



U.S. DEPARTMENT OF
ENERGY

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

Fiscal Year 2018

**Report to Congress
May 2019**

**United States Department of Energy
Washington, DC 20585**

Intentionally blank

Message from the Secretary

This is the Department of Energy's (Department or DOE) annual report to Congress addressing the Department's activities related to the Defense Nuclear Facilities Safety Board (DNFSB or Board). The annual report describes the Department's activities in Fiscal Year 2018 (FY18) that relate to the DNFSB.

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. We welcome the Board's advice and recommendations. Together, through healthy exchanges, DOE and the Board can fulfill our shared goal of protecting the public health and safety at the Department's defense nuclear facilities. I look forward to continuing to work closely with the Board in the coming year and welcome Congress' review of the following report, Department of Energy Activities Relating to the Defense Nuclear Facilities Safety Board Fiscal Year 2018.

Highlights of the Department's accomplishments are included in the report's Executive Summary. The status of the Department's actions in response to Board recommendations and Board input are included in the body of the report.

Pursuant to statutory requirements, this report is being provided to the following Members of Congress:

- **The Honorable Michael R. Pence**
President of the Senate
- **The Honorable Lisa Murkowski**
Chairman, Senate Committee on Energy and Natural Resources
- **The Honorable Maria Cantwell**
Ranking Member, Senate Committee on Energy and Natural Resources
- **The Honorable Richard Shelby**
Chairman, Senate Committee on Appropriations
- **The Honorable Patrick Leahy**
Vice Chairman, Senate Committee on Appropriations
- **The Honorable Lamar Alexander**
Chairman, Senate Subcommittee on Energy and Water Development
Committee on Appropriations

- **The Honorable Dianne Feinstein**
Ranking Member, Senate Subcommittee on Energy and Water Development
Committee on Appropriations
- **The Honorable James Inhofe**
Chairman, Senate Committee on Armed Services
- **The Honorable Jack Reed**
Ranking Member, Senate Committee on Armed Services
- **The Honorable Nancy Pelosi**
Speaker of the House of Representatives
- **The Honorable Nita Lowey**
Chairwoman, House Committee on Appropriations
- **The Honorable Kay Granger**
Ranking Member, House Committee on Appropriations
- **The Honorable Marcy Kaptur**
Chairwoman, House Subcommittee on Energy and Water Development
Committee on Appropriations
- **The Honorable Mike Simpson**
Ranking Member, House Subcommittee on Energy and Water Development
Committee on Appropriations
- **The Honorable Adam Smith**
Chairman, House Committee on Armed Services
- **The Honorable Mac Thornberry**
Ranking Member, House Committee on Armed Service

If you have any questions or need additional information, please contact Mr. Dwayne Bolton, Principal Deputy Assistant Secretary or Mr. Shawn Affolter, Deputy Assistant Secretary for Senate Affairs, Office of Congressional and Intergovernmental Affairs, at (202) 586-5450 or Ms. Bridget Forcier, Associate Director for External Coordination, Office of the Chief Financial Officer, at (202) 586-0176.

Sincerely,



Rick Perry

Executive Summary

The Department welcomes the opportunity to provide this annual report to Congress.¹ This report describes the Department's key FY18 initiatives and activities related to the Defense Nuclear Facilities Safety Board (DNFSB). The Department has a unique role as owner, operator, and regulator of the Nation's defense nuclear facilities, and the DNFSB provides additional review and analysis to enhance the Department's nuclear safety posture at these facilities.

Using a multilayered approach to nuclear safety, the Department establishes specific nuclear safety requirements, using Federal regulations, Departmental directives, and technical standards. These include several levels of safety oversight, first by DOE site contractors, followed by DOE program and independent oversight offices. This system provides safety implementation and thorough responses to nuclear safety issues potentially affecting DOE workers, the public, and the environment. Regulatory enforcement actions conducted by the Department are another means to achieve compliance with nuclear safety requirements.

The Department has undertaken safety initiatives and activities to reinforce and ensure nuclear safety performance. These initiatives respond to issues identified by the Board, as well as, issues proactively identified by the Department through (1) site, facility, and program office self-assessments; (2) independent oversight activities; and (3) safety improvement initiatives and activities.

Progress on Initiatives and Activities

Savannah River Site, Aiken, SC - In FY18, the Department of Energy Savannah River Operations Office (DOE-SR) initiated a high-level effort to improve the operations of safety management programs at the Savannah River Site. DOE-SR provided guidance and oversight to encourage improvement of their contractor assurance systems by improving knowledge and implementation of the safety basis technical safety requirements and work authorization processes by both contractors, the Savannah River Nuclear Solutions and Savannah River Remediation.

In addition, DOE-SR recognizes the need for safe operations of H-Canyon in order to meet site mission requirements. DOE-SR continues efforts to ensure safe operations of the facility by conducting detailed structural analysis and increased visual inspections of the H-Canyon Exhaust Tunnel.

Pantex Plant, Amarillo, TX - The National Nuclear Security Administration (NNSA) Production Office (NPO) has taken actions to revise and improve the quality and clarity of the safety basis documents at the Pantex Plant and to ensure that such documents are in compliance with Title 10 Code of Federal Regulations (C.F.R.) Part 830, *Nuclear Safety Management*. In addition, NPO has implemented initiatives and corrective action plans to oversee contractor performance and progress to properly update and effectively implement the safety basis. NPO and NNSA Headquarters personnel are using the DNFSB's Pantex safety inquiry report, the DNFSB safety

¹ In accordance with Section 316(b) of the Atomic Energy Act of 1954, as amended, *codified at* 42 United States Code § 2286e(b).

issues reports, and other resources to assist in evaluating root causes and to assist the contractor in developing a more effective nuclear safety management program. NNSA recognizes that this improvement effort is an ongoing process and has been working with the contractor in the development and approval of a safety basis supplement to ensure compliance to 10 C.F.R. Part 830.

