U.S. DEPARTMENT OF ENERGY

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

Fiscal Year 2020

Report to Congress

July 2021

United States Department of Energy

Washington, DC 20585

Message from the Secretary

This is the U.S. Department of Energy (Department or DOE), including the National Nuclear Security Administration, Fiscal Year 2020 annual report to Congress addressing the activities related to the Defense Nuclear Facilities Safety Board (DNFSB or Board) and status of Implementation Plans in response to accepted Board recommendations, as required by Sections 316(b) of the Atomic Energy Act of 1954, as amended (AEA), codified at 42 United States Code §2286e(b) and Sections 315(g)(1) of the AEA, codified at 42 U.S.C. § 2286d(g)(1), respectively.

The Board serves a critical external oversight and advisory role to 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 safety protocols at the Department's defense nuclear facilities. We welcome the Board's advice, insights, and recommendations. Together, DOE and the Board fulfill a shared goal to ensure reasonable assurance of adequate protection of the DOE workforce and the public from operations conducted at the Department's defense nuclear facilities.

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

- **The Honorable Patrick Leahy**
  Chairman, Senate Committee on Appropriations

- **The Honorable Richard Shelby**
  Vice Chairman, Senate Committee on Appropriations

- **The Honorable Jack Reed**
  Chairman, Senate Committee on Armed Services

- **The Honorable James Inhofe**
  Ranking Member, Senate Committee on Armed Services

- **The Honorable Joe Manchin**
  Chairman, Senate Committee on Energy and Natural Resources

- **The Honorable John Barrasso**
  Ranking Member, Senate Committee on Energy and Natural Resources

- **The Honorable Rosa DeLauro**
  Chairwoman, 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 Mike Rogers**
  Ranking Member, House Committee on Armed Service

- **The Honorable Frank Pallone**
  Chairman, House Committee on Energy and Commerce

- **The Honorable Cathy McMorris Rodgers**
  Ranking Member, House 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. Ali Nouri, Assistant Secretary for Congressional and Intergovernmental Affairs, or Ms. Elizabeth Noll, Deputy Assistant Secretary for House Affairs, Office of Congressional and Intergovernmental Affairs, at (202) 586-5450.

Sincerely,

Jennifer Granholm

Executive Summary

This is the U.S. Department of Energy (Department or DOE), including the National Nuclear Security Administration (NNSA), annual report to Congress[1] regarding the Department's Fiscal Year (FY) 2020 activities related to the Defense Nuclear Facilities Safety Board (DNFSB or Board) and status of Implementation Plans (IPs) in response to accepted Board recommendations[2].

The policy of DOE is to ensure adequate protection and safety of workers, the public, and the environment during the design, construction, operation, and decommission of its nuclear facilities. This is implemented through of the Department's nuclear safety program comprised of a robust nuclear safety regulatory framework and multi-layered oversight by DOE line management and headquarters organizations. Nuclear safety oversight of DOE defense nuclear facilities is supplemented by the DNFSB, an independent executive branch agency established by Congress in 1988. The Board provides independent analysis, advice, and recommendations to the Secretary of Energy (Secretary) regarding the status and implementation of DOE nuclear safety programs designed to provide protection of DOE workers[3] and the public from operations conducted at the Department's defense nuclear facilities.

The DNFSB 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. This report provides information on notable interactions in FY 2020 including the coordination with the DNFSB on the development of a joint memorandum of understanding to address operational interface improvement opportunities between the two agencies, and participation in two public meetings to discuss the Department's actions to address DNFSB recommendations related to the Pantex Plant and Savannah River Site. Additional information regarding these and other interactions are detailed within the report.

In FY 2020, the Department completed all actions within the IPs associated with DNFSB Recommendations 2012-1, *Savannah River Site Building 235-F Safety* and 2012-2, *Hanford Tank Farms Flammable Gas Safety Strategy*. Progress continued with actions identified in the IP associated with Recommendation 2019-1, *Uncontrolled Hazard Scenarios and 10 C.F.R. 830 Implementation at the Pantex Plant.*

During FY 2020, the Department provided its final decision rejecting DNFSB Recommendation 2019-2, *Safety of the Savannah River Site Tritium Facilities,* and partially accepted DNFSB Recommendation 2020-1, *Nuclear Safety Requirements*.

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

[2] In accordance with Section 315(g)(1) of the AEA, codified at 42 U.S.C. § 2286d(g)(1).

[3] The National Defense Authorization Act for Fiscal Year 2020 modified the DNFSB mission to include health and safety of employees and contractors at DOE's defense nuclear facilities.

DEPARTMENT OF ENERGY ACTIVITIES RELATING TO THE DEFENSE NUCLEAR FACILITIES SAFETY BOARD FISCAL YEAR 2020

Table of Contents

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 (AEA), 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 Section 315(g)(1) of the AEA, codified at 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 report contains information regarding FY 2020 interface activities between DOE and the DNFSB, safety initiatives and activities at DOE defense nuclear facilities, and the status of DOE IPs that have not been completed to address accepted DNFSB recommendations.

The policy of DOE is to ensure adequate protection and safety of workers, the public, and the environment during the design, construction, operation, and decommission of its nuclear facilities. The Department protects its workers, the public, and the environment from nuclear hazards at its defense nuclear facilities through a rigorous and 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 line management and operating contractors, Federally managed field and headquarters Program Offices, the Office of Environment, Health, Safety, and Security, the Office of Enterprise Assessment, and Central Technical Authorities.

