



U.S. DEPARTMENT OF
ENERGY

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

Fiscal Year 2019

Report to Congress

June 2020

United States Department of Energy
Washington, DC 20585

Message from the Secretary

This is the U.S. Department of Energy's (Department or DOE), including the National Nuclear Security Administration's (NNSA), annual report to Congress addressing the Department's Fiscal Year 2019 activities related to the Defense Nuclear Facilities Safety Board (DNFSB or Board) 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).

The Board has a critical external oversight and advisory role in 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, DOE and the Board fulfill the shared goal of protecting the public health and safety from operations conducted at the Department's defense nuclear facilities.

This report provides highlights of the Department's activities and accomplishments related to improved safety at defense nuclear facilities in addition to the status of the Department's response to Board recommendations, letters, and other input.

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

- **The Honorable Richard Shelby**
Chairman, Senate Committee on Appropriations
- **The Honorable Patrick Leahy**
Vice Chairman, Senate 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 Lisa Murkowski**
Chairman, Senate Committee on Energy and Natural Resources
- **The Honorable Joe Manchin**
Ranking Member, Senate Committee on Energy and Natural Resources

- **The Honorable Nita M. Lowey**
Chairman, House Committee on Appropriations
- **The Honorable Kay Granger**
Ranking Member, House Committee on Appropriations
- **The Honorable Adam Smith**
Chairman, House Committee on Armed Services
- **The Honorable Mac Thornberry**
Ranking Member, House Committee on Armed Service
- **The Honorable Frank Pallone**
Chairman, House Committee on Energy and Commerce
- **The Honorable Greg Walden**
Ranking Member, Committee on Energy and Commerce

If you have any questions or need additional information, please contact Mr. Matthew B. Moury, Associate Under Secretary for Environment, Health, Safety and Security, at (202) 586-5175; Ms. Katie Donley, Deputy Director for External Coordination, Office of the Chief Financial Officer, at (202) 586-0176; or Mr. Christopher Morris, Deputy Assistant Secretary for House Affairs or Mr. Shawn Affolter, Deputy Assistant Secretary for Senate Affairs, Office of Congressional and Intergovernmental Affairs, at (202) 586-5450.

Sincerely,



Dan Brouillette

Executive Summary

This is the U.S. Department of Energy's (Department or DOE), including the National Nuclear Security Administration's (NNSA), annual report to Congress¹ regarding the Department's Fiscal Year (FY) 2019 activities related to the Defense Nuclear Facilities Safety Board (DNFSB or Board). This report also provides highlights of the Department's activities and accomplishments related to improved safety at defense nuclear facilities.

It is the policy of DOE to design, construct, operate, and decommission its nuclear facilities in a manner that ensures adequate protection of workers, the public, and the environment. This protection is provided through the implementation of the Department's nuclear safety program comprised of a robust nuclear safety regulatory framework and multi-layered oversight by DOE line and headquarters organizations.

Oversight of DOE defense nuclear facilities is supplemented by the Board, an independent executive branch agency established by Congress in 1988. The Board provides independent analysis, advice, and recommendations to the Secretary of Energy for the purpose of providing adequate protection of public health and safety from operations conducted at the Department's defense nuclear facilities.

The Board and the Department communicate and interact through a variety of mechanisms, including Board recommendations, reporting requirements, letters, public meetings and hearings, briefings, discussions, and site visits.

The Department completed all actions in its Implementation Plans in previous years for the following two recommendations. The Board closed these two recommendations during FY 2019:

- 2011-1, Safety Culture at the Waste Treatment and Immobilization Plant; and
- 2015-1, Emergency Preparedness and Response at the Pantex Plant.

With the addition of two new recommendations, there were four open recommendations at the end of FY 2019:

- 2012-1: Savannah River Site Building 235-F Safety,
- 2012-2: Hanford Tank Farms Flammable Gas Safety Strategy,
- 2019-1, Uncontrolled Hazard Scenarios and 10 C.F.R. 830 Implementation at the Pantex Plant, and
- 2019-2, Safety of the Savannah River Site Tritium Facilities.

This report contains information regarding safety initiatives and activities at DOE defense nuclear facilities; the status of DNFSB recommendations issued to DOE; DOE reports to the Board; and other notable interface activities between the Board and DOE in FY 2019.

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



DEPARTMENT OF ENERGY ACTIVITIES RELATING TO THE DEFENSE NUCLEAR FACILITIES SAFETY BOARD FISCAL YEAR 2019

Table of Contents

I. Legislative Language	1
II. Introduction	1
III. Departmental Nuclear Safety Initiatives and Activities	3
A. Office of Environmental Management Nuclear Safety Initiatives	3
B. National Nuclear Security Administration Nuclear Safety Initiatives	4
C. Hanford Site (Hanford).....	5
D. Los Alamos National Laboratory (LANL)	7
E. Nevada National Security Site (NNSS).....	8
F. Pantex Plant (Pantex).....	8
G. Savannah River Site (SRS).....	9
H. Y-12 National Security Complex (Y-12).....	10
IV. FY 2019 Progress on DNFSB Recommendations	11
A. Overview of the Recommendation Process.....	11
B. Recommendations Closed in FY 2019	11
C. Open Recommendations.....	12
V. Interface Activities.....	15
A. DOE Order 140.1, <i>Interface with the Defense Nuclear Facilities Safety Board</i>	15
B. Title 10 Code of Federal Regulations Part 830, <i>Nuclear Safety Management</i>	15
C. Safety Management of Waste Storage and Processing at Defense Nuclear Facilities	16
D. Departmental Response to Board Reporting Requirements.....	16
E. Departmental Participation in Public Hearings.....	19
Appendix. Acronyms and Abbreviations	20

I. Legislative Language

This report is being provided 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.