Aging Defense Nuclear Facilities - The NNSA infrastructure program developed a process to apply capital funding to the highest safety priorities at individual sites and routinely assesses the needs across the complex. This program ensures that NNSA sites are taking actions to maintain mission-essential facilities operational in a prioritized and methodical manner. At the Y-12 National Security Complex (Y-12), NNSA developed and is implementing an extended life program to safely sustain enriched uranium operations in Buildings 9215 and 9204-2E. These two buildings will operate for many years after Building 9212 is replaced by a new Uranium Processing Facility (UPF) in about 2025. In FY18, NNSA continued activities to upgrade the fire protection systems at the Pantex Plant and the Device Assembly Facility at the Nevada National Security Site.

Department of Energy and DNFSB Interface Activities - The Department updated its outdated Interface Manual (issued in 2001) with the issuance of Order 140.1, *Interface with the Defense Nuclear Facilities Safety Board*. The Order clearly defines the Secretary of Energy's (Secretary) expectations for roles and responsibilities related to interfacing with the Board, as established by law. Following the issuance of Order 140.1 in May 2018, the Department received feedback from the DNFSB, Members of Congress, and public interest groups. In response, DOE senior leadership met with various Congressional committees, provided testimony during the August 28, 2018, DNFSB public hearing, and corresponded with the Congress and public interest groups to address implementation of the Order. This served to clarify that the Order does not hinder cooperation with the Board or prevent the Board from conducting their independent oversight function. Order 140.1 governs how DOE operates and does not apply to, or change, how the Board operates under the enabling statute.

Progress on Board Recommendations

There are four open DNFSB recommendations at the end of FY18. The Implementation Plans (IP) for two of these recommendations: Recommendation 2011-1, *Safety Culture at the Waste Immobilization Plant* and Recommendation 2015-1, *Emergency Preparedness and Response at the Pantex Plant*, are complete. The Board has not formally closed the recommendations, therefore, actions associated with these recommendations in this report are provided as an update. This report discusses the two open recommendations: Recommendation 2012-1, *Savannah River Site Building 235-F Safety*, and Recommendation 2012-2, *Hanford Tank Farms Flammable Gas Safety Strategy*.



DEPARTMENT OF ENERGY ACTIVITIES RELATING TO THE DEFENSE NUCLEAR FACILITIES SAFETY BOARD FISCAL YEAR 2018

Table of Contents

I. Legislative Language.....	3
II. Background and Organization.....	3
III. Departmental Nuclear Safety Initiatives and Activities	4
A. Los Alamos National Laboratory (LANL).....	4
B. Savannah River Site	5
C. Waste Isolation Pilot Plant	6
D. Waste Treatment and Immobilization Plant in Hanford.....	7
E. Idaho Cleanup Project’s Accelerated Retrieval Project (ARP) V Facility	7
F. Environmental Management Nuclear Safety Initiatives	8
G. Y-12 National Security Complex	8
H. Pantex Plant Safety Basis Concerns.....	9
I. Device Assembly Facility Activities at Nevada National Security Site.....	10
J. Integrating Safety into the Design of Defense Nuclear Facilities.....	10
K. NNSA Nuclear Safety Initiatives	10
L. Emergency Preparedness and Response	11
IV. FY18 Progress on Board Recommendations	12
A. Overview.....	12
B. Open Recommendations.....	13
V. Interface Activities.....	15
A. Issuance of Order 140.1, Interface with the Defense Nuclear Facilities Safety Board	15
B. Revision of Title 10 Code of Federal Regulations (CFR) Part 830, <i>Nuclear Safety Management</i>	16
C. Departmental Response to Board Reporting Requirements	16

VI. Appendix A. FY18 Summary: Open Recommendations, Statutory Letter Reports and Public Meetings/Hearings..... 17

VII. Appendix B. Acronyms and Abbreviations 19

I. Legislative Language

This report is prepared and delivered to Congress in accordance with Section 316(b) of the Atomic Energy Act of 1954, as amended, *codified at* 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, including all recommendations made by the Board, during the year preceding the year in which the report is submitted.

II. Background and Organization

The DNFSB is an independent executive branch agency established by Congress in 1988 to provide independent technical analysis, advice, and recommendations to the Secretary of Energy (Secretary) regarding public health and safety issues at the Department's defense nuclear facilities (shown in Figure 1). 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;
- Performs analyses of design and operational data;
- Performs investigations of Departmental events and practices;
- Reviews the design and construction of new defense nuclear facilities; and
- Makes recommendations to DOE relating to its defense nuclear facilities, including operations of such facilities, standards and research needs, for the purpose of ensuring adequate protection of public health and safety.

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 member site visits.

