TESTIMONY OF

DR. PETER S. WINOKUR, CHAIRMAN

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

SAFETY OVERSIGHT OF DEPARTMENT OF ENERGY DEFENSE NUCLEAR FACILITIES

SUBCOMMITTEE ON FINANCIAL AND CONTRACTING OVERSIGHT
COMMITTEE ON HOMELAND SECURITY AND GOVERNMENTAL AFFAIRS

UNITED STATES SENATE

JUNE 27, 2013

MADAM CHAIRWOMAN AND MEMBERS OF THE SUBCOMMITTEE:

Thank you for the opportunity to testify on nuclear safety issues for clean-up work at defense nuclear facilities operated by the Department of Energy (DOE). This is a period of significant transition for DOE, which includes billions of dollars in construction projects and a huge portfolio of site clean-up work. The Defense Nuclear Facilities Safety Board (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. The Board continues to champion the early integration of safety in the design of new facilities, efforts to improve the safety culture in DOE's federal and contractor workforce, and the need to strengthen the protection of workers through improvements in work planning and conduct of operations at DOE's defense nuclear facilities.

I understand that the Subcommittee is interested in the Board's role in oversight of major design and construction projects, including the Waste Treatment and Immobilization Plant at the Hanford site and the Salt Waste Processing Facility at Savannah River. In addition, the Board has been asked to comment on safety culture, including risk assessment and quality assurance processes, and ongoing safety concerns at DOE defense nuclear facilities. Today I will start with some background on the Board's mission, how we operate, and our role in DOE's design and construction projects. Then I will summarize DOE's process for managing the acquisition of capital assets, describe the Board's initiative on integrating safety early in design for such projects, and highlight the issues the Board has raised for several of DOE's major defense nuclear facility design projects. I'll conclude with a brief discussion of federal oversight and safety culture.

Statutory Mission and Operations of the Board

The Board was created by Congress in 1988. The statutory mission of the Board is to *provide independent analysis, advice, and recommendations to the Secretary of Energy to inform*

the Secretary, in the role of the Secretary as operator and regulator of the defense nuclear facilities of the Department of Energy, in providing adequate protection of public health and safety at such defense nuclear facilities. The Atomic Energy Act of 1954, as amended, currently establishes two categories of facilities subject to Board jurisdiction: (1) those facilities under the 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, offsite 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—a complex that has served to design, manufacture, test, maintain, and decommission nuclear weapons and has served other national security purposes. To effectuate its oversight mission, the Board is statutorily mandated to review the content and implementation of DOE standards, facility and system designs, and events and practices at DOE defense nuclear facilities that the Board determines have adversely affected, or may adversely affect, public health and safety. The Board is further authorized to access and analyze any information related to a DOE defense nuclear facility.

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 DOE defense nuclear facilities. These powers facilitate accomplishment of the Board's primary function to independently oversee the safety of DOE's 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.

Board Safety Recommendations

The Board is required to make recommendations to the Secretary of Energy that the Board believes are necessary to ensure adequate protection of public health and safety. In this regard, the Board's actions are distinguishable from a regulator because the Secretary may accept or reject the recommendations in whole or in part. To enhance collaboration between the Board and DOE, the Board's enabling legislation was revised by the National Defense Authorization Act for Fiscal Year 2013 to require the Board to provide its safety recommendations to the Secretary of Energy in "draft" form, and to allow the Secretary 30 days to comment on the draft recommendations before they may be finalized and made available to the public.

Under its statute, the Board must consider the technical and economic feasibility of implementing its recommended measures. The Board is not required to refrain from issuing a safety recommendation based on either consideration. Nonetheless, in formulating its recommendations to the Secretary of Energy, the Board is confident that it has considered the technical and economic feasibility of each of its recommendations. On February 14, 2013, the Board issued a report to the congressional defense committees regarding how the Board considers the technical and economic feasibility of implementing its recommended measures.