DOE Sites with Defense Nuclear Facilities

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

Oversight of DOE defense nuclear facilities is supplemented by the DNFSB. The DNFSB is an independent executive branch agency established by Congress in 1988 that provides advice and recommendations to the Secretary regarding the status and implementation of DOE nuclear safety programs designed to provide protection of workers[4] and the public 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, informational letters, public meetings, public hearings, briefings, discussions, and site visits. The DNFSB:

- 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 from defense nuclear facilities;
- Performs investigations of Departmental events and practices at defense nuclear facilities;
- Reviews the design and construction of new defense nuclear facilities; and
- Makes recommendations regarding nuclear safety at DOE defense nuclear facilities.

Within DOE, interactions with the DNFSB are governed by DOE Order 140.1A, *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 is available at: https://ehss.energy.gov/deprep/.

[4] The National Defense Authorization Act for Fiscal Year 2020 modified the DNFSB mission to include health and safety of employees and contractors at DOE's defense nuclear facilities.

III. Departmental Activities Related to the DNFSB

This section provides information regarding notable interface activities between DOE and the DNFSB at the Departmental, Program Office, and defense nuclear site levels. This section also provides information regarding DOE responses to DNFSB reporting requirements.

A. Departmental Interface Activities

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

On June 15, 2020, DOE issued revised Order 140.1A to align with changes to the DNFSB's enabling statute enacted by Congress in the FY 2020 National Defense Authorization Act. DOE shared the revised draft Order with the DNFSB in February 2020. On February 28, 2020, the DNFSB sent a letter to the Secretary, stating that the revision "satisfactorily resolves the statutory concerns" previously expressed by the Board. The DNFSB also stated its interest in establishing a bilateral memorandum of understanding for example, to address operational interface between the two agencies. In DOE's August 26, 2020, letter to the Board, the Deputy Secretary acknowledged the Board's letters (one in February and two in August 2020) and noted direction to DOE staff to coordinate with the DNFSB to develop a memorandum of understanding. In October 2020, DNFSB and DOE jointly developed and signed a working group charter to develop a joint memorandum of understanding.

The Senate Armed Services Committee report for the FY 2021 National Defense Authorization Act directed the DOE and DNFSB to provide a joint briefing to the Committees on Armed Services of the Senate and the House of Representatives concerning how the two agencies intend to come to a common understanding of DOE Order 140.1A and its implementation. DOE and the DNFSB conducted a joint Congressional briefing on October 29, 2020, highlighting the status and plans to develop a memorandum of understanding relating to DOE and DNFSB interface activities.

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

On February 11, 2019, the DNFSB provided draft Recommendation 2019-1, *Safety of the Savannah River Site Tritium Facilities,* to the Secretary regarding potential consequences of an energetic release caused by an accident at the Tritium Facilities. NNSA provided comments on the draft recommendation on April 10, 2019, stating that the points of concern had been or were already being addressed. Additionally, NNSA stated that responding to this recommendation would divert critical resources allocated to implement the improvements needed to ensure the safety of the workers and the public. The Board did not agree with the Department's response and on June 11, 2019, issued the recommendation to the Department as Recommendation 2019-2.

The Department re-evaluated the recommendation and on September 10, 2019, the NNSA Administrator responded, on behalf of the Secretary, to 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 to the public in the safe operation of the Savannah River Site Tritium Facilities; and that ongoing actions adequately addressed DNFSB concerns.

The Department concluded that the most efficient and effective way to improve safety at the Savannah River Site Tritium Facilities was to continue implementing the identified corrective actions.

On October 28, 2019, DOE and NNSA attended the DNFSB public meeting to discuss the basis for rejecting Recommendation 2019-2 and the actions completed, underway, or planned to ensure reasonable assurance of adequate protection of public health and safety at the Savannah River Site. On December 5, 2019, the Board reaffirmed Recommendation 2019-2, noting that the Board members believe that DOE's basis for rejecting Recommendation 2019-2 was a difference in judgment regarding what constitutes adequate protection. On January 3, 2020, the Department provided its final decision rejecting Recommendation 2019-2, noting that DOE and NNSA concluded that adequate protection was being provided to the public and the workers at the Savannah River Site Tritium Facilities, and that actions already in progress will address the concerns raised by the Board in this recommendation.

DNFSB Recommendation 2020-1: Nuclear Safety Requirements

On August 8, 2018, DOE published a Notice of Proposed Rulemaking for changes to Title 10 Code of Federal Regulations (C.F.R.) Part 830, *Nuclear Safety Management,* in the *Federal Register* (FR) (83 FR 38982). DOE held four public meetings to allow any interested persons the opportunity to speak on the proposed rule. The DNFSB submitted its comments through the FR and in a letter to the Secretary on October 5, 2018.

On October 16, 2019, the DNFSB provided draft Recommendation 2020-1 to the Secretary regarding the proposed changes to 10 C.F.R. Part 830 and other areas of DOE's nuclear safety framework. DOE provided comments on the draft recommendation on December 17, 2019, disagreeing with the DNFSB's assertion that the revisions proposed in 10 C.F.R. Part 830 would erode the Department's nuclear safety framework. The DNFSB issued Recommendation 2020-1 on February 21, 2020, that included 11 sub-recommendations grouped into four topical areas: (1) aging infrastructure; (2) hazard categories; (3) DOE approvals, and (4) safety basis process and requirements.

The Department evaluated the revised recommendation and on June 11, 2020, the Secretary responded that the Department partially accepted three of the sub-recommendations, in the areas of aging infrastructure and safety basis process and requirements. In a letter to the Secretary, dated September 25, 2020, the Board acknowledged that DOE would soon publish the final changes to 10 C.F.R. Part 830 and that the Board continues to review DOE's response to the recommendation. The final rule was published in the FR on October 19, 2020.

