

Peter S. Winokur, Chairman  
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**DEFENSE NUCLEAR FACILITIES  
SAFETY BOARD**

Washington, DC 20004-2901



June 25, 2012

The Honorable Steven Chu  
Secretary of Energy  
U. S. Department of Energy  
Forrestal Bldg. Room 7A-257  
1000 Independence Avenue, SW  
Washington, DC 20585

Dear Secretary Chu:

The Defense Nuclear Facilities Safety Board (Board) is pleased to enclose a copy of our Report to Congress on the Status of Significant Unresolved Issues with the Department of Energy's Design and Construction Projects (dated June 25, 2012). In the Conference Report accompanying the FY 2007 National Defense Authorization Act, the conferees directed the Board to provide quarterly reports until the Department of Energy (DOE) and the Board submit a joint report "on their efforts to improve the timeliness of issue resolution, including recommendations, if any, for legislation that would strengthen and improve technical oversight of the Department's nuclear design and operational activities." The joint report was submitted to the congressional defense committees on July 19, 2007. While the conferees did not require the Board to continue providing reports, the Board believes these reports provide an appropriate means to keep all parties apprised of the Board's concerns with new designs for DOE defense nuclear facilities. The Board has received encouraging feedback from Congress. As such, the Board intends to continue issuing these reports to Congress and DOE.

Sincerely,

Peter S. Winokur, Ph.D.  
Chairman

Enclosure: as stated

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To the Congress of the United States:

The Defense Nuclear Facilities Safety Board (Board) provides periodic reports to Congress and the Department of Energy (DOE) on the status of significant unresolved technical issues concerning the design and construction of DOE's defense nuclear facilities. This periodic report builds on earlier reports to summarize the status of issues raised through the end of May 2012 and identifies new issues associated with the relevant projects. The status of many issues has not changed significantly during the reporting period; however, the fact that an issue has not been resolved does not necessarily imply a lack of progress.

In this report, the phrase "unresolved issue" does not necessarily mean that the Board has a disagreement with DOE or believes DOE's path forward to resolution is inappropriate. Some of the issues noted in these reports simply await final resolution through further development of the facility design. All of the significant unresolved issues discussed herein have been communicated to DOE. Lesser issues that the Board believes can be resolved easily and for which an agreed-upon path forward exists are not included. The Board will follow these items as part of its normal design review process.

It is important to note that the Board may identify additional issues in the course of its continuing design reviews. New issues identified since the previous report are noted below, as well as those issues the Board believes have been resolved. For this reporting period, four new issues were identified, and three issues were resolved. In addition, one issue was updated to reflect more accurately the Board's concerns. Enclosure 1 to this report provides a concise summary of significant unresolved issues for current design and construction projects. Enclosure 2 summarizes issues resolved by DOE on current and past design and construction projects. Past projects include those completed by DOE, as well as those delayed or abandoned.

## **PROJECTS WITH THE MOST SIGNIFICANT UNRESOLVED ISSUES**

The Board is again highlighting the Hanford Site's Waste Treatment and Immobilization Plant (WTP) and the seismic evaluation and upgrade of Los Alamos National Laboratory's (LANL) Plutonium Facility (PF-4) as those projects with the most significant unresolved safety issues. In addition, based upon the significance of safety issues identified by the Board with respect to the preliminary design and safety strategy for the Uranium Processing Facility (UPF), the Board believes it warrants additional attention as well.

***Los Alamos National Laboratory, Plutonium Facility Seismic Safety.*** On October 26, 2009, the Board issued Recommendation 2009-2, *Los Alamos National Laboratory Plutonium Facility Seismic Safety*, which addressed the need to reduce the potential consequences to the public from a seismic event at PF-4. On July 13, 2010, DOE provided the Board its Implementation Plan for this Recommendation. DOE has submitted all of the Implementation Plan deliverables to the Board, but has committed to revise, by November 2012, the deliverable that

establishes the project execution plan for seismic upgrades. The upgrades include modifications to the building structure, fire suppression system, and active confinement ventilation system.

In October 2011, the National Nuclear Security Administration (NNSA) approved a revision to the Documented Safety Analysis (DSA) for PF-4. The update asserts that all postulated accident scenarios have mitigated dose consequences to the public that are below the Evaluation Guideline established in DOE Standard 3009-94, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses*. The mitigated dose consequence is a key driver for the seismic upgrades planned at PF-4. In a June 18, 2012, letter to NNSA, the Board identified several technical deficiencies with the revised DSA, which challenge NNSA's conclusion that the dose consequence for the public does not exceed the Evaluation Guideline. The Board has asked that NNSA respond within 30 days.

In May 2007, prior to the issuance of Recommendation 2009-2, LANL updated the site's Probabilistic Seismic Hazard Analysis (PSHA). LANL revised the update in December 2009. The 2007/2009 PSHA update demonstrated a significantly higher value for the potential ground motion at the site than previous analyses. LANL initiated the Seismic Analysis of Facilities and Evaluation of Risk (SAFER) project to evaluate the resulting increase in seismic risk to facilities at the laboratory, including PF-4. The SAFER project's analysis of PF-4's structural integrity was included as a deliverable in the DOE Implementation Plan for Recommendation 2009-2. LANL completed the analysis in May 2011 and identified nine vulnerabilities that could render PF-4's structure unable to maintain its safety-class confinement function during postulated seismic events.

Responding to these vulnerabilities, NNSA approved a Justification for Continued Operation (JCO) for PF-4 in July 2011. The JCO identified interim compensatory measures to help mitigate the increased seismic risk of continuing operations and outlined a plan for addressing the structure's seismic vulnerabilities. The laboratory completed actions to address these vulnerabilities, including strengthening the roof to prevent one mechanism for a seismically-induced collapse.

Despite the structural upgrades, NNSA has agreed that additional structural analysis, including a static nonlinear seismic analysis of the facility's structure, is necessary to identify any additional structural vulnerabilities that could lead to a seismically-induced collapse or a loss of confinement. This additional analysis is expected to be completed by September 2012. The Board is concerned that several structural weak links need to be carefully assessed as part of this analysis including (1) portions of the roof slab above the service chase, (2) the joints between roof girders and corridor columns at the laboratory level, (3) the roof girders and corridor columns, (4) the unreinforced column capitals in the basement, (5) the laboratory floor including the assessment of column punching shear through the floor, and (6) the short, captured columns in the basement. Additionally, LANL is pursuing with the University of California, San Diego testing of specimens representative of key connections in the facility's roof to validate assumptions in the structural analysis. The Board is closely monitoring these efforts.

***Hanford Site, Waste Treatment and Immobilization Plant.*** Early in the design of the WTP project, DOE accepted project risks in the form of unresolved technical issues and unverified technical assumptions to advance the design and construction efforts. Recently, DOE has been transitioning the WTP project from design-construction to construction-operations. When making this transition, DOE

will have to address open and unresolved items to demonstrate that safety-related systems will perform their safety functions.