Another revision to the Board's enabling legislation in the National Defense Authorization Act for Fiscal Year 2013 directed the Board to "specifically assess risk (whenever sufficient data exists)" in making its recommendations. Consistent with commercial nuclear industry practices, an assessment of risk involves an evaluation of (1) what can go wrong, (2) how likely it is, and (3) what its consequences might be. In performing a risk assessment the Board takes many factors into account including: (1) Proximity to collocated workers and the offsite public; (2) Quantity, chemical composition, physical form, and radiological

characteristics of material stored or handled in the facility; (3) Mechanisms for release of materials (e.g., earthquakes, tornados, chemical reactions, fires, explosions, and other potential energy sources), nuclear criticality, highly energetic violent reactions involving nuclear explosives, and nuclear detonations; and (4) Complexity of safety controls and the degree of reliance on active safety systems or administrative controls instead of passive design features.

The Board is very mindful of the need for efficient and cost-effective solutions to safety problems at defense nuclear facilities and performs independent oversight of DOE's evaluation of options for mitigating hazards. These options may include factors such as the remaining life of the facilities, schedules for replacing them, and means to mitigate disruptions to ongoing operations that may result from recommended safety improvements. However, the Board has no authority to specify a particular solution; that authority is the Secretary's alone.

Under the Board's statute, the Secretary of Energy may "accept" a Board recommendation but make a determination that its implementation is impracticable because of budgetary considerations or because the implementation would affect the Secretary's ability to meet the annual nuclear weapons stockpile requirements. The Secretary must report any such decision to the President and to various congressional committees. The Secretary of Energy has never made a determination that a Board recommendation cannot be implemented due to budget impracticability. The Board believes it has executed its statute in a faithful and responsible manner.

If the Board were to determine that a recommendation relates to an imminent or severe threat to public health and safety, the Board would be required to transmit the recommendation 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, Appropriations, and Energy and Commerce of the House of Representatives and the Committees on Armed Services, Appropriations, and Energy and

Natural Resources of the Senate. Throughout its history, the Board has never made a determination of imminent or severe threat to the public.

Design and Construction of Defense Nuclear Facilities

One of the Board's functions is to review the design and construction of DOE defense nuclear facilities. The Board's enabling statute describes this function as follows:

> "The Board shall review the design of a new Department of Energy defense nuclear facility before construction of such facility begins and shall recommend to the Secretary, within a reasonable time, such modifications of the design as the Board considers necessary to ensure adequate protection of public health and safety. During the construction of any such facility, the Board shall periodically review and monitor the construction and shall submit to the Secretary, within a reasonable time, such recommendations relating to the construction of that facility as the Board considers necessary to ensure adequate protection of public health and safety. An action of the Board, or a failure to act, under this paragraph may not delay or prevent the Secretary of Energy from carrying out the construction of such a facility."

The Board does not impose requirements on DOE's capital projects or other activities. The Board operates by ensuring that DOE identifies a satisfactory set of safety requirements for a project or operation, and then by evaluating DOE's application of those requirements. The safety requirements are embodied in DOE's directives and/or invoked in national consensus standards. For example, the requirement that facilities withstand seismic events and other natural phenomena hazards is a DOE requirement that is implemented in a graded fashion, including consideration of the hazard associated with the facility. The requirement to assess the probabilistic seismic hazard analysis for DOE facilities built in seismically active areas every decade is likewise a DOE requirement. By keeping these analyses up to date, DOE is able to incorporate the best information available about the earthquake hazards at each site, which is

vital to ensure that all DOE facilities—both existing and proposed—provide adequate protection for seismic events.

The Board provides periodic reports to Congress on the status of significant unresolved technical differences between the Board and DOE on the design and construction of DOE's defense nuclear facilities. The Board receives positive feedback from congressional staff on these reports and believes they serve the useful purpose of keeping all parties apprised of the Board's concerns with new designs for defense nuclear facilities. The safety issues described below have all been documented in the Board's periodic reports, along with many other issues for DOE's design and construction projects.