B. Program Office Interface Activities

Office of Environmental Management (EM)

Programmatic Nuclear Safety Activities

In FY 2020, the 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. Specific activities include:

- At the direction of the Secretary, participating in six peer reviews with the Office of Enterprise Assessments of DOE-wide assessments of procedures and practices for packaging and shipping radioactive waste;
- Supporting the revision of DOE Standard 5506, *Preparation of Safety Basis Documents for Transuranic (TRU) Waste Facilities*;
- Coordinating with both the EM and NNSA Los Alamos Field Offices to provide the required approval of the flanged tritium waste container contractor readiness assessment Plan of Action;
- Supporting the EM Idaho Operations Office fire protection exemption request to allow containers to be stored in Building CPP-691;
- Conducting field operational awareness visits and assessments, including a safety basis desk audit of EM facilities at the Los Alamos National Laboratory;
- Providing technical expertise and technical reviewers to support Office of Project Management project reviews at EM defense nuclear facilities;
- Providing support to the Federal Operational Readiness Review of the Savannah River Site Salt Waste Processing Facility; and
- Providing support to EM defense nuclear facilities in response to the COVID-19 pandemic.

Improvements in Radioactive Waste Operations Oversight

In response to the April 11, 2018, over-pressurized TRU waste drum event at the Idaho Cleanup Project Accelerated Retrieval Project V facility at the Idaho National Laboratory Site, DOE conducted an investigation and subsequently directed all radioactive waste generators to review their waste inventories and processes for similar situations (extent of condition). EM issued a Safety Alert on May 28, 2019, that included required and recommended actions to be taken at EM sites with waste conditions similar to that at the Idaho National Laboratory Site, including the presence of metal carbides and possible generation of flammable gases.

On September 4, 2019, DOE issued an Experience Level 2 document that requested waste management information from all sites. The Operating Experience Level 2 document contained similar (but not identical) required actions and recommendations as was contained in the earlier EM Safety Alert.

In FY 2020, DOE received responses from 12 EM sites and six NNSA sites with respect to the Safety Alert and the Operating Experience notice. The data was collated, analyzed, and the results were shared with the DNFSB in a letter, dated January 6, 2020. The information in the responses to the Safety Alert and Operating Experience Level 2 document support the following conclusions:

- Most sites sample or assess waste at the point of generation; however, there is a need to conduct flammable gas analysis that is limited to drums with an indication of waste characteristics that would be of concern;

- In some cases, sites address potential hazards (and reduce the need for testing) by installing vents to release gases and purge container headspace;
- Sites that more regularly test for flammable gases generally do so based on requirements derived directly from shipping restriction or waste acceptance criteria for disposal sites.

Additionally, the extent of condition review by the sites resulted in the identification of waste containers or waste streams that either had or have the potential to contain:

- Flammable gasses at or near the lower explosive limit;
- Metal carbides; or
- Other reactive mixtures.

During the analysis of the field data, EM determined that an independent review of the waste characteristics and implemented controls for these identified wastes was warranted. In July 2020, EM utilized its Difficult Waste Team, an independent review consortium comprised of recognized and experienced experts in the identified waste streams, to determine whether any further actions are warranted to ensure safe storage and handling of such waste up to the point of its eventual treatment. Outcomes from the team's activities and the final report that summarizes the team's conclusions will be shared with the DNFSB when complete.

National Nuclear Security Administration

Programmatic Nuclear Safety Activities

The NNSA Office of Safety, Infrastructure, and Operations took several actions during FY 2020 to improve technical expertise, operational excellence, performance culture and nuclear safety. Notable accomplishments include:

- Providing technical assistance to field offices to support the qualification of Facility Representatives and other staff through high quality training and other knowledge transfer activities;
- Continuing implementation of the NNSA Safety Roadmap, a strategic document providing direction for implementing initiatives designed to facilitate an effective and efficient safety oversight program integrated across NNSA safety professionals. Accomplishments completed during FY 2020 include:
    - Receiving accreditation of the NNSA Technical Qualification Program from the Deputy Secretary in September 2020; and
    - Continuing development of the Safety Analytics, Forecasting, and Evaluation Reporting Program. This program is progressing on schedule to develop a comprehensive, data driven analysis tool to significantly broaden the reach of safety professionals in their oversight function and provide fact-based analysis of emerging and existing risks;

- Monitoring and trending NNSA operations to identify and focus field and Headquarters assessment activities on those areas where the most significant improvements could be achieved;
- Continuing to host a bi-monthly safety conference calls with all field offices to provide a forum for discussions of current events and challenges, sharing of lessons learned and best practices, and communicating NNSA-wide concerns and initiatives; and
- Briefing the NNSA Principal Deputy Administrator throughout the year to keep senior leadership abreast of safety concerns, successful best practices, the highest safety risks within current operations, actions being taken to address those risks, and interactions with the DNFSB.

Improvements in Safety Oversight

In FY 2020, NNSA implemented a limited revision to Supplemental Directive 226.1C, *NNSA Site Governance*. The supplemental directive establishes the NNSA governance approach to assure effective mission performance and operational excellence. Additional activities include the continued support of:

- The Safety Basis Community of Practice, which is comprised of safety basis professionals throughout NNSA and other DOE sites who collaborate on challenges and improve consistency of safety basis process and analysis.
- The Conduct of Operations Working Group that evaluates work stop events and addresses improvements in conduct of operations throughout NNSA to improve human performance and to enhance safe mission execution. This working group is using the Toyota "A3" problem-solving methodology. The Toyota methodology involves the development of a problem statement, assessment of current conditions, and then the generation of countermeasures to address undesirable situations.
- The Safety Basis Review Team Project, which successfully executed safety basis document reviews and approvals throughout NNSA. This initiative enhanced lessons sharing, personnel development and improving safety analysis standards in NNSA.

