

Peter S. Winokur, Chairman  
Jessie H. Roberson, Vice Chairman  
John E. Mansfield  
Joseph F. Bader  
Sean Sullivan

**DEFENSE NUCLEAR FACILITIES  
SAFETY BOARD**

Washington, DC 20004-2901



December 24, 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 December 24, 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

Peter S. Winokur, Chairman  
Jessie H. Roberson, Vice Chairman  
John E. Mansfield  
Joseph F. Bader  
Sean Sullivan

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Washington, DC 20004-2901

December 24, 2012



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 the Board's June 25, 2012, and earlier reports to summarize the status of issues raised through the end of September 2012 and identifies new issues associated with the relevant projects. The status of many issues has not changed significantly during this 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, five new issues were identified, and two issues were resolved. 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), the Uranium Processing Facility (UPF) at the Y-12 National Security Complex, 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.

***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, as analyzed in the PF-4 Documented Safety Analysis (DSA). In October 2011, the National Nuclear Security Administration (NNSA) approved a revision to the PF-4 DSA. The revision included a refined accident analysis for seismically-induced events and asserted that all postulated accident scenarios have mitigated dose consequences to the public that are below the Evaluation Guideline of 25 rem Total Effective Dose 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,

because it indicates whether additional seismically qualified controls are required to protect the public. In a June 18, 2012, letter to NNSA, the Board identified several technical deficiencies with the revised DSA, challenging NNSA's conclusion that the dose consequences to the public do not exceed the Evaluation Guideline. NNSA transmitted its response to the Board on November 5, 2012. NNSA's response acknowledged that the PF-4 DSA needs further improvement and committed to perform additional analysis to determine what additional safety controls may be needed. The Board is reviewing NNSA's response.

Separately, LANL updated the site's Probabilistic Seismic Hazard Analysis in 2007 and 2009 and identified that the potential ground motion was significantly higher than analyzed in the DSA. In 2010, LANL initiated the Seismic Analysis of Facilities and Evaluation of Risk project to evaluate the increase in seismic risk resulting from the higher ground motion. In 2011, NNSA completed its evaluation of the seismic performance of the PF-4 structure in response to the increased seismic hazard at the site. The evaluation identified nine vulnerabilities that could render the structure unable to maintain its safety-class confinement function during postulated seismic events. Responding to those vulnerabilities, NNSA approved a Justification for Continued Operation (JCO) for PF-4 in July 2011. The JCO served as a temporary change to the PF-4 DSA that allowed operations to continue in light of the seismic vulnerabilities. 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.

NNSA subsequently completed structural upgrades to address these nine vulnerabilities and exited the JCO in June 2012. In addition to the upgrades, NNSA agreed that additional structural analysis, including a static nonlinear seismic analysis of the facility's structure, was necessary to identify potential additional vulnerabilities that could lead to a loss of confinement or a seismically-induced collapse of the structure. In a July 18, 2012, letter to the Deputy Secretary of Energy, the Board expressed concern that the static nonlinear seismic analysis was proceeding without adequate definition and technical justification. LANL completed the static nonlinear seismic analysis in September 2012. The analysis identified additional structural vulnerabilities, such as roof girders and captured columns that could fail during a seismic event and lead to the collapse of the facility. LANL notified NNSA of these results and submitted a safety basis addendum to NNSA for approval. NNSA is reviewing the addendum. The Deputy Secretary of Energy responded to the Board's concerns with the analysis on September 28, 2012, and committed to take several actions. NNSA is developing an alternate approach for performing the static nonlinear seismic analysis that will more accurately reflect the building's behavior and the calculated impact of seismic forces on the structure.

The Board will continue working with NNSA to resolve potential vulnerabilities that could compromise the safety function of the PF-4 structure.

***Hanford Site, Waste Treatment and Immobilization Plant.*** DOE is slowing the construction of two key WTP facilities to resolve safety-related issues and re-evaluate the project's design. During this reporting period, the Board identified one new issue with the WTP project concerning the formation of sliding beds due to the settling of solids in process piping. This issue is discussed in the next section of this report. No outstanding issues with WTP were resolved, and DOE's progress in resolving the Board's open safety issues continues to be slow.

