U.S. DEPARTMENT OF ENERGY

Department of Energy Activities Relating to the Defense Nuclear Facilities Safety Board

Fiscal Year 2014

Report to Congress

June 2015

United States Department of Energy
Washington, DC 20585

Message from the Secretary

Section 316(b) of the Atomic Energy Act of 1954, as amended, requires the Department of Energy to submit a written annual report to Congress addressing the Department's activities related to the Defense Nuclear Facilities Safety Board (Board). Enclosed is the report on the Department's activities for Fiscal Year 2014 (FY14).

The Board has a critical advisory role within the Department's safety framework for defense nuclear facilities. Its expertise in reviewing the content and implementation of standards and directives relating to the design, construction, operation, and decommissioning of the Department's defense nuclear facilities helps strengthen the safety protocols at the Department's facilities nationwide. We welcome the Board's advice and recommendations. Through healthy exchanges with the Board and its staff, we can together fulfill our shared goal of protecting workers and the public at the Department's defense nuclear facilities. We look forward to continuing to work closely with the Board in the coming year and welcome Congress's review of the attached FY14 Annual Report.

Highlights of the Department's accomplishments are included in the report's Executive Summary. Additional details, as well as the status of the Department's actions in response to Board recommendations and other Board input, are included in the body of the report.

This report is provided to the following members of Congress:

- **The Honorable Lisa Murkowski**
  Chair, Senate Committee on Energy and Natural Resources
- **The Honorable Maria Cantwell**
  Ranking Member, Senate Committee on Energy and Natural Resources
- **The Honorable Thad Cochran**
  Chair, Senate Committee on Appropriations
- **The Honorable Barbara A. Mikulski**
  Ranking Member, Senate Committee on Appropriations
- **The Honorable Lamar Alexander**
  Chair, Senate Subcommittee on Energy and Water Development
- **The Honorable Dianne Feinstein**
  Ranking Member, Senate Subcommittee on Energy and Water Development
- **The Honorable John McCain**
  Chair, Senate Committee on Armed Services
- **The Honorable John F. "Jack" Reed**
  Ranking Member, Senate Committee on Armed Services
- **The Honorable Jeff Sessions**
  Chair, Senate Subcommittee on Strategic Forces

- **The Honorable Joseph Donnelly**
  Ranking Member, Senate Subcommittee on Strategic Forces
- **The Honorable Harold Rogers**
  Chair, House Committee on Appropriations
- **The Honorable Nita M. Lowey**
  Ranking Member, House Committee on Appropriations
- **The Honorable Mike Simpson**
  Chair, House Subcommittee on Energy and Water Development
- **The Honorable Marcy Kaptur**
  Ranking Member, House Subcommittee on Energy and Water Development
- **The Honorable William M. "Mac" Thornberry**
  Chair, House Committee on Armed Services
- **The Honorable Adam Smith**
  Ranking Member, House Committee on Armed Services
- **The Honorable Mike Rogers**
  Chair, House Subcommittee on Strategic Forces
- **The Honorable Jim Cooper**
  Ranking Member, House Subcommittee on Strategic Forces
- **The Honorable Fred Upton**
  Chair, House Committee on Energy and Commerce
- **The Honorable Frank Pallone**
  Ranking Member, House Committee on Energy and Commerce

If you have any questions or need additional information, please contact me, or Mr. Brad Crowell, Assistant Secretary for Congressional and Intergovernmental Affairs, at (202) 586-5450.

Sincerely,

Ernest J. Moniz

Executive Summary

The Department of Energy (DOE or the Department) welcomes the opportunity to provide this annual report to Congress in accordance with Section 316(b) of the Atomic Energy Act of 1954, as amended (AEA). The Department has a unique role as owner, operator, and regulator of the nation's defense nuclear facilities, and the Board's expertise has enhanced the Department's nuclear safety posture at these facilities. The Department's nuclear safety approach includes continuously improved policies, procedures, activities, and initiatives, which collectively support safety implementation, and a thorough response to emerging nuclear safety issues. As nuclear safety vulnerabilities are identified, the Department determines their causes in order to address them both locally and across the complex if necessary.

The Department has undertaken safety initiatives and activities to reinforce and ensure nuclear safety performance. These initiatives respond to issues identified by the Defense Nuclear Facilities Safety Board (DNFSB or Board), as well as issues proactively identified by the Department through site, facility, and program office self-assessments; through the Department's independent oversight activities; and through other Departmental safety improvement initiatives and activities. The Department's key Fiscal Year 2014 (FY14) initiatives and activities related to the Board are summarized below and discussed in more detail in the body of the report.

Progress on Initiatives and Activities

Los Alamos National Laboratory (LANL) Seismic Initiative at the Plutonium Facility (PF-4). The National Nuclear Security Administration (NNSA) has made progress in addressing a number of the Board's questions about the degree to which PF-4 provides adequate protection for the public and workers. NNSA and the contractor that operates LANL have completed all but one of the items in the Implementation Plan for Board Recommendation 2009-2, *Los Alamos National Laboratory Plutonium Facility Seismic Safety*, to mitigate the effects of a seismic event and have improved the safety posture of the facility. Detailed seismic analyses were completed using different methods to assess the structure, and NNSA and LANL are reviewing the results of these analyses. LANL is continuing with physical upgrades determined from the initial analysis to reduce seismic risk.

Nuclear Criticality Safety (NCS). DOE continues to make progress addressing nuclear criticality safety issues at PF-4 at LANL and at the Waste Treatment and Immobilization Plant (WTP) at Hanford. Since LANL suspended programmatic operations in June 2013 at PF-4, LANL has completed several root cause evaluations and developed corrective action plans. NNSA subject matter experts have assisted the laboratory in implementing these corrective action plans. LANL is following a phased approach to restart operations, which includes actions addressing conduct of operations, training operators, rebuilding the NCS staff, and multiple levels of readiness evaluations. At the WTP, the Office of Environmental Management (EM) has focused on the path to address unresolved NCS issues. The WTP contractor issued a plan, which identified NCS issues and associated actions to address those issues. DOE is closely following the contractor's progress in implementing this plan.

Nuclear Explosive Safety (NES). Efforts during FY14 focused on revising applicable NES directives to clarify the purpose of conducting NES evaluations, the nature and categorization of evaluation findings, the tracking and closure process for NES findings, and the process for dispositioning Senior Technical Advisor comments. Additionally, NNSA is reviewing the DOE standard for hazards analysis reports for nuclear explosive operations to address DNFSB concerns.

Waste Isolation Pilot Plant (WIPP) Activities. DOE convened Accident Investigation Boards (AIB) to determine the root causes of the February 5, 2014, underground fire and the February 14, 2014, radiological event at WIPP. The AIB completed its investigation of the underground fire, identifying the root cause to be the collective failure of DOE line management, as well as WIPP's current Management and Operations (M&O) contractor and the previous M&O contractor, to adequately recognize and mitigate the potential hazards of an underground fire at WIPP. The Department convened a second AIB to determine the cause of the radiological release and to develop recommendations for corrective actions. This AIB is using a two-phased approach. The first phase focused on the response to the radioactive material release, including related exposure to above ground workers and the response actions. The Phase 1 report issued on April 24, 2014, cited deficiencies in the response to the event and in the areas of nuclear safety, maintenance, radiological protection and controls, emergency response, safety culture, and oversight. The second phase of the investigation, which is currently in progress and will continue into FY15, is focusing on the cause of the radiological release. Facility recovery efforts are focusing on activities to safely restore mine operations and meet the Department's commitments for transuranic (TRU) waste cleanup across the complex.

Aging Facilities. Recognizing the infrastructure challenges posed by its aging defense nuclear facilities, the Department is analyzing its most pressing age-related hazards confronting its older facilities and eliminating or mitigating those hazards on a risk priority basis. During FY14, the Department continued addressing age-related issues at its higher risk facilities, including the Aging Management Program at the Y-12 National Security Complex, upgrading aging fire suppression systems at the Pantex Plant and the Savannah River Site, and assessing deferred maintenance at EM sites.

Safety Culture. DOE continues to make progress in strengthening its safety culture. These efforts included training, self-assessments, a complex-wide evaluation of self-assessments and extent-of-condition reviews, and identifying specific processes and controls to improve and sustain a robust safety culture. The Secretary of Energy appeared at a DNFSB public hearing and provided his perspectives on establishing and maintaining a strong safety culture.