The Board has observed that the WTP contractor, Bechtel National, Incorporated (BNI), is relying on complex models to resolve technical issues and verify assumptions. Complex models require greater technical justification of inputs, assumptions, and methods than simpler models or calculations based on more conservative assumptions. Often, high quality experimental data are needed to validate predictions from complex models. When the data do not support the predictions from models, calculations, or assumptions used in the WTP safety basis, changes to the design or operations are necessary to meet DOE safety requirements. Late design changes and modifications can impact multiple systems and result in increasing costs, lengthening the schedule, and even limiting the plant's ability to accomplish its cleanup mission.

Outstanding issues identified by the Board concerning validation of complex models with experimental data and unverified technical assumptions are discussed in this section. They include inadequacies with respect to (1) process vessel mixing systems, (2) the methodology for evaluating spray leak accidents, (3) heat transfer analyses for process vessels, (4) verification and validation of computational fluid dynamics models, and (5) analyses of erosion and corrosion of process components. Items (4) and (5) are new issues identified during this reporting period and are discussed in the section of this report dedicated to new issues.

#### *Mixing in Process Vessels*

On December 17, 2010, the Board issued Recommendation 2010-2, *Pulse Jet Mixing at the Waste Treatment and Immobilization Plant*, to address potential nuclear safety hazards arising from inadequate performance of mixing systems at WTP. These hazards include nuclear criticality accidents, explosions of flammable gases, and mechanical failures of process vessel components. During this reporting period, DOE undertook significant effort to resolve this issue. On January 19, 2012, for example, the Board formally accepted DOE's Implementation Plan for Recommendation 2010-2. The plan provides a framework for using large-scale testing to inform the design of pulse jet mixed vessels. The plan also provides a strategy for addressing project risks originating from unresolved technical issues with the mixing technology. In accordance with the Implementation Plan, DOE transmitted several early deliverables to the Board. In reviewing the plan for verification and validation of BNI's computer simulation models, the Board identified a new issue (discussed in the next section of this report).

In its January 19, 2012, letter accepting the Implementation Plan for Recommendation 2010-2, the Board noted that recent testing results challenge DOE's assumption that methods for assessing the behavior of Newtonian fluids are also appropriate for assessing the performance of non-Newtonian waste at WTP. This assumption formed the basis for much of DOE's Implementation Plan. On April 30, 2012, DOE transmitted a letter to the Board expressing that Newtonian techniques are not appropriate for assessing the performance of non-Newtonian waste. Consequently, DOE must revise the Implementation Plan to include development of new strategies for mixing non-Newtonian wastes. DOE expects to deliver the revised plan to the Board by the fourth quarter of this year.

In another key deliverable in the Implementation Plan, BNI identified misalignments between the nuclear safety strategy and the facility's design. BNI has outlined a plan for resolving technical issues associated with inadequate mixing and "reconstituting" the WTP safety bases to realign them with the plant's design. This activity is a major effort late in the design-construction phase of the project and will likely take years to complete.

#### *Spray Leak Analysis*

In a letter to DOE dated April 5, 2011, the Board identified technical issues with BNI's model for estimating radiological consequences to the public from spray leak accidents in the Pretreatment and High-Level Waste Facilities. DOE responded to the Board's letter on June 3, 2011, committing to resolving the issues through an active test program. During this reporting period, DOE continued its spray leak testing program at Pacific Northwest National Laboratory. DOE now anticipates that there will be three reports from this testing, and they will be available by summer 2012. DOE's letter to the Board also stated that DOE's Office of Health, Safety and Security planned to address complex-wide issues identified by the Board with respect to sprays and leaks. The Board is awaiting this response from DOE.

#### *Heat Transfer Analysis for Process Vessels*

In a letter dated August 3, 2011, the Board communicated to DOE issues related to heat transfer calculations used to establish post-accident hydrogen mixing requirements in Pretreatment Facility process vessels. Without defensible calculations, it is not possible to confirm that mixing controls in process vessels are adequate. On November 16, 2011, DOE responded that the heat transfer calculations used conservative assumptions and bounding sensitivity analyses, and that the modeling approach had been properly verified and validated. DOE committed to further justifying these assumptions through technical or sensitivity analyses to show the conservatism of the modeling approach. DOE directed BNI to issue a revised heat transfer report including the results of these studies by May 31, 2012. The Board remains concerned about the suitability and accuracy of the modeling approach and the inputs, assumptions, and methodologies used in the heat transfer calculations. The Board is awaiting the revised heat transfer report from DOE.

Successfully transitioning the WTP to operations requires that DOE align the plant's design and safety bases and that the design be consistent with nuclear safety directives, orders, and industry consensus standards. The Board discussed alignment of the plant's design with the safety bases with DOE and BNI at its public hearing in Kennewick, Washington, on March 22, 2012. Several of the Board's unresolved technical issues concern the application of directives, regulations, and standards. These issues include the adequacy of the design for the (1) piping and ancillary vessels for hydrogen explosions, (2) the instrumentation and control system, (3) controls for potential ammonia releases, and (4) the electrical distribution system. Item (4) is a new issue that is discussed in greater detail in the section of this report addressing new issues. A discussion on item (1) is below.

#### *Hydrogen in Piping and Ancillary Vessels*

Flammable gases generated by the wastes treated in WTP will accumulate in process piping whenever flow is interrupted or in regions of the piping system that do not experience flow, such as

pipng dead legs. In February 2010, DOE approved a revision to the hydrogen control strategy for piping systems. The revision allows hydrogen explosions in piping under certain conditions and relies on a quantitative risk analysis and other complex models to predict the magnitude of the explosion and the response of the piping system. The Board is concerned about the revised approach, particularly the quantitative risk analysis, because no DOE standards and requirements exist to govern use of the approach or control the assumptions that underpin the analysis in the WTP safety basis. In April 2010, BNI chartered a 12-member expert review team to conduct an independent evaluation of the revised hydrogen control strategy. During this reporting period, BNI completed the resolution of technical issues raised by the expert review team.

The Board is encouraged that DOE recently reaffirmed its commitment to using a deterministic approach for nuclear safety, consistent with DOE Standard 3009-94. However, DOE has not yet (1) fully established how the quantitative risk analysis used for design can be incorporated in a deterministic safety analysis, (2) produced a comprehensive example calculation detailing the complete design and safety methodologies, or (3) begun a test program to demonstrate the performance of in-line components, such as valves and instrumentation, during hydrogen explosions. The Board is concerned that additional delays are likely as DOE encounters unanticipated technical issues in implementing the revised hydrogen control strategy.

***Y-12 National Security Complex, Uranium Processing Facility.*** The Preliminary Safety Design Report (PSDR) for the UPF project is not based on a bounding unmitigated evaluation of the potential hazards in the facility. As a result, the safety-related controls included in the preliminary design may not adequately protect the public and workers for all accident scenarios at UPF. DOE has independently identified a similar issue and has directed the project team to address and correct it. Additional detail on this new issue is provided in the next section.

