

TESTIMONY OF
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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

SAFETY OVERSIGHT OF DEFENSE NUCLEAR FACILITIES

SUBCOMMITTEE ON STRATEGIC FORCES
HOUSE ARMED SERVICES COMMITTEE
UNITED STATES HOUSE OF REPRESENTATIVES

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MR. CHAIRMAN AND MEMBERS OF THE SUBCOMMITTEE:

Thank you for the opportunity to testify on nuclear safety issues at defense nuclear facilities operated by the Department of Energy (DOE) and the National Nuclear Security Administration (NNSA). Clearly, this is a period of significant transition for DOE, which is accompanied by billions in construction projects and a huge portfolio of Recovery Act work. The Board believes it is prudent to proactively address safety issues at DOE's defense nuclear facilities to ward off threats to public health and safety and to resolve safety concerns early in the design process. My testimony is arranged in two parts: first, I will provide some background on the Defense Nuclear Facilities Safety Board (Board) and how we operate, and second, I will describe broad nuclear safety issues that affect activities throughout the DOE and NNSA defense nuclear complex.

Legislative History and Statutory Mission of the Board

The Board was created by Congress in 1988. Congress tasked the Board to conduct safety oversight of defense nuclear facilities under the control or jurisdiction of DOE. The Atomic Energy Act of 1954, as amended, currently establishes two categories of facilities subject to Board jurisdiction: (1) those facilities under Secretary of Energy's control or jurisdiction, operated for national security purposes that produce or utilize special nuclear materials, and (2) nuclear waste storage facilities under the control or jurisdiction of the Secretary of Energy. The Board's jurisdiction does not extend to facilities or activities associated with the Naval Nuclear Propulsion Program, transportation of nuclear explosives or materials, the U.S. Enrichment Corporation, facilities developed pursuant to the Nuclear Waste Policy Act of 1982 and licensed by the Nuclear Regulatory Commission, or any facility not conducting atomic energy defense activities.

Under its enabling statute, 42 U.S.C. § 2286 *et seq.*, the Board is responsible for independent oversight of all programs and activities impacting public health and safety within DOE's defense nuclear facility complex, which has served to design, manufacture, test, maintain,

and decommission nuclear weapons. The Board is authorized to review and analyze facility and system designs, operations, practices, and events, and to make recommendations to the Secretary of Energy that the Board believes are necessary to ensure adequate protection of public health and safety, including worker safety. In this regard, the Board's actions are distinguishable from a regulator in that the Secretary may accept or reject the recommendations in whole or in part. The Board must consider the technical and economic feasibility of implementing the recommended measures, and the Secretary must report to the President and Congress if implementation of a recommendation is impracticable because of budgetary considerations. If the Board determines that an imminent or severe threat to public health or safety exists, the Board is required to transmit its recommendations to the President, as well as to the Secretaries of Energy and Defense. After receipt by the President, the Board is required to make such recommendations public and transmit them to the Committees on Armed Services and Appropriations of the Senate and to the Speaker of the House.

The Board's enabling statute also requires the Board to review and evaluate the content and implementation of health and safety standards, including DOE's orders, rules, and other safety requirements, relating to the full life cycle of defense nuclear facilities, including design, construction, operation, and decommissioning. The Board must then recommend to the Secretary of Energy any specific measures, such as changes in the content and implementation of those standards that the Board believes should be adopted to ensure that public health and safety are adequately protected. The Board is also required to review the design of new defense nuclear facilities before construction begins, as well as modifications to older facilities, and to recommend changes necessary to protect health and safety. The Board periodically reviews and monitors construction at these defense nuclear facilities to evaluate whether construction practices and quality assurance ensure design requirements related to nuclear safety are met.

In support of its mission, the Board may conduct investigations, issue subpoenas, hold public hearings, gather information, conduct studies, establish reporting requirements for DOE, and take other actions in furtherance of its review of health and safety issues at defense nuclear facilities. These powers facilitate accomplishment of the Board's primary function, which is to

assist DOE in identifying and correcting health and safety problems at defense nuclear facilities. The Secretary of Energy is required to cooperate fully with the Board and provide the Board with ready access to such facilities, personnel, and information the Board considers necessary to carry out these responsibilities.