Progress on Board Recommendations

This report documents the closure of six Board recommendations in FY14. This left five open recommendations with the Board issuing one new recommendation in FY14 for a total of six open recommendations in place at the end of FY14.

DEPARTMENT OF ENERGY ACTIVITIES RELATING TO THE DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Table of Contents

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I. Legislative Language

This report was prepared and delivered to Congress in accordance with AEA § 316 (42 United States Code (U.S.C.) § 2286e).

> *(b) DOE REPORT. The Secretary of Energy shall submit to the Committees on Armed Services, Appropriations, and Energy and Commerce of the House of Representatives and the Committees on Armed Services, Appropriations, and Energy and Natural Resources of the Senate each year, at the same time that the President submits the budget to Congress pursuant to section 1105(a) of Title 31 [United States Code], a written report concerning the activities of the Department of Energy under this subchapter during the year preceding the year in which the report is submitted.*

II. Background and Organization

The Department of Energy (DOE or the Department) welcomes the opportunity to provide this annual report to Congress describing the Department's activities in Fiscal Year 2014(FY14) that are relevant to the Defense Nuclear Facilities Safety Board (DNFSB or Board).

The Board is an independent executive branch agency established by Congress in 1988 to provide independent analysis, advice, and recommendations to the Secretary of Energy (Secretary) regarding public health and safety issues at the Department's defense nuclear facilities. The Board reviews and evaluates the content and implementation of standards and directives relating to the design, construction, operation, and decommissioning of the Department's defense nuclear facilities. Figure 1 shows the locations of DOE's active defense nuclear facility sites.

The Board and the Department communicate and interact through a variety of mechanisms, including formal Board recommendations, formal reporting requirements, Board letters requesting information, letters providing suggestions, letters providing information (e.g., staff trip reports and reports on specific issues), Board-sponsored public meetings and hearings, Board briefings, discussions, and Board site visits. This report is organized with the following sections.

- ***Section III, Departmental Nuclear Safety Initiatives and Activities*** describes broad-based Departmental activities affecting environment, safety, and health that are of interest to the Board.
- ***Section IV, FY14 Progress on Board Recommendations,*** describes Departmental activities completed or ongoing in FY14 to implement Board recommendations accepted by or under review by the Secretary.
- ***Section V, Interface Activities,*** describes Departmental activities to maintain communications and improve interaction between the Department and the Board.
- ***Appendix A*** contains tables summarizing the status of the six open Board recommendations, the 15 letter reports completed in FY14, and the four Board public meetings/hearings held in FY14 and October 2014.

- ***Appendix B*** lists acronyms and abbreviations.

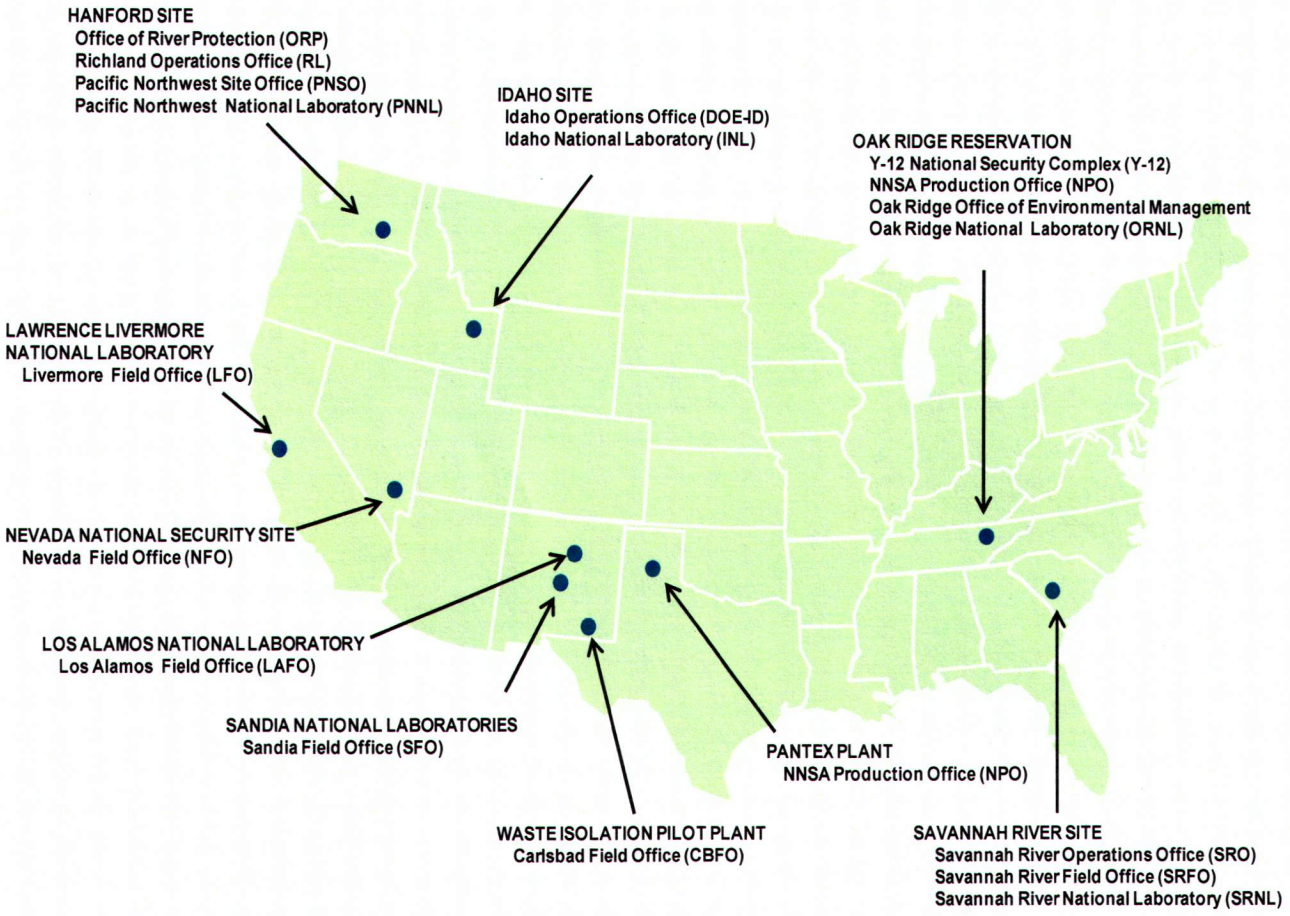

Figure 1. Department of Energy Active Defense Nuclear Facility Sites

III. Departmental Nuclear Safety Initiatives and Activities

This section describes the major FY14 initiatives and activities the Department undertook to improve and ensure its nuclear safety performance. These initiatives respond to issues identified by the Board and those proactively identified by the Department through site, facility, and program office self-assessments. Issues are also identified by independent oversight activities by the Office of Enterprise Assessments (formerly part of the DOE Office of Health, Safety and Security[1]); and through other Departmental safety improvement initiatives and activities. The Department protects its workers, the public, and the environment from nuclear hazards through rigorous, proactive nuclear safety programs and a robust regulatory framework. DOE operates defense nuclear facilities under specific nuclear safety enabling legislation and well-established rules contained in the Code of Federal Regulations

[1] On May 4, 2014, the former Office of Health, Safety and Security (HSS) was divided into two separate organizations: the Office of Environment, Health, Safety and Security (EHSS) and the Office of Enterprise Assessment (EA).

(C.F.R.). DOE also establishes and implements nuclear safety policies, requirements, and guidance within a system of directives and technical standards that are cited in contract terms and conditions. DOE uses independent and line management oversight, as well as enforcement activities, to ensure compliance with its safety requirements.

A. Plutonium Facility (PF-4) Seismic Safety

The PF-4 at Los Alamos National Laboratory (LANL) is the nation's only operational, full capability plutonium science and manufacturing facility; its national security mission is unique. DOE and the National Nuclear Security Administration (NNSA) have made progress in increasing the seismic margin of PF-4 through the execution of the Implementation Plan for Recommendation 2009-2, *LANL Plutonium Facility Seismic Safety*. LANL and NNSA have completed all but one of the items in the Implementation Plan to mitigate the effects of a seismic event and have improved the safety posture of the facility. The outstanding commitment is to issue a project execution plan and schedule that includes the remaining facility upgrades needed to prevent/mitigate a seismically induced event from exceeding the Documented Safety Analysis 25 rem evaluation guideline.