DOE Process for Managing Design and Construction Projects

DOE manages its design and construction projects through DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*. DOE Order 413.3B organizes the project life cycle by project phases and critical decisions (CDs) progressing from broadly stated mission needs into well-defined requirements for the project, with the development of the safety strategy and the identification of safety structures, systems, and controls progressing in a similar fashion. The critical decisions serve as major milestones approved by the DOE Acquisition Executive and mark an authorization to increase the commitment of resources to the project. For projects with a total project cost greater than or equal to $750 million, the critical decisions must be proposed by the appropriate Program Secretarial Officer and approved by the Deputy Secretary. The critical decisions and required safety documentation are:

- CD-0, Approve Mission Need. There is a need that cannot be met through other than material means;
- CD-1, Approve Alternative Selection and Cost Range. The selected alternative and approach is the optimum solution; Conceptual Safety Design Report;

- CD-2, Approve Performance Baseline. Definitive scope, schedule and cost baselines have been developed; Preliminary Safety Design Report;
- CD-3, Approve Start of Construction/Execution. The project is ready for implementation; Preliminary Documented Safety Analysis; and
- CD-4, Approve Start of Operations or Project Completion. The project is ready for turnover or transition to operations, if applicable. A Documented Safety Analysis (DSA) is required per the requirements of DOE's Nuclear Safety Management Rule, 10 CFR 830, Part B. The DSA essentially serves as a license to operate the facility in a safe and reliable manner.

The resulting process is consistent with the core functions and guiding principles of Integrated Safety Management (ISM), as described in DOE Policy 450.4, Integrated Safety Management Policy. It implements the applicable ISM core functions—define the work, analyze the hazards, and establish the controls—necessary to provide protection of the public, workers, and the environment. The process also addresses important guiding principles of ISM through identification of safety standards and requirements and development of hazard controls tailored to the work to be performed. The process includes documentation and timely review of safety design evolution to ensure feedback and improvement as the project advances.

Board Initiative on Early Integration of Safety in Design

The Board believes that safety serves as an enabler to DOE's mission. In the area of new design and construction, identifying safety issues and their mitigation or avoidance early in the design process provides for adequate protection of the public, including the worker, in a manner that adds little or no cost to the project. DOE projects that undergo significant redesigns late in the project design or even worse during construction frustrate the benefits of early identification and resolution of safety issues. Such flaws in the design process have in the past typically increased costs and delayed operations while corrections were made. With DOE's design and

construction costs on the order of $20 billion, fractional increases in project costs can equate to large dollar amounts.

The Board conducted four public meetings between 2005 and 2008 to explore the need to integrate safety early into the design process for DOE defense nuclear facilities under DOE Order 413.3 and develop corrective actions to improve the integration of safety in design. DOE acknowledged that safety was not being integrated consistently into the early stages of the design of new defense nuclear facilities. DOE's senior leadership strongly supported the Board's effort to improve this situation. In a memorandum to DOE elements dated December 5, 2005, the Deputy Secretary of Energy stated, "I expect safety to be fully integrated into design early in the project. Specifically, by the start of the preliminary design, I expect a hazard analysis of alternatives to be complete and the safety requirements for the design to be established. I expect both the project management and safety directives to lead projects on the right path so that safety issues are identified and addressed adequately early in the project design."

In a joint report to Congress on July 19, 2007, the Board and DOE agreed that early integration of safety in design is both crucial and cost-effective, as it avoids schedule delays as compared to the case when safety issues are recognized late in the design process or worse, after construction has commenced. In most cases, the types of safety measures needed to meet DOE's safety requirements are a small fraction of the cost of the project. The same principle applies to oversight of operations—in an effective Integrated Safety Management system, hazards are recognized while the procedure for an operation is being developed, safety controls are built into the process, and the operation is then conducted safely and efficiently.