Nuclear Safety Issues at DOE and NNSA Defense Nuclear Facilities

The Board evaluates all of DOE's and NNSA's activities in the context of Integrated Safety Management. At the Board's public meeting on safety oversight in November 2009, DOE and NNSA reaffirmed the central role of Integrated Safety Management in protecting the public, the environment, and workers in conducting their missions at defense nuclear facilities. The core functions of Integrated Safety Management are straightforward and have been institutionalized in policy by DOE and NNSA in response to the Board's recommendations. They are:

- Define the scope of work
- Analyze the hazards
- Develop and implement hazard controls
- Perform work within controls, and
- Provide feedback and continuous improvement

Integrated Safety Management also institutionalizes guiding principles that form the basis for a safety-conscious and efficient organization, including:

- Balance mission and safety
- Line management responsibility for safety
- Competence commensurate with responsibility, and
- Identification of safety standards and requirements appropriate to the task at hand

When properly implemented at all levels, Integrated Safety Management results in facility designs that efficiently address hazards, operating procedures that are safe and productive, and feedback that drives continuous improvement in both safety and efficiency. Shortcomings in safety and efficiency in the operation of DOE and NNSA defense nuclear facilities can almost always be related to a failure to apply Integrated Safety Management.

I would like to highlight several broad safety issues that cut across the defense nuclear complex:

- The need to preserve and continuously improve safety directives
- The need to consider safety early in the design of new defense nuclear facilities
- The need to replace unsound facilities and invest in infrastructure for the future
- The need to safely store and disposition DOE's and NNSA's large inventories of nuclear materials
- The need to develop and maintain a technically qualified federal workforce dedicated to the effective oversight of safety, including an integrated nuclear safety research and development program

Preserving an Effective Nuclear Safety Directives System:

Preserve the Departmental requirements and guidance essential to ensuring safety within the DOE defense nuclear complex.

DOE and NNSA are self-regulated, and to facilitate self-regulation have developed a system of nuclear safety directives enumerating a comprehensive set of nuclear safety requirements, garnered from 60 years of operating experience in both the commercial and defense-related arenas. The Board evaluates these safety directives, provides comments on gaps or weaknesses, and uses the directives as fundamental yardsticks for evaluating safety of facilities and activities.

Until recently, DOE and NNSA were pursuing an effort to review a significant subset of the directives to ensure that objectives are “accomplished without being unclear, overly prescriptive, duplicative, or contradictory” per the direction of the Secretary of Energy in a memorandum dated September 10, 2007. Thus far, this process has reaffirmed several of the key safety principles necessary for DOE to be a self-regulating agency. Additionally, in January 2009, DOE issued a sweeping revision to the directive that governs the structure of the directives system and the processes used to develop and revise directives. This revision resulted in a fundamental paradigm shift that will result in DOE and NNSA revising many existing directives.

Early this year, the Board learned of a new DOE initiative to further reform directives. This new initiative is aimed at identifying and eliminating burdensome directives to improve efficiency across DOE. The Board is fully in favor of continuously improving safety directives; however, DOE’s commencement of another wholesale revision of the directives system before the efforts already underway are properly concluded may severely challenge DOE’s ability to maintain and promulgate safety requirements.

DOE’s previous reviews of the directives system concluded in most cases that its safety requirements are correct and appropriate, and that inefficiencies result from how the requirements are implemented. The Board has observed that inefficiencies in implementation typically result from DOE having provided insufficient technical guidance, as opposed to excessively prescriptive guidance.

In all, more than 50 nuclear safety-related directives were redrafted during 2009. The number to be changed in 2010 is indeterminate at this time but is likely to be significantly larger. This is a large and costly effort, and care must be taken to avoid weakening the directives that underpin safety throughout the defense nuclear complex. The Board is maintaining an intense level of oversight over the revision to the directives system and the vitality of the directives being revised to ensure that the margin of safety embodied in DOE’s directives is maintained or increased. It is essential that the senior leadership of DOE and NNSA do the same, or many years of progress in development and refinement of the directives system could be undone.

Integrating Nuclear Safety Early in the Design of Defense Nuclear Facilities:

Continue implementation of the safety-in-design initiative as a high priority.