Two separate contractors using different methods completed detailed seismic analyses. One was completed in FY13, and a nationally recognized engineering firm that specializes in designing, investigating, and rehabilitating structures completed an alternate modal loading analysis in September 2014. Interested stakeholders monitored the process during FY14. NNSA and LANL are reviewing the results of these analyses to determine the best path forward. This path could include the need for additional upgrades or confirm the adequacy of upgrades already completed. Concurrent with these analyses, LANL continues to pursue physical upgrades to reduce seismic risk at PF-4. During FY14, LANL completed reinforcing the PF-4 basement short columns with a carbon fiber-reinforced polymer. The laboratory is currently in the work planning stage to reinforce the roof girders. This reinforcing technique is commonly used to reinforce bridges and other structures in earthquake-susceptible areas.

B. Nuclear Criticality Safety

The Board's staff collaborated with DOE staff to develop revised reporting criteria with respect to how the Program Secretarial Offices (PSO) develops the annual nuclear criticality briefing to the Board. The goal was to maximize the value of these reports in assessing the health of individual criticality programs and to minimize the administrative burden of the report. The new criteria provide that each PSO brief the details of the metrics it relies upon in performing effective line management oversight of criticality safety programs. Sites with fissile material nuclear operations use a variety of leading (providing insight to future results) or lagging (providing information on past activity) criticality safety-related metrics indicators. Sites with higher risk operations tend to monitor more metrics. Metrics combined with other tools such as performance awards/evaluations, trending analysis, communicating best practices, periodic reviews, etc. are useful elements of a comprehensive line management oversight process. Two sites received close attention to their nuclear criticality safety programs this year: PF-4 at LANL, and the Waste Treatment and Immobilization Plant (WTP) at the Hanford site.

PF-4 – LANL suspended PF-4 programmatic activities in June 2013 in response to nuclear criticality safety (NCS) issues. LANL has completed several root cause evaluations and developed corrective action plans. NNSA has dispatched several subject matter experts to assist the laboratory with implementing these corrective action plans. Because operations were shut down for over a year, LANL and NNSA are implementing a phased approach to restarting operations based on risk and complexity of the processes. The plans address conduct of operations, training operators and rebuilding NCS staff, material limitations and labeling, and multiple levels of readiness evaluations by the contractor and/or the federal staff.

WTP – In the fall of 2012, the Secretary assembled a group of technical experts that subsequently chartered a team to develop a path forward to address NCS issues. As a result, the NCS team developed a plan in May 2013. The WTP contractor issued a plan in the fall of 2014, which reiterated the issues from the NCS team report and established a schedule to address them.

EM also sponsored a special session at the American Nuclear Society during its summer 2014 meeting on the topic of applying NCS metrics to monitor and improve NCS programs. The session critically reviewed advantages and disadvantages of metrics at various DOE and Nuclear Regulatory Commission sites. As a result, several EM sites are now revising their NCS metrics.

C. Nuclear Explosive Safety

Pursuant to his Nuclear Explosive Safety (NES) oversight responsibilities, the NNSA Associate Administrator for Safety and Health completed a top down review of DOE's two NES orders and two manuals. NNSA developed revisions to clarify the purpose of conducting NES evaluations, the nature and categorization of findings, the tracking and closure process for NES findings and Senior Technical Advisor comments, and the timing of reviews for ongoing operations. NES remains an issue at Pantex. During FY14, the NNSA Production Office oversaw the transition to a new consolidated M&O contractor at the Y-12 National Security Complex (Y-12) and Pantex. The field office is continuing to monitor progress to improve the NES safety culture within the Pantex workforce. During FY14, NNSA generated technical data to address the hazard analyses of potential consequences caused by a falling man accident scenario during nuclear explosive operations. This information will apprise the Pantex Plant (Pantex) contractor of necessary and appropriate changes to work controls and/or tooling.

DOE updated the top-level requirements in revised DOE Orders for NES. In addition to directives, DOE is reviewing DOE Standard 3016, *Hazards Analysis Reports for Nuclear Explosive Operations*, per the DOE Technical Standard revision process. Multiple changes are in the offing to address Board concerns. These revisions will address identified discrepancies in the current documentation of technical bases for weapon responses.

D. Waste Isolation Pilot Plant Activities

The Waste Isolation Pilot Plant (WIPP) is the nation's only repository for disposal of transuranic (TRU) radioactive waste resulting from atomic energy defense activities. DOE suspended WIPP operations on February 5, 2014, following a fire involving an underground vehicle. Nine days later, an underground radiological event occurred contaminating a portion of the mine, primarily along the ventilation path,

and releasing a small amount of contamination into the environment. The suspension of WIPP operations is taxing TRU waste storage and disposal operations at many DOE sites.

The Department convened an Accident Investigation Board (AIB), which completed an investigation of the underground fire. This AIB identified the root cause to be the collective failure of DOE line management, WIPP's current Management and Operations (M&O) contractor and the previous M&O contractor, to adequately recognize and mitigate the potential hazards of an underground fire at WIPP. The Department convened a second AIB to determine the cause of the radiological release and to develop recommendations for corrective actions. This AIB is using a two-phased approach. The first phase focused on the response to the radioactive material release, including related exposure to aboveground workers and the response actions. The Phase 1 report issued on April 24, 2014, cited deficiencies in the response to the event and in the areas of nuclear safety, maintenance, radiological protection and controls, emergency response, safety culture, and oversight. The Phase II report was issued on April 16, 2015, and focused on the cause of the radiological release.

The Department and the M&O contractor are required to develop corrective action plans for both the underground fire and the radiological release. The WIPP Recovery Plan, issued on September 30, 2014, summarizes the proposed strategy, key activities, and management approach for the safe restart of WIPP operations. Efforts to restart WIPP operations are focusing on activities to restore mine operations. These include upgrading safety basis documentation and fire protection; surveying; reestablishing underground facility habitability and maintenance; initial closure of areas associated with the radiological release; decontamination; and increasing ventilation capacity.

The two AIBs identified a number of deficiencies with various WIPP safety programs. In light of these deficiencies, it is important that the Department and its M&O contractor upgrade safety protocols to meet applicable standards, and that they complete corrective actions prior to restarting WIPP operations. DOE will ensure these requirements are met in accordance with Departmental regulations and directives through Operational Readiness Reviews at the contractor and federal levels. Activities to restart operations will continue at a safe pace, commensurate with workforce capabilities, mine conditions, and the status of WIPP infrastructure and systems.

E. Nuclear Safety Oversight

The Department has congressionally mandated nuclear safety oversight responsibilities at its defense nuclear facilities and the Board is responsible for advising and making recommendations to the Secretary regarding nuclear safety at these facilities. These two responsibilities are complementary. Both the Board and the Department strive to ensure that the nation's defense nuclear facilities are designed, constructed, operated, and ultimately decommissioned in a safe manner.

In FY14 the Department realigned the former Office of Health, Safety and Security (HSS) into two offices: the Office of Environment, Health, Safety and Security (EHSS), reporting to the Under Secretary for Management and Performance; and the Office of Enterprise Assessment (EA), reporting to the Secretary. With respect to nuclear safety, the effect of this reorganization has been to separate the offices responsible for nuclear safety policy and technical assistance, i.e. EHSS, from those

responsible for nuclear safety oversight and enforcement, i.e., EA. Nuclear safety is a cornerstone of the Department and the recent reorganization continues its support.

F. Nuclear Safety Issues at Aging Facilities

Recognizing the infrastructure challenges posed by its aging defense nuclear facilities, the Department is analyzing its most pressing age-related hazards confronting its older facilities and is eliminating or mitigating those hazards on a risk priority basis. During FY14, the Department continued addressing age-related issues at its higher risk facilities. Examples include: the Aging Management Program at Y-12; upgrading aging fire suppression systems at Pantex and the Savannah River Site (SRS); assessing deferred maintenance at several EM sites; improvements at the Waste Encapsulation and Storage Facility (WESF) at the Hanford Site; and evaluating the Spent Nuclear Fuel Facility at the Idaho Site. Specifics on activities at Pantex, Y-12, WIPP, and EM-wide actions are provided below.