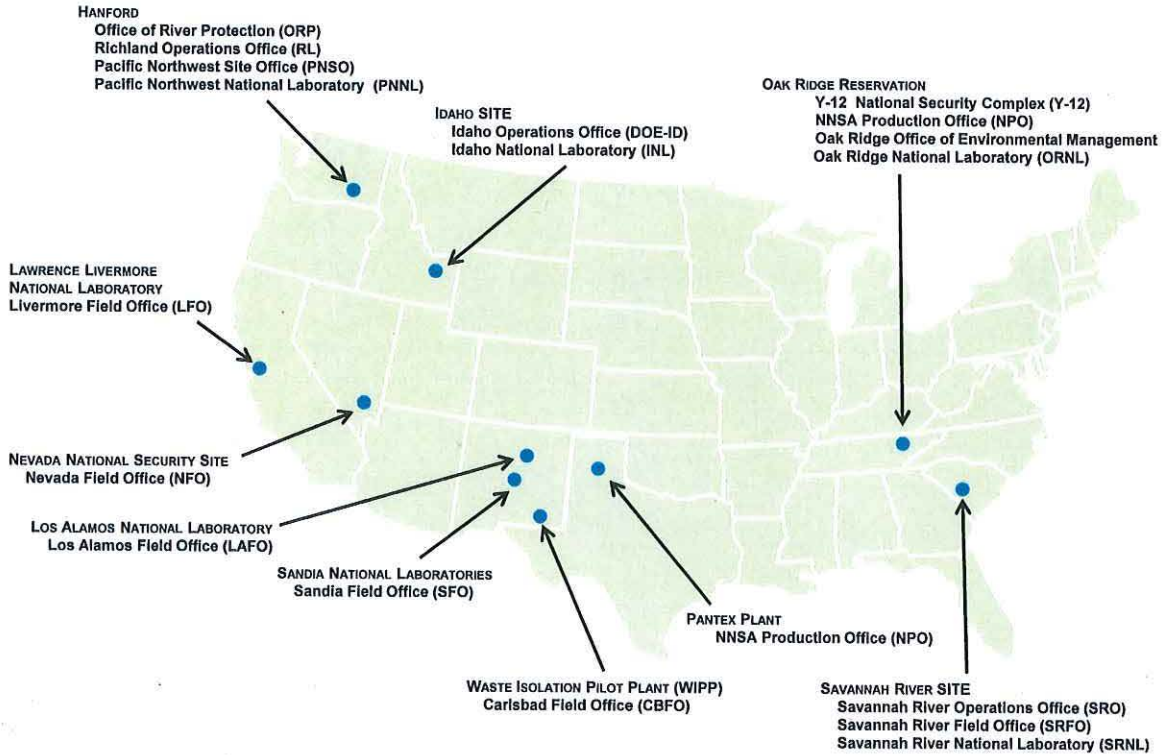


Figure 1 Locations of DOE Defense Nuclear Facilities

III. Departmental Nuclear Safety Initiatives and Activities

This section describes the major FY18 initiatives and activities the Department undertook to improve and ensure nuclear safety at DOE defense nuclear facilities. These initiatives respond to issues identified by the Board and the Department through site, facility, and program office self-assessments. Independent oversight activities by the Office of Enterprise Assessment (EA) and the Department’s Central Technical Authorities help to identify nuclear safety issues for both Federal and contractor employees. The Department protects its workers, the public, and the environment from nuclear hazards through a rigorous, proactive nuclear safety program and a robust nuclear safety regulatory framework.

A. Los Alamos National Laboratory (LANL)

During FY18, NNSA continued efforts to improve facility seismic safety at the Plutonium Facility (PF-4) through seismic performance upgrades and initiating a contract to conduct a nonlinear dynamic analysis of how PF-4 will respond to seismic conditions. NNSA continued to reduce material-at-risk inventory, including a significant reduction in the amount of transuranic waste at PF-4. NNSA accomplished this reduction through shipment of the waste to the new Transuranic Waste Facility, which achieved full operation status in 2018 and has received

hundreds of waste drums. NNSA is implementing an enhanced oversight of operations program at PF-4 working in conjunction with the LANL contractor to improve conduct of operations.

In FY18, the LANL contractor completed a Documented Safety Analysis (DSA) update for the Radioassay and Nondestructive Testing (RANT) facility and provided it to NNSA for approval. Upon approval and implementation of the RANT DSA and completing requisite readiness activities, RANT operations will support de-inventorying of LANL transuranic waste streams via shipment to the Waste Isolation Pilot Project (WIPP). The goal is to begin startup operations in early FY19.

NNSA and the LANL contractor are finalizing a safety basis strategy to update several nuclear facility DSAs to meet the requirements of DOE Standard 3009-2014, *Preparation of Nonreactor Nuclear Facility Documented Safety Analysis*. This strategy supports the current NNSA Administrator's objectives for LANL to meet overall pit production requirements. The transition to a new Management and Operating contractor occurred in early FY19.

The Los Alamos Nuclear Criticality Safety Program improvements continue and is approaching full compliance. Federally approved compensatory measures remain in place until improvements are complete. Working legacy evaluations to remove compensatory measures remain a continuing challenge as well as contractor staffing.

B. Savannah River Site

Conduct of Operations

DOE shares the concerns highlighted in the Board's January 4, 2018, letter regarding safety issues with the Conduct of Operations (ConOps) safety management program at the Savannah River Site (SRS). DOE recognizes that compliance with facility safety bases is instrumental to ensuring safe operations and adequate protection of public health and safety. It is also important to note that the nature of the events and corrective actions implemented do not indicate that SRS operations represent an immediate safety concern. The Office of Environmental Management (EM), NNSA, and the contractor organizations have self-identified ConOps concerns since 2014 and are implementing continuous improvements in this area. In July 2017, DOE-SR issued letters to Savannah River Nuclear Solutions (SRNS) and to Savannah River Remediation directing corrective action plans be implemented to improve implementation of Technical Safety Requirements (TSR). In these letters, DOE-SR identified weaknesses in the following three major areas, each requiring specific corrective actions to drive improvement:

- Less than adequate knowledge of TSRs and their bases;
- Rigor of TSR control implementation; and
- Work Authorization Process.

Each contractor developed comprehensive corrective action plans, each with over 30 discrete actions to address the above concerns and to minimize the likelihood of recurrence. The contractor's corrective actions are essentially complete. Once the contractor has had adequate

operational time and has certified correction of the deficiencies, DOE will perform effectiveness reviews and other oversight. Long-term refinements of training and of improving TSR implementation databases are ongoing, with these actions being fully implemented by early 2020.

Savannah River Site's H-Canyon Exhaust (HCAEX) Tunnel

In FY18, the Department received two letters from the Board and multiple Board staff interactions expressing concerns over the viability of the HCAEX and the implementation of the associated SRNS safety controls documented in the Justification for Continued Operation (JCO). DOE identified, from periodic remote inspections, that the HCAEX Tunnel interior concrete surfaces have degraded to the point that aggregate and steel reinforcement bars are exposed after over 60 years of service. To ensure a qualified HCAEX Tunnel is available and capable of performing its safety function, DOE is pursuing the following adaptable multi-year strategy.

- **Tunnel Viability:** DOE is analyzing viability issues through complex modeling and analysis, including a nonlinear fragility analysis. The analysis addresses the in-situ condition of the tunnel walls using the best available data and information. The nonlinear elements of the analytical model approximate the effects of the physical loss of concrete and the potential loss of compressive strength of the concrete altered by exposure to a nitric acid air environment. DOE anticipates having preliminary results in calendar year 2019.
- **Implementation of Safety Controls:** DOE-SR identified implementation concerns with the JCO and is documenting the technical bases for operator actions specified in the JCO and conducting a training drill to ensure adequate operator implementation and demonstration.

