue to sustain stockpile safety and reliability under a nuclear test moratorium.
3. Work with DoD to implement a strategy to hedge strategic risks.
4. Restore eroding human skills in modern warhead design, development and engineering.

These "must dos," of course, are NNSA's job irrespective of the ongoing NPR; this NPR's job is to highlight again their critical importance to U.S. security in helping to deter foreign threats and assure allies of our commitment to come to their defense.

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Nuclear Modernization Underway

Mr. Obama initiated, and Mr. Trump continued, a 30-year, $1.2 trillion nuclear modernization program involving the near simultaneous replacement of every leg of the aging triad, a major upgrade to the nuclear command and control system, and recapitalization of NNSA's aging warhead production infrastructure. This program, so far, has received strong bipartisan support from Congress. Recall the NNSA piece of that modernization program:

- Five warhead life extension programs to be completed on time and cost:
  - W76-1 SLBM warhead (now completed)
  - B61-12 bomb (FPU announced this month?),
  - W88-alt SLBM warhead,
  - W80-4 for LRSO, and
  - W78 ICBM warhead (now called the W87-1 LEP).

- Other warhead-related activities:
  - Field a low-yield warhead for the Trident D-5 SLBM (also completed).
  - Advance concept/feasibility studies for a next Navy SLBM warhead—the Mk7/W93.
  - Advance similar studies for a modern nuclear SLCM warhead.
  - Plan to retain the B83 bomb in the nuclear stockpile.

- Nine large capital construction projects in various stages of execution to provide:
  - Capability and capacity to produce plutonium pits at two sites at a combined rate of no fewer than 80 pits per year by the early 2030s.
  - Safe, environmentally sound manufacture of highly enriched uranium (HEU) parts at the Y-12 plant in Oak Ridge, TN.
  - Reactor capacity, and availability of sufficient unobligated low enriched uranium (LEU), to produce an adequate supply of tritium for the nuclear stockpile.
  - Continued capability to develop and manufacture secure, trusted rad-hard microelectronic systems beyond 2025.

There is nothing more important for U.S. and allied security than for NNSA to successfully complete these complex and challenging warhead and infrastructure modernization programs on time and cost.

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Stockpile Stewardship under a Continued Nuclear Test Moratorium

In turning to my second point—Stockpile Stewardship under a test moratorium—it is first important to correct a widely-held misperception. The task is not to "sustain the aging stockpile without nuclear testing," although that's our hope. Rather, from Day#1 of the SSP, it is to "understand the stockpile well enough to know when a nuclear test is required to confirm a problem with, or certify a fix to, a warhead critical to the nation's deterrent." U.S. policy, then and now, is to suspend its test moratorium to conduct any such required tests.

The good news is that, for nearly a quarter century, our national labs and universities have brought extraordinary scientific capabilities to bear in assessing that the U.S. stockpile remains safe and reliable in the absence of underground nuclear testing—an achievement that 25 years ago many of us thought would not be possible. Absolutely essential to continued success are activities to sustain the scientific and technical personnel, computational, experimental, and test capabilities needed to assess safety and reliability as well as to design, develop, and produce modern nuclear warheads if needed in the future. There are some concerns in this area to which many of you are aware and to which I will return.

Hedging Strategic Risk

The concept of the hedge broadly refers to the approach taken to meet deterrence objectives while managing strategic risks to the U.S. nuclear deterrent, especially in light of an uncertain global security environment, today's limited warhead production capacity, and a much smaller deployed stockpile. Strategic risks to the U.S. deterrent are threefold:

- **Technical Failure:** Component failure affecting a warhead or delivery system involving a significant portion of the deployed force. For example, an ALCM warhead failure would reduce the ability to hold at-risk targets requiring a stand-off capable bomber strike option.
- **Geopolitical Reversal:** Unanticipated changes in the global security environment that could place at risk the U.S. ability to deter, or respond to, attacks by ever more capable adversaries. For example, a Russian effort to attain nuclear superiority via New START breakout, or an effort by China to achieve nuclear weapons peer status, or both.
- **Technological Disruption:** Advanced technologies or systems that could degrade the effectiveness of a portion of the U.S. deterrent. For example, an adversary develops an advanced ASW capability to detect and track submerged U.S. SSBNs and thereby put at risk the survivability of the sea-based leg of the Triad.

An integrated hedge strategy must take into account each of these strategic risks.

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Hedging with a Responsive Nuclear Infrastructure

During the Cold War, to deter a hostile Soviet Union and for strategic risk management, the U.S. maintained a fully exercised nuclear weapons innovation, R&D and manufacturing base as well as a stockpile of tens of thousands of nuclear warheads of many different types. The then-extant capabilities and capacities of the nuclear enterprise itself provided a near-continuous program of stockpile modernization and fielding of new weapons. After the end of the Cold War much of this activity ceased, the nuclear stockpile was dramatically reduced, the nuclear enterprise contracted, and many supporting capabilities went unattended.

The preference, as articulated in previous NPRs, is to hedge with a modern, responsive nuclear weapons R&D and production infrastructure. With such a capability the U.S. could repair or remanufacture warheads and/or delivery systems in a timely way in response to unanticipated contingencies. As the ongoing strategic modernization program proceeds, the DoD nuclear infrastructure is being fully exercised, although some pieces (e.g., large solid-rocket motor production) have been underutilized of late and may be at some risk. For warheads, the NNSA production infrastructure is not capable today to meet hedge needs although there are funded programs in place that will recapitalize it over time. For the next decade or so, we must make do with what modest capabilities we have to fix broken warheads or, if necessary, augment the force by producing new ones.

