U.S. DEPARTMENT OF ENERGY

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

Fiscal Year 2022

Report to Congress

March 2023

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, Fiscal Year 2022 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 Section 316(b) of the Atomic Energy Act of 1954, as amended (AEA), codified at 42 United States Code (USC) §2286e(b) and Section 315(g)(1) of the AEA, codified at 42 USC § 2286d(g)(1).

The Board provides oversight and advice to the Secretary of Energy regarding the safety of the Department's defense nuclear facilities. The DNFSB's 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 Department's defense nuclear safety posture. We welcome the Board's advice, insights, and recommendations. Together, DOE and the DNFSB fulfill a shared goal to provide 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 Patty Murray**
  Chair, Senate Committee on Appropriations
- **The Honorable Susan Collins**
  Vice Chair, Senate Committee on Appropriations
- **The Honorable Jack Reed**
  Chairman, Senate Committee on Armed Services
- **The Honorable Roger Wicker**
  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 Kay Granger**
  Chairwoman, House Committee on Appropriations
- **The Honorable Rosa DeLauro**
  Ranking Member, House Committee on Appropriations
- **The Honorable Mike Rogers**
  Chairman, House Committee on Armed Services

- **The Honorable Adam Smith**
  Ranking Member, House Committee on Armed Services
- **The Honorable Cathy McMorris Rodgers**
  Chair, House Committee on Energy and Commerce
- **The Honorable Frank Pallone**
  Ranking Member, House Committee on Energy and Commerce

If you have any questions or need additional information, please contact Ms. Katie Donley, Director, Office of Budget, Office of the Chief Financial Officer, at (202) 586-0176; or Ms. Rebecca Ward, Deputy Assistant Secretary for Senate Affairs, or Ms. Janie Thompson, 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's (Department or DOE), including the National Nuclear Security Administration, annual report to Congress[1] regarding the Department's Fiscal Year (FY) 2022 activities related to the Defense Nuclear Facilities Safety Board (DNFSB or Board) and status of Implementation Plans in response to accepted Board recommendations.[2]

It is the policy of DOE to provide reasonable assurance of adequate protection and safety of workers, the public, and the environment during the design, construction, operation, and decommissioning of its defense nuclear facilities (DNFs). This policy is implemented through the Department's nuclear safety program, which is comprised of a robust nuclear safety regulatory framework and multi-layered oversight by DOE line management and headquarters organizations. Oversight of DOE DNFs is supplemented by the DNFSB, an independent executive branch agency established by Congress in 1988, that provides analysis, advice, and recommendations to the Secretary of Energy regarding safety at DOE DNFs.

In FY 2022, DOE:

- Provided over 3,400 documents to the DNFSB in response to 236 requests for information.
- Participated in 16 meetings or briefings with the Board.
- Completed responses to 8 of 19 Board reporting requirements. The remaining 11 responses are projected to be completed in FY 2023.

Other notable interactions included:

- The establishment of a joint Memorandum of Understanding and a Supplementary Agreement between the two agencies to improve agency-to-agency communication, transparency, and information sharing as well as operational and interface efficiencies.
- Preparation for a DNFSB public hearing regarding Los Alamos National Laboratory activities.

Additional information regarding these and other interactions are detailed within the report.

As of the end of FY 2022, the status of open DOE Implementation Plans (IPs) developed in response to accepted Board recommendations is as follows:

- Recommendation 2019-1, *Uncontrolled Hazard Scenarios and 10 CFR 830 Implementation at the Pantex Plant.* Sixty-four of 69 IP actions have been completed. The remaining actions are scheduled to be completed by the end of FY 2023.
- Recommendation 2020-1, *Nuclear Safety Requirements.* DOE transmitted the IP to the DNFSB on June 27, 2022. The IP contains 17 milestones that are scheduled to be completed by the end of FY 2025.

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

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

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

FISCAL YEAR 2022

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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 (USC) § 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 USC § 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 of Energy 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 fiscal year (FY) 2022 activities between the U.S. Department of Energy, including the National Nuclear Security Administration (NNSA or NA), and the Defense Nuclear Facility Safety Board, on safety initiatives and activities at DOE defense nuclear facilities, and the status of open DOE implementation plans developed in response to DNFSB recommendations accepted by the Secretary of Energy (Secretary).

Section 318 of the Atomic Energy Act of 1954, as amended, codified at 42 USC § 2286g, defines a DNF as:

(1) A production facility or utilization facility (as defined in 42 USC §2014 [§ 11 of the AEA]) that is under the control or jurisdiction of the Secretary of Energy and that is operated for national security purposes, but the term does not include:

   (a) Any facility or activity covered by Executive Order No. 12344, dated February 1, 1982 [50 USC § 2511 note], pertaining to the Naval nuclear propulsion program;

   (b) Any facility or activity involved with the transportation of nuclear explosives or nuclear material;

(c) Any facility that does not conduct atomic energy defense activities; or

(d) Any facility owned by the United States Enrichment Corporation.

(2) A nuclear waste storage facility under the control or jurisdiction of the Secretary of Energy, but the term does not include a facility developed pursuant to the Nuclear Waste Policy Act of 1982 (42 USC 10101 et seq.) and licensed by the Nuclear Regulatory Commission.