Savannah River Site Tritium Facilities

NNSA has evaluated plausible hazards from operations at the Tritium Facilities and has determined that public dose consequences from the design basis accidents for these facilities are not expected to exceed the Department's guidelines with current modeling techniques. Hazards to collocated workers continue to be evaluated for reduction by limiting the material at risk available and the use of safety significant controls. NNSA directed actions to review and update the Tritium Facilities safety bases to ensure protection of the workers

C. Waste Isolation Pilot Plant

Both the Board and DOE EA identified deficiencies in the conduct of maintenance and operations through assessments and oversight activities. The Board provided a letter to the Department on September 24, 2018, identifying safety issues with maintenance and inspection processes and procedures for structures, systems, and components. These safety issues can degrade structures, systems, and components and result in hazards (e.g., fires) affecting onsite personnel. These issues are similar to those identified in DOE's Accident Investigation Report, as contributing to the fire event in 2014. EA evaluated the contractor work requirements pertaining to DOE Order 422.1, *Conduct of Operations*, and noted most areas were in

compliance with the Order. One finding addresses authorization controls to operate mine ventilation systems, including practices to ensure that operators receive accurate and unambiguous communication regarding changes to ventilation conditions to ensure proper ventilation configuration. These issues are being addressed with local Federal oversight.

D. Waste Treatment and Immobilization Plant in Hanford

The Department is working to construct and operate the treatment facilities and infrastructure to safely immobilize and dispose of Hanford's tank waste. As planned, the Waste Treatment and Immobilization Plant will include five facilities: Analytical Laboratory, Balance of Facilities, Low-Activity Waste Facility, High-Level Waste Facility, and Pretreatment Facility. The original plan required waste to be processed through the Pretreatment Facility, where it would be separated into a low-activity waste stream to be vitrified in the Low-Activity Waste Facility and a high-level waste stream to be vitrified in the High-Level Waste Facility. The Analytical Laboratory and Balance of Facilities support these vitrification activities. Since technical issues are being resolved for the Pretreatment Facility, the Department is pursuing a strategy to focus on completion of the Low-Activity Waste Facility, Balance of Facilities, and Analytical Laboratory. In addition, work necessary to feed low-activity waste directly from tank farms to the Low-Activity Waste Facility (instead of routing waste through the Pretreatment Facility – an approach called direct-feed low-activity waste) is also being conducted to meet regulatory and legal milestones.

As part of this approach, the Department identified the need to construct an effluent management facility to manage the high volume of water generated while retrieving and treating low-activity waste for disposal. As originally envisioned, this capability was going to be located in the Pretreatment Facility. However, with the restructuring of the project into a phased startup, this capability is needed prior to the completion of construction for the Pretreatment Facility requiring the construction of the Effluent Management Facility.

In FY18, the Department focused on completion of construction at the Low-Activity Waste Facility and startup of the Analytical Laboratory and Balance of Facilities. Completion of this work scope will allow vitrification of the most mobile tank waste, the supernate, to begin as soon as practicable. DOE continues working in parallel to design the HLWF while resolving Pretreatment Facility technical issues.

Significant progress was made in FY18 resolving the following technical issues: (1) erosion and corrosion of piping, vessels and pulse jet mixer nozzles; (2) pulse jet mixer control; (3) natural phenomenon hazard of volcanic ash fall, and; (4) electrical distribution system. On January 29, 2018, the Department transmitted a letter to the Board regarding actions taken to resolve the Board's concerns related to spray leak methodology. DOE discussed progress on the resolution of these issues with the DNFSB staff throughout the year.

E. Idaho Cleanup Project's Accelerated Retrieval Project (ARP) V Facility

On April 11, 2018, four waste drums at the Idaho National Laboratory underwent an over-pressurization event. The Department found that waste in the drums generated methane gas, which contributed to the event. During the remainder of the fiscal year the Board and the

Department continued to collect information and evaluate the safety implications of the over-pressurization event.

During the past few years, DOE has strengthened its processes and controls for the certification and safe disposal of transuranic waste, such as requiring chemical compatibility evaluations and basis of knowledge reviews as part of the certification process. The event involved processing of waste drums prior to the certification process. The Idaho Cleanup Project is completing corrective actions to ensure safe practices and controls are in place for stored and treated drums in such situations. These enhancements include routine waste drum storage area flammable gas monitoring, response procedure for waste drum storage area elevated flammable gas concentrations, and improving the safety culture.

Both the Board and the Department will continue its investigation and further corrective actions into the following fiscal year.

F. Environmental Management Nuclear Safety Initiatives

In FY18, the Chief of Nuclear Safety for EM continued initiatives promoting technical responsibility and nuclear safety within EM and its facilities. The Chief of Nuclear Safety staff performs oversight, provides technical support, and executes technical activities, as appropriate, to support nuclear operations. Examples of specific activities in FY18 include:

- Conducting 19 field operational awareness visits and assessments guided by the Chief of Nuclear Safety – Nuclear Facility Risk Ranking;
- Performing 10 technical assistance visits applying staff expertise to unique problems facing EM facilities;
- Providing technical expert reviewers to support six Office of Project Management project reviews at EM nuclear facilities;
- Providing team members for the Operational Readiness Review of the Engineered Container Retrieval and Transfer System at Hanford;
- Leading the Federal Readiness Assessment of Mobile Loading Unit operations in Area G at LANL;
- Serving on writing teams, reviewing, and concurring on revisions to nuclear safety technical standards;
- Managing EM's Differing Professional Opinion (DPO) process and adjudicating four submitted DPOs;
- Completing lines of inquiry for design and engineering review of DOE nuclear facilities, part of the EM Standard Review Plan; and
- Representing DOE on the American Nuclear Society Siting: Seismic Subcommittee of the Environmental and Siting Consensus Committee.