This report also addresses 42 U.S.C. § 2286d(g)(1), which states:

Subject to paragraph (2), not later than one year after the date on which the Secretary of Energy transmits an implementation plan with respect to a recommendation (or part thereof) under subsection (f), the Secretary shall carry out and complete the implementation plan. If complete implementation of the plan takes more than 1 year, the Secretary of Energy shall submit a report 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 setting forth the reasons for the delay and when implementation will be completed.

II. Introduction

This is the DOE's, including the NNSA's, annual report to Congress regarding the Department's FY 2019 activities related to the DNFSB. This report also provides highlights of the Department's activities and accomplishments related to improved safety at defense nuclear facilities.

It is the policy of DOE to design, construct, operate, and decommission its nuclear facilities in a manner that ensures adequate protection of workers, the public, and the environment. The Department protects its workers, the public, and the environment from nuclear hazards at its defense nuclear facilities through a rigorous, proactive nuclear safety program that is comprised of a robust nuclear safety regulatory framework of Federal Regulations, DOE Directives, and Technical Standards; and multi-layered oversight by DOE management and operating contractors, Federally managed field and headquarters Program Offices, the Office of Enterprise Assessments, and Central Technical Authorities.

Oversight of DOE defense nuclear facilities is supplemented by the Board. The Board is an independent executive branch agency established by Congress in 1988 that provides independent analysis, advice, and recommendations to the Secretary of Energy for the purpose

of providing adequate protection of public health and safety² from operations conducted at the Department’s defense nuclear facilities located throughout the United States. 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.

Sites Where DOE Defense Nuclear Facilities Are Located

Site Name	State
Hanford Site	Washington
Idaho National Laboratory Site	Idaho
Lawrence Livermore National Laboratory	California
Los Alamos National Laboratory	New Mexico
Nevada National Security Site	Nevada
Pantex Plant	Texas
Sandia National Laboratories	New Mexico
Savannah River Site	South Carolina
Waste Isolation Pilot Plant	New Mexico
Y-12 National Security Complex / Oak Ridge National Laboratory	Tennessee

The Board and the Department communicate and interact through a variety of mechanisms, including Board recommendations, reporting requirements, letters, public meetings and hearings, briefings, discussions, and site visits.

Within DOE, interactions with the DNFSB are governed by DOE Order 140.1, *Interface with the Defense Nuclear Facilities Safety Board*. The Order emphasizes DOE line management accountability and establishes clear requirements and responsibilities for DOE Federal and contractor staff when working with the DNFSB. Additional information regarding the interactions with the Board may be found at: <https://ehss.energy.gov/depdep/>.

This report contains information regarding safety initiatives and activities at DOE defense nuclear facilities, the status of DNFSB recommendations issued to DOE, and other notable interface activities between the Board and DOE conducted in FY 2019.

² The National Defense Authorization Act for Fiscal Year 2020 modified the DNFSB’s mission to include health and safety of employees and contractors at DOE’s defense nuclear facilities. This will be reflected in the Department’s FY 2020 Annual Report to Congress.

III. Departmental Nuclear Safety Initiatives and Activities

A. Office of Environmental Management Nuclear Safety Initiatives

Programmatic Activities

In FY 2019, the Office of Environmental Management (EM) Office of the Chief of Nuclear Safety continued to perform oversight, provide technical support, and execute technical activities, as appropriate, in support of nuclear operations. Examples of specific activities in FY 2019 include:

- Conducting six field operational awareness visits and assessments guided by the Chief of Nuclear Safety-Nuclear Facility Risk Ranking;
- Performing 12 technical assistance visits applying staff expertise to unique problems facing EM facilities;
- Providing technical expert reviewers to support seven Office of Project Management project reviews at EM defense nuclear facilities;
- Supporting the development, review, and concurrence of revisions to nuclear safety technical standards;
- Managing EM's Differing Professional Opinion process and adjudicating submitted cases;
- Completing lines of inquiry for design and engineering review of DOE nuclear facilities as part of the EM Standard Review Plan;
- Supporting the revision of DOE Handbook 3010, *Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facilities*; and
- Providing support to the Savannah River Site EM Emergency Preparedness exercise regarding a tritium release.

Improvements in Safety Oversight

After the 2018 energetic release of radioactive material from four vented 55-gallon drums of suspect transuranic waste at the Idaho National Laboratory, EM issued a May 28, 2019, Safety Alert with reporting requirements and required and recommended actions to be taken at EM sites that had waste conditions similar to that at the Idaho National Laboratory, including the presence of metal carbides and possible generation of flammable gases. On September 4, 2019, the Department issued an Operating Experience notice that requested waste management information from all DOE and NNSA sites. In FY 2019, the responses from field sites resulting from the Safety Alert and the Operating Experience notice were being collated and analyzed. The Department plans to share the outcome of these extent-of-condition reviews with the Board.