The safety in design initiative has resulted in DOE revising DOE Order 413.3 to describe more completely the safety requirements for design and construction; identify references to the required safety directives and standards; clarify the use of tailoring as applied to safety requirements; and improve roles, responsibilities, and oversight related to safety. DOE also issued a new standard, DOE Standard 1189, *Integration of Safety into the Design Process*, to

provide expectations for incorporating safety into the design process defined in DOE Order 413.3 to provide adequate protection for the public, workers, and the environment. DOE Standard 1189 incorporates the facility safety criteria in DOE Order 420.1B, *Facility Safety*, as a key foundation for achieving safety in design. DOE Order 420.1B includes important design objectives such as defense in depth—"multiple layers of protection to prevent or mitigate the unintended release of radioactive materials to the environment."

The requirements provided in DOE Orders 413.3 and 420.1 and the expectations in DOE Standard 1189 provide for identification of hazards early in the project and the use of an integrated team approach to design safety into the facility. The basic precepts are as follows:

- Appropriate and reasonably conservative safety structures, systems, and components are selected early in project designs;
- Project cost estimates include these structures, systems, and components; and
- Project risks associated with safety structures, systems, and components selections are specified for informed risk decision-making by the project approval authorities

Assessment of risk is built into the safety-in-design methodology. DOE Order 413.3B requires projects to develop a Risk Management Plan in the conceptual design phase (i.e., before Critical Decision-1). The safety-in-design strategy is evaluated in a Risk and Opportunities Assessment that is required as an input to the Risk Management Plan. The Risk and Opportunities Assessment is intended to identify technical and programmatic risks early in design, so that opportunities to address the risks can be identified early enough to influence fundamental design decisions and inform project cost estimates. Executed properly, this assessment will lead to an appropriately conservative safety design and avoid surprises later in the project when significant changes would be costly and disruptive. The Risk and Opportunities Assessment is updated at each phase of design to allow the project to determine whether elements of the safety strategy conservatively identified early in design are still warranted, or

whether the continued development of the design, supporting technology, and safety analysis justifies changes.

Safety Issues in Major Defense Nuclear Facility Design and Construction Projects

As discussed above, DOE has significantly improved governing requirements and guidance for its capital asset projects. Following this guidance, the Salt Waste Processing Facility at the Savannah River Site and the Integrated Waste Treatment Unit at the Idaho Cleanup Project have largely succeeded in addressing safety issues early in design. However, the Waste Treatment and Immobilization Plant at the Hanford site continues to have major unresolved design and safety issues even though its construction is well over halfway complete. In addition to the early integration of safety in design, issues that tend to be common across DOE's design and construction projects are quality assurance, late design changes, and incorporation of new technologies before they are developed adequately.

Quality Assurance

The commercial nuclear industry works to stringent quality standards in order to protect the health and safety of the public. DOE's Nuclear Safety Management Rule, 10 CFR 830, seeks to accomplish the same for DOE's nuclear facilities. Subpart A of the Rule establishes quality assurance requirements for "contractors conducting activities, including providing items or services, that affect, or may affect, nuclear safety of DOE nuclear facilities." The required quality assurance program must encompass all aspects of such activities, including training and qualification of personnel, design of items and processes, procurement of items and services, inspection and acceptance testing, performance of work, and independent assessments. This includes selecting and enforcing appropriate standards for everything from design work, to computer software and calculations, to construction methods such as concrete placement and welding, to operational practices and maintenance programs. However, regardless of the

requirements, a quality assurance program is only as effective as its implementation. Quality assurance is a management function—failures in quality assurance are failures in management.