C. Defense Nuclear Facilities Interface Activities

Hanford Site

Waste Treatment and Immobilization Plant

In FY 2020, the Department continued construction of the Hanford Site Waste Treatment and Immobilization Plant for the safe immobilization and disposition of underground storage tank waste. However, 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 to feed low-activity waste directly from tank farms to the Low-Activity Waste 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 (supernate) to begin no later than December 31, 2023.

On October 7, 2019, the DNFSB responded to the Department's December 10, 2018, letter regarding the resolution of issues related to the operability and safety of the site's electrical distribution system. The Board letter stated that DOE documented an adequate path forward on eight of the ten issues. DOE and DNFSB discussed the other two issues, which do not impact Direct-Feed Low-Activity Waste operations.

On November 18, 2019, the DNFSB responded to the Department's May 15, 2019, letter regarding the resolution of technical issues related to the control of Pulse-Jet Mixers. The DNFSB letter acknowledged resolution of the identified issues by DOE and noted that it strengthened the technical foundation for use of Pulse-Jet Mixers systems in black cells in the Pretreatment Facility.

On June 25, 2020, the DNFSB transmitted a letter to the Secretary regarding its concerns with the hazard categorization for the Low-Activity Waste Facility. The Department discussed the actions being taken to address these concerns with the DNFSB. These actions are in progress and are forecasted to be complete within the first quarter of FY 2021.

K Basins

Following completion of sludge removal from the 105K-West Basin in September 2019, decommissioning of the basin began in preparation of its planned dewatering and demolition in 2023. In FY 2020, the installation of the garnet filter removal system was completed in preparation for loading the garnet filter media into shipping casks and transporting by truck to the T-Plant for interim storage until it is treated and sent to the appropriate disposal facility. Activities continued to characterize the remaining debris in the basin for determination of the appropriate disposal path and developing specialized equipment to size reduce and remove high activity debris from the basin. In March 2020, work was paused when the Hanford Site transitioned to an appropriate safety posture due to the COVID-19 pandemic.

Building 324

In FY 2020, the 300-296 structural modifications and removal of legacy debris from Building 324 hot-cells continued. These actions will eventually enable the remote excavation of highly-contaminated soil from beneath the B Hot-Cell.

In November 2019, due to several personnel contamination events, work was paused inside radiological zones in the building, to conduct a holistic review of the process to include the strategy, risks, and controls necessary to remove highly radioactive soil from beneath the building. A root cause evaluation of the contamination events was performed and implementation of corrective actions began.

Resumption of work at Building 324 is scheduled to occur in stages, with lower-risk radiological activities resuming in December 2020 and higher-risk activities restarting in the spring of 2021. The staged resumption helps to ensure workers are protected as they proceed with this high-hazard project. In March 2020, project work was paused when the Hanford Site transitioned to an appropriate safety posture due to the COVID-19 pandemic.

Los Alamos National Laboratory

Plutonium Facility–Building 4 (PF-4)

In FY 2020, the 2018 PF-4 Documented Safety Analysis (DSA) was implemented. Formal implementation of this version of the DSA closes several legacy Conditions of Approval and comments from previous reviews. The revised DSA incorporates and consolidates other approved safety basis documents, effectively making the associated control set streamlined and user-friendly for operators and other facility personnel. This version of the DSA also reduces the allowable material-at-risk (MAR) and represents a significant improvement in the facility's overall safety management posture.

Full scale capital testing of PF-4 columns was completed in FY 2020 and the results demonstrate performance at greater than three times the design basis earthquake. The Phase 1 milestone of the ongoing non-linear dynamic analysis was also completed. The NNSA and contractor team, along with independent experts, are in the process of creating an interim risk analysis of PF-4 seismic performance to gain perspective on the results of the column testing. The interim risk analysis will examine the potential need for, and nature of, further structural upgrades to the facility.

Other analytical activities at PF-4 include:

- Completion of the first iteration of the fire suppression system seismic analysis and constructability reviews to determine where additional piping anchors or design iterations may be necessary to support installation.
- The design of the safety class Facility Control System replacement to support installation in 2023.
- The completion of seismic analysis for seven glovebox support stand clusters.
- Removing 66 Criticality Safety Evaluation documents from the backlog of Criticality Safety Evaluation documents needing to be updated and reducing the time to resolve open criticality safety infractions to less than one month as opposed to the over 12 months it took in FY 2018.

Physical safety improvements implemented at PF-4 include:

- Installing and putting into service two safety class diesel generators to support the fire suppression system (doubling the number of safety class firewater pumps);
- Replacing 37 fire doors throughout the laboratories and 59 fire doors in the laboratory attic spaces; and
- Refurbishing the trolley systems.

In FY 2020, the MAR inventory at PF-4 continued to be reduced. The last confinement vessel was moved from TA-55 to the Chemistry and Metallurgy Research Facility for remediation, and remediation of all vessels was completed. TRU waste continues to be transferred to the Transuranic Waste Facility; and the Radioassay and Nondestructive Testing Facility is fully operational to support waste shipments to the Waste Isolation Pilot Plant, enabling the NNSA and EM programs to reduce MAR at PF-4 and throughout the Los Alamos National Laboratory.

Transuranic Waste Facility

In FY 2020, the seismic power cut-off switches were replaced and the new switches put into service. This replacement safety class system was fully developed and verified by the Los Alamos National Laboratory and is being reviewed for use at other DOE sites as it meets all quality assurance requirements for a nuclear safety system.

The installation of the Transuranic Waste Facility safety significant fire suppression system (originally documented in the preliminary DSA) continued, procurement of parts is now complete, and the check valve on the pump discharge was physically removed. A pressure and flow test is scheduled for early in FY 2021 to verify the system can support its defined safety significant function.