B. National Nuclear Security Administration Nuclear Safety Initiatives

Programmatic Activities

In FY 2019, the NNSA Office of Safety, Infrastructure, and Operations (NA-50) took several actions to improve technical expertise, operational excellence, performance culture, and nuclear safety. NA-50's key FY 2019 accomplishments include:

- Providing technical assistance to field offices to support the qualification of Facility Representatives and other staff via high quality training and other knowledge transfer activities;
- Continuing to integrate the site-wide assessment planning processes at field locations and revising the NNSA Supplemental Directive on NNSA site governance to facilitate continued improvement of the planning process;
- Monitoring and trending enterprise operations to identify and focus field and Headquarters assessment activities on those areas where the most significant improvements could be achieved;
- Publishing and initiating the implementation of the NNSA Safety Roadmap that outlines initiatives designed to enhance safety processes at NNSA headquarters and field offices. The NNSA Safety Roadmap includes:
 - The accreditation of the Technical Qualification Program, which will help ensure a rigorous and consistent training and qualification program across the NNSA Enterprise, demonstrating the NNSA commitment to competence commensurate with responsibilities.
 - The Safety Basis Review Team initiative, which will improve consistency in analysis, leverage human resources across the NNSA Enterprise, and promote best-in-class processes as the standard for doing business while enhancing knowledge transfer across the NNSA Enterprise. This initiative's goal is to provide a centralized and consistent approach for review and approval of nuclear facilities safety basis documentation.
 - The Safety Analytics, Forecasting and Evaluation Reporting project, which will provide data evaluation and analysis of performance information and better inform risk-based decision making to focus resources on the areas of greatest concern. This initiative's focus is on data capabilities to facilitate information sharing, data management, trending and analysis for converting available data into useful information and visualizations for decision makers to optimize resources and support safety oversight decisions.
 - Several risk-based dashboards, which were developed and implemented to provide leadership with more insight into where resources should best be applied to address safety risk at each site.
- Continuing to host a bi-monthly safety conference call with all field offices to provide a forum for discussions of current events and challenges faced throughout the NNSA

Enterprise, sharing of lessons learned and best practices, and communicating enterprise-wide concerns and initiatives; and

- Briefing the NNSA Principal Deputy Administrator several times throughout the year to inform NNSA senior leadership of safety concerns, areas of best practices, areas of highest safety risk in current operations, and actions being taken to address those risks as well as interactions with the DNFSB.

Improvements in Safety Oversight

In FY 2019, NNSA completed a limited revision to Supplemental Directive 226.1C, *NNSA Site Governance*. The supplemental directive establishes NNSA’s governance approach by describing how the Federal Government and NNSA’s Management and Operating contractors assure effective mission performance and operational excellence. The revision added new attachments providing expectations for Safety Management Program reviews and Site Integrated Assessment Plans.

Supplemental Directive 226.1C requires that the scope of Federal oversight be determined based on the demonstrated strength of the contractor’s management systems and the risks associated with less-than-satisfactory performance. High-risk activities and areas with significant performance weaknesses must be evaluated to determine the necessary activity-specific oversight. Nuclear safety, nuclear security, and fiduciary functions are examples of activities that warrant increased oversight.

The approach consists of three overlapping systems of oversight:

1. Federal oversight performed by Federal program, functional, and field offices;
2. Contractor assurance performed by the laboratories, plants, and sites; and
3. Contractor corporate parent(s) oversight performed by the Management and Operating corporate parent(s), as specified by contract.

This forms a site governance approach focused on continuous improvement of all activities and functional areas that can affect mission reliability. The site governance approach is designed to be transparent and encourage efficiencies. Data generated from oversight and assurance activities are shared to allow federal and contract personnel to identify positive and adverse indicators and opportunities for improvement.

C. Hanford Site (Hanford)

Waste Treatment and Immobilization Plant (WTP)

In FY 2019, the Department continued construction of the WTP to safely immobilize and dispose of Hanford underground storage tank waste. The original plan required waste to be processed through the Pretreatment Facility for separation 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. However, as reported in the past, due to technical issues with the Pretreatment Facility, the Department is focusing on completion of the Low-Activity Waste Facility, Balance of Facilities, and Analytical Laboratory in order to feed low-activity waste directly from tank farms to the Low-Activity Waste Facility instead of routing waste through the

Pretreatment Facility. As part of this direct-feed 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. Completion of this work supports vitrification of the most accessible and mobile tank waste, the supernate, to begin no later than December 31, 2023.

On October 24, 2018, the Department transmitted a letter to the Board regarding action taken to resolve the Board's concerns related to the Safety Design Strategy for the High-Level Waste Facility. The Board's May 9, 2019, response stated that DOE has identified acceptable strategies for the resolution of these concerns.

In addition, in FY 2019 the Department resolved remaining technical issues regarding Board concerns on WTP and briefed the Board. The Department issued correspondence for the resolution of the technical issues; which are: (1) the operability and safety of the electrical distribution system, dated December 10, 2018; (2) control of Pulse Jet Mixers dated May 15, 2019, and (3) erosion wear allowances for piping, vessels and Pulse Jet Mixers dated August 30, 2019.

Sludge Treatment Project

In FY 2019, the Sludge Treatment Project transferred approximately 7,000 gallons of radioactive sludge stored underwater in six engineered containers within the 105K-West Basin for interim storage until the sludge is treated and sent to the appropriate disposal facility. The sludge is a combination of corrosion products from metallic spent nuclear fuel (particulates of uranium oxides and uranium metal), debris corrosion products, windblown dust, and spallation products from the basin's concrete walls and floors. The sludge was transferred in multiple batches as slurry via a hose-in-hose system into containers located in the sludge loading bay of the K-West Basin Annex. The containers were then loaded into shipping casks and transported by truck to the T-Plant without incident.

Electrical Distribution Infrastructure

Progress on improving the site-wide electrical infrastructure continues with completion of wood pole testing and treatment, as well as completing upgrades to the electrical system and access roads. Several projects continued throughout FY 2019 to upgrade the transmission and distribution lines, which includes poles and hardware. Additional electrical system projects are planned for FY 2020 to upgrade protective devices, alarms, and controls to improve reliability of the site's power. Monitoring of underground cabling continued through FY 2019; and plans were developed to replace a portion of underground cabling over the next two years with the remainder to be replaced on a longer-term schedule.

