

TESTIMONY OF
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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

WEAPONS COMPLEX NUCLEAR SAFETY ISSUES

SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT
COMMITTEE ON APPROPRIATIONS
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 National Nuclear Security Administration (NNSA). I have arranged my testimony in three parts. First, I will provide some background on the Defense Nuclear Facilities Safety Board (Board) and how we operate. Next, I will describe broad nuclear safety issues that affect activities throughout NNSA's part of DOE's defense nuclear complex. Last, I will summarize the key safety issues at individual NNSA defense nuclear sites.

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 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 systems 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 nuclear safety-related design requirements 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 NNSA's Defense Nuclear Facilities

The Board evaluates all of NNSA's activities in the context of Integrated Safety Management. 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:

- 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 NNSA defense nuclear facilities can almost always be related to a failure to apply Integrated Safety Management.

I would like to highlight four broad safety issues that cut across NNSA's 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
- The need to develop and maintain a technically qualified federal workforce

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 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. We evaluate their safety directives, provide comments when we find gaps or weaknesses, and use those directives as fundamental yardsticks for evaluating safety of facilities and activities.

DOE and NNSA also are reviewing 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. Furthermore, 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 is a fundamental paradigm shift that will result in DOE and NNSA reworking many existing directives.

In all, more than 60 nuclear safety-related directives were redrafted during 2008, and more will be redrafted in 2009. 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.

NNSA defense nuclear facilities currently under design and construction have a total project cost of about \$10 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 for NNSA includes facilities such as:

- Chemistry and Metallurgy Research Replacement Project, Los Alamos National Laboratory (LANL)
- Uranium Processing Facility, Y-12 National Security Complex
- Pit Disassembly and Conversion Facility, Savannah River Site
- Radioactive Liquid Waste Treatment Facility Replacement Project, LANL
- New Solid Transuranic Waste Facility, LANL

The importance of this initiative, especially in light of the current federal budget environment, 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.

Section 3112 of the 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 Los Alamos National Laboratory until the Board and NNSA each submit a certification to the Congressional defense committees stating that the concerns raised by the Board regarding the design of the facility's safety class systems (including ventilation systems) and seismic issues have been resolved. To this end, the Board is reviewing design documentation supplied by NNSA, and has established a process that will allow NNSA and the Board to achieve resolution on each issue identified by the Board. The Board's goal is to reach a decision on certification as soon as possible following receipt from NNSA of the information necessary for the Board to formulate a reliable expert opinion on the design. The Board is devoting a significant portion of our technical staff to this effort. Our reviews of the safety basis have found deficiencies in the identification of safety-related controls and associated functional requirements and performance criteria. Correcting these problems will greatly reduce the likelihood that significant changes will be required late in design. The Board is also making progress in reviewing the seismic design and will render a conclusion whether the seismic design of the structure and associated safety-related equipment is adequate once NNSA completes the necessary analyses.

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 new designs for 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 seven reports issued thus far are available to the public on the Board's web site.

Ending Reliance on Unsound Facilities:

Manhattan Project era facilities are no longer suitable for prolonged use.

NNSA continues to rely on aging facilities to carry out hazardous production missions in support of the nation's nuclear deterrent while planned replacement facilities suffer extended design and construction delays. Examples 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 building at LANL (55 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 Chemistry and Metallurgy Research 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 the Chemistry and Metallurgy Research building 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 the Chemistry and Metallurgy Research building 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.

Unfortunately, planned replacement facilities have been delayed beyond original projections and face continued scrutiny regarding cost, scope, and programmatic need. NNSA must continue to drive safety improvements at the existing facilities while, in parallel, building replacement facilities quickly or finding alternative, safer means of accomplishing mission-related work.

Improving Federal Technical Staff Capability:

Ensure technical project managers, facility representatives, and safety system oversight personnel have appropriate backgrounds, training, and qualifications.

Safe and efficient execution of NNSA's mission requires an adequate complement of qualified technical staff at its headquarters and site offices. Therefore, NNSA has committed to developing and maintaining a technically competent federal workforce. However, across the complex, the number of qualified individuals on NNSA staffs is well below desired levels, as evidenced by the quarterly reports issued by the DOE Federal Technical Capability Panel. In particular, NNSA needs to rectify shortages of qualified federal staff in 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. Unfortunately, hiring was severely curtailed under this year's Continuing Resolution, and NNSA does not have an aggressive and proactive staffing plan that integrates anticipated losses with recruitment and the time required to complete training. The ability of NNSA to effectively manage projects and oversee its contractors will not improve until adequate numbers of qualified staff are available to do this work.

That summarizes the highest level of cross-cutting concerns that the Board has raised to NNSA. Now, I would like to briefly review the primary nuclear safety issues that the Board is concerned about at specific NNSA sites.

