



Office of the Director

January 25, 2010

The Honorable Michael R. Turner
Ranking Member Subcommittee on Strategic Forces
Committee on Armed Services
U.S. House of Representatives
2120 Rayburn House Office Building
Washington DC 20515

SUBJECT: JASON Report on Life Extension Options for the U.S. Nuclear Weapons Stockpile

Dear Ranking Member Turner:

Thank you for the opportunity to comment on the JASON report *Life Extension Options for the U.S. Nuclear Weapons Stockpile*.

Before providing specific comments on the report, I would like to provide some overarching perspectives. The Laboratories continually assess the stockpile through surveillance, the experimental and simulation tools of the Stockpile Stewardship Program, and the expertise of our scientists and engineers. We have observed aging changes that continue to grow and have gained new technical insights which all have created physics and engineering conditions that are often very difficult to evaluate and resolve. In many cases, the uncertainties associated with these issues threaten to overwhelm the small performance margins that characterize most of the weapons in the current stockpile. This ultimately limits the lifetime of the weapons and dictates that almost every weapon system in the current stockpile will require a life extension activity in the next 25 years. This can provide opportunities to manage the stockpile by:

1. Replacing all conventional high explosive (CHE) primaries with insensitive high explosive (IHE) primaries to increase safety margins and enable security improvements;
2. Deploying certain intrinsic surety systems in the entire stockpile to better meet today's security challenges; and
3. Increasing nuclear performance margins to mitigate the need for nuclear testing.

A strategy that blends refurbishment, reuse and replacement provides options to incorporate all three of these goals, implemented for each weapon system based on its specific circumstances. Constraining the strategy to a refurbishment-only strategy does not permit the incorporation of the first two warhead attributes within the future stockpile and only permits limited improvement in performance margins.

In my judgment, a technically sound stockpile management program must incorporate IHE, deploy appropriate intrinsic surety features and substantially increase nuclear performance

margins. The ability to develop and certify a future stockpile with these weapon attributes, as well as, the ability to assess when each weapon system should undergo a life extension activity and the scope of that activity, depends on a sound, robust stockpile stewardship program.

With respect to the JASON report, I agree in general with its findings and recommendations. However, there are certain findings that have been misinterpreted, especially as presented in the unclassified summary. I will address some of these explicitly here.

The JASON report states that the lifetimes of today's nuclear weapons could be extended for decades, with no anticipated loss of confidence, by using approaches similar to those employed in LEPs to date. I do not agree with this assertion. Some materials and components in the current stockpile cannot be replicated in a refurbishment, and it is not known if suitable replacements that would sustain confidence could be incorporated into the current systems. Moreover, it cannot be assumed that increasing insight and understanding in the future will necessarily increase confidence in the stockpile; such knowledge is fundamentally unknowable in advance. Although the Stockpile Stewardship Program has provided the experimental, simulation and analytical tools to assess most issues to date, the available mitigation actions, such as changes external to the nuclear package, or relaxation of certain military requirements, are reaching their limits.

There are several technical issues that cannot be addressed using a refurbishment-only approach:

- It is not possible to replace CHE primaries with IHE primaries or implement certain intrinsic surety features in today's stockpile using refurbishment because of current system constraints.
- Weapon aging, which can manifest itself in the form of corrosion, microscopic and macroscopic defects, etc., can lead to off-normal or feature-driven disruption to nuclear performance and diminish the available performance margin in low-margin weapons more rapidly than the weapons could be cycled through a refurbishment. This risk can be managed by preemptively increasing margins – but by amounts larger than those available through refurbishment.
- The JASON correctly recognizes that "Substantial reductions in yield for various stockpile warheads, which may be called for in the forthcoming Nuclear Posture Review, also could not be accomplished using refurbishment."

Further, the JASON report states that some reuse and replacement options require a more advanced understanding of weapons physics. While this is an accurate statement, it also applies to refurbishment. And it does not mean that reuse and replacement options are precluded technically. In fact, the classified JASON report supports reuse and replacement options:

- "An LEP strategy largely based on reuse of tested stockpile components such as primaries and secondaries from different warheads could eventually be used as the foundation of a stockpile with weapons with enhanced surety and high confidence factors."
- "An LEP strategy centered on complete replacement of the primary and secondary could also provide intrinsic surety with, in principle, even larger performance margins at lower yields."

Finally, it would be incorrect to conclude from the report that reuse and replacement options are more difficult to certify. In fact, the JASON report states that, "Assessment and certification challenges depend on design details and associated margins and uncertainties, not simply on whether the LEP is primarily based on refurbishment, reuse or replacement."

In general, I support the five recommendations presented in the Executive Summary:

1. Determine the full potential for refurbishment.
2. Quantify potential benefits and challenges of LEP strategies that may require reuse and replacement.
3. Strengthen and focus science programs to anticipate and meet potential challenges of future LEP options.
4. Revise the surveillance program so that it meets immediate and future needs.
5. Assess the benefits of surety technologies in the context of the nuclear weapons enterprise as a system.

I believe that the first recommendation is largely in hand as a result of experience gained from the W87 life extension project, the B61-7/11 Alteration 357 and the W76-1 life extension project. Activities are already underway to address the second and fifth recommendations. I have repeatedly raised my concern about the adequacy of the surveillance program in my annual assessment letters and the National Nuclear Security Administration has acknowledged the need to address these concerns and the fourth JASON recommendation.

The third recommendation requires the most attention and effort in the future. The technical challenges in sustaining and managing the nuclear deterrent can only be met with a focused and balanced weapons science program. The JASON report recognizes the importance of a robust science enterprise when it states, "The most serious threat in our view to the success of the ongoing and future LEPs is lack of support for weapons science activities that are critical to our understanding of fundamental processes in nuclear weapons." The JASON and I are in complete agreement on this issue.

I would be pleased to discuss my observations in additional detail at your convenience.

Sincerely,



Michael R. Anastasio
Director

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Dr. George Miller, Lawrence Livermore National Laboratory
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