Pantex – The materiel condition of the facilities and infrastructure at Pantex is a significant Board and Departmental concern. The site requires steady improvement of operations-funded capital as well as line-item project support and approval to address long-term concerns. The site has developed, and is executing, a long-term strategy to replace critical safety systems nearing or at the end of their useful life, such as flame detection systems, radiation alarm monitoring systems, and high-pressure fire loop lead-ins. This strategy addresses only the most urgent needs at the site and will evolve over time to include other critical safety systems such as blast door interlocks. During FY14, the plant contractor completed two major line item projects. One line item project involved improvements to the fire suppression system and the other involved upgrading the high explosives pressing facility.

Y-12 – During FY14, Y-12 continued to implement the facilities and infrastructure and enriched uranium (EU) processes aging management programs. The Building 9212 Nuclear Facility Risk Reduction project reached over 90 percent completion of improvements to electrical, ventilation, process and support systems, which are critical to maintaining acceptable safety risks while NNSA designs and constructs the Uranium Processing Facility (UPF). In addition, NNSA directed the development of an EU infrastructure strategy to maintain the uranium mission capabilities in the Y-12 aging EU infrastructure while taking into account the changing UPF scope and schedule. The Continued Safe Operability Oversight Team (CSOOT) is closely monitoring these efforts and regularly assesses the physical condition of the EU infrastructure to support safe operations. The team has focused on evaluating EU process and infrastructure issues, evaluating safety basis impacts, facility-aging trends, and monitoring material-at-risk reduction activities. CSOOT continued its transition to more detailed system adequacy evaluations of key process and infrastructure systems. An annual evaluation of Buildings 9212, 9215, and 9204-2E performance indicators, facility condition assessments, and operational data, identified no imminent safety issues that would limit operations. Recent changes to size, complexity, and timing of the UPF project emphasize the necessity for prompt action on recommended improvement projects for Buildings 9215 and potentially 9204-2E.

WIPP and EM-wide Actions – In response to WIPP events discussed in Section D, the Acting Assistant Secretary for EM sent a memo to all EM Field Office Managers in April 2014, directing EM sites to perform an extent-of-condition review of deferred maintenance. The memo specifically directed sites to report on the adequacy of resources for system and equipment maintenance, maintaining

configuration control, and upgrades to support system infrastructure. The EM memo identified 30 "mandatory factors" (metrics) for sites to evaluate. In July 2014, EM Headquarters commissioned a team, led by the EM Office of Safety, Security and Quality Programs, to review the site responses and produce a summary report. The team report summarized individual site responses, highlighted significant issues and concerns, identified maintenance related vulnerabilities and lessons-learned, and recommended follow-up activities. The team reviewed site responses and is comparing data. In general, site responses reflect safety-class/safety significant related maintenance as first priority. The team issued a draft report for the Assistant Secretary for EM's review at the end of FY14.

G. New Facility Design and Construction

WTP – The WTP project made progress throughout FY14 in resolving safety, quality, and technical issues identified by multiple internal and external reviews over the past several years. These reviews have resulted in a series of management actions to assess the root cause of the issues and to implement management and process changes that, combined with resolution of technical issues, will allow the project to complete the design phase and move forward with major procurements and construction.

In March 2014, the Department issued a document entitled *U.S. Department of Energy Approach for Resolution of Pulse-Jet Mixed Vessel Technical Issues in the Waste Treatment and Immobilization Plant*, which describes the general plan for selecting and testing pulse-jet mixed vessels in the Pre-Treatment (PT) Facility and the High Level Waste (HLW) Facility. Engineering, procurement, and construction activities related to the PT facility and certain portions of the HLW facility have been on hold since FY12. The project completed its Full Scale Vessel Test platform and initiated demonstration tests for the pulse-jet mixing control system design and operating concepts in July 2014. In August 2014, the Department completed an evaluation, and authorized resumption of all engineering work necessary to finalize the design of the HLW Facility. In addition, limited procurement and construction activities could proceed in accordance with specific conditions included in the authorization letter. The construction contractor began developing a plan in FY14 that will define the criteria and approach for resuming production engineering for the PT Facility.

Key technical issues the project must resolve prior to resuming full project construction include:

- Hydrogen gas control in pulse jet mixed vessels, piping, and ancillary vessels;
- Criticality in PT Facility and HLW vessels;
- Pulse jet mixer controls and effectiveness of mixing;
- Erosion and localized corrosion in WTP vessels, piping, and pulse jet mixer nozzles;
- Spray leak analysis method;
- Ammonia controls;
- Design and construction of the Electrical Distribution system and design of the Instrumentation and Control system; and
- Ventilation balancing.

H. Integration of Safety into Design

Transuranic Waste Facility (TWF) at LANL – TWF supports the closure of Material Disposal Area G in Technical Area-54, consistent with a Consent Order signed with the State of New Mexico. This project supports safe storage and shipping of TRU waste. LANL is designing the TWF project in compliance with DOE Standard 1189, *Integration of Safety into the Design Process.* Although LANL resolved several of the Board issues that could affect the design and functional classification of safety-related controls, some remain open. Previously identified issues deal with analysis of radiological consequences to workers and the public, as well as strategies for ensuring operability of the fire protection system during cold weather. The new issues include inadequate analyses of potentially high consequence accidents affecting facility workers and safety controls to address a postulated wild land fire. LANL will incorporate corrective actions into the Documented Safety Analysis.

Uranium Processing Facility (UPF) at Y-12 – The Board identified a number of deficiencies with the UPF Preliminary Safety Design Report and design requirements that challenged the UPF project team strategy of integrating safety into the preliminary design. The UPF project team revised the Preliminary Safety Design Report and supporting hazard and accident analyses to address these issues. In the spring of 2013, NNSA identified new safety issues concerning the effectiveness of UPF's safety controls that required additional action to ensure the integration of safety into the UPF design. The project team laid out a path forward to resolve the Board's concerns. NNSA simultaneously began pursuing alternatives to the UPF design because of cost and schedule concerns. NNSA adequately addressed the Board's new safety concerns in April 2014. NNSA is moving ahead with a strategy for modernizing uranium operations at Y-12, and for moving mission-critical activities out of the age-weakened facilities. This strategy will significantly change the original conceived design of UPF. As the UPF alternative design matures, both NNSA and the Board will continue to monitor the new safety design strategies and progress.

I. Nuclear Safety, Policy, Standards, and Programs

The Department protects its workers, the public, and the environment from nuclear hazards through a rigorous, proactive nuclear safety program and through equally rigorous responses to incidents or safety vulnerabilities identified through internal or external oversight. The Department's nuclear safety program includes continuously improved policies and procedures to support safety and a thorough response to emergent nuclear safety issues within the complex. DOE's nuclear safety policies, standards, and requirements comprise the foundation of its proactive nuclear safety posture.

As further discussed in Section IV, the Department actively pursued revision of DOE Standard 3009, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses*, which it issued in November 2014. DOE has also revised and distributed for Department-wide review, DOE Standard 1104, *Review and Approval of Nuclear Facility Safety Basis and Safety Design Basis Documents*, and DOE Order 420.1C, *Facility Safety*, which are scheduled to be issued in FY15. In addition, DOE has initiated the revision of DOE Standard 1189, *Integration of Safety into the Design Process*.

J. Nuclear Safety Culture

On October 7, 2014, the Secretary appeared at a DNFSB public hearing on safety culture related to DNFSB Recommendation 2011-1, *Safety Culture at the Waste Treatment and Immobilization Plant*. The Secretary reiterated his commitment to safety culture improvements and noted the need for continuous improvement in this area. He commented on the importance of more consistent levels of attention on safety culture, learning from best practices, understanding core principles, and making improvements enterprise wide. The Principal Deputy Assistant Secretary for Environmental Management and the NNSA Principal Deputy Administrator also testified at the public hearing.

The Secretary noted the Integrated Safety Management (ISM) Policy is the framework from which DOE operates to support a strong safety culture and noted the value of examining how DOE uses incentives in procurements and contracts as a tool to help emphasize and support a strong safety culture. He remarked that safety culture is linked to other larger issues such as technical issue resolution and project management.

As a follow up to the Secretary's September 2013 memo on health and safety through leadership, employee engagement, and organizational learning, the Secretary and Deputy Secretary wrote to the Department's senior leadership on June 30, 2014, reaffirming their commitment to a positive safety culture. This memo stressed the importance of senior leadership demonstrating their commitment to a strong safety culture and safety conscious work environment in each visit to the field. Secretary Moniz also challenged senior leaders and program support offices to advance these goals, emphasizing that the Department needs to factor safety into every day decisions, which include how it allocates resources, and how it interacts with and responds to individuals on a daily basis.