Quality assurance has been a problem area for DOE's major defense nuclear facility design and construction projects. The contractors managing the two largest construction efforts currently being undertaken by the DOE Office of Environmental Management—the Salt Waste Processing Facility (SWPF) and the Hanford Waste Treatment and Immobilization Plant—have encountered significant problems in the quality of work of their subcontractors. The SWPF project experienced cost overruns and schedule delays due to vendor performance in meeting quality requirements for major equipment including the facility's large mixing vessels and also encountered quality problems in welding of piping systems by subcontractors that required a significant amount of rework. The Office of Enforcement in DOE's Office of Health, Safety and Security issued a consent order in April 2010 fining the SWPF project contractor for deficiencies in quality assurance oversight of its suppliers. And last year, DOE's Inspector General issued a report documenting the failure of the project contractor for the Hanford Waste Treatment and Immobilization Plant to comply with quality assurance requirements in the procurement of major vessels, as well as inadequate DOE oversight of the contractor's quality assurance process. Furthermore, many of the safety issues that the Board has identified in DOE's design and construction projects stem from inadequate assurance of the quality of engineering design and analysis, and of the testing programs that underpin process designs.

Design Changes

In addition to the specific problems discussed below for each of these projects, the Board has pointed out to DOE the recurring problem of DOE and its contractors altering safety-related aspects of the project designs without sufficient technical justification. Altering safety aspects of the design without adequately understanding the associated technical difficulties, complexities, or project risks involved can reduce the safety margin, create new safety issues, drive up costs, and imperil the success of the project. DOE Order 413.3B and DOE Standard 1189 provide that

safety features of the design should be decided upon during the conceptual design phase, before Critical Decision 1, and revised later only if there is a solid technical basis justifying the change. Adherence to this approach should improve the integration of safety and project efficiency in the future.

Hanford Waste Treatment and Immobilization Plant

The Hanford Waste Treatment and Immobilization Plant (WTP) plays a vital role in DOE's waste clean-up program. Millions of gallons of high-level waste liquids and soluble saltcake that have been in storage for decades have no path to treatment and disposition unless these projects are successfully completed. Most of the tanks storing these wastes are well beyond their design life, and most of the remainder will be beyond their design life before they are emptied. The continuing hazard posed by these tanks has been made very obvious by the recently identified leaks in both single-shell and double-shell tanks at the Hanford Tank Farms.

WTP, under design and construction at an official estimated cost of $12.263 billion, is essential to the safe stabilization and disposal of 53 million gallons of high-level waste stored in 177 underground tanks, some of which date back to World War II. WTP will perform complex, high-hazard radiochemical processing operations to pretreat and vitrify radioactive sludge, saltcake, and liquids with diverse chemical, physical, and radiological characteristics resulting from the various radiochemical processes used during decades of plutonium production at Hanford. The waste is not well-characterized. Although the various contractors that have operated the Tank Farms over the years have obtained many samples of wastes from tanks, the design of the tanks offers very limited locations for sampling, which precludes obtaining representative samples of settled sludges and saltcakes. The resulting uncertain characteristics of the waste feed make it vital that WTP use robust processes that can tolerate a broad range of chemical, physical, and radiological properties.

DOE awarded a design-build contract to the present project contractor in 2000 to design, construct, and commission the WTP. The project was challenging from the beginning because WTP is a one-of-a-kind facility that will treat a unique and diverse spectrum of wastes with very hazardous characteristics using technologies on a large scale that are unproven for these waste forms. In 2005, the scope of work was changed, but the technical analysis linking the design and safety strategy was not properly aligned. In 2006, the Secretary of Energy commissioned an External Flowsheet Review Team that performed an extensive review of the design of the WTP facilities. In its 2006 report, the team identified 17 major issues, defined as issues that would prevent WTP from operating consistently and would prevent it from meeting contract throughput rates. One of the major issues was the effectiveness of WTP's novel pulse jet mixing systems for process vessels. Vessels that use pulse jet mixing contain no moving parts; they contain pulse tubes that use compressed air and vacuum cyclically to draw in waste from the vessel and discharge it back into the vessel, agitating the waste in the process. Pulse jet mixing systems have not been demonstrated effective for the solids-laden wastes to be processed in WTP, and insufficient mixing could result in hydrogen explosions, nuclear criticality accidents, or mechanical damage within the vessels.