The DNFSB letter to DOE, dated July 2, 2019, acknowledged progress on improving the site-wide electrical infrastructure over several years and the vulnerability associated with underground cabling. The letter also noted that the aging T-Plant electrical distribution system could impact the safety significant confinement ventilation system. DOE is taking this information under advisement. The DNFSB also recognized that the planned short and longer term projects should allow the operational flexibility necessary to manage the Hanford mission. The letter did not identify any findings regarding the site-wide electrical system.

D. Los Alamos National Laboratory (LANL)

Plutonium Facility–Building 4 (PF-4)

In FY 2019, NNSA approved the 2018 annual update to the PF-4 Documented Safety Analysis (DSA), and implementation was initiated. The update included changes necessary to close several legacy Conditions of Approval and remaining comments from previous reviews. The update also incorporated and consolidated other approved safety basis documents, effectively making the associated control set implementation more streamlined and user-friendly for operators and other facility personnel. The DSA update represents a significant improvement in the facility's overall safety management posture.

Seismic analysis for six PF-4 glovebox support stand clusters was completed in FY 2019. The completion of the analysis supports the plan to physically upgrade gloveboxes to ensure they perform their safety functions during and following seismic events. Non-linear dynamic analysis and the capital column testing initiatives of the facility's seismic response was initiated to better understand the facility's seismic response and determine the need for, and nature of, further structural upgrades. Also, progress was made in addressing the backlog of Criticality Safety Evaluation documents to address potential firewater ingress into gloveboxes.

PF-4 continued to reduce its overall material at risk (MAR) inventory through confinement vessel movements to the Chemistry and Metallurgy Research Facility for remediation and the transfer of waste drums to the Transuranic Waste Facility. In addition, the FY 2019 approval of the safety basis and completed startup activities at the Radioassay and Nondestructive Testing Facility to support the shipment of waste to the Waste Isolation Pilot Plant, represents a significant accomplishment which enables the NNSA to reduce MAR at PF-4 and throughout LANL.

NNSA made a variety of other physical safety improvements at PF-4. Improvements include:

- Replacement of all pipe overpack container filters (600-700) to improve confinement capabilities;
- Installment of two diesel generators that double the number of safety-class firewater pumps;
- Remediation of 2-over-1 seismic interaction issues for the fire suppression system to improve its ability to survive a seismic event; and
- Other fire suppression and fire protection upgrades to prevent fire propagation.

Transuranic Waste Facility

Efforts continued in FY 2019 to complete the installation of the Transuranic Waste Facility safety-significant fire suppression system originally documented in the preliminary DSA to include the procurement and installation of replacement pumps to ensure consistent replication of associated pressure curves. Additional replacement pump parts were procured to ensure sufficient numbers of critical spares are available. Also, testing was completed to

verify that new seismic power cut-off switches will not be affected by electromagnetic signals. The replacement of the seismic cut-off switches and firewater pumps will improve the reliability of the two safety systems.

E. Nevada National Security Site (NNSS)

Device Assembly Facility

The DNFSB has followed the progress associated with the Device Assembly Facility ten-year seismic analysis update. On March 21, 2019, the DNFSB issued a letter to DOE expressing concern with the bounding seismic accident and engineered control response. While the Board's letter did not include a reporting requirement, the Board explicitly expressed a desire to continue to monitor the seismic analysis update. In FY 2019, the Device Assembly Facility probabilistic seismic hazard analysis was approved and a contract was awarded to perform the soil-structure interaction and in-structure response analyses. The final seismic response calculations are on schedule for completion in FY 2020.

U1a Complex

On December 19, 2018, the DNFSB issued a letter to DOE regarding controls in the DSA for the U1a Complex. Several Specific Administrative Controls are used at U1a in lieu of engineered controls, as viable engineered controls are not readily available. As acknowledged in the DNFSB letter, evaluation of potential engineered controls is a planned safety basis improvement. In FY 2019, the evaluation of a new shipping container, which could potentially eliminate several Specific Administrative Controls once implemented, was completed.

F. Pantex Plant (Pantex)

Infrastructure

During FY 2019, efforts continued to proactively address deteriorating infrastructure and equipment through the site's Life Sustainment Program. Upgrades to the fire protection systems, flame detection system, lead-in piping replacements to the High Pressure Fire Loop, and other facility reconfigurations were initiated. The DNFSB reviewed construction packages for these projects and provided value-added feedback. The DNFSB was regularly updated regarding the status of corrective actions and information regarding project schedules and status. Scheduled outages continued in order to improve reliability and availability of the electrical distribution system. Facility enhancements and updates to transportation and handling equipment and processes continued to be implemented to meet seismic requirements.

Nuclear Explosive Safety

In FY 2019, the DNFSB staff continued to be included in NNSA Nuclear Explosive Safety (NES) reviews. The DNFSB staff reviewed input documents; received briefings by subject matter experts or affected programs under evaluation; and observed process demonstrations and live operations as part of the NES process. In June 2019, the Board provided a written request to the Secretary of Energy regarding the desire to attend NES study group deliberations in lieu of out briefs. NNSA responded on August 9 that NNSA will continue to provide the DNFSB staff a briefing following NES study group deliberations. The DNFSB response in October 2019

documents their disagreement with this position. Pursuant to its enabling statute (42 U.S.C. §2286c(a)), the Board concludes that access to NES deliberations is necessary to evaluate the safety of nuclear explosive operations.

G. Savannah River Site (SRS)

Conduct of Operations

In FY 2019 NNSA and EM contractors continued to implement corrective actions to improve implementation of the Technical Safety Requirements with a focus on Conduct of Operations (ConOps). The corrective action plans were developed and implemented at the direction of the DOE Savannah River Operations Office in late FY 2017.

The EM contractor completed an effectiveness review in September of 2018 for the activities completed at that time. The effectiveness review identified additional opportunities to improve. Over 80 percent of those actions were completed in FY 2019. The contractor's open actions include development and implementation of an application for Limiting Conditions for Operation and Surveillance Tracking and the completion of an effectiveness review of the application. All these activities are on schedule for completion in the 1st quarter of FY 2020.