A new non-destructive assay instrument was approved for use at the Transuranic Waste Facility for TRU waste containers to enhance TRU waste certification throughput for the Los Alamos National Laboratory.

Other Facilities

Readiness Review activities were conducted on the flanged tritium waste containers to support the planned transfer of the containers at Area G to the Weapons Engineering Tritium Facility for disposition.

A DSA for upgrading the Radiological Laboratory Utility Office Building facility to a Hazard Category 3 facility was submitted to NNSA to support MAR removal from the Chemistry and Metallurgy Research facility and to enable relocation of mission essential analytical chemistry capabilities.

Nevada National Security Site

Device Assembly Facility

Progress on the Device Assembly Facility ten-year seismic analysis update continued in FY 2020. The final soil properties/ground motions report used to provide input to the soil-structure interaction analysis was approved. The final soil-structure interaction analyses and generation of in-structure response spectra are scheduled for completion in FY 2021. Procurement of a subcontract to perform follow-on activities, including structural analysis and structure, system, and component evaluation, is scheduled to be established in FY 2021.

The Device Assembly Facility fire suppression system has undergone significant modifications to include replacement of the individual building lead–in lines and installation of a new domestic water line to separate the fire suppression system from the domestic water system. Provisions were completed in FY 2020 to provide a credited alternate source of water to the fire suppression system. The credited alternate source of water will support replacement of the facility water tank which is planned for early FY 2021.

Replacement of the uninterruptable power supply system is in progress and is scheduled for completion in mid–FY 2021. Until its completion, an alternate emergency lighting system for use in nuclear safety-related applications has been identified and approved for use.

U1a Complex

As a result of the December 19, 2018, DNFSB letter to the Secretary regarding controls in the DSA for the U1a Complex, an integrated project team was established to analyze alternatives to the existing device shipping container used to transport subcritical experiments to the U1a Complex. The alternative analysis was completed in FY 2019 and determined that a new transport container is needed. The new transport container will provide the desired level of protection from defined mechanical, thermal, and electrical hazards while allowing a reduction or elimination of several specific administrative controls. The integrated project team began a review of the new container's functional requirements. The review is scheduled to be completed by the end of the first quarter of FY 2021. Preliminary design and analysis of the container is scheduled to occur in the second quarter of FY 2021. The goal is to have the new compliant transport container available for use in FY 2024.

In FY 2020, a support subcontract for the U1a complex hoist system was established and awarded. The subcontract provides services, such as consulting, technical support, design, fabrication, and material procurements for all hoist systems, including the safety significant U1h hoist control system. In August 2020, the vendor evaluated the U1h hoist control system with plans to provide a recommendation for upgrading the system in October 2020. The upgrade is intended to resolve obsolescence issues while addressing concerns raised by the DNFSB related to DOE Standard 1195, *Design of Safety Significant Safety Instrumented Systems Used at DOE Nonreactor Nuclear Facilities*, as described in the DNFSB's May 13, 2020, letter to the Secretary.

In FY 2020, the safety significant U1a.03D and U1a.07 fire barrier dampers were determined to be undersized for all potential ventilation flow conditions and were subsequently replaced with properly sized units.

New containment plugs for sealing ventilation penetrations safety significant containment barriers were installed, providing defense-in-depth and preventing the unintended release of radioactive materials into the environment.

Pantex Plant

Nuclear Explosive Safety

On June 12, 2019, the DNFSB transmitted a letter to the Secretary regarding denial of access to participate in Pantex Plant nuclear explosive safety study activities; and on February 11, 2020, a DNFSB report was provided to Congress regarding the denial of access. On April 23, 2020, a letter from NNSA was transmitted to the DNFSB with clarifying expectations for allowing the DNFSB participation in all nuclear explosive safety review deliberations. The DNFSB responded in June 2020 and the matter was resolved.

Infrastructure

During FY 2020, the site established the Life Sustainment Program. To support the program, a safety strategy and implementation plan were issued in FY 2020 to establish a forum for key stakeholders to be engaged in identifying, prioritizing, and executing the necessary activities ensuring long-term safe operation of Pantex Plant facilities.

Electrical infrastructure improvements are ongoing along with scheduled outages to improve

reliability and availability of the electrical distribution system. Fourteen seismic repairs and upgrades for the plant were completed according to the overall milestone schedule. DNFSB reviewed project documentation and work completed and is engaged in review of future seismic upgrades.

Fire Protection

In FY 2020, the Pantex Plant life sustainment plan for fire protection upgrades continued. This plan identifies all needed fire protection upgrades to the fire protection systems, flame detection systems, and lead-in piping replacements to the high-pressure fire loop serving nuclear facilities. Building 12-96 fire protection upgrades were completed, including lead-in and immediate area loop piping replacements. The DNFSB reviewed the 12-96 High-Pressure Fire Loop Lead-In Project, and on August 6, 2020, sent a letter to Secretary that included a staff report regarding deficiencies in the quality assurance of the repairs. Fire suppression system upgrades at seven additional facilities, are ongoing with planned completion in the first half of FY 2021.

Federal staff continued monitoring unexpected electrical faults on the newly installed Det-Tronics flame detection systems. The information regarding the faults, including the status of the path forward is communicated weekly to the DNSFB.

Savannah River Site

Conduct of Operations

The DOE Savannah River Operations Office continues to monitor actions to improve implementation of the Technical Safety Requirements, focusing on Conduct of Operations, through daily oversight by the DOE Savannah River Operations Office Facility Representatives and by targeted assessment activities. Compliance with Technical Safety Requirements has improved significantly as a result of contractor implementation of major improvements in its programs since 2017. The improvements are a response to correspondence from the DOE Savannah River Operations Office in 2017 to the Management and Operations and Liquid Waste contractors directing upgrades to their implementation programs. DOE's focus in this area has resulted in an outstanding run of 511 days without a Technical Safety Requirements violation, the majority of which occurred during FY 2020.