DOE and NNSA defense nuclear facilities currently under design and construction have a total project cost of more than \$20 billion. The Board is required by law to make such recommendations to the Secretary during design and construction that would ensure that new defense nuclear facilities provide adequate protection of the health and safety of the workers and the public. For the past several years, the Board has driven an initiative to ensure that DOE and NNSA design project teams focus on early recognition and rapid resolution of safety issues. The Board and DOE prepared a joint report to Congress, dated July 19, 2007, that describes in detail many of the actions being taken to accelerate identification and resolution of safety issues. Performing thorough reviews of safety issues earlier in the design process allows issues to be resolved efficiently and in a timely manner, and minimizes adverse impacts to project cost and schedule. This approach is essential to the success of major design and construction projects, which includes facilities such as:

- Waste Treatment and Immobilization Plant, Hanford Site
- Chemistry and Metallurgy Research Replacement Project, Los Alamos National Laboratory (LANL)
- Uranium Processing Facility, Y-12 National Security Complex
- Pit Disassembly and Conversion Project, Savannah River Site
- Salt Waste Processing Facility, Savannah River Site
- Integrated Waste Treatment Unit, Idaho National Laboratory
- Radioactive Liquid Waste Treatment Facility Upgrade Project, LANL

The importance of early integration of safety into the design cannot be overstated. This approach is the best way to avoid costly late resolution of major design issues or surprises late in the development of a new facility.

The Duncan Hunter National Defense Authorization Act for Fiscal Year 2009, Public Law 110-417, enacted a limitation on funding for the Chemistry and Metallurgy Research Replacement Project at LANL until the Board and NNSA each certified that certain design issues reported by the Board had been resolved. The Board submitted its certification report to Congress on September 4, 2009. The Board applied significant resources toward accomplishing this certification, consuming about 6,500 hours of Board and staff effort. Working with NNSA, the Board identified specific concerns and the actions necessary to resolve them prior to certification. As discussed in detail in the Board's certification report, NNSA revised or agreed to revise the preliminary design, design requirements, and design processes to address the Board's concerns. NNSA also committed to implement detailed designs during final design consistent with the design requirements agreed to as part of the certification review. The Board will continue to review the facility design as it develops to ensure that it remains consistent with the commitments made by NNSA. Both the Board and NNSA believe this effort will result in savings and enhanced safety as the project proceeds into construction by avoiding the need for major redesigns.

The House Conference Report 109-702 on the National Defense Authorization Act for Fiscal Year 2007 (H.R. 5122) directed the Board to provide quarterly reports on the status of significant unresolved technical differences between the Board and DOE on issues concerning the design and construction of DOE's defense nuclear facilities. While the direction no longer requires the Board to continue providing quarterly reports, we believe these reports serve as an appropriate mechanism to keep all parties informed of the Board's concerns with design of new DOE defense nuclear facilities. The Board has also been encouraged by the feedback received from the Congressional committees and intends to continue providing these reports to Congress and DOE. The nine reports issued thus far are available to the public on the Board's web site.

Ending Reliance on Unsound Facilities and Investing in Infrastructure for the Future:

Parallel investments are needed to safely operate existing facilities and develop replacements.

NNSA's production infrastructure includes aging and hazardous facilities overdue for replacement as well as newer facilities that require upgrades to provide safe and reliable support for the nation's enduring nuclear deterrent. Examples of aging facilities include the 9212 Complex at Y-12 (portions of which are more than 60 years old), to be replaced by the planned Uranium Processing Facility; and the Chemistry and Metallurgy Research (CMR) building at LANL (more than 50 years old), to be replaced by the Chemistry and Metallurgy Research Replacement Project. The 9212 Complex cannot meet existing nuclear safety requirements for Hazard Category 2 nuclear facilities, and the CMR building's seismic fragility poses a continuing risk to the public and workers. Other facilities in similar situations include the Radioactive Liquid Waste Treatment Facility at LANL and the scattered facilities that constitute LANL's capability to repackage, characterize, and ship transuranic wastes offsite for disposal.

NNSA is taking interim actions to improve the safety posture in the existing facilities. NNSA has reduced the inventory of uranium solutions in plastic bottles at the 9212 Complex, and plans to relocate some activities from CMR to a more robust facility at LANL. NNSA also is executing a line-item project to upgrade certain facility systems in the 9212 Complex based on a facility risk review and is consolidating operations in CMR into wings of the structure that do not lie directly above a seismic fault. However, these are stop-gap measures. These facilities are structurally unsound, are unsuitable for use any longer than absolutely necessary, and will have to be shut down, perhaps before the replacement facilities are ready.

The planned replacement facilities have been delayed beyond original projections, but the need to proceed with them now appears to be broadly recognized and supported. This is a positive development, but the new facilities are at least a decade away. NNSA must continue to drive safety improvements at the existing facilities while the replacement facilities are developed. Unsafe conditions would rapidly develop if NNSA were to turn away from

maintaining and upgrading facilities such as the 9212 Complex and CMR in anticipation of their eventual replacement.