The DOE Savannah River Operations Office continues to monitor contractors' progress in ConOps through daily oversight by DOE Facility Representatives and by targeted assessment activities.

Savannah River Tritium Enterprise (SRTE)

The SRTE calculated co-located worker dose consequences exceed the commonly used 100 rem onsite evaluation criteria. The dose factors (calculated doses) are based on the atmospheric dispersion value (χ/Q) specified in DOE-STD-1189-2008, *Integration of Safety Into the Design Process*, for the co-located worker at 100 meters. In FY 2018, a Co-located Worker Risk Reduction Strategy including a plan of action and milestones was developed, and implementation was initiated. By the end of FY 2019, six of the 19 scheduled items were completed. One item, "Plume Rise Analysis," was incorporated into the recently resubmitted Tritium Facilities DSA and Technical Safety Requirements currently under review by the NNSA Savannah River Field Office.

The SRTE has made progress in the area of ConOps, since the Board issued its January 4, 2018, letter regarding the ConOps safety management program at SRS. SRTE's sustainability plan (which consisted of ConOps coaching, targeted Senior Supervisory Watch, and other enhancements) has instilled a more disciplined approach to operations. In FY 2019, substantial decreases were seen in the number of reportable occurrences. SRTE continued to deploy additional initiatives such as Human Performance Improvement tools to further advance its ConOps program.

H-Canyon Exhaust (HCAEX) Tunnel

As part of ongoing discussions regarding an issue that has existed since 2015, DOE received a letter from the Board in FY 2019 and had multiple interactions with the Board and its staff over concerns regarding the ability of the HCAEX system to perform its safety functions following a seismic event. The HCAEX is designated as a safety-class system that provides normal facility

ventilation and would filter out radionuclides in the event of a design basis seismic event. Since November 2017, H Canyon has continued to operate under a temporary Justification for Continued Operation with restricted radionuclide inventory and additional administrative controls due to degradation observed in the underground concrete duct. These controls and restrictions have allowed compliance with DOE standards for postulated dose consequences to the public and to workers while DOE implements the following two parallel efforts to refine the long-term safety basis.

- Revision of the existing accident analysis was initiated to document an appropriate suite of safety controls consisting of appropriate seismic qualification for the H-Canyon vessels, jumpers and connectors. These structures, systems, and components are credited as safety-class, and thus relax the safety-class designation for the HCAEX system. The Department expects to approve the revised H-Canyon DSA in FY 2020.
- The non-linear analysis of H-Canyon continued in FY 2019 to determine if the degraded concrete can withstand the analyzed earthquake (Performance Category 3). The draft analysis is complete, and it demonstrates that the concrete duct can retain credit as a seismically-qualified structure. The final report from this effort is expected to be issued in FY 2020.

H. Y-12 National Security Complex (Y-12)

Deteriorating Infrastructure

With continued program support, Y-12 made significant progress implementing the Extended Life Program Implementation Plan 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 extended life of these facilities, in addition to sustaining safe programmatic enriched uranium operations of Building 9212 through the year 2025 (until replacement by the Uranium Processing Facility), relies on continued efforts to remove MAR and the continuation of a strong maintenance, repair and replacement program. Accomplishments during FY 2019 included removal of 5.5 metric tons of uranium from legacy facilities; upgrading electrical equipment in Buildings 9204-2E and 9215 (80 percent complete); isolating four out-of-service Building 9212 systems; disposition of significant non-equity waste materials and low equity uranium bearing inventories; and moving the component radiography function from Building 9212 to Building 9204-2E.

Criticality Safety Program

On July 25, 2019, the DNFSB sent a letter to DOE that identified concerns with the Y-12 Criticality Safety Program and Federal oversight. In this letter, the Board reiterated issues self-identified by the contractor and NNSA during the past two years. In response to the self-identified issues, several process-specific corrective actions and site-wide improvement actions that address concerns with the Criticality Safety Program were implemented or are ongoing. The Department briefed the Board in early October 2019 regarding the actions completed in FY 2019 that improved the structure, execution, and oversight of the program. The briefing also included information regarding actions to be implemented in FY 2020 to further improve the Criticality Safety Program.

Uranium Processing Facility (UPF)

In April 2019, NNSA approved the UPF preliminary DSA annual update that contained no Conditions of Approval. The DNFSB conducted multiple site visits to evaluate the UPF Quality Assurance Program; visited several UPF glovebox fabricator shops; and observed ongoing construction work at the UPF site. The Board did not communicate any identified issues to DOE in FY 2019 from these visits.

IV. FY 2019 Progress on DNFSB Recommendations

A. Overview of the Recommendation Process

The Board issues recommendations via letter and publication in the *Federal Register* to the Secretary of Energy (Secretary) regarding specific measures the Board advises that the Department should adopt. The Secretary is required to respond stating whether to accept or reject, in whole or in part, the Board recommendation within 45 days of the recommendation's publication in the *Federal Register* unless granted an extension by the Board. If the Secretary accepts all or part of the recommendation, an Implementation Plan (IP) addressing the recommendation's concerns is required to be transmitted to the Board within 90 days of the publication of the Secretary's response. The time may be extended upon notice to Congress and the Board.

The Secretary is required to complete the items contained within the IP within one year of issuance. If additional time is needed, DOE is required to submit a report to Congress discussing the reasons for delay and providing a schedule for completion of the IP items. As a rule, the scope and technical complexity of the safety issues addressed in the IPs generally require more than one year for completion as many IPs require changes in DOE directives, changes in planning and scheduling, and coordination with multiple DOE sites and offices to solve complex-wide challenges.