DOE Savannah River Operations Office has not identified any other significant Conduct of Operations trends. DOE and the contractor's management have taken actions to increase field presence and capitalize on opportunities to improve focus as part of continuous improvement actions.

H-Canyon Exhaust (HCAEX) Tunnel

As part of ongoing discussions initiated in 2015, DOE received a letter from the DNFSB on December 7, 2018, noting the Board's concerns regarding the ability of the HCAEX system to perform its safety class functions following a seismic event. DOE has explained that the HCAEX provides normal facility ventilation and was formally credited to filter out radionuclides in the event of a design basis seismic event. From November 2017 to March 2020, H-Canyon operated under a Justification for Continued Operation with a restricted radionuclide inventory

and additional administrative controls due to degradation observed in the underground concrete duct. The Justification for Continued Operation allowed compliance with DOE standards for postulated dose consequences to the public and workers.

During FY 2020, DOE approved a revision to the accident analysis in which seismic qualification was demonstrated for the H-Canyon vessels, jumpers and connectors thus allowing these to be credited as safety class structures, systems, and components. In combination with revised, right-sized MAR limits, the revised accident analysis relieves the HCAEX system from having to be safety class for a seismic event. Although seismic qualification of the HCAEX is no longer required to protect the public, a structural non-linear analysis of the HCAEX tunnel was completed in FY 2020. The analysis demonstrated that the degraded concrete can withstand the analyzed earthquake (Performance Category 3) and that the concrete duct is a seismically qualified structure.

Salt Waste Processing Facility

In FY 2020, independent contractor and Federal Operational Readiness Reviews were completed to ensure that the Salt Waste Processing Facility could be safely operated. Following these reviews, all issues identified affecting the safe operation of the facility were corrected. The DNFSB observed the Operational Readiness Reviews and did not communicate any safety issues.

The Salt Waste Processing Facility Project received approval to initiate Hot Commissioning on August 17, 2020, with the Deputy Secretary of Energy signing the Critical Decision 4. The start-up of this facility is the last major piece of the Savannah River Site liquid waste treatment system allowing for increased processing rates and accelerating closure of the remaining 43 waste storage tanks.

Tritium Facilities

In FY 2020, the DNFSB showed considerable interest in the accident analysis for co-located worker doses postulated by accidents from the Tritium Facilities. The Tritium Facilities' postulated dose consequences exceed the 100 rem onsite evaluation criteria specified in DOE Standard 1189-2008, *Integration of Safety Into the Design Process*, for a co-located worker at 100 meters. The dose consequences are conservatively analyzed to release 100 percent of the MAR in the worst-case form, i.e., tritium oxide.

In FY 2018, a Co-located Worker Risk Reduction Strategy, including a plan of action and milestones, was developed. The strategy is updated every year. The milestones were further refined into discrete schedule activities. In FY 2020, a Specific Administrative Control "Tritium Facilities Inventory Controls" was incorporated into the Tritium Facilities Safety Basis upgrade. The safety function of the Tritium Facilities Inventory Controls Program is to limit the MAR in each tritium facility and selected locations. This Specific Administrative Control is part of a future DSA update, however, it was brought forward and implemented earlier to reduce potential co-located worker exposures in postulated, worst-case accident scenario analyses. By the end of FY 2020, nine of the original 19 milestone items were completed. Progress continues to address the remaining milestones despite the impact of the COVID-19 pandemic

on site operations. Discussions continue to be held with the DNFSB on a monthly basis on the status of work activities and project schedules.

DOE participated in the DNFSB public meeting held on October 28, 2019, to discuss the safety posture of the Tritium Facilities (see subsection A). A follow-up DNFSB public hearing scheduled for March 2020 was postponed due to COVID-19. In July 2020, the DNFSB shared a review agenda covering the Tritium Finishing Facility safety basis. Facility contractor and Federal staff interacted with the DNFSB and responded to the agenda lines of inquiry in October 2020.

Y-12 National Security Complex

Deteriorating Infrastructure

Y-12 made significant progress towards reducing mission dependency on Building 9212 and cleaning out the facility. Additionally, significant progress continued toward implementing the Y-12 National Security Complex Extended Life Program (ELP) required to sustain safe enriched uranium mission operations in Buildings 9215, 9204- 2E, and 9995. The ELP consists of two major elements: (1) the ELP IP and (2) the ELP Safety Strategy. The ELP IP identifies and prioritizes required facility sustainment activities while providing the necessary details to support funding and scheduling requirements. In concert with the ELP IP, the ELP Safety Strategy focuses on identifying and addressing the gaps between the existing facilities and modern regulatory codes and standards providing data to identify and address nuclear safety risks. The extended life of these facilities relies on continued efforts to remove MAR and the continuation of a strong maintenance, repair and replacement program. Accomplishments during FY 2020 include:

- Removal of several metric tons of uranium from legacy facilities;
- Upgrading electrical equipment in Buildings 9204-2E and 9215 (90% complete);
- Isolation of six out-of-service systems in Building 9212 and continued disposition of significant non-equity waste materials and low-equity uranium bearing inventories.

The Board noted in DNFSB Recommendation 2020-1 that DOE's efforts to address aging infrastructure at Y-12 were creditable.

