

Comments on *Peer Review and Design Competition in the NNSA National Security Laboratories**

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On 1/5/2016, I received an email from the Counsel to the Strategic Forces Subcommittee of the House Armed Services Committee, inviting me to testify the following Tuesday, 1/12/2016 to the Subcommittee to provide context and alternative perspective on a recommendation to build new prototypes of nuclear weapons made in the recent NAS report on peer review and design competition in the NNSA national security laboratories (for reference, see footnote below; in this note, I refer to this document as “the NAS report”). Due to other commitments, I declined the invitation to testify. This note outlines my views on the subject NAS report.

Briefly, the NAS report deals with two crucial issues in stockpile stewardship: 1) providing quality assurance in the maintenance of the nuclear deterrent through inter-laboratory peer review, and 2) developing and retaining technical staff, both under the Nation’s moratorium on explosive nuclear testing. In my view, the conclusions and recommendations regarding peer review are generally supportive of policies implemented by NNSA and its national laboratories during 2008-2010, with useful suggestions for extension and improvement. On the other hand, its second major recommendation, to develop new prototype nuclear weapons not to be entered into the stockpile, is so vague and poorly supported that it cannot be analyzed in a serious way. The intent of the recommendation, to provide important, challenging technical problems that will attract and retain qualified scientists and engineers to careers in the stockpile stewardship program, must be part of any long-term strategy to maintain the nation’s nuclear deterrence, but the proposal outlined in the NAS report provides no basis for anticipating its value to U.S. deterrence, its chances of success, or its potential for launching unintended deleterious consequences. Finally, the report is spotty in terms of level of detail and is lacking in clarity, which must make it difficult, at best, for anyone not already immersed in details of the U.S. nuclear weapons program to understand what is being proposed.

I what follows, I give a personal synopsis of the report, followed by additional comments.

* Report of the Committee on Peer Review and Design Competition Related to Nuclear Weapons, The National Academies Press (2015).

The NAS Report, a Brief Synopsis

The NAS report was the product of a committee organized through the National Academies and chaired by Paul Percy and Jill Dahlburg. The study commenced in June 2014 and completed with the recent release of the report by NAS in late 2015. The Administrator of the National Nuclear Security Administration commissioned the study in response to Congressional language. The charge followed by the committee was:

“Assess the following:

- The quality and effectiveness of peer review of designs, development plans, engineering and scientific activities, and priorities related to both nuclear and non-nuclear aspects of nuclear weapons;
- Incentives for effective peer review;
- The potential effectiveness, efficiency, and cost of alternative methods of conducting peer review and design competition related to both nuclear and non-nuclear aspects of nuclear weapons, as compared to current methods;
- Known instances where current peer review practices and design competition succeeded or failed in finding problems or potential problems; and
- How peer review practices related to both nuclear and non-nuclear aspects of nuclear weapons should be adjusted as the three NNSA laboratories transition to a broader national security mission.”

The report lists four basic sets of conclusions with accompanying recommendations. The first set addresses the first two bulleted elements of the charge, concluding that the peer review process is used effectively by all three NNSA laboratories (Los Alamos, Livermore, and Sandia), that incentives for peer review at the laboratories “are abundantly evident”, that somewhat different approaches are used by the labs, and that there are opportunities for improvement.

Conclusion/Recommendation Set 2 focuses on aspects of design competition raised by the third bulleted point in the study charge, but falls short of addressing all the questions. The NAS report does not address effectiveness, efficiency, and cost of alternative approaches of either peer review or design competition. The Set 2 recommendation argues for maintaining “independent design capabilities” at Los Alamos and Livermore “to enable independent peer review of critical technical issues”, a position I strongly endorse.

Conclusion/Recommendation Set 3 assesses various deficiencies of the RRW design competition process and suggests remedies in peer review processes, which

seem to have been largely addressed by the INWAP. This would appear to represent the committee's response to a "failed" design competition/peer review practice.

Conclusion 4 states: "In contrast to the robust state of peer review at the NNSA laboratories, the state of design competition is not robust." Recommendation 4 goes on to assert that a series of design competitions that "exercise the full set of design skills necessary for an effective nuclear deterrent" and *not* contribute designs that would enter the stockpile would attract a workforce to maintain the future viability of the nation's nuclear deterrent.

The last element of the charge—how peer review ... should be adjusted as the three NNSA laboratories transition to a broader national security mission—doesn't appear, at least to me, to be addressed in the four conclusion-recommendation sections.

A Personal Assessment of Certain Aspects of the NAS Report

The crux of the report is contained in Conclusion/Recommendation Set 4. Whether the single word "robust" is sufficient to describe adequately the key issues necessary to maintain the nation's future nuclear deterrent, Conclusion 4 seems to aptly summarize this report: peer review is in pretty good shape and, with some tweaks of the INWAP process (chiefly having Sandia follow peer review procedures that engage Los Alamos and Livermore personnel or a broader range of topics than annual assessment), can work well as long as competent, motivated, and imaginative technical people are committed to the program.

Recommendation 4 focuses only on design competitions. There is no explanation of how such competitions would be formulated or how a winner would be selected. I simply do not understand how such a vague plan to engage design experts can possibly achieve the important objective, to which I subscribe, of maintaining the technical expertise and vitality of NNSA's laboratories—and its unique production capabilities.

Why is the challenge space limited to design? There are many key technical capabilities essential to maintaining the nuclear deterrent. It is a truism that capabilities must be exercised to be maintained—"use it or lose it!" What other capabilities might need regular exercise, not available during normal LEP cycles, for example?

What does one do with the successful/unsuccessful results generated from a competition? Do they cause cost concerns or proliferation concerns that will actually harm stockpile stewardship? After a few cycles in such a campaign of competitions, will the process still satisfy the fundamental need to attract and retain key people?

The report is unclear and can be misinterpreted in important sections. For example, how is a non-expert to understand the statement under Conclusion 1.3 (page 2): “With only archival nuclear explosion test data available, ...”? Unmentioned are all the other data that have been and are being actively acquired and analyzed. What is a “NEP laboratory”? Is it true that “peer review ... is recognized as a means of ensuring high-quality work products? Does “QMU systematically apply the output of the Stockpile Stewardship Program ... to assessment of the stockpile? There are other examples of non-sequiturs inadvertently created in the report, which could lead to misunderstanding of important messages. More careful editing would have been well worth the additional time and effort.