DOE Sites with Defense Nuclear Facilities

Site		Location	DOE Program Office Responsible for DNFs*
Name	Acronym or Abbreviation		
Hanford Site	Hanford	Washington	EM, SC
Idaho National Laboratory Site	INL Site	Idaho	EM
Lawrence Livermore National Laboratory	LLNL	California	NA
Los Alamos National Laboratory	LANL	New Mexico	NA, EM
Nevada National Security Site	NNSS	Nevada	NA
Oak Ridge National Laboratory	ORNL	Tennessee	EM
Pantex Plant	Pantex	Texas	NA
Sandia National Laboratories – New Mexico	SNL-NM	New Mexico	NA
Savannah River Site	SRS	South Carolina	NA, EM
Waste Isolation Pilot Plant	WIPP	New Mexico	EM
Y-12 National Security Complex	Y-12	Tennessee	NA

*** EM = Office of Environmental Management; NA = National Nuclear Security Administration; SC = Office of Science**

It is the policy of DOE to provide reasonable assurance of adequate protection and safety of workers, the public, and the environment during the design, construction, operation, and decommission of its DNFs. The Department protects its workers, the public, and the environment from hazards associated with its DNFs through a rigorous and proactive nuclear safety program that is comprised of a robust nuclear safety regulatory framework of Federal Regulations, DOE directives (i.e., Notices, Policies, Orders, Manuals, and Guides) and technical standards (STDs), and multi-layered oversight by DOE line management, management and operating contractors, Federally managed field and headquarters Program Offices, the Office of Environment, Health, Safety, and Security, the Office of Enterprise Assessments, and Central Technical Authorities.

Oversight of DOE DNFs is supplemented by the DNFSB. 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[3] and the public from operations conducted at DOE DNFs. 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 DOE standards and directives relating to the design, construction, operation, and decommissioning of DOE DNFs.
- Performs analyses of design and operational data from DOE DNFs.
- Performs investigations of safety-related practices, incidents, and accidents at DOE DNFs.
- Reviews the design and construction of new DOE DNFs.
- Makes recommendations regarding safety at DOE DNFs.

Within DOE, interactions with DNFSB are governed by DOE Order 140.1A, *Interface with the Defense Nuclear Facilities Safety Board*, issued June 15, 2020, that emphasizes DOE line management accountability and establishes clear requirements and responsibilities for DOE Federal and contractor staff when communicating and/or interfacing with DNFSB. Additionally, a joint Memorandum of Understanding was implemented on February 17, 2022, to improve agency-to-agency communication, transparency, and information sharing. Additional information regarding Departmental interactions with DNFSB is available at: https://ehss.energy.gov/deprep/.

III. Departmental Activities Related to the DNFSB

This section provides information regarding notable activities between DOE and DNFSB and other information related to nuclear safety at DOE DNFs. This section also provides information regarding responses to Board requests for information, meetings, and briefings between the two agencies, and the status of reporting requirements.

A. Departmental Activities

DOE-DNFSB Memorandum of Understanding

The DOE Deputy Secretary and the Board Chair signed a joint Memorandum of Understanding that became effective on February 17, 2022, and provides a foundation to improve agency-to-agency communication, transparency and information sharing, and operational and interface efficiencies. On June 1, 2022, DOE and DNFSB jointly issued a Supplementary Agreement to facilitate staff-to-staff interface.

DNFSB Public Hearing regarding Los Alamos National Laboratory Activities

On August 11, 2022, the Board transmitted a letter to the Secretary inviting the Department to provide testimony on November 16, 2022, at a public hearing regarding the legacy cleanup,

[3] Public Law 116-92, the National Defense Authorization Act for Fiscal Year 2020, § 3202, modified the DNFSB mission to include health and safety of employees and contractors at DOE's DNFs.

nuclear safety, and increased production activities at LANL. DOE met with DNFSB in September 2022, to provide technical information and to discuss hearing topics.

B. Program Office Activities

Office of Environmental Management

Programmatic Nuclear Safety Activities

In FY 2022, 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 EM nuclear operations. Specific activities included:

- Conducting training on the revised DOE-STD-5506-2021, *Preparation of Safety Basis Documents for Transuranic (TRU) Waste Facilities*, at SRS and Hanford. (See below for additional detail.)
- Continuing coordination with NNSA on implementing measures to improve management of TRU waste at LANL in response to DNFSB letter, dated September 24, 2020, and associated DNFSB Technical Report 46, *Potential Energetic Chemical Reaction Events Involving Transuranic Waste at Los Alamos National Laboratory*.
- Continuing to evaluate the data within the *Independent Review of Generator Responses to the U.S. Department of Energy Headquarters Regarding Potentially Reactive Waste* report to develop programmatic improvements at EM sites, as appropriate.
- Continuing to conduct an independent EM Headquarters virtual review of the implementation of DOE-STD-1027-2018, *Hazard Categorization of DOE Nuclear Facilities*, at EM sites.
- Continuing to provide technical expertise and support to Field Office review of the revised LANL Area G safety basis documents.
- Continuing to support the Federal Readiness Review of the Idaho Cleanup Project Integrated Waste Treatment Unit facility.
- Providing support to the ORNL Building 2026 Federal Operational Readiness Review Initial Processing Campaign.

DOE-STD-5506-2021, Preparation of Safety Basis Documents for Transuranic (TRU) Waste Facilities

The revised DOE-STD-5506-2021 was published in August 2021. EM held two training classes at SRS in July 2022, and two training classes at Hanford in August 2022. Classes were well attended and included DNFSB staff participation. Additional classes are planned in FY 2023 in Albuquerque, NM; Salt Lake City, UT; Oak Ridge, TN; Idaho Falls, ID; and Cincinnati, OH.