Los Alamos National Laboratory: Many of the safety systems in defense nuclear facilities at this site have documented inadequacies, as do the supporting administrative programs. NNSA has accepted the risk of operating under these conditions, in part due to confidence in the laboratory contractor's plan to assess and correct the widespread, systemic deficiencies. The Board believes that NNSA should insist on the contractor's implementation of these plans. The primary safety improvements needed include:

- Nuclear facility safety bases—development and implementation of high-quality safety bases to provide assurance that defense nuclear facilities can operate in a manner that protects workers, the public, and the environment
- Institutional safety programs—significant improvement in institutional safety programs such as formality of operations, training and qualification, integrated work management, fire protection, and nuclear criticality safety
- Infrastructure replacement and upgrades—interim upgrades and near-term replacement for the Chemistry and Metallurgy Research building and Radioactive Liquid Waste Treatment Facility; and safety system upgrades for the Plutonium Facility
- New facility design issues—resolution of safety issues in the design of the Chemistry and Metallurgy Research Replacement facility, Radioactive Liquid Waste Treatment Facility Replacement, and New Transuranic Solid Waste Facility

I have already mentioned that the existing Chemistry and Metallurgy Research facility is structurally unsound. NNSA must quickly replace the Chemistry and Metallurgy Research Facility and construct new facilities for processing solid and liquid radioactive waste in order to accomplish programmatic activities at Los Alamos safely.

Lawrence Livermore National Laboratory: NNSA plans to reduce the inventory of special nuclear materials at Livermore such that there would no longer be any facilities characterized as security category I or II at the site. This will allow eliminating costly security measures, but the Superblock facilities would retain enough special nuclear material to be considered Hazard Category 2, which requires continued effective nuclear safety measures. The

Board is closely evaluating the laboratory's planning for continuation of ongoing nuclear safety improvements during and after the inventory reduction program.

Nevada Test Site: The Device Assembly Facility at the Nevada Test Site is being modified to house the Criticality Experiments Facility, which has been relocated from LANL. NNSA is also still considering using the facility for nuclear explosive operations to supplement Pantex. NNSA must ensure that the facility infrastructure is ready to support safe conduct of criticality experiments and potential nuclear explosive operations. The most significant physical problem that needs to be fixed is the impaired fire suppression system, which at this point cannot be credited as a reliable means of suppressing fires within the facility.

Pantex Plant: The implementation of a concept known as Seamless Safety for the 21st Century (SS-21), a reengineering of nuclear explosive operations at Pantex, has improved both safety and productivity at the plant. Pantex is also taking a lead role in implementing a forward-looking approach of monitoring leading indicators in an effort to identify negative trends in safety before any unwanted events happen. The principal safety issues of concern to the Board for Pantex include the following:

- Technical support by design agencies—implementation of NNSA requirements governing the development, documentation, and peer review of technical analyses of postulated events and environments during nuclear explosive operations at Pantex
- Lightning and electrostatic discharges—characterization and control of the effects of lightning strikes and electrostatic discharge in nuclear explosive facilities
- Nuclear explosive safety process—effectiveness and management support of the expert Nuclear Explosive Safety Study Groups that independently evaluate the safety of nuclear explosive operations at Pantex

Y-12 National Security Complex: As I discussed earlier, the most significant safety issue at Y-12 is the continued operation of the very old 9212 Complex. The Board has succeeded in focusing NNSA on the need to accomplish interim safety upgrades at the facility, but it is vital that it be replaced as soon as possible. The primary safety issues we are pursuing at this site are as follows:

- 9212 Complex—risk reduction and facility safety improvements required to allow interim operations to continue safely in the short term
- Nuclear criticality safety program—improvement in the site's nuclear criticality safety program to ensure that applicable standards are properly implemented
- Nuclear materials storage—continued and where possible accelerated efforts to reduce the inventory of excess and legacy nuclear materials stored indefinitely in aging facilities

- New facility design issues—resolution of safety issues in the design of the Highly Enriched Uranium Materials Facility and the Uranium Processing Facility

Savannah River Site: The tritium extraction and processing facilities that support the nuclear weapons stockpile are located at the Savannah River Site. NNSA plans to build facilities at the Savannah River Site to disposition plutonium and waste materials from surplus weapon components. The Board's nuclear safety oversight of NNSA's materials disposition activities at the Savannah River Site focuses on the design of the Pit Disassembly and Conversion Facility (which may be combined with the Office of Environmental Management's Plutonium Preparation Project) and the resolution of safety issues in the design of the Waste Solidification Building. The third planned facility, the Mixed-Oxide Fuel Fabrication Facility, is not within the Board's jurisdiction. It will be licensed by the Nuclear Regulatory Commission.

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 National Nuclear Security Administration. I will be happy to answer any questions you may have.