Further complicating matters, DOE began a significant redesign of the facility in 2009, when the design was already more than two-thirds complete and construction of the WTP facilities ranged from about one-quarter to halfway done. As part of the redesign, the project proposed removing or reducing many safety-related controls. The Board did not agree and was concerned that safety was not appropriately implemented in the design at this very late stage. The removal of controls was proposed despite the existence of numerous technical issues that still needed to be resolved and was not consistent with the principle of the early integration of safety in design. At its core, this use of technologies unproven for their applications in the WTP has resulted in DOE struggling to integrate safety into the design of a facility partially built. It also contributed to the development of an acrimonious relationship within the project contractor's organization between the people responsible for the safety basis and those who did

engineering. The acrimony made the resolution of safety issues extremely difficult and damaged the project's safety culture.

The Board is expending a significant portion of its resources evaluating the safety of the WTP design, many aspects of which continue to evolve. The Board has held three public meetings and issued more than 40 pieces of correspondence to DOE on safety issues for the WTP project, including formal recommendations to the Secretary of Energy on pulse-jet mixing systems (Recommendation 2010-2) and the project's safety culture, including DOE's role in that culture (Recommendation 2011-1). Several significant technical issues must be resolved to support completing the design and construction of the Pretreatment Facility and, to a lesser extent, the High-Level Waste Facility at the plant. Issue resolution is complicated by the partial construction of the facilities and the use of a "black-cell" design concept in certain areas that may not allow for maintenance during the 40-year life of the plant. Four key safety issues that require resolution are summarized below:

- The unproven effectiveness of the mixing and transfer systems, which are essential to the operation of WTP and are needed to prevent flammable gas from accumulating in process vessels and to prevent accumulations of solids, which could pose a nuclear criticality hazard (Recommendation 2010-2);
- Questions regarding the control strategy for flammable gas in process systems, which relies on quantitative risk analysis as a design tool, a novel approach for a defense nuclear facility;
- The need to demonstrate that erosion and corrosion of piping, vessels, and pulse jet mixer nozzles located in black cells are within allowable limits for the 40-year design life of the facility; and
- The unproven capability to characterize, control, and transfer waste from the Tank Farms to WTP in compliance with the waste acceptance criteria that must be met to allow the safe and successful operation of the WTP Pretreatment Facility.

Last year, in response to the numerous issues raised by the Board, DOE's project management and oversight organizations, and other reviewers, Secretary Chu undertook a comprehensive review of the plant's design. In a letter dated November 8, 2012, Secretary Chu informed the Board that this review may result in further changes to DOE's approach to resolving the mixing issues. However, Secretary Chu has now left office, and it is not clear what changes are in store. Meanwhile, DOE slowed the construction of two key facilities of the treatment plant, and the schedule for completion remains unclear.

Salt Waste Processing Facility

The Salt Waste Processing Facility (SWPF) at the Savannah River Site is needed to pretreat millions of gallons of high-level waste liquids for immobilization and disposal. The project cost has been impacted by the delays related to acceptance of process vessels I discussed previously, but is presently on the order of $1.7 billion. Its operations are similar to the Pretreatment Facility at the Hanford Waste Treatment and Immobilization Plant, but it is a simpler facility because it only handles salt solutions from the waste tanks, not sludge, and the associated vitrification, or glass-making, capability already exists in the Defense Waste Processing Facility at the Savannah River site. The facility design is essentially complete, and construction is about 71 percent complete. Development of this facility pre-dated the safety in design initiative, but the Board has monitored the project carefully. In 2009, the Board informed the Acting Assistant Secretary for Environmental Management that the Board had identified no safety issues that would preclude construction, but that a number of outstanding actions regarding safety-related systems needed to be resolved before completion of construction and operation of the facility. The Board has continued to evaluate the resolution of the safety issues and to analyze the details of the safety analysis and controls, such as flammable gas hazards in vessels and piping systems, to ensure that the facility will be safe to operate once construction is complete. The DOE/contractor project team continues to resolve the remaining issues successfully.