## **NEW ISSUES IDENTIFIED DURING THE PERIOD**

### **1. Project: Hanford Site, Waste Treatment and Immobilization Plant—Pretreatment, High-Level Waste, and Low-Activity Waste Facilities**

***New Issue—Erosion and Corrosion of Piping, Vessels, and Pulse Jet Mixer Nozzles.*** In a January 20, 2012, letter to DOE, the Board communicated its concern that design information for WTP does not provide confidence that wear (erosion and corrosion) allowances are adequate to ensure that piping, vessels, and pulse jet mixer (PJM) nozzles located in black cells will function reliably for the 40-year design life of the facility. The piping and vessels confine radioactive material, and the PJM nozzles ensure adequate mixing of the waste in part to prevent inadvertent criticality accidents and hydrogen explosions. Additionally, the Board noted that the WTP project team had not established means to control the key assumptions and operating parameters affecting wear and supporting the safety basis. The Board's findings reinforced similar issues that were identified during DOE surveillances of the wear design of WTP vessels and PJM nozzles conducted late in 2011 and early in 2012.

In a March 5, 2012, response to the Board's letter, DOE agreed with the Board's evaluation. To resolve these issues, DOE is revising key input parameters to the wear model to reflect current information and reviewing documentation that supports the design basis. DOE will perform

additional testing to validate the wear model. DOE will use the results of these efforts to confirm the wear allowances, identify safety basis controls, and determine whether design changes are required. Additionally, DOE will perform an engineering study to identify methods for monitoring wear throughout the operating life of the facility so that problems with high wear can be predicted or detected before they result in failures. Currently, BNI is developing a plan for evaluating erosion and corrosion on a vessel-by-vessel basis that accounts for variations during waste processing operations. BNI's plan will also address the concerns developed during DOE surveillances.

**2. Project: Hanford Site, Waste Treatment and Immobilization Plant—Pretreatment and High-Level Waste Facilities**

*New Issue—Selection of Validation Set for Computational Fluid Dynamics Model.* On April 3, 2012, the Board issued a letter to DOE regarding planned experiments that are required to validate a computer model of pulse jet mixing in WTP. BNI will use the FLUENT computational fluid dynamics model to confirm that the performance of the WTP mixing systems will meet several safety requirements. The Board is concerned that experimental data obtained from planned small-scale tests will not be adequate to validate the FLUENT model over the range of mixing conditions expected at WTP. For example, the technical basis for the testing did not incorporate physical parameters that may be necessary for accurate modeling of full-scale mixing behavior with actual waste in WTP. On May 18, 2012, DOE requested an additional 60 days to complete its response to the Board's letter. DOE has taken the initiative to engage subject matter experts at the National Energy Technology Laboratory to support the development of the response. The experts affirmed the Board's concerns during recent discussions involving DOE and the Board's staff.

**3. Project: Hanford Site, Waste Treatment and Immobilization Plant—All Facilities**

*New Issue—Design and Construction of Electrical Distribution System.* On April 13, 2012, the Board issued a letter to DOE identifying safety issues with the design of the electrical distribution system at WTP. Although the system meets many of the requirements in DOE orders and industry consensus standards, the Board identified issues concerning the operability and safety of the overall electrical distribution system. Additionally, recent design decisions regarding sources of emergency power have introduced new technical issues that the project team is determining how to address.

**4. Project: Y-12 National Security Complex, Uranium Processing Facility**

*New Issue—Inadequacies in the Integration of Safety into the Design.* In an April 2, 2012, letter to DOE, the Board communicated its concern that the UPF project team had not adequately integrated safety into the preliminary design. Integrating safety into the design would require that the project team develop a complete set of safety controls to protect the public and workers from facility hazards in the PSDR and supporting analyses, and subsequently incorporate the control strategy into the facility design. The Board identified a number of deficiencies in the PSDR and supporting analyses. For example, the hazard analyses failed to analyze all hazards, and in some instances incorrectly limited the frequency or

consequences of hazards by crediting safety controls for an analysis that should have been unmitigated, i.e., analyzed without controls. The accident analyses failed to adequately identify and analyze representative and bounding accidents. These practices are inconsistent with the methodology defined in DOE Standard 3009-94. The project team also adopted non-conservative parameters in analyses of radiological dose consequences.

DOE provided a response to the Board's letter on May 2, 2012. The response outlined a general approach that, if adequately implemented, can resolve the Board's issues. DOE is planning to submit a more detailed plan for resolving the issues on July 2, 2012.

## ISSUES RESOLVED DURING THE PERIOD

### 1. **Project: Hanford Site, K-Basin Closure Sludge Treatment Project**

***Issue—Inadequacies in Integration of Safety into the Design Process.*** The Sludge Treatment Project team's design documentation did not contain sufficient information with which to verify the ability of safety systems to perform their safety functions. The application of a "tailoring strategy" that ambiguously combined the Critical Decision-2 and Critical Decision-3 milestones eliminated key safety-in-design deliverables.

***Resolution—***In December 2011, DOE began its review of the PSDR, a document previously canceled by the tailoring strategy. The development and review of this key safety-in-design deliverable reduced the project's safety risk while meeting the requirements of DOE Order 413.3A, *Program and Project Management for the Acquisition of Capital Assets*. The safety control set documented in the PSDR and supporting design media provide sufficient detail, such as system boundaries and functional requirements, to verify the ability of the safety systems to perform their safety functions. These actions adequately address the Board's concern regarding the integration of safety into the design. This issue is therefore closed.

***Issue—Inadequacies in Safety Basis Development.*** The development of safety basis information for the Sludge Treatment Project lacked adequate rigor and conservatism to ensure that the appropriate type and level of controls would be selected to protect the public and the environment from potential hazards.

***Resolution—***The Sludge Treatment Project team revised the spray leak accident analysis to conservatively bound the uncertainty in spray leak parameters. The revised analysis resulted in the identification of safety-significant controls for the protection of workers. For members of the public on the Columbia River, the revised accident analysis resulted in accident dose consequences that challenged DOE's Evaluation Guideline. To protect the public, DOE developed the capability to restrict access to the river during sludge transfer accidents in lieu of implementing safety-class engineered controls. In March 2012, DOE successfully completed a river closure drill and committed to incorporate this capability into the Sludge Treatment Project's safety control set. These actions adequately address the Board's concern. This issue is therefore closed.



**2. Project: Savannah River Site, Salt Waste Processing Facility**

***Issue—Operator Actions Following a Seismic Event.*** The design of the Salt Waste Processing Facility did not ensure that all operator actions required by the Preliminary Documented Safety Analysis to prevent explosions following a seismic event could be accomplished.

***Resolution—***DOE performed an analysis and implemented a number of design changes to ensure that operator actions required to prevent explosions following a seismic event could be accomplished. For example, DOE replaced a manual switch with seismically qualified interlocks in the process design to shut down the large recirculation pumps to the process vessels should waste temperatures exceed a threshold. DOE also incorporated a seismically qualified manual “disconnect switch” for shutting down other, smaller pumps during post-seismic conditions, also to limit waste temperature. In addition, DOE performed detailed calculations of the temperature rise of liquid waste within the process vessels following a seismic event to establish a defensible basis for the selection of controls to prevent explosions. Finally, DOE incorporated seismically designed, safety-significant piping connections into the designs for the safety-significant Air Dilution System, the process vessel ventilation system, and the air pulse agitators. These connections allow a portable air compressor to be attached after a seismic event to maintain the operation of these systems if necessary. These actions adequately address the Board’s concern. This issue is therefore closed.