G. Y-12 National Security Complex

The Y-12 National Security Complex (Y-12) made significant progress implementing an Extended Life Program (ELP) required to sustain safe enriched uranium mission operations in Buildings 9215 and 9204-2E until the year 2040 or beyond when new facilities could be available. The ELP IP defines the scope of the effort by specifically identifying a roadmap with planned projects for implementation of required capabilities. The extended life of these facilities, in

addition to sustaining programmatic enriched uranium operations of Building 9212 through the year 2025 (until replacement by the UPF), relies on effective implementation of maintenance, repair, and replacement activities. DOE will continue to support the recapitalization of the weapon complex's aging infrastructure through processes and extended life programs providing the necessary resources to support and sustain safe mission operations.

Noteworthy accomplishments during FY18 include:

- Removing 6.9 metric tons of uranium from legacy facilities;
- Upgrading switchgear, motor controllers, and electrical panels in Building 9204-2E and 9215 as part of the continuing execution of the Nuclear Facilities Electrical Modernization project; and
- Continued execution of the Building 9212 Exit Strategy outlining a plan to cease programmatic enriched uranium operations in Building 9212 when UPF becomes available. FY18 activities included isolation of out of service systems and disposition of non-equity waste materials and low equity uranium bearing inventories.

During a FY18 Board Member visit to Y-12, the Board Member noted that Y-12 has made progress to address the aging enriched uranium mission infrastructure and noted other sites would benefit from similar initiatives. To aid NNSA sites and Headquarters to learn, share, and improve in this area, Consolidated Nuclear Security (CNS), LLC, hosted a second Aging Infrastructure Management Workshop at Y-12 in November 2018.

H. Pantex Plant Safety Basis Concerns

For several years, NNSA has focused on improving the quality and effectiveness of safety basis documents at the Pantex Plant. DNFSB has shared concerns in this area. NNSA has implemented major initiatives and associated corrective actions to improve document quality and safety performance, however, NNSA recognizes that further progress is necessary to resolve quality and legacy issues.

In FY 2018, NPO and the contractor conducted an executive level deep dive to address safety basis quality and legacy issues. As a result of this effort, the contractor developed a Corrective Action Plan (CAP) with an overall strategy intended to significantly improve development and implementation of the Pantex safety basis in three areas: (1) quality of safety basis submittals; (2) legacy weaknesses and compliance issues; and (3) inadequate implementation of safety basis controls. The CAP is divided into two phases: (1) immediate (FY 2019 completion) actions that focus on addressing the safety basis document quality and high-priority compliance issues; and (2) long-term actions to address legacy issues with lower levels of safety significance. A key outcome of the Pantex CAP was the issuance of a Safety Basis Supplement (SBS), which evaluates and ensures the adequacy of safety controls for each legacy compliance issue. NNSA and the Pantex contractor will process any additional legacy compliance issues identified outside the scope of the SBS through the established Unreviewed Safety Question process.

In June 2018, the DNFSB conducted a preliminary safety inquiry on the Pantex Plant's implementation of 10 C.F.R. Part 830, *Nuclear Safety Management*, requirements. The results of this effort were never formally transmitted to the Department; however, draft staff reports

were released to the public on the Board's website through its notational vote process. The Pantex SBS and CAP address the issues raised in the Board's draft staff reports.

I. Device Assembly Facility Activities at Nevada National Security Site

The Device Assembly Facility (DAF) is a Hazard Category 2 nuclear facility. A significant safety-related infrastructure issue is the ongoing degradation of the DAF fire suppression water storage tank and fire suppression system lead-in piping. The piping was susceptible to corrosion failure and cannot be relied upon to provide fire suppression system water in the event of a fire.

NNSA initiated two projects to address the wet-pipe fire suppression system lead-in line issues and deficiencies with building sprinkler systems. The first project, the "DAF Lead-in Line Project," focused on an evaluation of replacement to the existing lead-in lines, or modifying the internal standpipe loop such that it can supply water to the wet-pipe fire suppression system. The second project, the "DAF Deficiencies Project," was initiated in parallel to address sprinkler system deficiencies within the building.

Currently, NNSA has corrected the fire suppression system lead-in line installation issues and deficiencies for 26 of 27 DAF buildings. NNSA anticipates the correction of all issues in the last remaining building and subsequent completion of both projects in FY19. In addition, NNSA initiated a third project to address the deficiencies associated with the DAF fire suppression water storage tank. In 2015, an inspection of the water storage tank revealed deficiencies with the tank substrate that prompted the facility to expedite its efforts to rehabilitate the tank; NNSA anticipates the overall project to rehabilitate the tank to be complete in FY20.

J. Integrating Safety into the Design of Defense Nuclear Facilities

DOE continues to strengthen its management of nuclear projects and the integration of safety into the design of nuclear facilities. In FY18, NNSA transitioned to full operations at the Hazard Category 2 Transuranic Waste Facility (TWF) at LANL. TWF has accepted hundreds of drums from LANL's PF-4 facility and is performing routine operations to accept more drums. In addition, NNSA approved the Conceptual Safety Design Report (CSDR) for the LANL Radioactive Liquid Waste Treatment Facility. At SRS, NNSA approved the CSDR for the Tritium Finishing Facility project.

NNSA performed Independent Project Reviews and/or Annual Project Reviews for several projects, including the LANL Chemistry and Metallurgy Research Replacement Facility project, TA-55 Reinvestment Project Phase 3, U1a Complex Enhancements project at the Nevada National Security Site, Calcliner Project at Y-12, and Surplus Plutonium Disposition project at the Savannah River Site.

K. NNSA Nuclear Safety Initiatives

The NNSA Office of Safety, Infrastructure, and Operations (NA-50) provides technical support for nuclear operations at NNSA facilities. In FY18, NA-50 took several actions to promote technical expertise, operations excellence, performance culture, and nuclear safety at NNSA facilities.