NNSA's infrastructure problems extend beyond the obviously obsolete facilities; however, NNSA also needs to invest in safety upgrades at newer facilities with enduring missions. The Plutonium Facility at LANL is a compelling example. NNSA plans to rely on that facility as its sole manufacturing capability for nuclear weapon pits for decades to come, but had not made commensurate investments in the building's safety systems. The Board spent several years pressing NNSA to establish a reliable confinement system for the facility, but NNSA resisted making any such investment. As a result, the Board issued an urgent formal recommendation last year on the need to implement reliable safety systems in the facility to reduce the consequences of severe accident scenarios.

A similar situation exists at the Device Assembly Facility at the Nevada Test Site. That facility is the permanent home to the Critical Experiments Facility relocated from LANL. It also performs assembly work for subcritical experiments and is a potential location for nuclear explosive assembly and disassembly operations. Despite these important, enduring missions, and despite the Board's urging, NNSA has not committed to the investment needed to correct numerous, long-standing deficiencies in its fire suppression system.

Investments such as these are a continuing need in the defense nuclear complex. Failing to devote sufficient resources to these improvements has long-term negative effects on NNSA's ability to safely accomplish its objectives.

Safe Storage and Disposition of Nuclear Materials

Safely package, store, and disposition excess nuclear materials to eliminate the risk they may pose to facility workers and the public.

DOE and NNSA manage a large inventory of nuclear materials that have been declared surplus to national security needs and are no longer required in active programs. These materials

include plutonium metal, plutonium oxides, spent nuclear fuel, enriched uranium, and other special nuclear materials. DOE's and NNSA's contractors continue to add to this surplus inventory by ending cold-war era programs, decommissioning old nuclear facilities, and uncovering or producing additional wastes during Recovery Act work.

One example of newly excess material comes from the Idaho National Laboratory, where DOE recently dismantled the Zero Power Physics Reactor. In its wake remain more than 250,000 unirradiated or slightly irradiated fuel plates totaling several hundred metric tons of material. The bulk of the plates are made of depleted uranium metals and oxides, and DOE may dispose of these plates as low-level waste. However, DOE must also find a disposition path for more than 20,000 fuel plates and pins made of plutonium metals, oxides, and alloys totaling more than one metric ton of plutonium.

As DOE personnel declare or identify excess materials, they must also safely characterize, package (or repackage), and store the materials pending disposition. The Board continues to urge DOE to complete the implementation of safe packaging practices per the Board's Recommendation 2005-1, *Nuclear Material Packaging*.

DOE has defined the disposition paths for many of its excess nuclear materials, but some materials have no defined disposition path. Other previously planned disposition paths may change. For many materials, DOE's preferred method of disposition is chemical processing through the H-Canyon facility at the Savannah River Site. This facility, and its now-deactivated sister facility, the F-Canyon, have successfully provided a safe disposition path for large quantities of spent nuclear fuel and other special nuclear materials. However, it is not clear to the Board that operating H-Canyon through the end of its planned lifespan in 2019 will be sufficient to process DOE's entire inventory of surplus nuclear materials that have no other disposition path. DOE will need to provide maintenance resources until H-Canyon is ultimately deactivated and carefully consider how long H-Canyon can operate safely.

Effectively Performing Federal Safety Oversight:

Ensure federal personnel have appropriate backgrounds, training, and qualifications, and are dedicated to the oversight of safety of defense nuclear facilities.

Safe and efficient execution of DOE's and NNSA's missions requires an adequate complement of qualified technical staff at its headquarters and site offices. DOE and NNSA have committed to developing and maintaining a technically competent federal workforce. Both DOE and NNSA have made good progress in assigning qualified federal staff to the Technical Qualification Program, Facility Representative Program, and Safety System Oversight Program, each of which is critical for providing technically competent personnel for the oversight of defense nuclear facilities.

Safe and efficient execution of DOE's and NNSA's missions also requires commitment by senior federal management to dedicate sufficient resources to safety oversight of the contractors who design, build, operate, maintain, and decommission DOE's and NNSA's facilities. However, both DOE and NNSA are reevaluating their roles in overseeing the work of their contractors.

Last year, DOE undertook a major review to evaluate whether it should shed its oversight responsibilities in a number of areas, including worker safety and radiological safety. DOE did not implement major changes but is continuing to study its options.