Federal Oversight and Safety Culture

Effective federal oversight and a healthy safety culture are essential elements in major facility design and construction projects. Without them, safety issues will not be addressed effectively in the design phase so that the resulting facility can be cost effectively designed and built, and operated safely. The Board has not always found these important elements to be in place. Based on concerns raised by employees, the Board investigated the safety culture of the WTP project and then issued Recommendation 2011-1, *Safety Culture at the Waste Treatment and Immobilization Plant.* A poor safety culture has broad practical impacts on the safe and efficient design, construction, and operation of facilities because it prevents engineers, operators and workers in general from identifying technical, quality, and safety issues to their management. The Board's recommendation specifically discussed the ways in which the poor safety culture on the WTP project was inhibiting technical and safety issues from being raised and resolved. In addition to recommending that DOE address the culture problems at WTP, the Board recommended that DOE conduct an extent of condition review to establish the extent of its safety culture problem.

As part of DOE's implementation plan for the Board's recommendation, DOE's Office of Health, Safety and Security undertook independent assessments of the safety culture at DOE's Office of Environmental Management, as well as several major design and construction projects across the complex. The Office of Health, Safety and Security, which plays a vital role in DOE's oversight, also subjected its own office to an assessment. The assessments were led by recognized experts in safety culture and found numerous problems. The extent and severity of the problems beyond the Hanford WTP project came as a surprise, particularly in the case of DOE headquarters and field offices. While some organizations fared better, the overall list of negative perceptions held by DOE and contractor employees about the attitudes and behaviors regarding safety in their organizations are sobering.

The Board is encouraged by the manner in which DOE's leaders are pursuing these assessments and their forthrightness in presenting the results. DOE's leaders are voicing strong commitment to a stronger safety culture throughout the DOE enterprise. This commitment is absolutely essential—an organization's leaders play a pivotal role in shaping its safety culture. A number of important actions remain under DOE's plan for implementing the Board's recommendation, including performing self-assessments at sites and facilities not assessed by the Office of Health, Safety and Security; integrating the findings across the complex into a coherent whole; and developing tools to sustain a robust nuclear safety culture throughout DOE's defense nuclear complex.

Conclusion

DOE has developed a strong regulatory framework for design and construction projects, particularly in requirements to integrate safety early in design. However, the requirements and guidance are only a good as their implementation. Adhering to the well-thought-out processes defined in DOE Order 413.3B, DOE Standard 1189, and the associated guidance documents will set DOE up for the design, construction, and commissioning of defense nuclear facilities that can carry out their missions safely and efficiently. When safety issues are identified and mitigated or avoided early in design, their resolution has no impact on project cost and schedule. Achieving this result will require close oversight at all levels of project implementation to ensure that design and construction decisions are well-founded, analyses are complete and accurate, technology is of sufficient maturity, attention is given to quality assurance, and that expediency and short-term savings are not allowed to jeopardize the long-term safety and efficiency of the facility.

DOE's recent efforts to characterize and reinforce the importance of a strong safety culture across the defense nuclear facility complex have the potential to dramatically improve the willingness of workers to raise safety and technical issues on its projects and operations.

Combined with the improved project management framework, the potential exists for major improvement in project execution.

The Board seeks to ensure that oversight and decision-making processes that affect safety requirements in the DOE defense nuclear complex remain strong and technically defensible. The bottom line is that a nuclear accident is unacceptable to the public, the Board, and DOE.

The Board works diligently to communicate safety issues such as the ones I have described to DOE and our congressional oversight committees in a timely and constructive manner. These issues have been previously identified by the Board in public documents, such as letters to DOE, reports to Congress that summarize unresolved safety issues concerning design and construction of defense nuclear facilities, reports to Congress on aging facilities, and the Board's Annual Report to Congress. These reports and documents are available for review on the Board's public web site.