Key FY18 accomplishments include:

- Pursued accreditation across the NNSA Enterprise for the Technical Qualification Program. This will improve technical competence and enhance transportability of qualifications throughout the enterprise.
- Testing to improve the seismic resilience of PF-4. NNSA engaged its Management and Operating contractor in development of a non-linear dynamic analysis of the structure. The PF-4 facility's seismic performance is analyzed through computational probabilistic analysis. Additionally, a specific component in question (column capitals) is being tested through a contract with the University of Nevada Reno. The column capital testing will provide for a precise understanding of the load bearing capabilities of these components. This data, in conjunction with the non-linear dynamic analysis, should confirm the components in PF-4 with the highest demand/capacity ratios in the structure, allowing for prioritized upgrades if warranted.
- Supported Field Offices by conducting or assisting over 50 technical reviews of nuclear safety programs and activities to ensure safe operations of NNSA nuclear facilities. Continued support of field oversight through the site integrated assessments plans, leveraging Field and Headquarters' resources to maximize coverage and effectiveness.
- Executed a Safety Basis Review Team project to enhance the safety basis review and approval process at an enterprise level, improve consistency in reviews, and improve the use of complex-wide resources. This effort facilitates Field Office focus on day-to-day oversight of operational activities in the field. The NNSA Office of Safety (NA-51) manages the program and integrates the teams from the enterprise conducting these reviews.
- Initiated development of a data analytics program to improve and focus oversight efforts throughout the enterprise. This process captures and allows analysis of existing data streams and metrics. The analysis results allows for the efficient application of resources to the highest risk areas.
- Decreased total deferred maintenance in NNSA nuclear facilities, slowing the degradation of legacy facilities throughout the enterprise.
- Implemented the governance process in accordance with revised NNSA Supplemental Directive 226.1B, *NNSA Site Governance*. Implementation of this directive increases transparency in the government and contractor relationship, leverages the expertise of parent company organizations in the execution of the mission, and improves NNSA Field and Headquarters' efforts through the "one NNSA" concept.
- Addressed the application of recapitalization funding to the highest safety priorities at individual sites using the NA-50 infrastructure "deep-dive" process. Integration of safety in the "deep-dive" process provides visibility at the highest level of the most significant safety risks as related to infrastructure vulnerabilities.

L. Emergency Preparedness and Response

On December 13, 2017, the Board issued a letter to the Secretary closing Recommendation 2014-1, *Emergency Preparedness and Response*. In January 2018, the Department completed the final DOE IP deliverable, issuing the Baseline Emergency Management Criteria Review and Approach Document, and provided it to the Board.

The Board's December 13, 2017, closure letter also requested a briefing from DOE/NNSA officials to address the issues and concerns identified in the letter, including DOE's assessment of the progress made to date to address the Board's concerns. DOE/NNSA leadership briefed the Board on March 23, 2018, and communicated the Department's firm commitment to continue driving improvement of emergency management preparedness and response across the Emergency Management Enterprise.

The briefing addressed the following topical areas:

- DOE/NNSA Governance Model;
- NNSA Office of Emergency Operations (NA-40) roles and responsibilities for the development of emergency management policy and guidance, technical assistance, and support of readiness assurance activities; and
- DOE/NNSA line organizations (field or site managers) oversight responsibilities for emergency management programs at their sites and facilities, including identification and implementation of corrective actions.

NNSA stated to the Board that readiness assurance is an ongoing program area of focus. NNSA NA-40, in collaboration with the NPO, developed a concept plan and framework for the enhancement and sustainment of readiness assurance activities within NNSA Emergency Management Enterprise. The readiness assurance plan established a quarterly metric driven reporting structure to enhance near "real time" site-level emergency management readiness compliance and performance.

IV. FY18 Progress on Board Recommendations

A. Overview

The Board issues recommendations to the Secretary for specific measures 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 of its publication in the Federal Register (or longer, if the Board grants additional time). In addition, the Secretary must provide an 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).

Legislation requires the Secretary to complete the IP within one year of issuance, or if the IP takes more than one year to complete, a report to Congress is required. The scope and technical complexity of the safety issues addressed in DOE's IPs generally requires more than one year for completion. Many IPs require changes in DOE directives, resource planning and scheduling, and coordination with many different sites and offices to solve complex-wide challenges.

Appendix A, Table A.1, Open Board Recommendations, lists the four recommendations that remained open at the end of FY18, the date of issuance of each recommendation, and the timeframe that DOE currently projects for completing the associated IP actions. 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/depdep/>) and/or the DNFSB (<http://www.dnfsb.gov/>).

B. Open Recommendations

2015-1: Emergency Preparedness and Response at the Pantex Plant

On November 24, 2015, the Board issued Recommendation 2015-1, *Emergency Preparedness and Response at Pantex*, to address significant safety issues specific to the Pantex Plant. The recommendation was accepted on January 13, 2016, and an IP was issued on June 16, 2016. The Recommendation identified three areas of concern:

- Inadequate drill and exercise programs;
- No demonstrated capability to provide timely, accurate information to the public regarding off-site radiological consequences; and
- Inadequate technical planning bases and decision-making tools.

DOE approved and executed an IP to address the areas of concern and to make improvements to the Pantex program. DOE submitted its final set of IP deliverables to the Board on June 13, 2017. At that time, NNSA indicated a review would be conducted to verify the actions taken to address the Board's recommendation had been successful. These included effectiveness reviews and performance demonstrations conducted by the NPO, CNS, as well as independent reviews by DOE EA. All reviews have been completed and confirm the IP actions to be effective in addressing the identified issues.

DOE, NNSA, and CNS actions and their positive effects on Pantex emergency response were witnessed by DNFSB Board Members and staff during multiple exercises and performance demonstrations throughout FY18. During an FY18 Board Member site visit to Y-12, NNSA and CNS presented a progress status and verification of improvements. This included a pathway for sustainability and continued improvement through a rigorous Enterprise Readiness Assurance Model. Both NNSA and CNS concluded that the work completed in response to Recommendation 2015-1 resulted in a more comprehensive ability for the Pantex Plant to respond during emergencies. Due in part to improvements made and sustained, the Pantex Emergency Management organization received the Texas Emergency Management Partnership Recognition Award in FY 2018. In a November 29, 2018, letter to the Board Chairman, the NPO Manager documented that all of the actions to correct the Board's concerns were completed.