Several of the technical issues discussed below are associated with the verification of safety-related assumptions using complex modeling approaches. As discussed below, the project team has experienced significant setbacks with validating assumptions related to issues with safety-related mixing. The Board expects that further delays and additional technical challenges will occur given the scope and magnitude of the existing technical concerns. Listed below are several unresolved technical issues that the project team is addressing.

#### *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. The Board accepted DOE's Implementation Plan to resolve these concerns, but noted that the closure strategy was based on a key unverified technical assumption dealing with the treatment of non-Newtonian waste. Following DOE direction, the project team attempted to validate this critical modeling assumption and concluded that it was not supported. Accordingly, DOE notified the Board that several deliverables cannot be completed, which will require a revision to the Implementation Plan. Also, the Secretary of Energy has undertaken a review of the WTP design. This review was ongoing at the time this report was prepared. Based on the Secretary's November 8, 2012, letter to the Board, the Board understands that this review may result in major changes to the design verification philosophy for mixing systems at WTP. The Secretary committed to incorporating these changes into the planned revision of the Recommendation 2010-2 Implementation Plan.

#### *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 components located in black cells will perform their safety functions over the 40-year design life of the facility. During this reporting period, the Board began to review the project team's draft action plan for resolving these issues.

#### *Selection of Validation Set for Computational Fluid Dynamics Model*

On April 3, 2012, the Board issued a letter to DOE identifying technical issues with the plan to validate experimentally a computer model of pulse jet mixing at WTP. During this reporting period, DOE notified the Board that its response would be incorporated into a deliverable under Recommendation 2010-2. As previously noted, the Secretary's November 8, 2012, letter to the Board highlighted the potential for major changes to the design verification philosophy for mixing systems at WTP. These changes are consistent with concerns previously communicated by the Board to DOE dealing with the use of computational fluid dynamics models to validate the performance of mixing systems. DOE will incorporate these changes into the planned revision of the Recommendation 2010-2 Implementation Plan.

*Spray Leak Analysis*

On April 5, 2011, the Board issued a letter to DOE identifying technical issues with the project team's model for estimating radiological consequences to the public from spray leak accidents in the Pretreatment and High-Level Waste Facilities. During this reporting period, DOE completed a spray leak testing program at Pacific Northwest National Laboratory (PNNL) and issued three test reports. The PNNL test reports concluded that the WTP spray leak model is not conservative under anticipated accident conditions. The project team plans to initiate a second phase of testing to further evaluate spray leak phenomena. DOE anticipates that this second phase of testing will be completed in the spring of 2013.

*Hydrogen in Piping and Ancillary Vessels*

Flammable gases, such as hydrogen, 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 piping dead legs. DOE has approved a strategy that 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. As identified in previous reports, the Board is concerned that DOE has not yet established how the quantitative risk analysis will be implemented. During this reporting period, no progress was made by DOE in resolving this safety issue. The Board remains concerned that additional delays are likely as DOE encounters technical issues in completing these activities.

*Design and Construction of the Electrical Distribution System*

On April 13, 2012, the Board issued a letter to DOE identifying several issues with the operability and safety of the electrical distribution system at WTP. DOE transmitted its response to the Board on September 27, 2012. The Board is reviewing DOE's response.

***Y-12 National Security Complex, Uranium Processing Facility.*** In an April 2, 2012, letter to NNSA, the Board expressed concern that the UPF project team had not adequately integrated safety into the preliminary design consistent with the expectations and requirements in DOE directives. For example, the Preliminary Safety Design Report (PSDR) for the project was not based on a complete and bounding unmitigated evaluation of hazards in the facility. Also, the accident analyses did not adequately identify and analyze representative and bounding accidents. Finally, the seismic design requirements for key safety controls were inadequate to ensure protection of the public and workers during postulated seismic events. NNSA independently identified many similar issues during its review of the PSDR. The Board's letter also reiterated a long standing Board concern with effective federal oversight of the project.

On June 27, 2012, NNSA provided a detailed response to the Board's letter. NNSA committed to upgrade seismic design requirements for (1) portions of the active confinement ventilation system and (2) structures, systems, and components needed to prevent criticality accidents after a seismic event. This commitment is a reasonable approach for ensuring that the public and the workers are protected from potential releases of radiological materials and criticality accidents in the event of an

earthquake. NNSA also committed to systematically review and correct the hazard and accident analyses to address deficiencies noted in the Board's letter. These analyses define both the radiological and non-radiological consequences to the offsite public and workers as well as the controls necessary for their protection. NNSA is in the process of revising the safety analysis documents to incorporate changes stemming from the Board's review. The UPF project team recently submitted a major revision of the PSDR to NNSA, and the Board is reviewing this document.