National Nuclear Security Administration

Programmatic Nuclear Safety Activities

The NNSA Office of Safety, Infrastructure, and Operations continued to work toward improving technical expertise, operational excellence, performance culture and nuclear safety. Notable activities included:

- Obtaining a combined DOE Laboratory Accreditation Program certification in March 2022, allowing Y-12 to process thermoluminescent dosimeters for Y-12 and Pantex.
- Supporting safety basis reviews, such as the reviews of the Y-12 Uranium Process Facility documented safety analysis (DSA) and technical safety requirement (TSR) documents and supporting the LANL Plutonium Facility–Building 4 DSA update.
- Encouraging the implementation of DOE-STD-5506-2021, where applicable. Sites initiated evaluations of the potential impacts of implementing the standard.
- Conducting nuclear explosive safety evaluations at applicable nuclear production sites. DNFSB was invited and participated in these evaluations.
- Collaborating with Field Offices, design laboratories, and DNFSB to achieve concurrence on proposed changes to DOE-NA-STD-3016-2018, *Hazard Analysis Reports for Nuclear Explosive Operations*. The changes are intended to maintain the safety of nuclear explosive operations, provide additional operational flexibility, and better align with the requirements and guidance of DOE-STD-3009-2014, *Preparation of Nonreactor Nuclear Facility Documented Safety Analysis*.
- Continuing to improve Facility Representatives, safety professionals, and other technical staff professional competence through high quality and position-specific training, mentoring, and other learning activities supporting qualification to Federal Technical Capabilities requirements.
- Continuing the implementation of the NNSA Safety Roadmap, a strategic plan providing direction for implementing initiatives designed to facilitate an effective and efficient safety oversight program.
- Continuing to host bi-monthly safety conference calls with Field Offices to provide a forum for discussion of current events and challenges, sharing of lessons learned and best practices, and communicating NNSA-wide concerns and initiatives.

Improvements in Safety Oversight

In FY 2022, NNSA continued work to enhance the “One-NNSA” governance model, focusing on improvements to integrate activities between the Headquarters and Field Office oversight. A few improvements are highlighted below.

- Established monthly meetings between Headquarters and Field Offices to ensure Field Offices are properly resourced to support their NNSA Site Integrated Assessment Program schedule.

- Developed and provided training on conducting and documenting performance-based oversight as part of the Biennial Review processes.
- Increased participation of Energy Facility Contractors Group representation into the NNSA Conduct of Operations Working Group, to collaboratively address enterprise and site-level issues. The Conduct of Operations Working Group continues to address metrics associated with evaluating disciplined operations of the contractor's performance evaluation process.
- Supported and participated in a Subterranean Operations – Safety and Oversight Integrated Project Team with the Office of Environment, Health, Safety, and Security, EM, and SC to review and develop improvements to DOE directives and regulations that pertain to DOE underground operations.

C. Site-Specific Activities

Hanford Site

Waste Treatment and Immobilization Plant

In FY 2022, the Department began commissioning activities for the Low Activity Waste Facility, Balance of Facilities, and Analytical Laboratory, collectively known as the Direct-Feed Low-Activity Waste Facilities. These facilities support feeding Hanford Tank Farms liquid waste directly to the Low Activity Waste Facility to create a stable waste form for disposal. The first significant commissioning test, the loss of offsite power test, was completed in October 2021. Final preparations for the Low Activity Waste Facility Melter 1 heat-up tests were performed in FY 2022. Melter 1 heat-up is scheduled to be conducted in FY 2023.

On July 19, 2022, the Board transmitted a letter to the Secretary regarding its review of a revised preliminary DSA for the High-Level Waste Facility. The Board noted that while the Department has made progress in resolving some long-standing technical issues, the hydrogen control strategy for process vessels was not fully defined. The Department will continue to develop the hydrogen control strategy in future preliminary DSA revisions.

Central Waste Complex

On November 16, 2021, the Board transmitted a letter to the Secretary documenting the results of the DNFSB November 2020 safety basis review of the Central Waste Complex. The letter identified several weaknesses and areas for improvement in the DSA and TSR documents. The Department is addressing the issues identified in the Board's letter as part of an ongoing update to the DSA and TSR.

242-A Evaporator Facility

In FY 2022, discussions with the Board continued regarding the need to revise commitments made by DOE in its August 28, 2014, response to a June 18, 2014, Board letter with a reporting requirement related to the 242-A Evaporator Facility safety basis. The Department's commitments were related to: (1) a fire-related vulnerability of safety-significant solenoid valves located in the condenser room, and (2) the adequacy of programmatic administrative controls for seismic shutdown. On July 19, 2022, the Board transmitted a letter to the

Secretary with a reporting requirement for a briefing regarding its concerns with the Department's proposed revisions to the 2014 commitments. A briefing with the Board is scheduled for October 2022 to address the Board's concerns.

Tank-Side Cesium Removal System

In FY 2022, DNFSB initiated discussions with DOE regarding the results of the Department's October 2021 readiness assessment of the Tank-Side Cesium Removal System, and a documented finding of threaded connector damage on the system's ion exchange column. DNFSB sent lines of inquiry to DOE in November and December 2021 in response to the Department's analysis and corrective actions of these issues. DOE provided DNFSB written responses to the lines of inquiry and subsequent discussions were held. DNFSB sent a final set of lines of inquiry to the Department in February 2022. DOE addressed the final set of inquiries at a meeting with DNFSB. The Tank-Side Cesium Removal System successfully operated throughout FY 2022 enabling Hanford to treat more than 380,000 gallons of Tank Farms waste.

Los Alamos National Laboratory

In July 2022, the Board Vice Chair visited the laboratory for discussions with site management and facility familiarization tours.

Technical Area 54, Area G

In FY 2022, DOE continued to communicate with DNFSB about activities in Area G. In FY 2022, material-at-risk continued to be transferred from Technical Area 54, Area G to the Radioactive Assay and Nondestructive Testing Facility for shipment to and eventual disposal at WIPP. Fifty-two shipments totaling approximately 130 cubic meters were sent to WIPP—surpassing the proposed goal of 30 shipments.