In support of Recommendation 2011-1, DOE completed a complex-wide independent evaluation in FY14 of DOE's line organization self-assessments of its Safety Conscious Work Environment (SCWE). The resulting report provided feedback for continued improvement in guidance and execution of self-assessments conducted by DOE program and site offices.

K. Nuclear Safety Work Planning and Control

DOE completed its work planning and control (WP&C) commitments as detailed in its letter to the Board dated November 30, 2012. These commitments target two specific outcomes: (1) enhance complex-wide awareness and reinforce the need for rigorous activity-level planning, and (2) strengthen the guidance and formality associated with contractor implementation and federal monitoring of these activities. During FY14, DOE program and field offices continued to build upon the Integrated Safety Management Champions Workshop, as well as analyses of WP&C weaknesses. Specific areas of emphasis were on WP&C oversight and on improvement initiatives to improve WP&C implementation. In FY14, DOE issued a handbook and a revised guide within the Departmental directives system for contractor implementation and DOE oversight of WP&C. Sustained federal oversight, contractor assurance, and contractor implementation of WP&C in accordance with the handbook and guidance documents are key actions that are proceeding to ensure continued improvement of activity-level WP&C and work execution. On February 14, 2014, DOE transmitted to the Board its assessment of the effectiveness of its activities to improve implementation and oversight of WP&C.

L. Environmental Management Nuclear Safety Initiatives

EM identified emerging safety issues through ongoing awareness and analysis of operational experience and efforts to improve quality assurance program implementation across EM sites. Examples of EM efforts supporting operational experience improvements include:

- Assessment of the EM-wide Extent-of-condition Review on Deferred Maintenance;
- Assessments of WP&C and Conduct of Operations;
- Participation in the DOE NCS Support Group;
- Assistance visits to perform improved Beyond Design Basis Events analyses;
- Support and review of EM sites' annual Integrated Safety Management System and Quality Assurance declarations.

In FY14, the Chief of Nuclear Safety (CNS) for EM continued the initiatives to promote technical responsibility and nuclear safety at EM facilities. The CNS functions by performing oversight, providing technical support, and executing technical activities as appropriate to support nuclear operations. Examples of specific activities in FY14 include:

- Hosting a Startup and Commissioning Meeting to support EM capital projects;
- Leading and providing technical expert reviewers for Construction Project Reviews at the WTP and the SRS Salt Waste Processing Facility;
- Continuing the sponsorship and quality assurance activities for DOE/NNSA projects to validate and verify(V&V) the System for Analysis of Soil-Structure Interaction (SASSI) Software;
- Conducting over 30 field operational awareness visits and assessments guided by the CNS Nuclear Facility Risk Ranking;
- Sponsoring the DOE EM/Office of Nuclear Energy/Office of Science Software Quality Assurance Support Group to maintain federal competency and promote consistent implementation of nuclear safety software quality requirements; and
- Representing DOE on the American Society of Mechanical Engineers/American Nuclear Society Joint Committee for Nuclear Risk Management;

The Office of the CNS, in cooperation with NNSA, continued a project to V&V the SASSI software. DOE and the nuclear industry use this computer software widely to model soil-structure interaction analyses of facilities during seismic events. This effort began after DOE contractors noted irregularities in certain SASSI results and after a letter issued by the DNFSB in April 2011, expressed concerns with the V&V of SASSI. The project is developing a suite of test problems to demonstrate that SASSI simulations are sufficiently accurate over a range of parameters for sites and structures typical of nuclear facilities. In February 2014, the project staff met with Board staff, DOE sponsors, and project peer reviewers to discuss progress and receive feedback. The V&V activities include 12 tasks. The project completed all tasks, including over 1,000 engineering test problems, in FY14. CNS staff is performing final quality and review checks in preparation for issuance. CNS is planning a guidance document for SASSI practitioners to synthesize the results of the V&V work and provide insights for users to validate future SASSI results and avoid potential spurious results.

M. National Nuclear Security Administration Nuclear Safety Initiatives

The Office of the Associate Administrator of Infrastructure and Operations (NA-00) and the Office of Associate Administrator for Safety and Health (NA-SH) conducted multiple nuclear safety functions and initiatives in 2014, including laying the groundwork for merging the two organizations to become the Office of Associate Administrator for Safety, Infrastructure and Operations (NA-50) in 2015. The combined office will more efficiently execute the nuclear safety responsibilities previously carried out by NA-00, NA-SH, including the Office of Chief of Defense Nuclear Safety (CDNS). Some of the 2014 nuclear safety initiatives/responsibilities include:

- An assessment by NA-00 of safety basis implementation at the Lawrence Livermore National Laboratory, including the oversight functions of the Livermore Field Office.
- A CDNS Biennial Review of the NNSA Production Office (NPO), simultaneously evaluating NPO's fulfilment of nuclear safety responsibilities at two sites. As a result of the review, the nuclear safety delegation authorities for NPO were affirmed, and nuclear safety issues were identified and/or verified, resulting in NPO's ability to take appropriate actions to ensure nuclear safety functions are properly implemented.
- A complete overhaul of the suite of nuclear explosive safety directives, resulting in re-written DOE NES Orders and a new NES Supplemental Directive. These are ready for final approval by the Deputy Secretary (Orders) or NNSA Administrator (Supplemental Directive). The revised NES directives improve the methods for the safe conduct of Nuclear Explosive Operations.
- Assessments of NNSA laboratories software Quality Assurance for weapons response functions.
- The standup of a new service of seismic expertise for the NNSA complex, particularly for major issues at Los Alamos and for the UPF Project at Y-12.
- Leadership for the NNSA Nuclear Safety Specialist's (NSS) community for implementing the Safety Basis Professional Program, a suite of highly technical training courses designed to ensure consistent and quality NSS community performance.
- Execution of multiple NNSA nuclear Independent Project Reviews for nuclear safety, resulting in the identification of project nuclear safety issues in a manner that provides for timely and effective resolution.
- Technical support (e.g., QA, Nuclear Safety Specialists, Maintenance, Safety System Oversight) to augment NNSA Field Offices' staff, ensuring key nuclear safety functions were effectively performed.
- The publishing of NNSA Technical Bulletins that provided discussions of nuclear safety issues and responses to nuclear safety implementation questions.

IV. FY14 Progress on Board Recommendations

A. Overview

The Board issues recommendations to the Secretary for specific measures that it believes the Department should adopt to ensure adequate protection of public health and safety. The Secretary is required to respond to each Board recommendation within 45 days after its publication in the *Federal Register* (or longer, if granted additional time). In addition, the Secretary must provide an Implementation Plan (IP) to the Board within 90 days after publication in the *Federal Register* of the Secretary's acceptance of all or part of a recommendation (or longer, upon appropriate notice). The Department's policy is to begin IP development in parallel with the development of the Department's response, if it is expected that the Secretary will accept the recommendation in whole or in part. The Department strives to satisfy all IP actions within one year of issuance. However, most IP schedules extend beyond one year due to the scope and technical complexity of the safety issues being addressed, the lengthy processes for revising DOE directives, and the challenges inherent in implementing and verifying changes at defense nuclear facilities across the DOE complex.

Appendix A, Table A.1, *Open Board Recommendations*, lists the five recommendations that remained open at the end of FY14, the date of issuance, and the timeframe that DOE currently projects for completing the associated IP actions. It also lists one new recommendation issued by the Board on September 3, 2014, which DOE was reviewing at the end of FY14. The Board closed six recommendations in FY14. Five of these closures were due to DOE's progress in completing its IPs. One of the closures, Recommendation *2010-2: Pulse Jet Mixing at the Waste Treatment and Immobilization Plant*, occurred after DOE revised its technical approach associated with the control and operation of the plant, which resulted in the DNFSB determining its sub-recommendations were no longer relevant. All recommendations (both open and closed), the associated IPs, and a chronological record of related correspondence between DOE and the Board are available on the websites of the DOE Office of the Departmental Representative to the DNFSB (https://ehss.energy.gov/deprep/) or the DNFSB (http://www.dnfsb.gov/).