In January 2010, NNSA began a 6-month moratorium on NNSA-initiated functional assessments, reviews, evaluations, and inspections of its contractors. NNSA stated the purpose of the moratorium is to "1) free up resources to be redirected to higher mission direct work; and, 2) to allow NNSA to use available resources to develop an integrated, comprehensive, interdisciplinary oversight approach with an implementing plan consistent with the Secretarial objective to rely more on contractor assurance systems, reduce or eliminate requirements for transactional oversight where not required by law or regulations and rely on rigorous peer reviews." NNSA stated that it expected to cancel about 95 assessments of various types,

including assessments of contractor assurance systems, that it had planned to perform during the period covered by the moratorium.

In parallel with this effort, DOE's Office of Health, Safety and Security (HSS) changed its operational model from the traditional role of performing independent oversight to one that emphasizes assisting line organizations in addressing problem areas in safety and security. The Deputy Secretary of Energy issued a safety and security reform plan on March 16 stating that HSS had suspended independent oversight of low-hazard operations except where site performance warranted increased attention, but that rigorous and informed oversight will continue for high-hazard operations. The reform plan states that DOE's directive on independent oversight—DOE Order 470.2B, *Independent Oversight and Performance Assurance Program*—will be revised to redefine the independent oversight and regulatory enforcement functions of HSS.

The Board believes that there are noteworthy elements in DOE's and NNSA's oversight reform efforts. For example, the Board agrees that DOE should cultivate and maintain the technical expertise within its headquarters organizations to advise line organizations and field elements on safety issues. The Board also agrees that DOE and NNSA should require their contractors to implement and continuously improve assurance systems that drive the safe execution of work. However, contractor assurance systems at defense nuclear facilities have not achieved a degree of effectiveness that would warrant a reduction in federal safety oversight, nor are they expected to in the foreseeable future. It would not be prudent to begin reducing federal safety oversight of defense nuclear facilities in expectation of future improved assurance by the contractors.

The Board is planning to hold a second public meeting on the topic of federal safety oversight for defense nuclear facilities later this spring. The Board expects to thoroughly address DOE's and NNSA's oversight reform initiatives in this public meeting.

Nuclear Safety Research and Development

Ensure the integration and support of research, analysis, and testing in nuclear safety technologies.

The Board's recommendation on safety oversight by DOE and NNSA— Recommendation 2004-1, *Oversight of Complex, High-Hazard Nuclear Operations*— specifically addressed the need for DOE and NNSA to ensure the continued integration and support of research, analysis, and testing in nuclear safety technologies. Such research is particularly needed to improve safety assurance for high consequence, low probability events, and to identify improvements in DOE's safety directives. In addition, nuclear safety directives compensate for the gaps in the knowledge of nuclear science by conservatively addressing the hazards. This conservatism is only a best estimate. It is based upon incomplete knowledge of the hazard and can in the extreme be very costly.

DOE's October 2006 implementation plan for the recommendation acknowledged that DOE's nuclear safety research program was fragmented and not consistently prioritized relative to the need. DOE committed to pursue an integrated nuclear safety research and development program that would identify key gaps between research needs and program plans and to highlight those needs to DOE/NNSA senior leaders at an appropriate point in the planning and budgeting cycle. Properly defined and executed, this program would ensure better integration of research and development throughout DOE and provide critical information to enhance decision-making.

DOE needs to address immediate safety research needs, as well as provide state-of-the-art research and testing capabilities to ensure the continuous improvement of complex activities such as facility design, safety analysis, and development of safety directives, and to support the needs of the DOE and NNSA Central Technical Authorities. To have the greatest effect, this effort needs to solicit input at the site and facility level to harness first-hand knowledge of safety research needs and to disseminate the results of research widely.

DOE and NNSA have made very little progress in meeting their commitments to establish and institute a nuclear safety research program as one of the central elements to strengthen federal safety assurance. The Board is planning to hold a public meeting on this topic later this year to discuss how to reinvigorate this initiative.

Conclusion

I anticipate that the issues I have described are familiar to NNSA and our Congressional oversight committees. They have been previously identified by the Board in public documents, such as letters to DOE and NNSA, and Quarterly Reports to Congress that summarize unresolved safety issues concerning design and construction of defense nuclear facilities. These reports and documents are available for review on the Board's public web site.

Thank you for the opportunity to report to you on safety issues at defense nuclear facilities operated by the Department of Energy and the National Nuclear Security Administration. I will be happy to answer any questions you may have.