**3. Project: Los Alamos National Laboratory, Safety System Upgrades at Technical Area-55**

***Issue—Inadequate Approach to Ensure Timely Improvements to the Safety Posture.*** The Board lacked confidence that safety system vulnerabilities at Technical Area-55 identified during DOE’s efforts to upgrade the safety basis would be addressed in a timely manner. Specifically, the Board observed that the Integrated Priority List process used by LANL managers to implement recommended upgrades failed to ensure that the fundamental principles of DOE Order 413.3A, *Program and Project Management for the Acquisition of Capital Assets*, would be met, and that the upgrades would be funded.

***Resolution—***DOE successfully improved the Integrated Priority List process. For example, DOE convened Integrated Nuclear Planning workshops to identify, plan, and execute upgrades important to safety at Technical Area-55. Evidence for the effectiveness of this process includes the early completion of upgrades under Technical Area-55 Reinvestment Project I and progress on Phases A, B, and C of Technical Area-55 Reinvestment Project II. However, the Board remains concerned about the timely completion of upgrades necessary to improve the seismic performance of PF-4, particularly upgrades associated with the building structure and the fire suppression and active confinement ventilation systems. Therefore, the Board’s original issue concerning the adequacy of the approach for ensuring timely improvements to the safety posture at Technical Area-55 is being removed from this report. The Board’s remaining concerns are being incorporated into an issue concerning the seismic safety posture of PF-4 (see Enclosure 1).

**NEWLY LISTED PROJECT****1. Project: Hanford Site, Interim Hanford High-Level Waste Storage Project**

*Description*—The Interim Hanford High-Level Waste (HLW) Storage Project will provide the capability to receive and store 4,000 canisters of immobilized HLW produced by WTP, with the potential to add storage and shipping modules in follow-on projects. Until a final disposal alternative is available, the interim on-site canister storage capability is required to enable startup and support the operation of the WTP High-Level Waste Facility.

*Status of Facility*—After establishing the mission need in fiscal year 2011, the Interim Hanford HLW Storage Project team proceeded with preparation of the conceptual design. In summer 2012, the project team plans to submit the conceptual design, technology alternatives, and the safety design strategy to DOE for review. DOE indicated that the funding for this project has not been established for fiscal year 2013, which could delay the project.

*Status of Significant Issues*—The Board is initiating its review of this project and has not identified any significant issues at this time.

**2. Project: Los Alamos National Laboratory, Plutonium Facility (PF-4) Seismic Upgrades**

*Description*—This report has previously tracked safety improvements at Technical Area-55 and PF-4 under the Technical Area-55 Reinvestment Project (TRP) (see Enclosure 2). DOE established the TRP in part to correct deficiencies with safety systems that were identified when DOE upgraded the safety basis for Technical Area-55. The TRP does not capture all of the PF-4 seismic upgrades of concern to the Board. The Board will therefore continue tracking seismic upgrades at PF-4 under a new entry in Enclosure 1 (i.e., “Plutonium Facility Seismic Upgrades”). This entry will replace the TRP entry.

*Status of Facility*—See the section of the report titled “Projects with the Most Significant Unresolved Issues.”

*Status of Significant Issues*—See the section of the report titled “Projects with the Most Significant Unresolved Issues.”

**CHANGE IN PROJECT STATUS****1. Project: Los Alamos National Laboratory, Chemistry and Metallurgy Research Replacement Project**

The President’s Budget Request for fiscal year 2013 provided no funding for the Chemistry and Metallurgy Research Replacement Nuclear Facility (CMRR-NF) and defers the project for 5 years. The Board is awaiting Congressional direction on this project. At this time, LANL has developed a set of activities necessary to substantially complete the CMRR-NF design by the end of 2012. The Board will follow these activities.

As directed by Congress, the Board will continue to exercise its existing statutory authority.

Respectfully submitted,



Peter S. Winokur, Ph.D.  
Chairman



Jessie H. Roberson  
Vice Chairman



John E. Mansfield  
Member



Joseph F. Bader  
Member

Enclosure

**ENCLOSURE 1**

**JUNE 2012 REPORT  
SUMMARY OF SIGNIFICANT UNRESOLVED ISSUES  
WITH NEW DEFENSE NUCLEAR FACILITIES**

SITE	FACILITY	TOTAL PROJECT COST (\$M)	STATUS			ISSUES <sup>b</sup>
			Critical Decision (CD) Approved	Design Completion <sup>a</sup>	Construction Completion	
Hanford Site	Waste Treatment and Immobilization Plant (WTP)	12,263			<i>(Operational 2019)</i>	
	a. WTP Pretreatment Facility		CD-3	79% Final Design	42%	5. Hydrogen gas control— <i>(Jun 09)</i> 7. Inadequate mixing— <i>(Apr 10)</i> 9. Inadequacies in the spray leak methodology— <i>(Jun 11)</i> 11. Heat transfer analysis for process vessels— <i>(Sep 11)</i> 12. Erosion and corrosion— <i>(Jun 12)</i> 13. Selection of validation set for computational fluid dynamics model— <i>(Jun 12)</i> 14. Design and construction of electrical distribution system— <i>(Jun 12)</i>
	b. WTP High-Level Waste Facility		CD-3	88% Final Design	41%	5. Hydrogen gas control— <i>(Jun 09)</i> 8. Inadequacies in the spray leak methodology— <i>(Jun 11)</i> 9. Erosion and corrosion— <i>(Jun 12)</i> 10. Selection of validation set for computational fluid dynamics model— <i>(Jun 12)</i> 11. Design and construction of electrical distribution system— <i>(Jun 12)</i>

<sup>a</sup>The percent of design completion is an estimate for the particular stage of design (conceptual, preliminary, or final).

<sup>b</sup>Dates in parentheses indicate the periodic report in which an issue was first identified. The number assigned to each issue indicates the order in which the issue was identified. Issues not listed have been resolved by DOE and are summarized in Enclosure 2.