The Board conducted a public hearing on the integration of safety into the design of the UPF project in Knoxville, Tennessee on October 2, 2012. The hearing focused on: (1) the Board's concerns identified in the April 2, 2012, letter to NNSA, (2) a major change in the project's execution strategy that defers the installation of major processes in the facility until after the construction of the building is complete, (3) the redesign of the UPF structure and some process systems in response to self-identified equipment spacing and fit issues, and (4) the development and use of new technology in the facility that is not yet fully mature.

During this reporting period, the Board also identified a new issue with the UPF project team's validation of local modeling assumptions in the design of the UPF structure. This issue is discussed in the next section of this report.

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

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

*New Issue—Non-Bounding Spray Leak Consequence Analyses.* In a letter to DOE dated July 31, 2012, the Board identified that the preliminary accident analysis for the K-Basin Closure Sludge Treatment Project (STP) improperly relied upon active engineered controls and unsupported assumptions such as operator actions to limit the duration of radioactive material releases during postulated spray leak accidents. The accident analysis was therefore inconsistent with DOE's directives that require an "unmitigated" evaluation of accident consequences. Additionally, the Board observed that the atmospheric dispersion parameters used by the STP project team to calculate accident doses were not bounding. As a result of these concerns, the safety control set for the project may not be adequate. To address these issues, the STP project team plans to revise the accident analysis to provide an adequate technical basis for assumptions, and to include additional passive engineered controls.

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

*New Issue—Safety Instrumented Systems.* In a letter to DOE dated July 31, 2012, the Board identified that the safety basis for the STP preliminary design credits instrumented systems with performing safety functions. However, the preliminary design does not include design requirements or criteria for certain key attributes of safety instrumented systems such as overall system reliability or independence from non-safety systems. Objective design criteria are necessary to assure that safety systems reliably perform their intended safety function(s). The STP project team plans to include additional design requirements for safety instrumented systems in the final design.

**3. Project: Hanford Site, Waste Treatment and Immobilization Plant—Pretreatment Facility**

*New Issue—Formation of Sliding Beds in Process Piping.* In a letter to DOE dated August 8, 2012, the Board expressed concern that the portions of the WTP piping design that transport slurries containing high levels of solids will not prevent the formation of sliding beds of solids along the bottom of process piping. The formation of sliding beds increases wear from erosion/corrosion and the likelihood of pipeline plugging. Additionally, prolonged operation of a centrifugal pump with a plugged process line can cause over-pressurization and pump explosion, resulting in a loss of primary confinement and the potential to damage adjacent structures, systems, and components.

The Board also observed that the project has been slow to incorporate important new information regarding high-level waste properties into the WTP piping system design. This new information has the potential to impact WTP performance, safety, and mission, including higher erosion rates and a greater potential for pipeline plugging.

**4. Project: Los Alamos National Laboratory, Transuranic Waste Facility**

*New Issue—Deficiencies in the Preliminary Safety Design Report.* In a letter to DOE dated June 11, 2012, the Board identified a number of issues with the PSDR for the Transuranic Waste Facility (TWF) project that could impact the identification, design, and functional classification of the facility's safety-related controls. Specifically, the Board identified that the project team did not: (1) adopt appropriate release parameters for modeling the consequences of accidents involving radioactive sealed sources, (2) follow DOE's guidance on deposition velocity and therefore used a value in the accident analysis that was not technically supportable, (3) correctly apply the process established in DOE Standard 3014-2006, *Accident Analysis for Aircraft Crash into Hazardous Facilities*, for evaluating the probability of an aircraft impacting the facility, (4) apply conservative and technically supportable assumptions in deriving the probability for large truck crash accidents, and (5) meet DOE guidance for identifying the appropriate controls for protecting the safety-significant fire protection system from freeze-related damage.

The Board received DOE's response on October 9, 2012. The Board is reviewing this response.