Highly Enriched Uranium Materials Facility

On June 1, 2020, the DNFSB transmitted a letter to the Secretary regarding the storage of select materials at the Highly Enriched Uranium Materials Facility and requested a briefing addressing their concerns. The letter noted that while Highly Enriched Uranium Materials Facility is a modern robust storage facility that provides multiple rigorous safety controls, there were three concerns with the safe storage for these materials: worker protection, due diligence, and disposition. On August 25, 2020, Federal and contractor staff briefed the Board regarding the controls that are in place for the safety of workers and stored materials in the Highly Enriched Uranium Materials Facility, the establishment of container/characterization programs leveraging disposition activities to ensure safety, and funded programs to disposition 80 percent of materials of concern by 2024. The Board acknowledged that the brief addressed its concerns.

Uranium Processing Facility

Construction significantly progressed in FY 2020 for all Uranium Processing Facility process facilities. The Salvage and Accountability Building structural steel work was completed, and the concrete wall installation was completed through the second deck of the Main Process Building. Fabrication continued for process equipment and gloveboxes. Several of the process tank skids were delivered and installed. There were no DNFSB concerns or open items associated with the Uranium Processing Facility Project. The DNFSB's FY 2020 planned assessment of the Safety Detection and Response System was deferred due to COVID-19-related travel restrictions.

In December 2019, the DNFSB conducted an outbrief of its oversight review of the Uranium Processing Facility Quality Assurance Program during construction and during a sampling of glovebox fabricators shops. The outbrief identified no issues. The review of the fabrication of Uranium Processing Facility gloveboxes was conducted at: Premier Technology (main casting glovebox line); Petersen (oxide material production centrifuge glovebox, receipt and packaging glovebox, and oxide material production /special material production main glovebox lines); and Teledyne Brown Engineering (furnace loading glovebox and microwave casting). In FY 2020, the DNFSB provided a verbal outbrief of its review of site construction quality assurance, noting that it did not identify any issues.

Waste Isolation Pilot Plant

Safety System Confinement Ventilation System (SSCVS)

On August 27, 2019, the DNFSB sent a letter to the Secretary outlining three safety items and two observations related to the SSCVS final design. The first safety item stated that the 60-second closure time of isolation dampers was too long to prevent an unfiltered radiological release to the atmosphere. The Board's letter indicated that contaminated air has the potential to reach the surface in less than 60 seconds (41 seconds in one example calculation). The second safety item pertained to the lack of interlocks between SSCVS fans and (future) utility shaft fans to prevent potential up-casting of contaminated air. The third safety item was related to how the locations and set points of the underground continuous air monitors were selected. The observations related to continuous air monitor performance criteria and redundancy.

On December 20, 2019, DOE responded to the DNFSB's letter. In response to the first safety item, DOE indicated that dampers have the capability to close in 30 seconds or less. In response to the second safety item, DOE committed to provide a safety designation and install the interlock before utility shaft fans start operation. In response to the third safety item, DOE committed to include information on how the locations and set points of the underground continuous air monitors were determined when the safety basis is revised prior to startup of the SSCVS. For the observations, DOE responded that the continuous air monitor design will account for degradation due to environmental factors and that the objective of the redundant controls of the radiation detection system will be to maximize the probability of detection.

The Department also committed to brief the Board on these topics. DOE subsequently briefed the Board on February 14, 2020, indicating that the WIPP contractor would conduct an underground air flow analysis to assess the locations of continuous air monitors required to

ensure adequate performance of the radiological release detection system. This action will be performed upon completion of construction of the SSCVS, but prior to it entering service.

WIPP DSA - Revision 6a

On May 29, 2020, the DNFSB sent a letter to the Secretary identifying areas for improvement regarding WIPP DSA Revision 6a. DOE directed the WIPP contractor to take actions to address the concerns identified. The contractor issued a management self-assessment, MSA-ENG-2020-014, which addressed safety basis technical justification rigor and identified corrective actions. The management self-assessment was provided to the DNFSB on September 15, 2020. The contractor continues to implement the corrective actions identified in the management self-assessment.

Safety Significant Controls

In October 2019, a failure of an output card rendered the safety instrumented alarm system inoperable for almost four weeks. In response to discussions between the Carlsbad Field Office (CBFO) and the DNFSB in February 2020, CBFO provided more complete and detailed responses to 27 lines of inquiry generated by the DNFSB in mid-2019 citing the contractor's lack of consolidated and appropriate corrective action response to address the causal factors for many functional work areas involving safety instrumented alarm system deficiencies. An internal independent CBFO team conducted a full-scale assessment and extent of condition review, which lead to additional findings in 11 areas. The DNFSB was initially briefed on preliminary results of the assessment in April 2020; and was provided a management level briefing in September 2020 after completion of the field work. Issuance of the final report is expected in early FY 2021.

Underground Ventilation Filtration System/Interim Ventilation System

In April 2020, the contractor evaluated a potential inadequacy in the DSA related to the clogging of high efficiency particulate air filters in the safety significant underground ventilation filtration system/interim ventilation system. The potential inadequacy was related to a scenario that involves vehicle tires burning during a liquid fuel pool fire. The DNFSB reviewed the potential inadequacy evaluation and discussed that the safety analysis was missing the technical basis for why soot generated from tires did not impact the control selection. The WIPP contractor agreed and revised the evaluation for the potential inadequacy in the DSA, re-analyzed the contribution of soot from burning tires, and revised the technical basis accordingly.

Waste Management

In January 2020, during the WIPP contractor's processing of a waste shipment from the Idaho National Laboratory Site, workers noticed a small potential puncture in the side of the ten drum overpack (TDOP) waste container and halted work. The WIPP Facility Shift Manager entered Limiting Condition of Operation 3.7.1-Condition B, which requires action to disposition the potential puncture in the TDOP within 48 hours. A radiological survey was performed and did not detect contamination outside of the TDOP. The TDOP was then placed back into the TRUPACT-II shipping package. The Facility Shift Manager entered Limiting Condition of

Operation 3.7.1-Condition F, requiring preparation and implementation of an approved Response Plan within 10 days. CBFO approved the Response Plan in late January, and the contractor implemented the specified interim controls. In early February 2020, CBFO notified the DNFSB that the TDOP was declared safe, no repairs were required, and that the Facility Shift Manager was exiting Limiting Condition of Operation 3.7.1-Condition F. The DNFSB did not raise any concerns at the time.