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**WITH NEW DEFENSE NUCLEAR FACILITIES**

SITE	FACILITY	TOTAL PROJECT COST (\$M)	STATUS			ISSUES <sup>b</sup>
			Critical Decision (CD) Approved	Design Completion <sup>a</sup>	Construction Completion	
Hanford Site (continued)	c. WTP Low-Activity Waste Facility		CD-3	87% Final Design	69%	3. Instrumentation and control system design— <i>(Sep 11)</i> 4. Erosion and corrosion— <i>(Jun 12)</i> 5. Design and construction of electrical distribution system— <i>(Jun 12)</i>
	d. WTP Analytical Laboratory		CD-3	82% Final Design	80%	2. Design and construction of electrical distribution system— <i>(Jun 12)</i>
	e. WTP Balance of Facilities		CD-3	78% Final Design	64%	1. Ammonia controls— <i>(Mar 12)</i> 2. Design and construction of electrical distribution system— <i>(Jun 12)</i>
	K-Basin Closure Sludge Treatment Project	268	Phase 1: CD-1  Phase 2: CD-0	Phase 1: 44% Final Design  Phase 2: 33% Conceptual Design	Phase 1: <i>(Operational 2014)</i>  Phase 2: <i>(Operational to be determined)</i>	No open issues remain
	Waste Feed Delivery System	660	Most subprojects not formally implementing CD process	Various degrees of completion	Various degrees of completion and operations	No open issues remain
	Tank Waste Supplemental Treatment Project	110-310	Not formally implementing CD process	100% Conceptual Design	<i>(Operational 2018)</i>	No issues identified
	Interim Hanford HLW Storage Project	90-240	Not formally implementing CD process	80% Conceptual Design	<i>(Operational 2017–2018)</i>	No issues identified
Idaho National Laboratory	Integrated Waste Treatment Unit (IWTU)	570.9	CD-4	100% Final Design	100% <i>(Operational 2012)</i>	No open issues remain
	Calcine Disposition Project	900–2,000	CD-0	< 30% Conceptual Design	Will utilize portions of the IWTU <i>(Operational 2022)</i>	No issues identified

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			Critical Decision (CD) Approved	Design Completion <sup>a</sup>	Construction Completion	
Los Alamos National Laboratory	Chemistry and Metallurgy Research Replacement Project—Nuclear Facility	3,710–5,860 Undergoing DOE review	CD-1	70% Final Design	Some ground work <i>(Operational to be determined)</i>	No open issues remain
	Plutonium Facility (PF-4) Seismic Upgrades	Building structure: 15-20  Fire suppression system: 6  Active confinement ventilation system: 60–145	Not formally implementing CD process	Various degrees of completion	Various degrees of completion	2. Inadequate seismic safety posture— <i>(Jun 12)</i>
	Upgrades to Pit Manufacturing Capability at the Plutonium Facility (Technical Area-55)	Annual funding	Not formally implementing CD process	Various degrees of completion	Work ongoing	No open issues remain
	Radioactive Liquid Waste Treatment Facility Upgrade Project—Transuranic Waste Processing Facility	77–112	CD-1	0% Preliminary Design	<i>(Operational 2021)</i>	No open issues remain
	Transuranic Waste Facility	71–124	Phase A: CD-3  Phase B: CD-1	Phase A: 100% Final Design  Phase B: 60% Final Design	Phase A: 2%  Phase B: 0%  <i>(Operational 2015–2018)</i>	No open issues remain
Savannah River Site	Pit Disassembly and Conversion Project (in existing K-Area facilities)	Undergoing DOE review	CD-0	95% Conceptual Design	<i>(Operational to be determined)</i>	No issues identified

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SITE	FACILITY	TOTAL PROJECT COST (\$M)	STATUS			ISSUES <sup>b</sup>
			Critical Decision (CD) Approved	Design Completion <sup>a</sup>	Construction Completion	
Savannah River Site (continued)	Salt Waste Processing Facility	1,340	CD-3	99% Final Design	61% <i>(Operational 2015)</i>	5. Flammable gas control— <i>(Jun 09)</i> 8. Mixing system controls and operational parameters— <i>(Apr 10)</i>
	Waste Solidification Building	345	CD-2/3	100% Final Design	83% <i>(Operational 2013)</i>	No open issues remain
Y-12 National Security Complex	Uranium Processing Facility	4,200–6,500	CD-1	73% Final Design	<i>(Operational 2022)</i>	3. Structural and geotechnical engineering— <i>(Apr 10)</i> 4. Inadequacies in the integration of safety into the design— <i>(Jun 12)</i>
Multiple Sites	Multiple Sites	N/A	N/A	N/A	N/A	1. Deficiencies with the System for the Analysis of Soil-Structure Interaction (SASSI) computer software— <i>(Jun 11)</i>

## ENCLOSURE 2

### JUNE 2012 REPORT SUMMARY OF RESOLVED ISSUES WITH NEW DEFENSE NUCLEAR FACILITIES

SITE	FACILITY	RESOLVED ISSUES <sup>a</sup>
<b>Hanford Site</b>	<b>a. Waste Treatment and Immobilization Plant (WTP) Pretreatment Facility</b>	<ol style="list-style-type: none"> <li>1. Seismic ground motion—<b>resolved Feb 08</b>. The initial ground motion for the design basis earthquake was not technically defensible. Geologic work was completed in early 2007. The resulting data were used to develop final seismic ground motion criteria.</li> <li>2. Structural engineering—<b>resolved Dec 09</b>. The Board found weaknesses in the structural design, including the modeling, the lack of a clear load transfer capability in the structure, and an inadequate finite element analysis. DOE revised the analyses and prepared summary structural reports showing that the reinforced concrete sections of the facility met structural design requirements.</li> <li>3. Chemical process safety—<b>resolved Oct 07</b>. The Board was concerned about hydrogen accumulation in plant equipment. In response, DOE developed a conservative design criterion. (Note: this issue was reopened in the June 22, 2009, periodic report to Congress as “hydrogen gas control” when DOE changed the design approach.)</li> <li>4. Fire safety design for ventilation systems—<b>resolved Dec 09</b>. The Board was concerned about the means of protecting the final exhaust high-efficiency particulate air (HEPA) filters of the confinement ventilation system from fires. DOE developed and approved design changes to provide adequate protection of the filters from fires.</li> <li>6. Structural steel analysis and design—<b>resolved Dec 10</b>. The Board identified issues related to the adequacy of the structural steel design. BNI subsequently incorporated more realistic composite construction modeling and demonstrated that the design margin was adequate to compensate for the inadequacies of the finite-element model.</li> <li>8. Deposition velocity—<b>resolved Mar 12</b>. The Board was concerned that a decision by the WTP project team to change the value for deposition velocity from 0 cm/sec to 1 cm/sec was not technically justified. The project team subsequently changed the deposition velocity to an acceptable value.</li> <li>10. Use of Low-Order Accumulation Model—<b>resolved Mar 12</b>. The Board was concerned about DOE’s use of the Low-Order Accumulation Model for design work on the WTP project because the model under-predicted solids accumulation and had no physical basis. DOE subsequently abandoned use of the model for design work on the project.</li> </ol>
	<b>b. WTP High-Level Waste Facility</b>	<ol style="list-style-type: none"> <li>1. Seismic ground motion—<b>resolved Feb 08</b>. See Item 1 for the Pretreatment Facility.</li> <li>2. Structural engineering—<b>resolved Dec 09</b>. See Item 2 for the Pretreatment Facility.</li> <li>3. Fire protection—<b>resolved Jun 09</b>. The Board was concerned that DOE lacked an adequate technical basis for not providing fireproof coatings on structural steel members. The project developed a new fire protection strategy. The Board reviewed this strategy and found it to be acceptable.</li> <li>4. Fire safety design for ventilation systems—<b>resolved Dec 09</b>. See Item 4 for the Pretreatment Facility.</li> <li>6. Structural steel analysis and design—<b>resolved Dec 10</b>. See Item 6 for the Pretreatment Facility.</li> <li>7. Deposition velocity—<b>resolved Mar 12</b>. See Item 8 for the Pretreatment Facility.</li> </ol>
	<b>c. WTP Low-Activity Waste Facility</b>	<ol style="list-style-type: none"> <li>1. Fire protection—<b>resolved Jun 09</b>. See Item 3 for the High-Level Waste Facility.</li> <li>2. Structural steel analysis and design—<b>resolved Dec 10</b>. See Item 6 for the Pretreatment Facility.</li> </ol>

<sup>a</sup> Dates in bold indicate the periodic report in which an issue was reported as resolved. The number assigned to each issue indicates the order in which the issue was identified. Issues not listed are unresolved and are summarized in Enclosure 1.