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

*New Issue—Validation of Local Analysis/Design Modeling Assumptions.* In a letter to DOE dated September 6, 2012, the Board noted that the overall structural design of the main UPF building is adequate to resist the loads from anticipated natural and man-made hazards. The Board's letter identified, however, that the UPF project team had not validated a number of modeling assumptions in the structural analyses and design that could impact the behavior of local areas of the structure under design loads. Failure of local areas during a seismic event could negatively impact safety-related systems and components attached to the structure that are relied upon to protect the public and workers from potential releases of radiological materials.

The Board received DOE's response on November 5, 2012. The Board is reviewing this response.

## ISSUES RESOLVED DURING THE PERIOD

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

**Issue—*Mixing System Controls and Operational Parameters.*** The Board concluded that, given appropriate controls and operational parameters, the air pulse agitators (APA) in the Salt Waste Processing Facility (SWPF) should fulfill the functions assumed in the safety basis to release flammable gas from the solids in the waste. However, the Board identified shortcomings with the testing and modeling performed for these devices that the project team should consider when selecting controls and operational parameters.

**Resolution—**DOE performed additional mixing tests with monosodium titanate using conservatively scaled parameters in a 1/5 Scale Air Pulse Agitator Test Facility. DOE also performed pump down tests after each mixing test to confirm the absence of dead zones on the bottom of the process vessel where solids, uninfluenced by APA jets, could accumulate in the waste. DOE also committed to incorporate process controls to ensure that waste characteristics during operation do not exceed the simulant characteristics used in testing. For example, DOE will ensure liquid waste entering the SWPF meets applicable waste acceptance criteria, and will control various parameters such as waste level, number of batches concentrated, the amount of filtrate, and the concentration of solids in key process vessels and tanks. This additional testing, combined with the proposed controls, resolves the Board's concerns with the ability of mixing systems to perform their safety function. The Board considers this issue closed.

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

**Issue—*Structural and Geotechnical Engineering.*** In a letter to NNSA dated March 15, 2010, the Board identified several issues related to the geotechnical and structural analysis of UPF. These issues included the need for NNSA to: (1) account for the effects of the weathered shale on the building's response to seismic loads, (2) maintain sufficient spacing between the UPF structure and adjacent buildings during seismic events, (3) systematically validate finite element modeling requirements, (4) confirm the adequacy of the size of structural members, and (5) develop appropriate controls to prevent or mitigate the impacts of internal blasts on the UPF structure.

**Resolution—**To address these issues, NNSA demonstrated that: (1) the weathered shale will not significantly affect the seismic response of the building, (2) sufficient spacing exists between the UPF structure and adjacent buildings during seismic events, (3) the overall finite element model is consistent with accepted industry practice, and (4) the main building is adequately designed to resist imposed seismic and other anticipated loads. In addition, NNSA committed to identifying engineered controls to prevent internal explosions precluding the necessity of designing the building for blast loading. These actions adequately address the

Board's concerns with structural and geotechnical engineering. The Board considers this issue closed.

*The Board is closely monitoring the redesign of the UPF structure in response to equipment spacing and fit issues identified by the project team to ensure the structural integrity of the building is not compromised.*

## **NEWLY LISTED PROJECT**

### **1. Project: Oak Ridge National Laboratory, Transuranic Waste Processing Center Sludge Project**

*Description*—DOE has used the Transuranic Waste Processing Center (TWPC) at the Oak Ridge National Laboratory to process supernatant from the adjacent Melton Valley Storage Tanks. The TWPC Sludge Project will provide additional capability to process approximately 2,000 cubic meters of sludge and residual supernatant remaining in these tanks following completion of the supernatant campaign. To accomplish the sludge processing, DOE will construct a two-story annex northwest of the main TWPC process building. DOE will ship the solidified waste generated in the annex to the Nevada National Security Site for disposal as low-level waste.

*Status of Facility*—DOE approved Critical Decision (CD)-1 in March of 2010. Because of cost growth, DOE must approve a revised CD-1 identifying a new alternative for fulfilling the project's mission or reaffirming the selected alternative.

*Status of Significant Issues*—The Board has initiated its review of this project and has identified no issues at this time.