This report documents the closure of six recommendations in FY14: (1) Recommendation 2004-2-*Active Confinement Systems*; (2) Recommendation 2004-1-*Oversight of Complex, High-Hazard Nuclear Operations*; (3) Recommendation 2005-1-*Nuclear Material Packaging*; (4) Recommendation 2010-2-*Pulse Jet Mixing at the Waste Treatment and Immobilization Plant*; (5) Recommendation 2009-1-*Risk Assessment Methodologies at Defense Nuclear Facilities*; and (6) Recommendation 2000-1-*Prioritization for Stabilizing Nuclear Materials*.

The Board issued one new recommendation in FY14, Recommendation 2014-1: *Emergency Preparedness and Response*.

B. Recommendations Closed in FY14

2010-2: Pulse Jet Mixing at the Waste Treatment and Immobilization Plant

The Board issued Recommendation 2010-2 on December 17, 2010. The recommendation addressed the Board's concern that DOE should enhance equipment testing and analysis at the WTP to establish with confidence that the pulse-jet mixing (PJM) and waste transfer systems will perform adequately at full scale. The Secretary accepted the recommendation and committed to more testing to provide additional confidence that PJM and waste transfer systems for the WTP will achieve their design and operating requirements. DOE delivered the IP to the Board on November 10, 2011.

During late FY12 and FY13, DOE identified and confirmed the need to revise the original IP based on a different approach to resolving the Board's concerns regarding inadequate mixing, which could lead to a criticality event, flammable gas releases, or an inability to fully control PJM vessels. DOE described the revised technical approach associated with the control and operation of the plant in a Board briefing and a Department letter to the Board on September 11, 2013, which provided a projected date of FY14 and FY15 for resolving the remaining technical issues. Based on this new approach, the Board found the individual sub-recommendations were no longer relevant and closed Recommendation 2010-2 on January 28, 2014. The Board noted that underlying safety-related PJM issues remain and they would continue to review and monitor the design and construction of WTP and advise DOE as necessary, to ensure the adequate protection of public health and safety.

2009-1: Risk Assessment Methodologies at Defense Nuclear Facilities

The Board issued Recommendation 2009-1 on July 30, 2009. The recommendation advised DOE to establish policies and associated standards and guidance on the use of quantitative risk assessment methodologies (referred to as probabilistic risk assessment) at its defense nuclear facilities. The Secretary accepted the recommendation and transmitted the IP to the Board on November 3, 2009 and, on April 27, 2010, transmitted Revision 1 of the IP to the Board.

The Department communicated to the Board by letter, dated December 23, 2013, stating that it had completed all IP actions and described the ongoing efforts to gain experience with the use of risk assessments in non-reactor nuclear facility safety applications. DOE issued a standard for controlling the development and review of probabilistic risk assessments in the departmental directives system and piloted a training course to assist in the implementation of this technique. The Board closed this recommendation on January 28, 2014.

2005-1: Nuclear Material Packaging

The Board issued Recommendation 2005-1 on March 10, 2005. The recommendation acknowledged DOE's progress in the stabilization and storage of its excess nuclear materials, but called for further enhancement of nuclear safety, by developing technically justified criteria for nuclear material packaging systems on a DOE-wide level that are not covered by existing, very narrowly focused standards. The Secretary accepted the recommendation on May 6, 2005, transmitted the IP to the Board on August 17, 2005, and updated the IP on November 22, 2006.

The Department has completed its IP actions and made significant progress in repackaging its nuclear material in accordance with requirements specified in DOE Manual 441.1-1, *Nuclear Material Packaging Manual*. The Board closed this recommendation in a March 31, 2014 letter and requested that the Department provide an update to site plans and schedules to implement Manual 441.1-1 requirements, a prioritized schedule for repackaging nuclear materials, and a plan for phasing out the Manual and converting its content to an appropriate directive. The Department's response of July 30, 2014, provided information updating the site schedules and informed the Board that a determination had been made that the current requirements and guidance in the Manual are appropriate for the repackaging effort. When requirements need to change, DOE will convert DOE M 441.1-1 into an order and/or guide, as appropriate, in accordance with the departmental directives program.

2004-2: Active Confinement Systems

The Board issued Recommendation 2004-2 on December 7, 2004. The recommendation cited the Board's assessment that benefits would accrue if the Department changed its safety policy to require active confinement ventilation systems for all new and existing Hazard Category 2 and 3 defense nuclear facilities that present the potential for a radiological release. The Board also recommended that the Department evaluate all new and existing defense nuclear facilities, and enhance and update the associated DOE directives and standards to include active confinement ventilation requirements.

The Secretary accepted the recommendation on March 18, 2005, transmitted the IP to the Board on August 22, 2005, and on July 12, 2006, transmitted revision 1 of the IP to the Board. The IP committed to a review of all Hazard Category 2 and 3 defense nuclear facilities to ensure that the selected confinement strategy is properly justified and documented. In accordance with the IP, the Department prioritized design and construction projects, including ongoing major modifications to existing facilities.

The Department notified the Board on June 29, 2014, that all actions called for in the IP were completed. As a result of extensive reviews of the confinement ventilation systems, DOE made improvements when warranted to ensure these systems will be ready and available to perform their intended safety functions in case of an accident at one of the defense nuclear facilities. The Department improved its regulatory infrastructure to ensure the design of confinement ventilation systems in any new nuclear facility or nuclear facility undergoing a major modification is appropriately planned. On July 15, 2014, the Board closed Recommendation 2004-2 and noted the significant enhancements made by DOE in this area.

2004-1: Oversight of Complex, High-Hazard Nuclear Operations

The Board issued Recommendation 2004-1 on May 21, 2004. The recommendation cited Board concerns regarding a number of safety issues related to the Central Technical Authority, delegations of safety responsibilities, technical capability for effective oversight, nuclear safety research and development (NSR&D), lessons learned from significant external events, and ISM. The Secretary accepted the recommendation and transmitted the IP to the Board on December 23, 2004. On August 30, 2011, DOE transmitted an updated IP that identified three broad areas for improvement: strengthening federal safety assurance, learning from internal and external operating experience, and revitalizing ISM implementation.

The Department transmitted information on March 6, 2014, concerning completed commitments for the NSR&D Program. This program provides a corporate-wide structure and process to improve coordination, integration, and support of the Department's research, analysis, and testing of nuclear safety technologies, consistent with its IP. DOE's NSR&D Program has grown to the state where it has established processes in place to identify NSR&D needs and priorities, evaluate NSR&D projects, and share NSR&D information across the DOE complex.

The Board reviewed the Department's progress with respect to the three remaining IP commitments and closed the recommendation in a letter to the Department dated May 1, 2014. The Board requested a response to one IP commitment concerning the verification of federal safety assurance capabilities. The Board requested that the Department provide a briefing and a report on DOE's federal safety oversight capability and its criteria for evaluating the effectiveness of federal safety oversight of high hazard nuclear operations at DOE's defense nuclear facilities.

C. Open Recommendations

2014-1: Emergency Preparedness and Response

The Board issued Recommendation 2014-1 on September 3, 2014. It reflected the Board's assessment that the requirements in DOE Order 151.1C, *Emergency Management System*, which establishes the basis for emergency preparedness and response at DOE sites with defense nuclear facilities, and the current implementation of these requirements, must be strengthened for the protection of workers and the public. The Board asserted these deficiencies can lead to failures to identify and prepare for plausible emergency scenarios and to demonstrate proficiency in emergency preparedness and response. The Secretary accepted the Recommendation on November 7, 2014, and as of the date of this Report, the Department was developing a comprehensive response with an implementation schedule.

2012-2: Hanford Tank Farms Flammable Gas Safety Strategy

The Board issued Recommendation 2012-2 on September 28, 2012. It reflected the Board's assessment that current operations at the Hanford Tank Farms require safety-significant active ventilation of double-shell tanks (DST) to ensure the removal of flammable gas from the tanks' headspace. The Board also recommended that DOE install real-time monitoring for tank ventilation flow rates and perform other upgrades on indication systems used to perform safety-related functions. DOE delivered the IP for this recommendation to the Board on June 6, 2013.