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SITE	FACILITY	RESOLVED ISSUES <sup>a</sup>
<b>Hanford Site (continued)</b>	<b>d. WTP Analytical Laboratory</b>	1. Fire protection— <i>resolved Jun 09</i> . See Item 3 for the High-Level Waste Facility.
	<b>Demonstration Bulk Vitrification System Project</b>	1. Confinement strategy— <i>resolved May 08</i> . The early design of the facility had a number of major vulnerabilities with regard to the confinement of hazardous wastes. DOE developed a confinement strategy that led to improvements in the confinement design.  This project was removed from this periodic report as of September 2010 after DOE decided to hold Critical Decision-2 in abeyance until it had completed additional studies and made a decision regarding the preferred strategy for pretreating and immobilizing the low-activity waste.
	<b>Interim Pretreatment System</b>	This project was removed from this periodic report as of September 2010 because DOE withdrew funding for the project after establishing the mission need. No detailed reviews were completed.
	<b>K-Basin Closure Sludge Treatment Project</b>	1. Completeness of Preliminary Documented Safety Analysis— <i>resolved Oct 07</i> . The Preliminary Documented Safety Analysis was not based on the project design. DOE subsequently re-established the project at the conceptual design stage, with plans to develop a new safety analysis. This action eliminated the issue. 2. Adequacy of project management and engineering— <i>resolved Sep 10</i> . Persistent technical and project management problems delayed the project and resulted in a design that could not meet project requirements. DOE subsequently implemented a formal project management approach in accordance with departmental directives, which led to an acceptable conceptual design. 3. Inadequacies in integration of safety into the design— <i>resolved Jun 12</i> . Design documentation did not contain sufficient information with which to verify the ability of safety systems to perform their safety functions. Through application of a tailoring strategy for project acquisition, the project team had eliminated key safety-in-design deliverables. DOE and the project team subsequently developed the appropriate safety-in-design documents and provided sufficient design detail to verify the adequacy of safety systems. 4. Inadequacies in safety basis development— <i>resolved Jun 12</i> . Safety basis information lacked adequate rigor and conservatism to ensure that DOE had selected the appropriate type and level of controls to protect the public, workers, and the environment from potential hazards. DOE subsequently revised the safety basis using more defensible parameters and identified additional safety controls in the design and operation of the facility to provide the required protection.
	<b>Large Package and Remote Handled Waste Packaging Facility</b>	This project was removed from this periodic report as of June 2011 after DOE placed conceptual design activities in abeyance until 2013. No detailed reviews were completed.
	<b>Waste Feed Delivery System</b>	1. Design pressure rating of waste transfer system— <i>resolved Oct 07</i> . The analysis performed to determine the pressure rating of the waste transfer system was inadequate. DOE performed additional analyses and conducted sufficient testing and modeling to determine the minimum design pressure accurately.
<b>Immobilized High-Level Waste Interim Storage Facility</b>	This project was removed from this periodic report as of September 2010 after DOE abandoned it, with plans to initiate a new capability to fulfill the mission at a later date. No detailed reviews were completed.	

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<b>Idaho National Laboratory</b>	<b>Integrated Waste Treatment Unit (IWTU) Project</b>	<ol style="list-style-type: none"> <li>1. Pilot plant testing—<i>resolved Feb 09</i>. During pilot plant testing, an over-temperature condition developed in the charcoal adsorber bed. DOE investigated the cause of the over-temperature condition and proposed adequate controls to prevent/mitigate such an occurrence in the full-scale facility.</li> <li>2. Waste characterization—<i>resolved Feb 09</i>. Characterization of the waste to be processed was necessary to ensure that the process would be operated within the bounds of its safety basis. Additional sampling data were compiled and analyzed to show that the control strategy for the facility was adequate.</li> <li>3. Distributed Control System design—<i>resolved Feb 09</i>. DOE had not demonstrated that the safety-related Distributed Control System was capable of placing the process in a safe configuration, if necessary. DOE changed the design of the control system and added new design requirements to ensure the operational reliability of the safety-related control system.</li> </ol>
<b>Los Alamos National Laboratory</b>	<b>Chemistry and Metallurgy Research Replacement Project—Nuclear Facility</b>	<ol style="list-style-type: none"> <li>1. Design-build acquisition strategy—<i>resolved Jun 07</i>. NNSA’s acquisition strategy combined Critical Decision-2 (approval of performance baseline) and Critical Decision-3 (approval to start construction), which essentially eliminated formal review of the final design prior to construction. NNSA directed the project team to revise its acquisition strategy to reflect a more traditional approach.</li> <li>2. Site characterization and seismic design—<i>resolved Dec 09</i>. A technically defensible seismic design for the facility was needed to ensure that safety-related structures, systems, and components could perform their intended safety functions when subjected to the ground motion of the design basis earthquake. See comment below.</li> <li>3. Safety-significant active ventilation system—<i>resolved Dec 09</i>. The safety-significant active ventilation system needed to remain operable and perform its intended safety functions following design basis accidents. See comment below.</li> <li>4. Safety-class fire suppression system—<i>resolved Dec 09</i>. This facility has the first safety-class fire suppression system in a new facility in the DOE complex. The fire suppression system needed to remain operable and perform its intended safety functions following design basis accidents. See comment below.</li> <li>5. Safety-class and safety-significant container design—<i>resolved Dec 09</i>. The safety strategy for the facility relied on containers to prevent the release of large fractions of material. See comment below.</li> <li>6. Deficiencies in Draft Preliminary Documented Safety Analysis—<i>resolved Dec 09</i>. Safety requirements from the safety analysis did not flow adequately into the system design descriptions to ensure that the requirements were incorporated into the design. See comment below.</li> </ol> <p>The Board submitted its Certification Review Report, <i>Chemistry and Metallurgy Research Replacement Facility Project Los Alamos National Laboratory</i>, to the congressional defense committees on September 4, 2009. In this report, the Board concluded that its concerns regarding the design of CMRR up to that point had been resolved, and this was the basis for closing issues 2-6 above.</p>