2012-2: Hanford Tank Farms Flammable Gas Safety Strategy

The Board issued Recommendation 2012-2, *Hanford Tank Farms Flammable Gas Safety Strategy*, on September 28, 2012, reflecting the Board's assessment that current operations at the Hanford Tank Farms require safety-significant active ventilation of double-shell tanks to ensure the removal of flammable gas from the tanks' headspace. A significant flammable gas accident could have considerable local radiological consequences, endanger personnel, contaminate portions of the Tank Farms, and seriously disrupt the Hanford waste cleanup mission. The Board also recommended that DOE install real-time monitoring systems for tank ventilation flow rates and perform other upgrades on systems used to perform safety-related functions. DOE accepted this recommendation on January 7, 2013, and transmitted the IP to the Board on June 6, 2013.

The Department provided the Board with a revised IP on March 24, 2016, describing a more efficient approach for the deployment of safety significant exhaustor units for use during off-normal events. The Board responded to the Department on September 16, 2016, concluding that the proposed safety-significant portable exhaustor concept was consistent with the Board's recommendation and expressing appreciation for the IP's updated deliverable schedule. Conceptual design is ongoing for a safety significant portable exhaustor using off-the-shelf components based on equipment successfully deployed at the SRS in similar applications.

The IP includes completed actions incorporated into the Tank Farms DSA. The margin of safety at the Tank Farms will improve as IP actions are completed. The implementation of safety-significant real-time flow monitoring is complete, adding both defense in depth and a simplified control strategy. Additionally, DOE installed a safety significant annulus liquid level detection system in all active double shell tanks. The system is in operational testing and work is ongoing to resolve potential issues in the area of wireless communication systems.

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

On May 9, 2012, the Board issued Recommendation 2012-1, *Savannah River Site Building 235-F Safety*, and on July 10, 2012, DOE accepted the Recommendation. The Secretary issued the IP on December 5, 2012. The IP identified multi-year actions to reduce the hazards associated with the material at risk (MAR) that remains as residual contamination in the building's Plutonium Fuel Form (PuFF) cells one through nine. DOE's Savannah River Operations Office (DOE-SR) developed a Deactivation Project Plan to guide near-term activities, as necessary, to improve the safety posture and long-term activities required to immobilize and/or remove remaining Pu-238 because of potential dose consequence to the collocated workers and the public. The Department recognizes this is the Board's main safety concern.

In November 2014, the Secretary transmitted a summary of schedule changes for the remaining IP actions and deliverables, citing unforeseeable challenges that led to schedule setbacks during FY13, and which carried into FY14. The changes reflected modifications to completion dates for the remaining actions and deliverables, but did not change specified actions. The completion date moved 29 months to May 31, 2021.

During FY18, DOE-SR continued to execute actions to mitigate hazards posed by the MAR. Progress during this timeframe includes:

- The East Maintenance wing cabinets are electrically and mechanically isolated. Isolation of all PuFF cells and wing cabinets is complete.
- The East Maintenance wing cabinet outer shield windows were removed, and characterization measurements of the MAR completed. Characterization of all PuFF cells and wing cabinets is complete.
- Gloves reinstalled in the Cell 1 wing cabinets and preparations for beginning equipment removal and MAR reduction are nearly complete.

Cumulatively, the actions taken to date improved Building 235-F's safety posture and reduced the likelihood of a full facility fire leading to design basis event consequences. Planning and conducting annual facility drills continues to demonstrate the site's ability to protect workers in all facilities and construction projects around Building 235-F.

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

The Board issued Recommendation 2011-1, *Safety Culture at the Waste Treatment and Immobilization Plant*, on June 9, 2011. This recommendation reflected the Board's assessment that, taken as a whole, the safety culture at the 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 on June 30, 2011, and DOE transmitted its IP on December 27, 2011. On September 14, 2012, DOE delivered an IP addendum, based on information and experience accumulated during execution of the original IP. DOE sent a revised IP schedule on September 27, 2013.

Consistent with the letter to the Board dated December 19, 2014, DOE revised WTP contract language to include DOE Integrated Safety Management (ISM) requirements. This was the last scheduled IP deliverable.

Safety culture sustainment plans have been implemented by each program office. EM and the Department continue to be committed to leading a shift in the organization and culture, by fostering a work environment of trust, a questioning attitude, and receptiveness to raising issues.

V. Interface Activities

A. Issuance of Order 140.1, Interface with the Defense Nuclear Facilities Safety Board

The Deputy Secretary of Energy charged DOE to take steps to address DOE concerns with the impacts of DOE's responses to, and interactions with, the DNFSB. Specifically, the Deputy Secretary directed the development of a DOE Order issuing Departmental expectations including re-alignment of the Department's roles and responsibilities with the DNFSB enabling statute. Secretarial Memorandum entitled, *Relationship with the Defense Nuclear Facilities Safety Board*, issued on October 13, 2017, set expectations regarding DOE line management roles, responsibilities, and accountability.

On May 14, 2018, DOE issued Order 140.1, *Interface with the Defense Nuclear Facilities Safety Board*, which replaces a 17 year-old DOE Interface Manual that was significantly out of date and inconsistent with the Atomic Energy Act. DOE developed Order 140.1 to establish a set of uniform requirements, including DOE Federal and contractor roles and responsibilities consistent with applicable law, and to ensure interface consistency and predictability relating to the Department's interactions with the DNFSB. The Order defines the Secretary's expectations for roles and responsibilities related to interfacing with the Board, as established by law. The purpose of Order 140.1 is to emphasize line management accountability and to establish clear requirements and responsibilities when working with the DNFSB – DOE is responsible and held accountable for decisions made to safely operate defense nuclear sites and facilities, and that DOE accepts full responsibility for safety, for which Congress and the public holds the Department accountable.