## **CHANGE IN PROJECT STATUS**

### **1. Project: Idaho National Laboratory, Integrated Waste Treatment Unit Project**

In April 2012, DOE approved CD-4 for the Integrated Waste Treatment Unit (IWTU) project beginning the project's transition to operations. Since this time, the IWTU has undergone testing to validate integrated operation, balance process systems, confirm operational procedures, and train operators. During this reporting period, the IWTU project experienced a significant operational upset during start-up testing. The upset resulted in process materials bypassing the process system filters and compromised the facility's ability to remove particulates from the process off-gas. Because the events occurred during integrated system testing and before the introduction of radioactive waste to the facility, there was no release of radioactive material to the environment. This event and subsequent actions taken by the project team to investigate and correct the cause have delayed the start-up of the facility until 2013.

DOE and the contractor have performed an investigation of the event and determined that the upset was caused by a number of weaknesses in the technical procedures, design, and

management of the project. The contractor expects to complete corrective actions in the spring of 2013, after which DOE will perform a readiness determination. Testing is expected to resume in the summer of 2013. The Board is closely monitoring the ongoing recovery actions.

**2. Project: Hanford Site, Interim Hanford High-Level Waste Storage Project**

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 operation of the WTP HLW Facility. DOE issued a notification of suspension for the project in June 2012. The notification indicates that design efforts may restart in fiscal year 2014. The Board is suspending its oversight of the project until design efforts recommence.

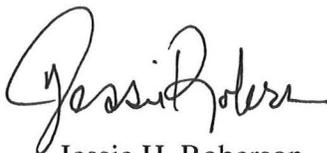
**3. Project: Savannah River Site, Pit Disassembly and Conversion Project (in existing K-Area facilities)**

NNSA closed the Pit Disassembly and Conversion Project on September 30, 2012, and the Board has discontinued its oversight. The Board will renew its oversight in the event that the Record of Decision from the Surplus Plutonium Disposition Supplemental Environmental Impact Statement process identifies the project as the preferred alternative.

Respectfully submitted,



Peter S. Winokur, Ph.D.  
Chairman



Jessie H. Roberson  
Vice Chairman



John E. Mansfield  
Member



Joseph F. Bader  
Member



Sean Sullivan  
Member

Enclosure

**ENCLOSURE 1**

**DECEMBER 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	82% 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> 15. Formation of sliding beds in process piping— <i>(Dec 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.

**DECEMBER 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 (continued)	b. WTP High-Level Waste Facility		CD-3	89% Final Design	42%	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>
	c. WTP Low-Activity Waste Facility		CD-3	87% Final Design	72%	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	85% Final Design	87%	2. Design and construction of electrical distribution system— <i>(Jun 12)</i>
	e. WTP Balance of Facilities		CD-3	79% Final Design	65%	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	280	Phase 1: CD-1  Phase 2: CD-0	Phase 1: 85% Final Design  Phase 2: 33% Conceptual Design	Phase 1: 10% <i>(Operational 2015)</i>  Phase 2: <i>(Operational to be determined)</i>	5. Non-bounding spray leak consequence analyses— <i>(Dec 12)</i> 6. Safety instrumented systems— <i>(Dec 12)</i>

**DECEMBER 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 (continued)	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 2018–2019)</i>	No issues identified
Idaho National Laboratory	Integrated Waste Treatment Unit (IWTU)	570.9	CD-4	100% Final Design	100% <i>(Operational 2013)</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
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	202–270	CD-1	0% Preliminary Design	<i>(Operational 2020)</i>	No open issues remain

**DECEMBER 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	
Los Alamos National Laboratory (continued)	Transuranic Waste Facility	71–124	Phase A: CD-3  Phase B: CD-1	Phase A: 100% Final Design  Phase B: 90% Final Design	Phase A: 85%  Phase B: 0% <i>(Operational 2015–2018)</i>	2. Deficiencies in the Preliminary Safety Design Report— <i>(Dec 12)</i>
Oak Ridge National Laboratory	Transuranic Waste Processing Center Sludge Project	50	CD-1	17% Final Design	<i>(Operational 2018)</i>	No issues identified
Savannah River Site	Salt Waste Processing Facility	1,340	CD-3	99% Final Design	65% <i>(Operational 2015)</i>	5. Flammable gas control— <i>(Jun 09)</i>
	Waste Solidification Building	345	CD-2/3	100% Final Design	84% <i>(Operational 2013)</i>	No open issues remain
Y-12 National Security Complex	Uranium Processing Facility	4,200–6,500	CD-1	77% Final Design	<i>(Operational 2023)</i>	4. Inadequacies in the integration of safety into the design— <i>(Jun 12)</i> 5. Validation of local analysis/design modeling assumptions— <i>(Dec 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

### DECEMBER 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. The project team 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.