DOE completed three IP actions during FY14, and eight currently remain open. During FY14, the DOE Office of River Protection (ORP) Tank Farms contractor completed the selection, installation, testing, and evaluation of flowmeters in selected DST ventilation exhausts. The Tank Farms contractor recommended a specific technology based on performance and reliability. ORP is working on the implementation schedule to install permanent safety significant real-time flow measurements in DST tank farms. The Tank Farms contractor also documented the evaluation of Hanford Tank Farms' capability to recover from a loss of ventilation due to an extended loss of power. There were no deficiencies or compensatory measures identified for the DST farms to respond to loss of ventilation

due to power loss. It determined the response times for each DST were compliant with the applicable limiting conditions for operation. The Tank Farms contractor also conducted a feasibility study to inspect the DST's primary tank ventilation system ductwork and assess technologies that could be used. ORP is evaluating the study. The Tank Farms contractor also developed a streamlined approach to upgrade the DST primary ventilation systems, which ORP is evaluating. On August 29, 2014, the Department provided the Board with an updated schedule of IP deliverables.

2012-1: Savannah River Site Building 235-F Safety

The Board issued Recommendation 2012-1 on May 9, 2012. The recommendation reflected the Board's position that the Department should take action to remove and/or immobilize the residual contamination within Building 235-F because of the potential dose consequences associated with a radiological release to collocated workers and the public. The Board also stated that DOE must take effective near-term actions to prevent a major fire in Building 235-F. The Secretary accepted the recommendation, agreeing with the need to take action to reduce the hazards associated with the material at risk that remains as residual contamination within Building 235-F. The Secretary's acceptance letter noted DOE's actions to remove special nuclear material from Building 235-F, remove transient combustible material, and limit access to the building. DOE issued the IP for Recommendation 2012-1 on December 5, 2012. DOE developed an IP revision in 2014 that will be implemented in FY15 to address changes in the commitment schedule.

DOE completed two IP actions in FY14 and seventeen remain open. DOE Savannah River has made progress on the 235-F risk reduction project. DOE is upgrading the building fire detection system to protect against the possibility of a small fire growing to a size that could cause off-site impacts. Further de-energizing of unneeded electrical equipment has reduced the risk of a fire starting and continued combustible material management efforts have further reduced risk in the facility. A key requirement of the IP is performing at least one formally assessed drill each year based on a postulated radiological release from Building 235-F. The site M&O contractor conducted one such drill in FY14. The overall performance of the facility's emergency response organization, as demonstrated in drills performed over the past several years, indicates the facility is capable of responding effectively to a radiological release from 235-F and implementing protective actions to protect personnel in facilities and construction sites surrounding 235-F. DOE implemented a Basis for Interim Operations for deactivation of the facility in February 2014 to provide an updated safety basis for ongoing activities.

2011-1: Safety Culture at the Waste Treatment and Immobilization Plant

The Board issued Recommendation 2011-1 on June 9, 2011. The recommendation reflected the Board's assessment that, taken as a whole, the Board's investigative record indicated that the safety culture at WTP was in need of prompt, major improvement and that corrective actions would be successful and enduring only if championed by the Secretary. The Secretary accepted the recommendation, and DOE delivered the IP to the Board on December 27, 2011. On September 14, 2012, DOE delivered an IP addendum to supplement the original IP, based on information and experience accumulated to date during execution of the IP. DOE sent a revised schedule for completing some IP milestones related to complex-wide actions to the Board on September 27, 2013.

During FY14, the Department completed six IP activities and three remain open. The activities completed in FY14 represent substantial progress toward completing the IP and build on much of the work completed in FY13, especially the SCWE self-assessments performed at headquarters and sites with defense nuclear facilities. By letter dated April 3, 2014, DOE transmitted the final SCWE self-assessment report to the Board, marking the completion of the SCWE self-assessments called for in the recommendation.

In a letter dated November 25, 2013, DOE informed the Board of the completion of SCWE training called for in the IP, i.e., DOE and contractor management and leadership training at DOE headquarters and sites across the complex. This training focused on the DOE ISM Guide and the DOE safety culture focus areas of leadership, employer engagement, and organizational learning. Ongoing training remains a part of the DOE long-term plan to improve and sustain a strong safety culture.

In a letter dated March 19, 2014, the DOE Office of Enforcement and Oversight sent the independent evaluation of site self-assessments for a broad set of DOE sites and field offices to the Board. The evaluation methodology focused on evaluating the quality of the site SCWE self-assessment process. Although the overall effort in performing SCWE self-assessments varied, the report noted that all sites benefited from the experience. It pointed out that a clear result of the SCWE self-assessments was an increased awareness, knowledge, and understanding of safety culture concepts, particularly SCWE. It observed the self-assessments and provided an opportunity for organizations to learn and improve on their overall culture, but noted that substantial improvements were needed across the complex to ensure that an effective and unbiased process is used to measure safety culture, including SCWE. The team recommended a focus on improving the guidance and tools used at site level.

In a letter dated May 29, 2014, DOE transmitted to the Board a consolidated report on the SCWE extent-of-condition reviews. This report was generated from a crosscutting team of members across the complex who reviewed the self-assessment and HSS independent reviews. The report documented overall assessment results from across the complex and provided interpretive conclusions. It also provided recommendations from a complex-wide perspective on actions to improve safety culture management. Overall, the report identified primary and secondary actions for improvement along with recommendations for their implementation.

With assessments complete, the next efforts focused on individual sites, identifying the specific processes and controls appropriate for improving and sustaining a robust safety culture. These actions were directed to sites in mid-FY14 with results submitted to PSOs for review and approval at the end of the fiscal year.

In June 2014, the DOE Office of Independent Assessment issued a report on their independent oversight follow up assessment of WTP's safety culture. The Secretary directed the conduct of another independent follow up assessment of WTP's safety culture in 2015.

2010-1: Safety Analysis Requirements for Defining Adequate Protection for the Public and the Workers

The Board issued Recommendation 2010-1 on October 29, 2010. The recommendation advised DOE to amend 10 C.F.R. Part 830, *Nuclear Safety Management*, by invoking a revised DOE Standard 3009-94, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses (DSA)*, as a required method. The recommendation also requested a revision to DOE Standard 3009-94 to clarify criteria for hazard and accident analysis methodologies, and identification of hazard controls. The Board also recommended a clearly defined approval authority for safety analyses at defense nuclear facilities that exceed the established Evaluation Guideline. The Secretary partially accepted the recommendation, DOE transmitted the IP to the Board on September 26, 2011, and a revised IP schedule was transmitted to the Board on September 20, 2013.

The IP provides an approach for updating the Department's DSA standards and requirements to improve the performance of hazard and accident analysis and the identification of safety controls. As part of the Department's IP efforts, it actively pursued the revision of DOE Standard 3009, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses*, during FY14, including significant efforts to incorporate the perspectives of key stakeholders, such as site offices, contractors, and the DNFSB. DOE Standard 3009 was issued in November 2014. DOE has also revised and submitted for Department-wide review DOE Standard 1104, *Review and Approval of Nuclear Facility Safety Basis and Safety Design Basis Documents*, and DOE Order 420.1C, *Facility Safety*. In addition, DOE has initiated the revision of DOE Standard 1189, *Integration of Safety into the Design Process*. These revisions incorporate commitments from the IP into the DSA development and approval process.

In October 2014, the secretary reached final decisions based on a Department analysis of its regulatory framework, as committed in the 2010-1 IP, and concluded that no change to 10 C.F.R. Part 830, *Nuclear Safety Management*, is necessary. This analysis also concluded that changes to DOE Order 420.1C are warranted to require use of DOE-STD-1104 and to prescribe the set of DOE nuclear facilities that will have to apply revised DOE-STD-3009. The Secretary also reiterated a commitment to evaluate existing DOE defense nuclear facilities to the new revision of DOE-STD-3009 related to protection of the public from nuclear hazards.

2009-2: Los Alamos National Laboratory Plutonium Facility Seismic Safety

The Board issued Recommendation 2009-2 on October 26, 2009. The recommendation advised the Department to implement near-term actions and compensatory measures to reduce the consequences of potential seismic events at PF-4 and to develop and implement a longer-term strategy to reduce consequences from seismic events. The Secretary accepted the recommendation on February 2, 2010, and transmitted the IP to the Board on July 13, 2010.

DOE has completed all but one IP action for this recommendation. Work continued in accordance with the Deputy Secretary's letter of September 28, 2012, to evaluate PF-4 structural integrity using an alternate seismic modeling analysis method. The result of this analysis will provide a better understanding of the seismic performance of PF-4 and enhance NNSA's confidence it has identified all

structural elements requiring reinforcement. These efforts will provide LANL with the necessary information to develop facility upgrade projects if they need to include structural modifications to prevent failure of the facility in a seismic event and actions for completion of a confinement ventilation system by FY20. A PF-4 Seismic Project Execution Plan will capture these plans.