DOE received feedback from the DNFSB, Congress, and public interest groups expressing concerns that DOE had limited the DNFSB's statutory oversight responsibility to ensure the

safety of the public and workers at DOE's defense nuclear facilities. To address these concerns, DOE senior leadership met with various Congressional committees, provided testimony during DNFSB public hearings, and corresponded with the Congress and public interest groups, as appropriate. Such interactions provided DOE with the opportunity to clarify that the Order does not challenge the DNFSB's legal authority, which is defined in 42 U.S.C § 2286 et seq. of the Atomic Energy Act. The Order does not hinder the Department's cooperation with the DNFSB or prevent the DNFSB from conducting its independent safety oversight mission of the Department's defense nuclear facilities to provide independent analysis, advice and recommendations to the Secretary of Energy. Order 140.1 pertains only to the interface between the Department and the DNFSB and does not address established Departmental requirements governing public and worker health and safety programs. These programs are implemented and monitored in accordance with established laws, regulations, rules, policies, and technical standards.

The first public hearing was conducted on August 28, 2018. DOE will continue to engage with the DNFSB, the Congress, and public interest groups to address related concerns. In addition to formal Recommendations, the Board and its staff regularly communicate with the Department through correspondence, site visits at the Department's defense nuclear facilities to review the implementation of safety programs and initiatives, assessments of defense nuclear facilities and their respective operations, and briefings. Information about DNFSB interactions with DOE, including all related correspondence, is available on the Departmental Representative website at <https://ehss.energy.gov/deprep/> and categorized by chronological order as well as by DOE site.

B. Revision of Title 10 Code of Federal Regulations (CFR) Part 830, Nuclear Safety Management

On August 15, 2017, the Regulatory Reform Task Group, through the Deputy Secretary, tasked the Office of Environment, Health, Safety and Security, working with the Office of General Counsel, to initiate a rulemaking to address nine (9) specific focus areas. The Department chose to conduct the rulemaking in a phased approach. Initial reform goals addressed changes that achieve improvements in efficiency and decrease in cost in DOE and its Laboratory operations, while maintaining accountability and contractor performance standards. In a letter to the Secretary dated April 27, 2018, the DNFSB shared their plans to review the proposed rulemaking and provide comments during the public comment period. DOE published the Notice of Proposed Rulemaking in the Federal Register (83 FR 38982) on August 8, 2018. DOE held four public meetings to allow any interested persons the opportunity to speak on the proposed rule. The DNFSB shared their comments submitted through the Federal Register with the Secretary in an October 5, 2018 letter. The comment period closed on October 9, 2018. Consistent with the Administrative Procedures Act, the Department will respond to comments with the intent to issue a final rule in the Federal Register in 2019.

C. Departmental Response to Board Reporting Requirements

DOE responds to the Board's reporting requirements, pursuant to 42 U.S.C. Section 2286b (d). During FY18, DOE completed actions in compliance with the reporting requirements listed in Appendix A, Table VI.2.

VI. Appendix A. FY18 Summary: Open Recommendations, Statutory Letter Reports and Public Meetings/Hearings

Table VI-1 Open Recommendations

Rec #	Title	Date Opened	Projected Timeframe for Completing Implementation Plan Actions
2015-1	Emergency Preparedness and Response at the Pantex Plant	11/24/2015	Implementation plan complete, DOE has evaluated all completed items for effectiveness.
2012-2	Hanford Tank Farms Flammable Gas Safety Strategy	09/28/2012	2019
2012-1	SRS Building 235-F Safety	05/09/2012	2021
2011-1	Safety Culture at the WTP	06/09/2011	Implementation plan complete, safety culture sustainment plans are executed.

Table VI-2 DOE Reports Required by DNSFB Letters – Completed In 2018

Date Completed	Reporting Requirements	Date of Board Letter
5/16/2018	Annual report and briefing on the Department's nuclear criticality safety program.	2/26/2016
3/23/2018	A briefing addressing the issues identified in the Board's letter closing Recommendation 2014-1, and DOE's assessment of the progress made to date to address Recommendation 2014-1.	12/13/2017
4/4/2018	A report and briefing related to Conduct of Operations Safety Management Program at the Savannah River Site	1/4/2018
11/1/2018	A written response and briefing on the path forward to ensure the continued structural integrity of the H-Canyon Exhaust Tunnel at the Savannah River Site or any alternatives being evaluated to replace the exhaust tunnel.	5/17/2018
10/19/2018	A briefing prior to the implementation of the interim revision to DOE-NA-STD-3016-2016, detailing how NNSA will implement the revision and on any changes-planned or taken-to the safety control strategies of nuclear explosive facilities.	9/7/2018

Table VI-3 DNFSB Public Meetings/Hearings Conducted

Date	Topic	Location	Discussion Areas
8/28/2018	The Department of Energy's Interface with the Defense Nuclear Facilities Safety Board.	DNFSB Headquarters, Washington D.C.	The goal for the hearing is to gather information on (1) the objectives of and intended improvements to be accomplished by DOE Order 140.1, Interface with the Defense Nuclear Facilities Safety Board; (2) DNFSB access to information, facilities, and personnel; and (3) potential impacts to the DNFSB resident inspector program.

VII. Appendix B. Acronyms and Abbreviations

Board	Defense Nuclear Facilities Safety Board
CAP	Corrective Action Plan
C.F.R.	Code of Federal Regulations
CNS	Consolidated Nuclear Security
CSDR	Conceptual Safety Design Report
DAF	Device Assembly Facility
Department	U.S. Department of Energy
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
DOE-SR	DOE's Savannah River Operations Office
DPO	Differing Professional Opinion
DSA	Documented Safety Analysis
EA	Office of Enterprise Assessment
ELP	Extended Life Program
EM	Office of Environmental Management
FY	Fiscal Year
HCAEX	H-Canyon Exhaust
IP	Implementation Plan
LANL	Los Alamos National Laboratory
MAR	Material at Risk
NA-50	Office of Safety, Infrastructure, and Operations
NNSA	National Nuclear Security Administration
NPO	National Nuclear Security Administration Production Office
PF-4	LANL Plutonium Facility
PuFF	Plutonium Fuel Form
Secretary	Secretary of Energy
SRS	Savannah River Site
TSR	Technical Safety Requirements
TWF	Transuranic Waste Facility
UPF	Uranium Processing Facility
WIPP	Waste Isolation Pilot Plant
WTP	Waste Treatment and Immobilization Plant
Y-12	Y-12 National Security Complex