



**DEFENSE NUCLEAR FACILITIES SAFETY BOARD
(DNFSB)**

2023-2024 Agency Activities

February 2024



Agenda

- **Board Overview**
- DNFSB Activities
 - Interface between DOE & DNFSB
 - Semi-Annual Report to Congress
 - Board Hearings & Meetings
 - Recommendations
- Safety Allegations
- Oversight at DOE Sites



Board Overview

“The mission of the Board shall be to provide independent analysis, advice, and recommendations to the Secretary of Energy to inform the Secretary, in the role of the Secretary as operator and regulator of the defense nuclear facilities of the Department of Energy, in providing adequate protection of public health and safety at such defense nuclear facilities, including with respect to the health and safety of employees and contractors at such facilities.”

Current Board Members



Joyce L. Connery
Chair



Thomas A. Summers
Vice Chair



Vacant



Vacant



Vacant



Agenda

- Board Overview
- **DNFSB Activities**
 - Interface between DOE & DNFSB
 - Semi-Annual Report to Congress
 - Board Hearings & Meetings
 - Recommendations
- Safety Allegations
- Oversight at DOE Sites



DOE / DNFSB Interface

- Memorandum of Understanding (MOU) between DOE and DNFSB
 - FY 2021 congressional committee and conference reports directed MOU
 - The Board and DOE signed an MOU on February 17, 2022, that defines interface agreements



Deputy Secretary Turk and Chair Connery Sign MOU



Board Hearings and Meetings

- November 16, 2022, public hearing on Los Alamos National Laboratory
- July 13, 2021, virtual public hearing and meeting on the status of the Savannah River Site
- December 4, 2020, virtual public meeting on the Board's revision or reaffirmation of Recommendation 2020-01
- Closed Meetings
 - July 13, 2023, Washington, DC
 - May 23, 2023, Washington, DC
 - March 21, 2023, Washington, DC
 - January 5, 2023, Washington, DC
 - September 30, 2021, Washington, DC



November 16, 2022, Public Hearing in Santa Fe, New Mexico



Board Recommendations

- Recommendation 2012-1, *Savannah River Site Building 235-F Safety*
 - DOE stopped removing Pu-238 in 2019; instead, DOE shifted to removing combustibles and preparing to deactivate the facility.
 - DOE revised the implementation plan and sent a letter stating all deliverables had been completed.
 - The Board issued an updated reporting requirement to DOE in December 2020, amending it further in December 2021 to refine details to be provided in the annual report and briefing.
 - DOE completed deactivation of the facility in September 2022 and is monitoring conditions through routine structural and radiological inspections. DOE continues to keep the Board updated regarding progress towards eventual decommissioning.
 - The Board has not closed this recommendation and remains focused on monitoring the results of periodic inspections.
- Recommendation 2019-1, *Pantex Uncontrolled Hazard Scenarios and 10 CFR 830 Implementation*
 - By the end of 2023, NNSA and its contractor completed all 69 implementation plan deliverables.
 - The Board plans to complete reviewing the safety basis changes for nuclear explosive operations at Pantex resulting from the recommendation in 2024.
 - Per the implementation plan, NNSA will commence its own effectiveness review of all completed actions during this same timeframe.



Board Recommendations

- Recommendation 2019-2, *Safety of the Savannah River Tritium Facilities*
 - The Board recommended near-term compensatory measures and long-term actions to prevent or mitigate high radiological consequences to workers and recommended evaluating the adequacy of safety management programs to respond to accidents at the tritium facilities.
 - DOE rejected the recommendation on the grounds that it was already addressing these safety issues.
 - The Board is focusing on activities enumerated in the rejection and on the reliability of engineered systems and safety management programs required to mitigate the safety risks of ongoing operations.
 - On October 4, 2023, the Board followed up with a letter to the Secretary of Energy establishing a reporting requirement for an annual report and briefing starting within six months on DOE's progress on safety improvements.
- Recommendation 2020-1, *Nuclear Safety Requirements*
 - The Board recommended improvements to DOE's nuclear safety regulatory framework; the Secretary accepted the Board's recommendation in September 2021, and issued an implementation plan in June 2022.
 - DOE's actions in response to Recommendation 2020-1 have been positive and are poised to improve critical aspects of its regulatory framework governing nuclear safety.
 - Despite this progress, DOE's response to elements of the recommendation related to aging infrastructure management require continued leadership attention.
 - EA completed implementation plan milestones to plan and conduct an independent review of safety basis preparation and approval processes, and EA's report provides recommendations to improve those processes and related DOE guidance.