In FY 2022, the Corrugated Metal Pipe Retrieval Project initiated below ground TRU waste retrieval activities, such as unearthing corrugated metal pipes. DNFSB was engaged during the initial and ongoing evolution of the activities.

Development and commencement of drill and drain operations for legacy waste drums resulted in repackaging of 44.5 cubic meters of TRU waste.

Consistent with the Department's March 30, 2021, response to the Board's September 24, 2020, letter to the Secretary regarding the need to improve analysis of potential energetic chemical reactions involving TRU waste, LANL improved the analysis, controls, and programs for chemical compatibility. The DOE Carlsbad Field Office conducted an audit of the Chemical Compatibility Program Waste Characterization Program in FY 2022. The results of that audit determined that the program is adequately established and satisfactorily implemented, resulting in effective processes.

Plutonium Facility–Building 4 (PF-4)

In FY 2022, efforts to update the PF-4 DSA continued. The revised DSA is now scheduled to be completed in FY 2023 and will provide updated safety basis support for the multiple programs within PF-4, including pit production in support of the Department of Defense. The revised PF-4 DSA will incorporate DOE-STD-5506-2021 analysis and controls that will enhance the safety

management of TRU waste at PF-4. The revised PF-4 DSA will also include safety analysis for the additional pit production capabilities currently being installed. NNSA and DNFSB conducted several meetings regarding the PF-4 DSA and safety infrastructure in advance of the November 16, 2022, LANL public hearing.

Radiological Laboratory and Utility Office Building

In FY 2022, NNSA conducted an operational readiness review of this facility in preparation for initiating operations as a hazard category 3 nuclear facility. The corrective actions developed as a result of the review are scheduled to be completed in FY 2023. Authorization to operate as a hazard category 3 nuclear facility will allow the transfer of remaining operations from the Chemistry and Metallurgy Research Facility to the Radiological Laboratory and Utility Office Building, thus supporting the eventual decommissioning of the Chemistry and Metallurgy Research Facility.

LANL Transportation Safety Document

On January 6, 2022, the Board issued a letter to the Secretary with a reporting requirement for a report and briefing regarding onsite transportation of nuclear materials. In response, NNSA conducted a baseline comparison of the LANL Transportation Safety Document to the NNSS Transportation Safety Document and identified potential compensatory measures to enhance the safety of onsite shipments of radioactive materials at LANL. NNSA provided the report to DNFSB on September 13, 2022. The briefing was scheduled for FY 2023.

Nevada National Security Site

Device Assembly Facility

On June 16, 2022, the Board transmitted a letter to the Secretary with a reporting requirement for a report and briefing regarding concerns identified during a DNFSB review of the nuclear criticality safety program at the LANL operated National Criticality Experiments Research Center (NCERC) at the Device Assembly Facility. In response, NNSA, the LANL Nuclear Criticality Safety Division, and NCERC line management identified and implemented improvements that addressed concerns contained in the letter.

LANL began revising the NCERC technical procedure development process to address inconsistencies between the NCERC and LANL integrated nuclear criticality safety programs. NNSA and LANL also began establishing performance metrics to evaluate the health of the nuclear criticality safety program and evaluating options for increasing the onsite presence of LANL oversight at NCERC. The increased oversight will improve awareness of planned and ongoing NCERC operations and provide timely updates of processes and procedures affecting nuclear criticality safety. Toward that end, LANL initiated the qualification of three LANL criticality safety analysts.

NNSA initiated structural analysis and structure, system, and component evaluations in FY 2022 to address DNFSB concerns regarding inadequate consideration of impacts of an increased seismic hazard in NCERC nuclear criticality safety evaluations. The evaluations are expected to be completed in FY 2023. Applicable technical documentation was revised as a result of the analysis and evaluations to explicitly address the concerns.

The report and briefing are scheduled to be provided to the Board in FY 2023.

U1a Complex

In FY 2022, construction activities were completed that provided a new access drift and an expanded drift to house the Advanced Sources and Detectors Accelerator; a new refuge station; and the necessary power and ventilation for mining new drifts that comprise the Enhanced Capability for Subcritical Experiments infrastructure. Construction activities were initiated for underground and surface preparations for drilling an eight-foot diameter borehole to provide a path for utilities from the surface. Mining has been completed in the U1a.102 drift which will provide space for electrical and mechanical equipment. Mining began in the zero-room area of the new test bed. New ventilation is scheduled to be completed in FY 2023. The preliminary DSA was approved in FY 2022 with conditions, which are being addressed. DNFSB periodically toured construction activities and continued communication with site personnel.

In FY 2022, the site continued to reduce reliance on specific administrative controls in the U1a Complex DSA and TSR in response to issues identified in a December 19, 2018, DNFSB letter. NNSS also initiated improvements to the U1a Complex hoist programmable logic controller, which will continue into FY 2023.

Pantex Plant

Training and Conduct of Operations

In March 2022, Pantex completed all activities associated with an action plan developed in response to a June 9, 2021, Board letter regarding weaknesses in Pantex training programs and concerns with organizational culture at the plant.

Safety Posture

On July 20, 2022, the Board issued a letter to the NNSA Administrator that included a reporting requirement for a briefing on how NNSA plans to maintain the positive trajectory of its previously communicated improvement initiatives for conduct of operations and organizational culture at Pantex. The letter also addressed concerns with revisions to DOE-NA-STD-3016, *Hazard Analysis Reports for Nuclear Explosive Operations* and co-located unit operations for nuclear weapons systems with conventional high explosives. NNSA is pursuing an alternate path with the DOE-NA-STD-3016 revision, which the Board described as appropriate and consistent with other safety guidance. If NNSA decides to pursue co-located conventional high explosives unit operations in the future, NNSA will provide the Board with detailed information on the safety risks and benefits. The briefing is scheduled for November 2022.