All recommendations (both open and closed), IPs, and a chronological record of related correspondence between DOE and the DNFSB are available on the DOE Office of the Departmental Representative to the DNFSB website at: <https://ehss.energy.gov/depreg/>.

B. Recommendations Closed in FY 2019

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

The Board issued Recommendation 2011-1 on June 9, 2011, stating that, taken as a whole, the safety culture at the WTP was in need of 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 initiated a number of actions to strengthen the safety culture at the WTP. On May 16, 2017, the Department informed the DNFSB that the final IP deliverable was complete. On July 30, 2019, the Board acknowledged the progress made and closed the recommendation after concluding that the Department had adequately addressed the underlying causes associated with the Board's concerns.

2015-1: Emergency Preparedness and Response at the Pantex

The Board issued Recommendation 2015-1 on November 24, 2015, regarding three specific areas of emergency preparedness and emergency response at Pantex :

1. Ensure drill and exercise programs comprehensively demonstrate proficiency by all responders in responding to emergencies for all hazards, all facilities, and all responders;
2. Ensure timely notification of an emergency to the State of Texas and local authorities and provide consistent off-site radiological monitoring support, if needed; and
3. Incorporate and validate changes to the decision-making tools (e.g., emergency action levels) and notification processes.

The recommendation was accepted on January 13, 2016, and an IP was issued on June 16, 2016. DOE transmitted its final set of IP deliverables to the Board on June 13, 2017. On February 6, 2019, the Board closed the recommendation and acknowledged the completion of all milestones in the IP, including effectiveness reviews.

C. Open Recommendations*Recommendation 2012-1: Savannah River Site Building 235-F Safety*

On May 9, 2012, the Board issued Recommendation 2012-1 regarding hazards from residual contamination within Building 235-F. DOE accepted the Recommendation on July 10, 2012, and the Secretary issued the IP on December 5, 2012. The Department revised the IP in 2014 to reflect a change in schedule to complete all actions by May 2021. The IP identifies multi-year actions to reduce the hazards associated with the MAR that remains as residual contamination in the building's Plutonium Fuel Form cells one through nine. The DOE Savannah River Operations Office continued to evaluate a Deactivation Project Plan that guides near-term activities, as necessary, to improve the safety posture and long-term activities required to immobilize or remove remaining Pu-238 that poses potential dose consequence to collocated workers and the public. The Department recognized that an incident involving major fire, in conjunction with a major seismic event, was the major driver for a potential significant release of Pu-238.

Activities conducted in FY 2019 include:

- Completion of MAR reduction activities in Plutonium Fuel Form Cell 1, Cell 1 Maintenance Wing Cabinet and Cell 2.
- Completion of an independent evaluation of the fire analysis for Building 235-F.
- Initiation of new radioactive material measurements of portions of Building 235-F.
- Annual facility drills to demonstrate the site's continued ability to protect workers in all facilities and construction projects in the vicinity of Building 235-F.

In the spring of 2019, DOE completed removal activities in portions of Building 235-F which had an estimated holdup of about 60 percent of the total facility Pu-238 inventory. Measurements of waste bagged out of that portion of the facility were lower than expected and revealed that

cleanout activities had succeeded in only removing 64 percent of the anticipated amount of plutonium holdup in those areas. It became evident that planned cleanout activities would not be successful in reducing residual contamination levels enough to appropriately reduce the potential co-located worker dose from a facility fire; and that continuing the current cleanout activities would unnecessarily place the facility workers at risk.

DOE completed an independent evaluation of the fire analysis for Building 235-F. The conclusions of the revised fire analysis, and the realization that the Pu-238 was far less mobile than anticipated, led to evaluating alternatives that would provide a safer and more successful path to mitigating the hazards associated with this facility. In FY 2019, DOE communicated with DNFSB the possibility of pursuing more appropriate options, and revising the IP to reflect these options.

Recommendation 2012-2: Hanford Tank Farms Flammable Gas Safety Strategy

The Board issued Recommendation 2012-2 on September 28, 2012, noting that current operations at the Hanford Tank Farms require safety-significant active ventilation of double-shell tanks (DSTs) to:

1. Ensure the removal of flammable gas from the tanks' headspace;
2. Install real-time monitoring systems for tank ventilation flow rates; and
3. Perform other upgrades on systems used to perform safety-related functions.

DOE accepted this recommendation on January 7, 2013, and transmitted the Department's 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 exhausters units for use during off-normal events. The Board responded to the Department on September 16, 2016, concluding that the proposed safety-significant portable exhauster concept was consistent with the Board's recommendation and expressing appreciation for the IP's updated deliverable schedule.

On November 6, 2018, the Department notified the Board that the safety significant annulus liquid level detection system was operational in all active DSTs. On August 13, 2019, the Department approved the safety basis amendment for safety significant real-time flow monitoring, completing Action 2-3 of the IP. On September 17, 2019, the Department implemented safety significant real-time flow monitoring in all active DSTs, completing Action 2-4 of the IP. The recently approved safety basis amendment for Action 2-3 also captured a single planned improvement to address the last two remaining actions - Actions 1-4 and 4-3.

Actions 1-4 and 4-3 call for the deployment of safety significant portable exhauster units equipped with self-generator units. However, that deployment is dependent on future decisions for whether or not to install mixer pumps in the DSTs to support the long-term High-Level Waste Facility mission. The safety basis now reflects this planned improvement as a placeholder if mixer pump operations in DSTs are pursued in the future.