V. Interface Activities

In addition to formal recommendations, the Board and its staff regularly communicate with DOE by letter, by visiting the Department's defense nuclear facilities to review the implementation of safety initiatives, by examining defense nuclear facilities and their operations, and by briefings. Information about DNFSB interactions with DOE, including all correspondence, is available by site and by fiscal year on the DR website at https://ehss.energy.gov/deprep/.

In addition to meeting IP commitments, DOE responds to the Board's issuance of formal letters establishing reporting requirements pursuant to 42 U.S.C. Section 2286b(d). During FY14, DOE completed actions related to such reporting requirements. Appendix A, Table A.2 shows these actions. The Board held three public hearings in FY14 and one in October 2014, which are summarized in Appendix A, Table A.3.

Appendix A. FY14 Summary: Open Recommendations; Statutory Letter Reports; and Public Meetings/Hearings

Table A.1 Open Recommendations

Rec #	Title	Date Opened	Projected Timeframe for Completing Implementation Plan Actions
2014-1	Emergency Preparedness and Response	09/03/2014	Implementation Plan Under Development
2012-2	Hanford Tank Farms Flammable Gas Safety Strategy	09/28/2012	2017
2012-1	Savannah River Site Building 235-F Safety	05/09/2012	2021
2011-1	Safety Culture at the Waste Treatment and Immobilization Plant	06/09/2011	2015
2010-1	Safety Analysis Requirements for Defining Adequate Protection for the Public and the Workers	10/29/2010	2016
2009-2	Los Alamos National Laboratory Plutonium Facility Seismic Safety	10/26/2009	2016

Table A.2 DOE Reports Required by DNFSB Letters - Completed In 2014

Date of Board Letter	Reporting Requirements	Date Completed
8/26/2013	A report and briefing describing (1) NNSA's plan and schedule for addressing the issues detailed in the section titled, "Open Issues with the UPF Safety Basis," in the enclosed report, and; (2) NNSA's plan to strengthen oversight of control selection and evaluation processes for the UPF project.	11/21/2013
7/15/2013	A report and briefing that details: (1) any corrective actions NNSA is taking to incorporate criticality safety controls into procedures, and to improve procedures, procedure use, criticality safety postings, and criticality safety support of operations; (2) any root causes NNSA has identified for recent criticality safety infractions; (3) any improvements NNSA has determined are needed to the Federal oversight and contractor assurance systems relative to criticality safety, conduct of operations, and effectiveness of corrective actions.	12/06/2013
8/28/2012	A report and briefing that details DOE's assessment of the effectiveness of the actions to address the lack of comprehensive requirements and guidance for activity level work planning and control.	02/14/2014
3/28/2014	A briefing (1) identifying emergency management resources needed to augment WIPP response capabilities, and; (2) identifying specific preconditions and contingency plans being implemented to ensure protection of the public and workers in case of another radiological release event during reentry activities.	04/04/2014
8/8/2012	A report outlining actions DOE has taken or plans to take to address the issues related to deficiencies in the safety analysis and the design of the WTP slurry transport system.	04/28/2014
10/23/2013	A report and briefing that details the Program Secretarial Officer's assessment of the metrics relied upon to perform effective line oversight of criticality safety programs.	04/30/2014
5/16/2014	A briefing on how NNSA will ensure that adequate controls will be identified as the laboratory resumes higher-risk operations in the Plutonium Facility.	05/30/2014
5/23/2014	A report and briefing on DOE's evaluation of the need for an independent assessment after the completion of startup testing at the Idaho National Laboratory Integrated Waste Treatment Unit.	06/20/2014
6/2/2014	A report and briefing that details: (1) the results of all applicable falling man experiments; (2) any immediate compensatory measures deemed necessary based on these results; (3) the actions and timeline associated with revising the falling man analysis.	07/11/2014
4/4/2014	A briefing on the actions identified to improve the process to revise, update, and improve the DOE directives and technical standards of interest to the Board.	07/17/2014
5/16/2014	A briefing on: (1) identifying the actions taken by DOE and its contractors to improve performance at SRS; (2) identifying how DOE and the contractors' assurance programs will evaluate the effectiveness of these actions.	07/21/2014

Date of Board Letter	Reporting Requirements	Date Completed
3/31/2014	A report on: (1) implementation of the Nuclear Materials Packaging Manual; (2) repackaging nuclear materials into containers that meet the requirements of the Manual; (3) DOE's plan for phasing out the Manual and converting the content into an appropriate directive.	07/30/2014
6/18/2014	A report that addresses concerns pertaining to the Safety Basis for the 242-A Evaporator facility at the Hanford site.	08/28/2014
8/7/2014	A briefing on actions taken or planned by NNSA to resolve safety issues for the Transuranic Waste Facility project at Los Alamos National Laboratory.	09/15/2014

Table A.3 DNFSB Public Meetings/Hearings Conducted

Date	Topic	Location	Discussion Areas
12/10/2013	Safety in Design, Operations, and Emergency Preparedness at the Y-12 National Security Complex	Knoxville Convention Center, Knoxville, Tennessee	• Actions taken to mitigate the risks of the Y-12 aging infrastructure • Emergency response planning • The role of oversight in ensuring safe nuclear operations • Effectiveness of NNSA oversight of nuclear operations
05/28/2014	Public Hearing on Safety Culture and Board Recommendation 2011-1 (Part 1)	DNFSB Headquarters, Washington, D.C.	• Approaching, assessing, interpreting safety culture reviews and using results to improve the process • Techniques for identifying and addressing organizational weaknesses • Safety culture activities at NASA and the NRC and their impact on mission
08/27/2014	Public Hearing on Safety Culture and Board Recommendation 2011-1 (Part 2)	DNFSB Headquarters, Washington, D.C	• U.S. Navy tools, metrics and practices used to sustain a strong safety culture, and share safety culture lessons learned • Role of organizational leaders in establishing and maintaining an effective, positive safety culture
10/7/2014	Public Hearing on Safety Culture and Board Recommendation 2011-1 (Part 3)	DNFSB Headquarters, Washington, D.C	• Secretary's vision for a stronger DOE safety culture • Concerns identified in NNSA and EM safety culture assessments and means of addressing them by senior management • Safety culture in NNSA and EM contractor organizations

Appendix B. Acronyms and Abbreviations

AIB	Accident Investigation Board
AEA	Atomic Energy Act
Board	Defense Nuclear Facilities Safety Board
CDNS	NNSA Office of Chief of Defense Nuclear Safety
C.F.R.	Code of Federal Regulations
CNS	Chief of Nuclear Safety
CSOOT	Continued Safety Operability Oversight Team
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
DSA	Documented Safety Analysis
DST	Double Shell Tank
EA	Office of Enterprise Assessment
EHSS	Office of Environment, Health, Safety and Security
EM	Office of Environmental Management
EU	Enriched Uranium
FY	Fiscal Year
Hanford	Hanford Site
HSS	Office of Health, Safety and Security
HLW Facility	WTP High Level Waste Facility
IP	Implementation Plan
ISM	Integrated Safety Management
LANL	Los Alamos National Laboratory
M&O	Management and Operations
NA-00	Office of the Associate Administrator of Infrastructure and Operations
NA-SH	Office of the Associate Administrator for Safety and Health
NCS	Nuclear Criticality Safety
NES	Nuclear Explosives Safety
NNSA	National Nuclear Security Administration
NPO	NNSA Production Office
NSR&D	Nuclear Safety Research and Development
NSS	Nuclear Safety Specialists
ORP	Office of River Protection
Pantex	Pantex Plant
PF-4	LANL Plutonium Facility
PJM	Pulse Jet Mixing

PSO	Program Secretarial Office
PT Facility	WTP Pre-Treatment Facility
QA	Quality Assurance
SASSI	System for Analysis of Soil-Structure Interaction
SCWE	Safety Conscious Work Environment
Secretary	Secretary of Energy
SRS	Savannah River Site
TRU	Transuranic
TWF	TRU Waste Facility
UPF	Uranium Processing Facility
U.S.C.	United States Code
V&V	Verification and Validation
WESF	Waste Encapsulation Storage Facility
WIPP	Waste Isolation Pilot Plant
WP&C	Work Planning and Control
WTP	Waste Treatment and Immobilization Plant
Y-12	Y-12 National Security Complex