Hedging with Reserve Warheads in the Stockpile

Thus, to hedge risk today, the U.S. must also maintain a stockpile of reserve warheads, and the ability to upload those warheads on existing delivery systems. Under New START, both sides accepted an aggregate limit of 700 deployed ICBMs, deployed SLBMs, and deployed nuclear-armed heavy bombers and an aggregate limit of 1550 strategic nuclear warheads on these systems. Today, the U.S. nuclear force consists of:

- 400 deployed Minuteman III ICBMs
- 12 deployed Ohio-class SSBNs each with 20 SLBMs
- 41 B52 Bombers
- 19 B2 Bombers.

The ability to upload and deploy additional weapons on these delivery systems provides some ability to mitigate any targeting shortfalls arising from unanticipated events. The upload potential in the force—many hundreds of warheads—will vary across triad legs as well as with the number of reserve warheads of specific types available for upload. Today's hedge strategy involving warhead upload has a number of features:

- Ideally, maintain two genetically-diverse warhead types for each leg of the Triad in sufficient numbers so that failure of one type can be hedged by uploading the other type.
- Uploading from within a triad leg (intra-leg hedging) is preferred to maintain the unique features of any leg experiencing a failure (e.g., pre-launch survivability, recallability).
- Hedging between legs (inter-leg hedging) is carried out when there are insufficient weapons for intra-leg hedging.
- Additional warheads are maintained to hedge a warhead completing life extension and just entering the force until confidence in the LEP is attained (e.g., W76-0. B83).
- A hedge sized to address technical risks to warheads and delivery systems is also deemed sufficient to address geopolitical reversals. This accepts the risk of a technical problem arising simultaneously with such a reversal or ensuing crisis.
- A hedge sized to address Russian breakout is deemed sufficient to address a separate, but not simultaneous, comparable threat evolving from China.

Human Skills and the Stockpile Responsiveness Program

Many of us take as a given that U.S. nuclear forces help prevent major wars and promote strategic stability among the major powers. But these forces are underwritten by a set of exquisite capabilities that are no less important in deterring adversaries and assuring allies: I refer to people—the people who design, develop, build, secure, plan, operate and maintain nuclear forces and the associated R&D, manufacturing, and operational infrastructures.

A concern of late is maintenance of the skills and capabilities of the people whom the nation relies on to design, develop and field modern nuclear warheads. For three decades, absent a military need for new warheads or warheads with new capabilities, focus has centered on maintaining existing warheads with life extension programs. Such life extensions have helped sustain today's stockpile, but they do not exercise the full range of skills needed to design, develop and field modern warheads. As a result, certain skills have eroded as have opportunities to train a next generation of weapons scientists and engineers.

For exactly this reason, Congress established the Stockpile Responsiveness Program. Its job is to provide opportunities (1) to exercise, and thereby restore, critical skills for fielding modern warheads and (2) to advance innovations that could allow the ongoing modernization program of record to deliver warheads faster and at lower cost. Although underway for only a few years, the SRP has so far met the goals that Congress intended for it and, as a result, constitutes an important component of U.S. hedge strategy.

Early on, the SRP was funded at a few tens of millions which was enough to begin limited efforts at the national labs to address design and engineering skills. In FY21, a funding ramp-

up to about $70M is enabling initiatives at the plants to pursue innovations in advanced manufacture. Funding for FY22 is not yet clear—the defense authorization committees marked the program at $70M while the relevant appropriations subcommittees have cut it to $10M. This disconnect may have resulted from an incorrect perception that the SRP is being used to circumvent Congress and produce new warheads without necessary authorization.

This is *not repeat not* the case! NNSA must correct this misperception and impress upon House and Senate appropriations committees the SRP's importance both to a healthy infrastructure and to U.S. hedge strategy. It should consider increasing SRP funding to the $100-150M range to continue work restoring critical design and engineering skills, including by providing challenging problems to a new generation of weapons scientists and engineers, and extend it to generate innovations in manufacture.

Defense Innovation

Finally, a responsive infrastructure must include a defense innovation base to address the risk of technological disruption highlighted earlier. We must invest to ensure that scientists and engineers at our national labs, universities, FFRDCs and defense contractors stay at the forefront of what is possible regarding technological advances that could place the nations deterrent at risk. The nation generally does a good job in this area but enduring focus here is essential.

China and the Hedge

China's apparent efforts to ramp up its ICBM force is exactly the unanticipated event for which a hedge was contemplated. Deterring a hostile Russia and China, possibly at the same time, has been a feature of U.S. policy for decades. During the Cold War, even in the event of a major nuclear exchange with Russia, the U.S. maintained sufficient survivable warheads in reserve to deter any incentive by the Chinese to take advantage by "piling on." But this was during a time when both Russia and the U.S. maintained thousands of strategic warheads, while China possessed just a few tens of ICBMs. There was flexibility then in U.S. forces to deter both.

Today, with operationally-deployed strategic warheads capped at 1550, most to deter Russia, and with China's ramp-up to potentially several thousand ICBM warheads, the situation changes dramatically. Limiting options is the fact that the intensive, ongoing program to modernize each leg of the Triad does not leave much "free energy" in the acquisition system for DoD or NNSA to respond with new nuclear programs in the near term.

Mr. Biden's NPR must begin the dialog for how to respond to China's nuclear buildup if and when it fully materializes. This response will have implications for nuclear doctrine and hedge policy to include the option that "hot" production lines for GBSD, the B-21 bomber, Columbia,

LRSO, and the like may be kept going once their originally intended build is complete. The NPR should also examine approaches to advance a bilateral dialog with China to manage, and possibly mitigate, this competition. I take note that just this week President Biden and General Secretary Xi agreed to begin a "conversation" on nuclear risk reduction.

Let me conclude my remarks here and I look forward to your questions.

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