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SITE	FACILITY	RESOLVED ISSUES <sup>a</sup>
Los Alamos National Laboratory (continued)	Technical Area-55 Reinvestment Project	<p>1. Adequacy of safety systems—<i>resolved Sep 08</i>. The scope and timing of this project warranted reconsideration to ensure that the project would address deficiencies with safety systems. NNSA subsequently developed and executed an Integrated Priority List to manage the safety system upgrades within the scope of the Technical Area-55 Reinvestment Project, as well as safety system upgrades managed through other means. The Board therefore closed this issue for the Reinvestment Project and committed to reevaluating issues with respect to the Integrated Priority List process. (Note: The Board subsequently raised an issue, “Inadequate approach to ensure timely improvements to the safety posture” concerning the Integrated Priority List process in its February 2009 periodic report to Congress.)</p> <p>2. Inadequate approach to ensure timely improvements to the safety basis—<i>removed Jun 12</i>. The Board lacked confidence that safety system vulnerabilities at Technical Area-55 identified during efforts to upgrade the safety basis would be eliminated in a timely manner. DOE successfully improved its processes for identifying and prioritizing safety system upgrades. The Board, however, remains concerned about the timely completion of upgrades necessary to improve the seismic performance of the Plutonium Facility, particularly upgrades associated with the building structure and the fire suppression and active confinement ventilation systems. Therefore, the Board’s generic issue concerning the adequacy of the approach to ensuring timely improvements to the safety posture at Technical Area-55 was removed from this report. The Board’s remaining concerns were incorporated into an issue concerning the seismic safety posture of PF-4.</p> <p>In the June 2012 periodic report, the Board replaced the entry for Technical Area-55 Reinvestment Project with an entry dedicated to seismic upgrades at PF-4 (i.e., Plutonium Facility (PF-4) Seismic Upgrades) because not all of the seismic upgrades of concern to the Board were captured under the Technical Area-55 Reinvestment Project.</p>
	Upgrades to Pit Manufacturing Capability at the Plutonium Facility (Technical Area-55)	<p>1. Lack of adherence to DOE Order 413.3A—<i>resolved Sep 08</i>. The project had not demonstrated formal mechanisms for ensuring that design requirements and interfaces would be appropriately managed and controlled. NNSA committed to managing the upgrades using a tailored approach to the Order and to developing an Integrated Nuclear Planning process to improve coordination among the projects. The Board decided to decouple this issue from the project and track it through the course of its normal oversight of the Integrated Nuclear Planning process.</p>
	Radioactive Liquid Waste Treatment Facility Upgrade Project	<p>1. Weak project management and federal project oversight—<i>resolved Sep 10</i>. The federal Integrated Project Team was not well established or providing effective oversight of the design process. NNSA assigned additional personnel to the team and increased the team’s involvement in project oversight.</p> <p>2. Weak integration of safety into the design process—<i>resolved Sep 10</i>. The integration of the safety and design processes for the project was weak. The project team subsequently developed and implemented appropriate tools for tracking and managing key assumptions and design requirements, developed an adequate technical basis for material selection, identified appropriate seismic criteria, and implemented appropriate hazard analysis techniques.</p>
	Transuranic Waste Facility	<p>1. Inadequate integration of safety into the design process—<i>resolved Sep 10</i>. The project team had not developed adequate information and design specificity for its safety systems to demonstrate the integration of safety into the design. NNSA changed the scope of the project such that the Board no longer considered this issue relevant.</p>

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SITE	FACILITY	RESOLVED ISSUES <sup>a</sup>
Los Alamos National Laboratory (continued)	Nuclear Material Safeguards and Security Upgrades Project, Phase 2	The Board's interest in this project stemmed from the potential for upgrades to impact safety-related aspects of Plutonium Facility operations. The Board's review revealed no adverse safety impacts, so this project was removed from this periodic report as of September 2010.
	Technical Area-55 Radiography Project	This project was removed from this periodic report as of September 2010 after DOE placed the conceptual design on hold. An interim radiography capability in Technical Area-55 is fulfilling the current requirements. No detailed reviews were completed.
Nevada National Security Site (formerly Nevada Test Site)	Device Assembly Facility—Criticality Experiments Facility	<ol style="list-style-type: none"> <li>1. Structural cracks—<i>resolved Feb 09</i>. The structure has numerous cracks in the concrete that are abnormal for a nuclear facility. Such cracking could indicate improper curing during construction that degrades the strength of the concrete. NNSA performed a comparative evaluation of uncracked and cracked portions of the facility. This evaluation revealed that the cracked and uncracked concrete had comparable strength.</li> <li>2. Deficiencies in fire protection system water supply—<i>resolved Sep 11</i>. Safety issues were associated with the fire protection system water supply to the facility, including susceptibility to single-point failure, use of unlisted components, and deterioration of the lead-in supply lines. NNSA completed an evaluation for the water supply system and developed recommendations for correcting these deficiencies. This assessment and proposed improvements were acceptable. NNSA authorized startup of the Criticality Experiments Facility on May 9, 2011. The Board will continue to report on the deficiencies of the fire protection water supply in its periodic <i>Report to Congress: Summary of Significant Safety-Related Infrastructure Issues at Operating Defense Nuclear Facilities</i>.</li> </ol>
Oak Ridge National Laboratory	Building 3019—Uranium-233 Downblending and Disposition Project	<ol style="list-style-type: none"> <li>1. Deficiencies in Preliminary Documented Safety Analysis—<i>resolved Sep 11</i>. The Preliminary Documented Safety Analysis was based on incomplete information and lacked detail on safety-related controls necessary to ensure that safety systems would be adequate to protect workers. DOE changed the scope of the project such that the Board no longer considered this issue to be relevant.</li> </ol> <p>As a result of changes in scope, this project was removed from this periodic report as of March 2012.</p>
Pantex Plant	Component Evaluation Facility	This project was removed from this periodic report as of September 2010 because DOE had made little progress beyond the initial mission need approval and has no plans to move forward with the project. No detailed reviews were completed.
Savannah River Site	Pit Disassembly and Conversion Facility	<ol style="list-style-type: none"> <li>1. Assumption on combustible loading for seismically induced fire—<i>resolved Apr 10</i>. The project team had not validated assumptions in the safety basis regarding combustible loading to support the facility's safety control strategy for a seismically induced facility fire. NNSA changed the scope of the project such that this issue was no longer relevant.</li> </ol> <p>On November 22, 2009, DOE approved combining the Pit Disassembly and Conversion Facility Project and the Plutonium Preparation Project into a new project called the Pit Disassembly and Conversion Project. The Pit Disassembly and Conversion Facility Project was therefore removed from this periodic report as of April 2010.</p>