Recommendation 2019-1: Uncontrolled Hazard Scenarios and 10 C.F.R. 830 Implementation at the Pantex Plant

The DNFSB issued Recommendation 2019-1 on February 20, 2019, regarding the adequacy of the safety basis, which contained five sub-recommendations to:

1. Implement compensatory measures to address all the deficiencies described in Appendix 1 and Appendix 2 of the recommendation,
2. Perform an extent-of-condition evaluation of the Pantex safety basis (including the procedures for development and configuration control of the safety basis documents) and implement subsequent corrective actions to ensure compliance with DOE regulations and directives,
3. Implement actions to ensure process design and engineering controls (including the use of special tooling) eliminate or protect a unit from impact and falling technician scenarios, including those scenarios identified in Enclosure 1 of the recommendation,
4. Ensure the design, procurement, manufacturing, and maintenance of special tooling is commensurate with its safety function (see Enclosure 1), and
5. Train safety basis personnel to ensure future revisions to the safety basis comply with 10 C.F.R. 830 requirements.

The Department accepted the recommendation on April 16, 2019; and transmitted the Department's IP to the Board on July 16, 2019. The IP details a programmatic approach addressing each of the Board's five specific sub-recommendations and is scheduled to be completed in FY 2020. Actions completed in FY 2019, include:

- Implementation of Falling Man Specific Administrative Controls;
- Updating all Safety Analysis and Hazard Analysis Reports;
- Incorporating enhancements to the Unreviewed Safety Question procedure;
- Reducing the Unreviewed Safety Question Determination backlog by over 40 percent;
- Implementing a plan with specific actions and a schedule for addressing legacy Conditions of Approval and Planned Improvements; and
- Issuing strategies for making revisions to safety management programs (i.e., tooling, testers, and supplemental equipment), Specific Administrative Controls, and In-Service Inspections.

Recommendation 2019-2: Safety of the Savannah River Site Tritium Facilities

On February 11, 2019, the DNFSB shared Draft Recommendation 2019-1, *Safety of the Savannah River Site Tritium Facilities*, with the Department. NNSA provided comments on the draft recommendation on April 10, 2019, stating that the points of concern had been or were already being addressed by the Department. Additionally, NNSA stated that resources needed to respond to this Board recommendation would divert critical resources allocated to

implement the improvements designed to enhance the safety of the co-located workers and the public. On June 11, 2019, the Board issued Recommendation 2019-2.

The Department re-evaluated the recommendation and on September 10, 2019, the NNSA Administrator responded on behalf of the Secretary informing the Board that DOE did not accept the recommendation stating “actions and plans that would have responded to this recommendation are complete or underway.” The response noted that DOE and NNSA remained fully compliant and committed in its duties to the public in the safe operation of the SRS Tritium Facilities and that ongoing actions adequately addressed DNFSB concerns. The Department concluded that the most efficient, effective, and quickest way to improve safety at the SRS Tritium Facilities was to continue implementing the identified corrective actions.

V. Interface Activities

A. DOE Order 140.1, *Interface with the Defense Nuclear Facilities Safety Board*

On May 14, 2018, DOE issued Order 140.1, *Interface with the Defense Nuclear Facilities Safety Board*, which replaced a 17 year-old DOE Interface Manual that was out of date and inconsistent with the Atomic Energy Act. DOE developed DOE Order 140.1 to establish a set of uniform requirements applicable to DOE, clarifying DOE Federal and contractor roles and responsibilities, and ensuring consistency with the applicable law relating to the Department's interactions with the DNFSB.

During FY 2019, 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 from operations 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 Congress and public interest groups, as appropriate. In addition, DOE met with, and provided requested information to the Government Accountability Office in September and October 2019. These interactions provided DOE with the opportunity to clarify that DOE Order 140.1 does not challenge the DNFSB's legal authority, defined in 42 U.S.C. § 2286 et seq. of the Atomic Energy Act; does not hinder the Department's cooperation with the DNFSB; nor does it 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.

Since the issuance of DOE Order 140.1, DOE leadership at Headquarters and field offices participated in three DNFSB public hearings to discuss the impacts of DOE Order 140.1 on DNFSB operations. In these public hearings, it was stated that the Department will continue to cooperate closely with the DNFSB and provide complete access to the information the Board needs to carry out its mission in accordance with the Board's statutory mandate.

B. Title 10 Code of Federal Regulations 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 to work with the Office of General Counsel to initiate a rulemaking change to Title 10 Code of Federal Regulations (C.F.R.) Part

830, *Nuclear Safety Management*. The purpose of the change was to improve laboratory efficiency, decrease cost, and maintain an appropriate level of DOE oversight.

On August 8, 2018, DOE published a Notice of Proposed Rulemaking in the Federal Register (83 FR 38982). DOE held four public meetings to allow any interested persons the opportunity to speak on the proposed rule. The DNFSB shared its comments submitted in response to the Notice of Proposed Rulemaking in an October 5, 2018, letter. The comment period closed on October 9, 2018. Consistent with the Administrative Procedures Act, the Department is evaluating the comments with the intent to issue a final rule in FY 2020.

C. Safety Management of Waste Storage and Processing at Defense Nuclear Facilities

In June 2019, the Department participated in a DNFSB public hearing regarding safety management of waste storage and processing at the Department's defense nuclear facilities. The purpose of the hearing was for the DNFSB to gather information and discuss actions the Department was taking to strengthen the safety posture of solid (transuranic) nuclear waste operations. The hearing, and written responses to Board inquiries, addressed root causes of radiological release events at the Waste Isolation Pilot Plant in 2014 and the Idaho National Laboratory in 2018; implications for DOE Technical Standard 5506–2007, *Preparation of Safety Basis Documents for Transuranic (TRU) Waste Facilities*; the effectiveness of implemented corrective actions; application of lessons learned across the defense nuclear facilities complex; and strengthening Federal subject matter expertise and oversight.