Pit Inventory

On January 6, 2022, the Board transmitted a letter to the NNSA Administrator, with a reporting requirement for a report addressing concerns regarding the slow rate at which Pantex was repackaging pits from traditional AL-R8s to AL-R8 sealed insert containers. Repackaging pits into AL-R8 sealed insert containers was an improvement adopted by DOE in response to concerns the DNFSB raised 20-years ago in Recommendation 99-1, *Safe Storage of Fissionable*

Material called "Pits." On June 12, 2022, NNSA provided a report to the Board and committed to placing a higher priority on repackaging of the pits. Following review of the of the NNSA response, DNFSB provided positive feedback and noted that it will monitor the progress to improve pit repackaging.

Dosimetry

In FY 2021 and FY 2022, DNFSB conducted a comprehensive review of the breakdown of the dosimetry program at Pantex that occurred in FY 2020. On May 10, 2022, the Board sent a letter to the Secretary requiring a report and briefing on lessons learned from this incident and actions taken to prevent reoccurrence at Pantex and other DNFs. In July 2022, NNSA informed the Board that an extension of time was needed to respond to the reporting requirements due to the number of stakeholders involved and the coordination needed to develop a response to address the Board's concerns. NNSA was scheduled to provide the Board a report in October 2022 and the briefing in November 2022.

As a result of this incident, NNSA implemented several corrective actions and established an Enterprise Dosimetry Program for Pantex and Y-12. The Enterprise Dosimetry Program received formal accreditation through the DOE Laboratory Accreditation Program in FY 2022 and lessons learned were published.

Legacy Conditions of Approval and Planned Improvements

During FY 2022, DNFSB initiated a review of the path to closure for various conditions of approval and planned improvements/upgrades to Pantex safety bases and facilities.

The NNSA Production Office and Pantex provided comprehensive responses to DNFSB lines of inquiry and provided field support for facility walkdowns. Opportunities for improvement were identified during the review and Pantex committed to administer appropriate improvements and corrections. The review was ongoing at the end of FY 2022.

Fire Protection

During FY 2022, DNFSB continued oversight of the implementation of the Pantex Life Sustainment Plan for fire protection upgrades. This plan identifies upgrades to the fire protection systems, flame detection systems, and lead-in piping replacements to the high-pressure fire loop serving nuclear facilities. Seven flame detection systems and eight high-pressure fire loop lead-in replacements were completed for: 12-44 Cell 5, 12-98 Cells 1 and 3, 12-84 Bays 2, 4, 6, and 8, and 12-104A Bay 19. Fire suppression system upgrades at two additional facilities were ongoing at the end of FY 2022 with planned completion in the first quarter of FY 2023.

NNSA continued monitoring unexpected electrical faults on newly installed flame detection systems. In July 2022, Pantex issued an analysis of the faults and actions to address the causes thereof. Information regarding tracking and trending analysis and the status of corrective actions was and continues to be communicated regularly with DNFSB.

In FY 2022, DNFSB initiated a review of Pantex fire protection systems, fire protection programs, and the onsite fire department. NNSA Production Office and Pantex responded to

lines of inquiry and supported facility walkdowns. The review was still ongoing at the end of FY 2022.

Welding Program

In FY 2022, DNFSB initiated an evaluation of the welding program at Pantex. The review included an assessment of various aspects of welding at the site including both internal and subcontracted welding of tooling and infrastructure. Pantex responded to lines of inquiry and supported facility walkdowns. DNFSB continues to evaluate the data that has been collected. This review was still ongoing at the end of FY 2022.

Savannah River Site

In May 2022, the Board Vice Chair visited the site for discussions with site management and facility familiarization tours.

Conduct of Operations

In FY 2022, conduct of operations at the site have been a subject of continued discussions with DNFSB. In July 2022, the Savannah River Operations Office issued a letter of concern to the site contractor for "Less Than Adequate Rigor of Conduct of Operations" in EM facilities (i.e., H-Area Complex, F-Area Complex, K-Area Complex, Spent Fuel, and the Solid Waste Management Facility). The letter was prompted by two TSR violations, nine Occurrence Reporting Program System occurrences, and assessment findings over a six-month period. The contractor responded with a Conduct of Operations Improvement and Sustainability Plan which was still being implemented at the end of FY 2022.

The Salt Waste Processing Facility experienced four TSR violations in FY 2022, just prior to a contract transition. A corrective action plan was developed and implemented with oversight from the Savannah River Operations Office. Post contract transition conduct of operations performance at the Salt Waste Processing Facility has since been found to be satisfactory.

Savannah River National Laboratory – Specific Administrative Controls

In FY 2022, DNFSB reviewed the Savannah River National Laboratory revised DSA and TSR. The review identified elements of administrative controls that performed credited safety functions in the DSA. The Savannah River Operations Office is in the process of providing clarification on the application of specific administrative controls regarding credited safety management programs and required elements of defense-in-depth controls. The guidance will further reinforce EM expectations for the application of DOE-STD-1186, *Specific Administrative Controls*.

Building 235-F

On November 2, 2021, the Board transmitted a letter to the Secretary requiring an annual report and briefing regarding five topic areas: deactivation progress in Building 235-F, the results of radiological surveys and inspections to verify that contamination in the facility is not spreading, status updates on establishing a final end-state determination with regulatory authorities, and the updated schedules for activities required to achieve such a final end-state.