D. Response to Board Reporting Requirements

In FY 2020, DOE completed actions in compliance with the reporting requirements, pursuant to 42 U.S.C. Section 2286b(d), listed in the following tables.

FY 2020 DOE Response to DNFSB Reporting Requirements

Reporting Requirements	Date of Board Letter	Date Completed or Status
DOE to provide the annual metrics table and briefing on the Department's Nuclear Criticality Safety Program.	1/29/2008 Revised 2/26/2016	Response: 1/15/2020 Briefing: 4/28/2020
Reporting requirement for a copy of DOE's evaluation of whether or not the Savannah River Site 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	12/30/2019
A response plan to address safety issues with the safety significant confinement ventilation system at the Waste Isolation Pilot Plant.	8/27/2019	12/20/2019
A revised response to questions regarding the waste drums over-pressurization at the Idaho National Laboratory Site.	10/18/2019	1/6/2020
DOE confirmation to provide a briefing addressing DOE's IP for Recommendation 2019-1, *Uncontrolled Hazard Scenarios and 10 C.F.R. 830 Implementation at the Pantex Plant*.	10/28/2019	12/12/2019
A briefing regarding the NNSA strategy for ensuring safety systems at the Los Alamos National Laboratory Plutonium Facility will be upgraded and the approach for addressing the weaknesses in the safety basis.	11/15/2019	2/7/2020
A briefing, including analysis or supporting data, to describe NNSA's strategy for safe storage of materials at the Y-12 National Security Complex Highly Enriched Uranium Materials Facility.	6/1/2020	8/25/2020
A report outlining how NNSA plans to ensure that construction projects at the Pantex Plant's nuclear facilities correctly identify safety basis controls and invoke quality assurance requirements commensurate with a project's importance to safety.	8/6/2020	Due: November 2020

IV. Status of DOE Implementation Plans

A. Overview

The Board issues recommendations to the Secretary, via letter and publication in the FR, regarding measures it feels that the Department should adopt to ensure adequate protection of Departmental workers and the public from activities conducted at DOE defense nuclear facilities. By law, the Secretary is required to accept or reject, in whole or in part, the Board recommendation within 45 days of its publication in the FR unless granted an extension by the Board. If the Secretary accepts all or part of the recommendation, an 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, or additional time may be permitted upon notice of the need for additional time sent to Congress and the Board.

The Secretary is required to complete the items in 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 nuclear safety issues generally require more than one year for completion.

Board recommendations, 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/deprep/.

B. Implementation Plans Completed in FY 2020

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

On May 9, 2012, the Board issued Recommendation 2012-1 regarding the facility safety and 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. In November 2014, the Department revised the IP to modify the schedule for the actions and deliverables.

In the spring of 2019, DOE completed MAR 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 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 its independent evaluation of the fire analysis for Building 235-F in December 2019. 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. Based on this information, a revised IP was developed. DOE briefed the DNFSB in December 2019 regarding the revised strategy and issued a second revised IP on June 3, 2020. The Department

completed all actions in the revised IP and the Secretary formally signed-off on the completion in June 2020.

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

The Board issued Recommendation 2012-2 on September 28, 2012, noting that operations at the Hanford Site Tank Farms required safety significant active ventilation of double-shell tanks 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 the recommendation on January 7, 2013 and transmitted the IP to the DNFSB on June 6, 2013. On March 24, 2016, the Department provided the DNFSB with a revised IP that described a more efficient approach for the deployment of safety significant exhauster 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.

On November 25, 2019, DOE notified the DNFSB that all actions in the IP had been completed. On July 15, 2020, the Board sent a letter to the Secretary noting that DOE's actions resulted in tangible safety improvements providing adequate protection of the public and workers at the Hanford site.

C. Implementation Plans In Process

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. The Department accepted the recommendation on April 16, 2019; and transmitted the Department's IP to the Board on July 16, 2019.

During a public meeting conducted by the Board on December 12, 2019, NNSA committed to revise the IP based on feedback received from the Board. Revision 1 of the IP was transmitted to the DNFSB on June 5, 2020. In August 2020, NNSA provided an informal Board briefing to discuss the status of IP actions. The Board appreciated the positive interaction with NNSA and the progress that had been made to complete the IP. In September 2020, the Board sent a letter to the Secretary noting the positive progress on IP actions.

By the end of FY 2020, 46 of the 69 improvement actions identified in Revision 1 of the Department's IP were completed. The remaining actions are on schedule to be completed by the end of FY 2023.

Appendix. Acronyms and Abbreviations

AEA	Atomic Energy Act of 1954, as amended
Board	Defense Nuclear Facilities Safety Board
CBFO	Carlsbad Field Office
C.F.R.	Code of Federal Regulations
Department	U.S. Department of Energy
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
DSA	Documented Safety Analysis
ELP	Extended Life Program
EM	Office of Environmental Management
FR	Federal Register
FY	Fiscal Year
HCAEX	H-Canyon Exhaust
IP	Implementation Plan
MAR	Material at Risk
NNSA	National Nuclear Security Administration
PF-4	Plutonium Facility–Building 4
Secretary	Secretary of Energy
SSCVS	Safety System Confinement Ventilation System
TDOP	Ten Drum Overpack
TRU	Transuranic
U.S.C.	United States Code
Y-12	Y-12 National Security Complex