**DECEMBER 2012 REPORT  
SUMMARY OF RESOLVED ISSUES  
WITH NEW DEFENSE NUCLEAR FACILITIES**

SITE	FACILITY	RESOLVED ISSUES <sup>a</sup>
Hanford Site (continued)	d. WTP Analytical Laboratory	1. Fire protection— <i>resolved Jun 09</i> . See Item 3 for the High-Level Waste Facility.
	Demonstration Bulk Vitrification System Project	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.
	Interim Pretreatment System	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.
	K-Basin Closure Sludge Treatment Project	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.
	Large Package and Remote Handled Waste Packaging Facility	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.
	Waste Feed Delivery System	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.
	Immobilized High-Level Waste Interim Storage Facility	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.

**DECEMBER 2012 REPORT  
SUMMARY OF RESOLVED ISSUES  
WITH NEW DEFENSE NUCLEAR FACILITIES**

SITE	FACILITY	RESOLVED ISSUES <sup>a</sup>
Idaho National Laboratory	Integrated Waste Treatment Unit (IWTU) Project	<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>
Los Alamos National Laboratory	Chemistry and Metallurgy Research Replacement (CMRR) Project—Nuclear Facility	<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>

**DECEMBER 2012 REPORT  
SUMMARY OF RESOLVED ISSUES  
WITH NEW DEFENSE NUCLEAR FACILITIES**

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 (PF-4), 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 (“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>

**DECEMBER 2012 REPORT  
SUMMARY OF RESOLVED ISSUES  
WITH NEW DEFENSE NUCLEAR FACILITIES**

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 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>

**DECEMBER 2012 REPORT  
SUMMARY OF RESOLVED ISSUES  
WITH NEW DEFENSE NUCLEAR FACILITIES**

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> <li>8. Mixing system controls and operational parameters—<i>resolved Dec 12</i>. The project’s selection of controls and operational parameters for the air pulse agitators had not accounted for the limitations of mixing tests and modeling. DOE performed additional tests to demonstrate acceptable mixing performance for the air pulse agitators and also committed to implementing appropriate process controls during facility operations.</li> </ol>

**DECEMBER 2012 REPORT  
SUMMARY OF RESOLVED ISSUES  
WITH NEW DEFENSE NUCLEAR FACILITIES**

SITE	FACILITY	RESOLVED ISSUES <sup>a</sup>
Savannah River Site (continued)	Container Surveillance and Storage Capability (CSSC) 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 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>

**DECEMBER 2012 REPORT  
SUMMARY OF RESOLVED ISSUES  
WITH NEW DEFENSE NUCLEAR FACILITIES**

SITE	FACILITY	RESOLVED ISSUES <sup>a</sup>
Savannah River Site (continued)	Waste Solidification Building	<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>
	Pit Disassembly and Conversion Project (in existing K-Area facilities)	NNSA closed the Pit Disassembly and Conversion Project on September 30, 2012, and the Board has discontinued its oversight. The Pit Disassembly and Conversion Project was therefore removed from this report as of December 2012.
Y-12 National Security Complex	Highly Enriched Uranium Materials Facility (HEUMF)	<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>
	Uranium Processing Facility	<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> <li>3. Structural and geotechnical engineering—<i>resolved Dec 12</i>. NNSA had not demonstrated that the following had been properly considered in the design of the UPF structure: (1) the effects of the weathered shale on the building's response; (2) the spacing between the UPF structure and adjacent buildings to accommodate the predicted horizontal seismic motion; (3) the finite element modeling requirements; (4) the sizing of structural members; and (5) controls for internal blasts. NNSA subsequently took appropriate actions to demonstrate that (1) the weathered shale will not significantly affect the response of the building; (2) sufficient spacing exists between the UPF structure and adjacent buildings; (3) the finite element modeling requirements are appropriate; (4) the main building is adequately designed for seismic and other anticipated loads; and (5) internal blasts will be prevented by process controls.</li> </ol>