The November letter was superseded by a December 2, 2021, Board letter modifying the due date of the report.

On July 7, 2022, DOE briefed the Board on the five topic areas. The regulatory process for end state determination was completed and approved by both the US Environmental Protection Agency and South Carolina Department of Health and Environmental Control. DOE fully funded Building 235-F deactivation activities in FY 2022 and completed all transitioning activities to a cold and dark isolation state by September 2022. The Department transmitted the required report to the Board on September 8, 2022.

Liquid Waste Operations

In FY 2022, the liquid waste mission and Salt Waste Processing Facility contracts transitioned to a new contractor. The new contractor identified and implemented process improvements and efficiencies to optimize operations in support of meeting the goal of completing the liquid waste mission within 15 years.

Improvements at the Salt Waste Processing Facility resulted in increased filtration and overall processing rates resulting in approximately 1,600,000 gallons of salt waste being processed in FY 2022. While the throughput was lower than desired, overall operations were affected by approximately four months down-time due to recovery from addressing solids formation in the facility, and a process change of introducing the use of glycolic acid at the Defense Waste Processing Facility. The use of glycolic acid is expected to enhance the ability of the facility to receive the projected higher processed salt waste volumes from the Salt Waste Processing Facility in future years. The use of glycolic acid is also expected to improve the safety posture of the Defense Waste Processing Facility by reducing the potential for hydrogen gas generation.

In FY 2022, the Tank Closure Cesium Removal Demonstration Project was completed resulting in the processing of approximately 370,000 gallons of salt waste. This process was placed in a stand-down condition for potential future use.

Tritium Facilities

In FY 2022, DNFSB completed a review of the 296-H stack and on July 26, 2022, the Board issued a letter to the Secretary with a reporting requirement for a report on the condition and structural integrity of the 296-H stack. The response is due in FY 2023.

On August 2, 2022, the Board transmitted a letter to the Secretary with a reporting requirement for a report on DOE's approach for system health monitoring of the safety significant glovebox oxygen monitors in the Tritium Facilities. The letter was a result of a FY 2022 DNFSB review of the 13.8 KVAC and 480 VAC electrical distribution systems, focusing on design and equipment condition. The response is due in FY 2023.

On August 11, 2022, the Board sent a letter to the NNSA Administrator with a reporting requirement for a briefing regarding the January 30, 2022, unplanned release of tritium from the Tritium Facilities and how NNSA plans to address the scenario in the DSA and implement operational improvements to protect workers from similar events in the future. The briefing is scheduled for November 2022.

Savannah River Plutonium Processing Facility

On January 24, 2022, the Board issued a letter to the NNSA Administrator regarding the DNFSB review of the facility's conceptual design. The letter identified eight safety observations for consideration as the project progresses into the preliminary design stage. On June 22, 2022, NNSA responded to the Board letter and identified planned actions and deliverables to address the observations.

Y-12 National Security Complex

In June 2022, Board members visited the site for discussions with site management and facility familiarization tours.

Infrastructure

Implementation of the Extended Life Program continued in FY 2022. The program focuses on the strategic maintenance and modernization of the infrastructure of Buildings 9215 and 9204-2E to sustain safe enriched uranium mission operations until FY 2040 or beyond.

The Extended Life Program has three major elements: an IP, a Safety Strategy, and an Outage Program (added in FY 2022). The IP identifies and prioritizes required facility sustainment activities while providing the necessary details to support funding and scheduling requirements. Reinvestment activities in FY 2022 included removal of obsolete process equipment and installation of new equipment in Buildings 9204-2E and 9215. Y-12 also initiated projects for both facilities that will enable them to ship and receive materials from the Uranium Processing Facility. Upgrades and replacements to key existing electrical infrastructure in Buildings 9215 and 9204-2E continued throughout FY 2022.

The Safety Strategy continued to focus on identifying and addressing gaps between the existing facility design and current regulatory codes and standards by providing data to identify and address nuclear safety risks. Progress in FY 2022 included updates to the seismic hazard assessment and completed evaluations of fire, ventilation, and lightning protection codes and requirements.

The Outage Program, which drives planned dedicated maintenance periods for applicable facilities, received funding for additional planner resources to maximize the usefulness of planned outages.

In June 2022, NNSA and Y-12 briefed Board members on the Building 9212 enriched uranium strategy. The briefing highlighted areas of progress that will ensure safe mission operations until the building's replacement by key mission transformation projects, including the Uranium Processing Facility. Progress in FY 2022 included elimination of the backlog of the highest contributor to material-at-risk, and installation of Building 9212 replacement technologies for existing aging mission processes. In FY 2022, increased maintenance resources, the critical spare parts program, and planned outages remained focused on key mission support systems to improve system reliability. Board members provided positive feedback regarding the Y-12 Extended Life Program.

Along with a strong maintenance, repair, and replacement program, efforts continued in FY 2022 to execute the Building 9212 exit strategy. In response to the July 7, 2021, Board letter to the Secretary regarding concerns with the criticality safety risk in out-of-service systems, an additional eight out-of-service systems were cleaned out and permanently isolated.

Nuclear Criticality Safety Program

In June 2022, Board members were briefed on recent improvements to the nuclear criticality safety program, including the Y-12 nuclear criticality safety roadmap-related efforts that document the path to closure of the longstanding NNSA concerns regarding uranium accumulation.

In FY 2022, DNFSB initiated a review of the Y-12 nuclear criticality safety program. The review is expected to conclude in FY 2023.