Board Recommendations

- Recommendation 2023-1, *Onsite Transportation Safety*
 - New recommendation transmitted to the Secretary of Energy on January 26, 2024
 - Recommends strengthening DOE's safe harbor for preparation of safety bases for onsite transportation of radioactive materials, addressing specific safety deficiencies at Los Alamos, performing a causal analysis for the safety issues, and taking corrective actions to preclude recurrence
 - Currently pending acceptance by the Secretary of Energy



Agenda

- Board Overview
- DNFSB Activities
 - Interface between DOE & DNFSB
 - Semi-Annual Report to Congress
 - Board Hearings & Meetings
 - Recommendations
- **Safety Allegations & Potential Legislative Proposal**
- Oversight at DOE Sites



Safety Allegations

- The agency has developed its first written operating procedure (OP) to memorialize how it handles safety allegations received from members of the public.
- From time to time, the agency receives communications from members of the public alleging current or potential unsafe conditions at defense nuclear facilities.
- These allegations are an important source of information that supplement the agency's own observation of defense nuclear facilities.
- The OP governs the intake, evaluation, and disposition of safety allegations, to ensure that they are appropriately assessed in furtherance of the agency's mission.



Agenda

- Board Overview
- DNFSB Activities
 - Interface between DOE & DNFSB
 - Semi-Annual Report to Congress
 - Board Hearings & Meetings
 - Recommendations
- Safety Allegations
- **Oversight at DOE Sites**



Resident Inspectors

The Board has resident inspectors (RI) at 5 DOE sites

- Savannah River Site: 3 RIs + 1 hired
- Hanford Site: 3 RIs
- Los Alamos National Laboratory 1 RI + 2 vacancies
- Pantex Plant: 2 RIs + 1 hired
- Y-12 National Security Complex/Oak Ridge National Lab: 2 RIs
-



Resident Inspector at the
Hanford Site



Los Alamos National Laboratory

Plutonium Facility Deficiencies Remain as Mission Increases

- Continued delays with safety system upgrades (ventilation, fire suppression)
- NNSA position that safety-class, seismically qualified confinement is not needed
- Safety basis weaknesses (non-conservative accident progression, passive confinement)
- Mission growing to include pit production, receipt of large amounts of heat source plutonium, and possibly surplus plutonium disposition project

Safety of Onsite Transportation of Radioactive Materials

- Board Recommendation 2023-1 identified deficiencies in safety basis and controls for onsite transportation at Los Alamos as well as the associated DOE safety directives
- NNSA implemented compensatory safety measures at Los Alamos, but safety basis needs to be revised and an improved suite of controls needs to be developed and implemented

Waste Management Challenges

- Transuranic waste hazards and controls are being addressed, albeit slowly
- Venting potentially flammable Flanged Tritium Waste Containers still not accomplished
- Interruptions of transuranic waste remediation at Area G



Doors in Passive Confinement for Plutonium Facility at Los Alamos



Cliff Alongside Transportation Route in Los Alamos



Savannah River Site

Board Visit

Tritium Facilities

- Design basis accidents with large onsite consequences (Rec. 2019-2)
- Structural analysis of stack with potential to collapse onto tritium vault
- Accident scenarios involving tritium release drawn back into occupied buildings
- Conceptual design for planned Tritium Finishing Facility

Processing and storage of nuclear materials

- Plutonium storage and down-blend
- Spent nuclear fuel storage and processing

Processing of high-level radioactive waste

- Salt Waste Processing Facility integration with Tank Farms, Defense Waste Processing Facility, and Saltstone
- Removal of tank waste for processing and tank closure
- Accelerated Basin De-inventory

Implementation of Savannah River National Laboratory Safety Basis

Conceptual design for the Savannah River Plutonium Processing Facility



L-Area Spent Fuel Basin



Salt Waste Processing Facility



Pantex Plant

Continued Operational Issues Amid Push for Production

- Board letters on June 9, 2021, and July 20, 2022, identified safety concerns regarding the formal conduct of operations at Pantex—in response, NNSA and its contractor increased direct safety oversight and augmented personnel resources to provide greater attention to the safe conduct of operations.
- Recent quality assurance lapses have not presented any immediate safety issues, but they indicate improvement in formality of operations is still needed to ensure nuclear explosive operations are performed safely and as intended.

Safety Basis Redesign and Alternate Safety Basis Methodology

- Initiatives aimed to simplify and strengthen the safety basis and controls for nuclear explosive operations.
- Final methodology expected to be released in 2024—Board's staff engaging with Pantex during development.

Closure of Legacy Conditions of Approval and Planned Safety Improvements

- DOE's implementation plan for Board Recommendation 2019-1, *Pantex Uncontrolled Hazard Scenarios and 10 CFR 830 Implementation*, identified need to address these lingering safety issues.
- Pantex completed several noteworthy safety improvements: (1) corrected errors in fire protection calculations and drawings; (2) addressed potential inappropriate applications of weapon response rules in the safety basis; and (3) modified acquisition requirements for vacuum chamber oil to address a potential fire scenario.
- Board found that Pantex closed a few legacy conditions of approval without fully addressing them, which may result in Pantex failing to implement valuable safety improvements, such as eliminating use of flammable cleaning solvents and reengineering processes to minimize hoisting of nuclear weapon components.



