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Nuclear Weapons Enterprise Transformation - A Sustainable Approach

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Nuclear weapons play an essential role in United States (U.S.) National Security Policy and a succession of official reviews has concluded that nuclear weapons will continue to have a role for the foreseeable future. Under the evolving U.S. government policy, it is clear that role will be quite different from what it was during the Cold War. The nuclear-weapons stockpile as well as the nuclear-weapons enterprise needs to continue to change to reflect this evolving role. Stockpile reductions in the early 1990s and the Stockpile Stewardship Program (SSP), established after the cessation of nuclear testing in 1992, began this process of change. Further evolution is needed to address changing security environments, to enable further reductions in the number of stockpiled weapons, and to create a nuclear enterprise that is cost effective and sustainable for the long term.

The SSP has successfully maintained the U.S. nuclear stockpile for more than a decade, since the end of nuclear testing. Current plans foresee maintaining warheads produced in the 1980s until about 2040. These warheads continue to age and they are expensive to refurbish. The current Life Extension Program plans for these legacy warheads are straining both the nuclear-weapons production and certification infrastructure making it difficult to respond rapidly to problems or changes in requirements. Furthermore, refurbishing and preserving Cold-War-era nuclear weapons requires refurbishing and preserving an infrastructure geared to support old technology. Stockpile Stewardship could continue this refurbishment approach, but an alternative approach could be considered that is more focused on sustainable technologies, and developing a more responsive nuclear weapons infrastructure.

Guided by what we have learned from SSP during the last decade, the stewardship program can be evolved to address this increasing challenge using its computational and experimental tools and capabilities. This approach must start with an improved vision of the future stockpile and enterprise, and find a path that moves us toward that future. The goal of this approach is to achieve a more affordable, sustainable, and responsive enterprise. In order to transform the enterprise in this way, the SSP warhead designs that drive the enterprise must change. Designs that emphasize manufacturability, certifiability, and increased safety and security can enable enterprise transformation. It is anticipated that such warheads can be certified and sustained with high confidence without nuclear testing. The SSP provides the tools to provide such designs, and can develop replacement designs and produce them for the stockpile. The Cold War currency of optimizing warhead yield-to-weight can be replaced by SSP designs optimizing margin-to-uncertainty.

The immediate challenge facing the nuclear weapons enterprise is to find a credible path that leads to this vision of the future stockpile and enterprise. Reliable warheads within a sustainable enterprise can best be achieved by shifting from a program of legacy-warhead refurbishment to one of warhead replacement. The nuclear weapons stockpile and the nuclear weapons enterprise must transform together to achieve this vision. The current Reliable Replacement Warhead (RRW) program represents an approach that can begin this process of transformation. If the RRW program succeeds, the designs, manufacturing complex, and certification strategy can evolve together and in so doing come up with a more cost-efficient solution that meets today's and tomorrow's national security requirements.

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