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SITE	FACILITY	RESOLVED ISSUES <sup>a</sup>
Savannah River Site (continued)	Salt Waste Processing Facility	<ol style="list-style-type: none"> <li>1. Geotechnical investigation—<i>resolved Feb 08</i>. The geotechnical reports required to support the design of the project were incomplete, precluding the ability to make a final determination of the design basis earthquake and design settlement. The project team completed the reports and finalized the design basis earthquake and design settlement.</li> <li>2. Structural evaluation—<i>resolved Dec 09</i>. Initial reviews of the structural design documentation for the main processing facility revealed several significant errors and deficiencies in the structural analysis. DOE brought appropriate structural design expertise and oversight to bear on the project, and issued summary structural reports showing that the facility meets the structural design requirements.</li> <li>3. Quality assurance—<i>resolved Jun 07</i>. Quality assurance requirements were not implemented, as evidenced by inadequate calculations and the project team’s failure to report unrealistic predictions by software and use of unapproved software. DOE completed a corrective action program to address these quality assurance issues.</li> <li>4. Hydrogen generation rate—<i>resolved Jun 09</i>. The project team failed to adequately consider or quantify in the project safety control strategy the hydrogen generation rate from thermolysis, which can occur when organic solvent material is heated in the presence of radiation. Idaho National Laboratory performed testing that demonstrated the adequacy of the hydrogen generation rate used in the design.</li> <li>6. Fire protection for final HEPA filters—<i>resolved Sep 10</i>. The design of the confinement ventilation system failed to implement all features required by DOE directives to protect the final HEPA filter stage from potential fires or to demonstrate the equivalency of the design to the requirements in DOE directives. The project team implemented design changes and documented the equivalency of the design to the requirements in DOE directives.</li> <li>7. Operator actions following a seismic event—<i>resolved Jun 12</i>. The design of the facility failed to ensure that all operator actions required to prevent explosions following a seismic event could be accomplished. DOE performed an additional analysis and implemented a number of design changes to ensure that the required actions could be completed. Examples included incorporating seismically qualified interlocks and switches for process pumps into the design and adding a seismically qualified connection for a portable air compressor to the air dilution and ventilation systems to maintain operability after a seismic event.</li> </ol>

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Savannah River Site (continued)	Container Surveillance and Storage Capability Project	<ol style="list-style-type: none"> <li>1. Fire protection strategy—<i>resolved Jun 08</i>. The project’s fire protection strategy, including the design of the safety-class fire detection and gaseous suppression system, was not sufficiently mature to demonstrate that containers of radioactive material would be protected during postulated fire events. This issue was removed from this periodic report when the project was subsumed by the Plutonium Preparation Project.</li> <li>2. Preliminary hazards analysis—<i>resolved Jun 08</i>. The Board identified several deficiencies with the preliminary hazards analysis, including the project team’s failure to address all hazards (e.g., loss of rack storage cooling, toxicological hazards from process gasses) and failure to incorporate DOE guidance on preliminary consequence calculations supporting the early identification of safety systems. This issue was removed from this periodic report when the project was subsumed by the Plutonium Preparation Project.</li> <li>3. Criticality safety—<i>resolved Feb 08</i>. The project team intended to rely on administrative controls to justify excluding nuclear incident monitors from the facility’s design. This approach was inconsistent with industry criticality standards. DOE subsequently decided to include nuclear incident monitors in the design.</li> <li>4. Design process controls—<i>resolved Jun 07</i>. The project team lacked an appropriate system for tracking design inputs and assumptions to ensure that safety-related structures, systems, and components would be designed and fabricated to meet requirements. The project team committed to maintaining inputs and assumptions, documenting their origin, and tracking them through completion of the design.</li> </ol> <p>On June 27, 2008, DOE approved a revised alternative for the Plutonium Preparation Project that subsumed the Container Surveillance and Storage Capability (CSSC) Project and revised the scope of the Plutonium Disposition Project. The CSSC project was therefore removed from this periodic report as of September 2008</p>
	Tank 48 Treatment Process Project	<ol style="list-style-type: none"> <li>1. Project delays—<i>resolved Jun 11</i>. DOE’s delay in recovering Tank 48 and returning it to service had the potential to impact high-level waste cleanup at the site and posed a safety risk to workers and the environment. DOE revised its Implementation Plan for the Board’s Recommendation 2001-1, <i>High-Level Waste Management at the Savannah River Site</i>. DOE also took actions to mitigate many of the risks associated with Tank 48 project delays, such as committing to making Tank 50 available for high-level waste service.</li> </ol> <p>DOE suspended this project in July 2011 because of budget constraints, identification of a promising new technology for treating the waste, and an improved projection of the volume of available high-level waste tank space resulting from enhancements at the Defense Waste Processing Facility. This project was therefore removed from this periodic report as of September 2011.</p>
	Plutonium Preparation Project (formerly the Plutonium Disposition Project)	<p>On November 22, 2009, DOE approved combining the Pit Disassembly and Conversion Facility Project and the Plutonium Preparation Project into a new project called the Pit Disassembly and Conversion Project. The Plutonium Preparation Project was therefore removed from this periodic report as of April 2010.</p>

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SITE	FACILITY	RESOLVED ISSUES <sup>a</sup>
<b>Savannah River Site (continued)</b>	<b>Waste Solidification Building</b>	<ol style="list-style-type: none"> <li>1. Structural design—<i>resolved Jun 09</i>. The analysis for the structural design of the roof and the design of the facility with respect to withstanding potential settlement was inadequate. NNSA directed the project team to alter the design of the roof and correct the settlement analysis. The revised settlement analysis identified the need for design changes to structural members; these changes were subsequently incorporated into the facility design.</li> <li>2. Deficiencies in Preliminary Documented Safety Analysis—<i>resolved Feb 09</i>. The Preliminary Documented Safety Analysis did not include an appropriate analysis of hydrogen explosion scenarios to ensure confinement of material, nor did it include an adequate demonstration of compliance with DOE Standard 1189 with respect to chemical hazards. NNSA directed the project team to revise its hydrogen explosion calculations to ensure confinement and to demonstrate compliance with the standard for chemical hazards.</li> </ol>
<b>Y-12 National Security Complex</b>	<b>Highly Enriched Uranium Materials Facility (HEUMF)</b>	<ol style="list-style-type: none"> <li>1. Water supply for fire protection system—<i>resolved Sep 08</i>. The water supply for the safety-significant fire suppression system was not classified as safety-significant in accordance with the design basis requirements. NNSA committed to connecting the system to the safety-significant water supply planned for the Uranium Processing Facility, to providing a safety-significant water supply pressure monitor, and to incorporating safety-related configuration controls to ensure the availability of a single dedicated flow path in the system.</li> </ol> <p>HEUMF began operation in January 2010.</p>
	<b>Uranium Processing Facility</b>	<ol style="list-style-type: none"> <li>1. Preliminary hazards analysis development—<i>resolved Jun 07</i>. The draft preliminary hazards analysis was insufficient to support the development of the design by ensuring the integration of safety and the appropriate specification of safety controls. NNSA subsequently developed a safety evaluation report that contained an appropriate hazards evaluation and adequate safety controls.</li> <li>2. Nonconservative values for airborne release fraction and respirable release fraction—<i>resolved Sep 08</i>. The project team used an airborne release fraction and respirable fraction for its preliminary hazards analysis that were not based on values in the DOE handbook. NNSA subsequently agreed to use the appropriate bounding values from the DOE handbook.</li> </ol>