D. Departmental Response to Board Reporting Requirements

DOE responds to the Board's reporting requirements, pursuant to 42 U.S.C. Section 2286b(d). During FY 2019, DOE provided information in response to the reporting requirements listed in the following tables.

DNFSB Reporting Requirements and Requests for a Board Briefing in FY 2019

Reporting Requirement or Request for a Board Brief	Date of Board Letter	Date Completed or Status
Reporting requirement for a copy of DOE’s evaluation of whether or not the SRS H-Canyon Exhaust Tunnel is necessary as a post-seismic safety-class control when completed, and a quarterly briefing on the status of the evaluation until complete.	12/7/2018	Briefing: 6/4/2019
Reporting requirement for a briefing regarding the Nuclear Criticality Safety Program at the Y-12 National Security Complex, to include overall performance and recent reportable occurrences.	2/6/2019	3/4/2019
Reporting requirement for DOE’s Response to Recommendation 2019-1, <i>Uncontrolled Hazard Scenarios and 10 C.F.R. 830 Implementation at the Pantex Plant.</i>	2/20/2019	4/16/2019
A request to brief the Board regarding the Integrated Waste Treatment Unit facility, part of the Idaho Cleanup Project.	2/27/2019	3/26/2019
Reporting requirement for a response and briefing, including analysis or supporting data, to questions regarding the waste drums over-pressurization at the Idaho National Laboratory.	3/12/2019	Response: 5/7/2019 Briefing: 4/17/2019
Reporting requirement for DOE to provide information regarding the Y-12 Complex criticality safety program.	6/5/2019	7/24/2019
Reporting requirement for DOE’s Response to Recommendation 2019-2, <i>Safety of the Savannah River Site Tritium Facilities.</i>	6/11/2019	9/11/2019
Reporting requirement for a report regarding whether the Secretary has reached a determination to deny access to all phases of the nuclear explosive safety study process.	6/12/2019	8/9/2019
A request to brief the Board on the roles and responsibilities of Federal staff conducting oversight of criticality safety at Y-12 and actions taken to improve Y-12’s criticality safety program.	DNFSB Letters: 7/24/2019, 8/23/2019	10/2/2019
Reporting requirement for a response describing plans to address safety issues with the safety significant confinement ventilation system at the Waste Isolation Pilot Plant.	8/27/2019	DUE: 11/25/2019

Previously Established DNFSB Reporting Requirements Completed in FY 2019

Reporting Requirements	Date of Board Letter(s)	Date Completed or Status
<p>Reporting requirement for NNSA to provide a report and briefing on NNSA's path forward for resolution of safety basis issues at the Radioassay and Nondestructive Testing at the Los Alamos National Laboratory.</p> <p>Note: NNSA's response include a commitment to provide quarterly briefings to the Board regarding progress on resolving Radioassay and Nondestructive Testing documented safety basis issues.</p>	<p>12/9/2014</p>	<p>Response: 3/25/2015 Briefings: 5/18/2015, 10/15/2015, 2/23/2017, & 8/29/2017 DNFSB closed on 5/22/19</p>
<p>Reporting requirement for DOE's annual metrics table and briefing on the Department's Nuclear Criticality Safety Program.</p>	<p>8/7/2003 1/29/2008 2/26/2016</p>	<p>Response: 2/17/2017 1/24/2018 1/25/2019 Briefing: 8/31/2017 5/16/2018 3/4/2019</p>
<p>Reporting requirement for 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.</p>	<p>5/17/2018</p>	<p>Response: 8/20/2018 Briefing: 11/1/2018</p>
<p>Reporting requirement for a briefing prior to the implementation of the interim revision to DOE-NA-STD-3016-2016, <i>Hazard Analysis Reports for Nuclear Explosive Operations</i>, detailing how NNSA will implement the revision and on any changes-planned or taken-to the safety control strategies of nuclear explosive facilities</p>	<p>9/7/2018</p>	<p>10/19/2018</p>

E. Departmental Participation in Public Hearings

In FY 2019, DOE participated the following public hearings held by the Board, pursuant to 42 U.S.C. Section 2286b(a).

DNFSB Public Hearings

Date	Topic	Location
11/28/2018	DNFSB's Second Public Hearing on the Department of Energy's Interface with the Defense Nuclear Facilities Safety Board	Defense Nuclear Facilities Safety Board Washington, DC
2/21/2019	DNFSB's Third Public Hearing on the Department of Energy's Interface with the Defense Nuclear Facilities Safety Board	Albuquerque, NM
6/20/2019	DNFSB's Public Hearing on Safety Management of Waste Storage and Processing in the Defense Nuclear Facilities Complex.	Defense Nuclear Facilities Safety Board Washington, DC

Appendix. Acronyms and Abbreviations

Board	Defense Nuclear Facilities Safety Board
C.F.R.	Code of Federal Regulations
ConOps	Conduct of Operations
Department	U.S. Department of Energy
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
DSA	Documented Safety Analysis
DST	Double-Shell Tank
EM	Office of Environmental Management
FY	Fiscal Year
Hanford	Hanford Site
HCAEX	H-Canyon Exhaust
IP	Implementation Plan
LANL	Los Alamos National Laboratory
MAR	Material at Risk
NA-50	NNSA Office of Safety, Infrastructure, and Operations
NES	Nuclear Explosive Safety
NNSA	National Nuclear Security Administration
NNSS	Nevada National Security Site
Pantex	Pantex Plant
PF-4	Plutonium Facility–Building 4
Secretary	Secretary of Energy
SRS	Savannah River Site
SRTE	Savannah River Tritium Enterprise
U.S.C.	United States Code
UPF	Uranium Processing Facility
WTP	Waste Treatment and Immobilization Plant
Y-12	Y-12 National Security Complex