Uranium Processing Facility

In August 2022, DNFSB visited the Uranium Processing Facility. The visit focused primarily on the Main Processing and Salvage and Accountability Buildings operations and equipment. In September 2022, DNFSB conducted a scoping visit in support of an upcoming review of gloveboxes as a follow-up to previous glovebox reviews. DNFSB observed construction activities and conditions at the Main Processing and Salvage and Accountability Buildings and various storage areas, including those that must meet quality level A and B storage requirements. DNFSB also toured the Test and Demonstration Facility which houses a microwave casting prototype operation and other prototypes being used for technology testing.

Waste Isolation Pilot Plant

In September 2022, the Board Vice Chair visited the plant for discussions with site management and facility familiarization tours.

Underground Ventilation System-700C Mine Fan

In FY 2022, WIPP conducted a 40-hour test of the 700C mine fan. The test was successful, and the fan was put into operation. Throughout FY 2022, DNFSB was regularly updated on issues regarding the operation of the continuous air monitors supporting the 700C mine fan. Salt dust from mining operations was building up on the continuous air monitors. Some equipment issues were also discovered and immediately corrected. WIPP developed a corrective action to modify the underground ventilation air flows to separate the mining from the disposal air flow which should alleviate salt dust buildup on the continuous air monitors. The modification is scheduled to be implemented by June 2023. The proposed action was communicated to DNFSB during a September 2022 site visit.

Mining and Ground Control

During FY 2022, DOE kept DNFSB informed of mining operations such as the completion of Panel 8 and mining of the West Mains towards the location of the future connection with the underground station for the utility shaft.

In May 2022, DOE informed DNFSB of accelerated ground movement above the ventilation overcast which directs airflow from disposal Panel 7 to the exhaust drift. Supporting bolts were installed in the mine roof above the overcast thus stabilizing the ground above the overcast. DNFSB did not communicate any issues with the corrective action taken in response to this event.

Waste Management

In FY 2022, several incidents involving waste shipments from LANL and the INL Site resulted in DNFSB inquiries. DOE is continuing to work with the DNFSB to ensure a full understanding of the facts surrounding these events.

The incidents involving LANL shipments included a missing vent plug on a standard waste box, an incorrect waste type in a shipment, and the acceptance and placement of a container without having undergone a flammable gas analysis.

The incidents from the INL Site shipments involved the integrity issues of containers from two shipments which resulted in discovery of liquid in the shipping cask on one occasion and contamination on the top of another shipment. Both shipments were returned to the INL Site.

D. Other Responses to DNFSB

Requests for Information

In FY 2022, the Department responded to 236 specific requests for information that resulted in providing over 3,400 documents to DNFSB.

Meetings and Briefings with the Board

The Department participated in 16 meetings or briefings with the Board in FY 2022. Table 3.1 identifies the meetings and briefings and the DOE Program office(s) involved.

Table 3.1. FY 2022 DOE – Board Meetings or Briefings

Date	DOE Program Office	Subject
11/17/2021	EM	Safely Managing Nitrates Waste Across the Complex
11/29/2021	DOE	S-1 meet and greet with DNFSB
12/21/2021	NA	NA-1 periodic discussion
01/25/2022	NA	NNSS Radioactive Waste Facilities' Safety Basis
01/26/2022	EM	EM-1 periodic discussions with DNFSB
01/27/2022	DOE	S-2 discussion with DNFSB
03/02/2022	NA	NNSA Production Office briefing on the status of the IP for Recommendation 2019-1, *Uncontrolled Hazard Scenarios and 10 CFR 830 Implementation at the Pantex Plant*
03/28/2022	EM	Briefing on EM Accelerated Basin De-Inventory Project
04/07/2022	NA	Briefing on DOE/NNSA 12-14-2021 response to DNFSB TECH-47, *Seismic Hazard Assessments*
04/20/2022	EM & NA	Briefing on LANL TRU Waste Management (Tech-46)
05/05/2022	NA	NA-1 periodic discussions with DNFSB

Date	DOE Program Office	Subject
05/13/2022	EM & NA	Briefing on FY 2021 DOE Nuclear Criticality Safety Programs
06/01/2022	DOE	S-1 discussion with DNFSB
07/07/2022	EM	Briefing on SRS Building 235-F safety
08/17/2022	EM	EM-1 periodic discussions with DNFSB
09/21/2022	NA	NA-1 periodic discussions with DNFSB

Reporting Requirements

The following table provides the status of DOE response to Board reporting requirements, pursuant to 42 USC Section 2286b(d).

Table 3.2. FY 2022 Responses to Board Reporting Requirements

Date of Letter	DOE Program Office and Site	Reporting Requirements	Completion Date
06/10/2021	DOE Headquarters, All DNF Sites	A report and briefing on DOE's implementation of Order 420.1C, *Facility Safety,* requirement to periodically assess the seismic hazard.	Report: 12/14/2021 Briefing: 04/07/2022
08/26/2021	NA, NNSS	A report and briefing addressing questions pertaining to the safety basis at NNSS Radioactive Waste Facilities.	Report: 11/10/2021 Briefing: 01/25/2022
09/08/2021	EM, WIPP	A report and briefing describing DOE's plan for safely managing nuclear waste containing mixtures of nitric acid or nitrate salts with polysaccharides.	Report: 02/01/2022 Briefing: 11/17/2021
11/24/2021	NNSA, LANL	A report that describes DOE's strategy for the LANL PF-4 ventilation system, the planned end-state of the ventilation system, the schedule for achieving that end-state, and how the system will be credited in the facility safety basis.	Report: 03/15/2022
12/02/2021	EM, SRS	Annual report and briefing on updates regarding deactivation progress in Building 235-F, the results of radiological surveys and inspections to verify that contamination in the facility is not spreading, status of establishing a final end state determination with regulatory authorities, and the schedules for activities required to achieve such a final end state.	Report: 09/08/2022 Briefing: 07/07/2022

Date of Letter	DOE Program Office and Site	Reporting Requirements	Completion Date
01/06/2022	EM and NA, All DNF Sites	Annual report and briefing regarding the Department's Nuclear Criticality Safety Programs.	Report: 03/30/2022 Briefing: 05/13/2022
01/06/2022	NA, Pantex	A report addressing safety concerns with pit staging at Pantex.	Report: 06/12/2022
01/06/2022	EM and NA, LANL	A report and briefing addressing questions pertaining to the adequacy of the LANL onsite transportation safety document and the onsite transportation safe harbors.	Report: 09/13/2022 Briefing: FY 2023
05/10/2022	NA, Pantex	A report and briefing on lessons learned from the Pantex external dosimetry program breakdown and actions to prevent recurrence at Pantex and other DNFs.	FY 2023
06/16/2022	DOE, All DNF Sites	Report on the implementation of the unreviewed safety question process following a probabilistic seismic hazard analysis update as detailed in the DNFSB TECH-47, *Seismic Hazard Assessments*. (Note: this reporting requirement is a follow-up to the previous Tech-47 response.)	FY 2023
06/16/2022	NA, NNSS	A report and briefing addressing questions related to the nuclear criticality safety program at the NNSS National Criticality Experiments Research Center.	FY 2023
07/19/2022	EM, Hanford	A briefing that describes how the final revised safety strategy will meet DOE's safety requirements and address the Board's concern regarding safety significant scenarios for the Hanford 242-A Evaporator Facility.	FY 2023
07/20/2022	NA, Pantex	A briefing on how NNSA plans to maintain the positive trajectory of its previously communicated improvement initiatives for Pantex conduct of operations and organizational culture.	FY 2023
07/26/2022	NA, SRS	A report on NNSA's assessment of the Savannah River Tritium Enterprise 296-H stack collapse analyses, and specific safety concerns from the Board's review of the 296-H stack.	FY 2023
08/02/2022	NA, SRS	A report on NNSA's approach to system health monitoring for the safety significant glovebox oxygen monitors at the Savannah River Tritium Enterprise facilities.	FY 2023
08/11/2022	NA, SRS	A briefing on plans to protect workers from similar events as the January 2022 unplanned tritium release from the Savannah River Tritium Enterprise.	FY 2023

Date of Letter	DOE Program Office and Site	Reporting Requirements	Completion Date
08/11/2022	NA, LANL	Analysis conducted in response to Los Alamos Field Office direction relating to PF-4 leak path factor calculations.	FY 2023
08/17/2022	DOE, All DNF Sites	A report and briefing regarding DOE's plans to address the safety matters discussed in the Board staff report on Federal Oversight Effectiveness.	FY 2023
08/24/2022	DOE, All DNF Sites	A briefing by the end of January 2023 addressing DOE's plans for the Safety Software Central Registry	FY 2023

IV. Status of DOE Implementation Plans

A. Process Overview

The Board issues recommendations to the Secretary, via letter and publication in the *Federal Register*, regarding measures it feels that the Department should adopt to ensure adequate protection of workers and the public from activities conducted at DOE DNFs. 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 *Federal Register* 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 an additional 45-days 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 when implementation will be completed. Generally, the scope and technical complexity of the nuclear safety issues usually 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 Plan Status

Recommendation 2019-1: Uncontrolled Hazard Scenarios and 10 CFR 830 Implementation at the Pantex Plant

Issue Date: February 20, 2019.

NNSA briefed the Board in March 2022 regarding the status of IP actions. By the end of FY 2022, 64 of 69 improvement actions identified in Revision 1 of the IP were completed. The remaining actions are on schedule to be completed by the end of FY 2023.

Recommendation 2020-1: Nuclear Safety Requirements

Issue Date: February 21, 2020.

DOE transmitted the IP to the DNFSB on June 27, 2022. The IP contains 17 milestones that are scheduled to be completed by the end of FY 2025. The Board responded with its assessments of the IP on August 18, 2022, noting that "[t]he Board finds the implementation plan to be consistent with your acceptance of the recommendation," and that "execution of the IP could result in improvements to DOE's nuclear safety framework that are consistent with most of the objectives of the Board's recommendation."

Appendix. Acronyms and Abbreviations

AEA	Atomic Energy Act of 1954, as amended
Board	Defense Nuclear Facilities Safety Board
CFR	Code of Federal Regulations
Department	Department of Energy
DNF	Defense Nuclear Facility
DNFSB	Defense Nuclear Facilities Safety Board
DOE	Department of Energy
DSA	Documented Safety Analysis
EM	Office of Environmental Management
FY	Fiscal Year
Hanford	Hanford Site
INL	Idaho National Laboratory
IP	Implementation Plan
LANL	Los Alamos National Laboratory
LLNL	Lawrence Livermore National Laboratory
NA	National Nuclear Security Administration
NCERC	National Criticality Experiments Research Center
NNSA	National Nuclear Security Administration
NNSS	Nevada National Security Site
ORNL	Oak Ridge National Laboratory
Pantex	Pantex Plant
PF-4	Plutonium Facility–Building 4
SC	Office of Science
Secretary	Secretary of Energy
SNL	Sandia National Laboratories
SRS	Savannah River Site
STD	Standard
TRU	Transuranic
TSR	Technical Safety Requirement
USC	United States Code
WIPP	Waste Isolation Pilot Plant
Y-12	Y-12 National Security Complex