Y-12 National Security Complex

Continued deficiencies in performance of Y-12's nuclear criticality safety program

- Weaknesses continue to be evident in implementation and effectiveness of nuclear criticality safety corrective actions.
- NNSA and contractor formed Disciplined Operations Council and developed Roadmap to Nuclear Criticality Safety but operational errors continue.
- Special Event Investigation by Y-12 contractor in 2023 identified another series of corrective actions.

Reactive Materials Hazards in Production Facilities

- November 18, 2022, Board letter advised that Y-12 should implement additional safety control strategies for thermal runaway reactions during processing of uranium materials and consider revisiting safety control strategies for new process technologies to ensure they address worker hazards from uranium pyrophoricity.
- NNSA response in early 2023 identified actions being implemented to mitigate and prevent pyrophoric events at Y-12
- Based on continuing pyrophoric events, Board will perform a follow-up review in 2024.

Design and construction of Uranium Processing Facility

- Construction officially commenced in 2018.
- All three of the main structures are nearing completion; installation of equipment for uranium processing continues.
- Procuring safety related equipment to be installed in the Main Processing Building and the Salvage and Accountability Building (Mechanical and Electrical Building is the third main structure).
- Factory acceptance testing for safety-related equipment.



Hanford Site

Direct Feed Low Activity Waste Facility (LAW) startup

- Start-up and commissioning
- Readiness evaluations
- Tank-side cesium removal
- Board review of conduct of operations and maintenance

Management of aging tank farm infrastructure

- 242-A evaporator repairs
- Tank integrity program
- Upgrades to safely extend usable life of existing infrastructure

Other priority work

- Evaporator start up
- Single-shell tank retrievals
- High-Level Waste Facility design
- Tank waste disposal alternative evaluation



Tank Side Cesium Removal System Process Enclosure



LAW Facility Control Room



Waste Isolation Pilot Plant

Board Visit

Salt Handling Shaft Structure

- Structural issues and operational impacts

New Infrastructure

- Utility Shaft Project
- Safety-Significant Confinement Ventilation System Project



L-Area Spent Fuel Basin



Salt Waste Processing Facility



Idaho National Laboratory

Flammable Gas Hazards in Nuclear Waste Drums

- February 24, 2023, letter to DOE regarding implementation of DOE-STD-5506-2021, Preparation of Safety Basis Documents for Transuranic (TRU) Waste Facilities and safety issues associated with flammable gas hazards

Integrated Waste Treatment Unit

- Commenced processing of radioactive sodium-bearing waste in April 2023
- Processed approximately 68,000 gallons of liquid waste in 2023

TRU Waste Management

- RCRA closure of Advanced Mixed Waste Treatment Project facilities continues
- Streams from the Radioactive Waste Management Complex subsurface disposal area
- Preparations to retrieve highly radioactive calcined material from underground storage facilities



National Transuranic (TRU) Program

Generator Site Technical Review Process

- New processes and enhancements to existing waste certification and acceptance criteria
- Process implementation for February 26, 2021, titanium fines sparking event
- Process implementation for LANL corrugated metal pipe waste stream

Radiologically Contaminated Shipments from Idaho to WIPP

- Idaho National Laboratory long term order for overpacking older waste drums
- Challenges in procuring overpack materials

Storage of Remediated Nitrate Salt Waste at Waste Control Specialists in Texas

- Thermal analysis supporting hazardous waste code removal
- Importance of conducting thorough safety analysis to support eventual transport to and disposal at WIPP



Aging Infrastructure

Aging facilities are prone to:

- Degraded systems and structures
- Increased radiological hold-up
- Obsolescent equipment and unavailable replacement parts
- Retrofits to meet evolving missions
- Repurposing for new missions for which they were not designed

Board monitoring DOE efforts to mitigate risks and develop replacement capabilities

- Y-12 Extended Life Program
- LANL Plutonium Strategy
- Pantex fire suppression system upgrades and remediation of legacy facility hazards
- SRS H-Canyon exhaust tunnel age-related degradation
- Complex-wide aging management



Y-12 and Pantex Infrastructure Upgrades



Pantex Plant – Aerial View



Design and Construction

Focus of Board reviews

- Before construction: Safety basis and safety-related structures, systems, & components
- During construction: Quality assurance and operability testing of safety systems

Significant construction projects under Board purview

- Hanford Waste Treatment and Immobilization Plant and related facilities
- Los Alamos Plutonium Pit Production Project
- Nevada Enhanced Capabilities for Subcritical Experiments Project
- Savannah River Plutonium Processing Facility
- Savannah River Site Surplus Plutonium Disposition Project
- Waste Isolation Pilot Plant Safety Significant Confinement Ventilation System and Utility Shaft
- Y-12 National Security Complex Uranium Processing Facility



Savannah River Plutonium Processing Facility



Hanford Waste Treatment and Immobilization Plant



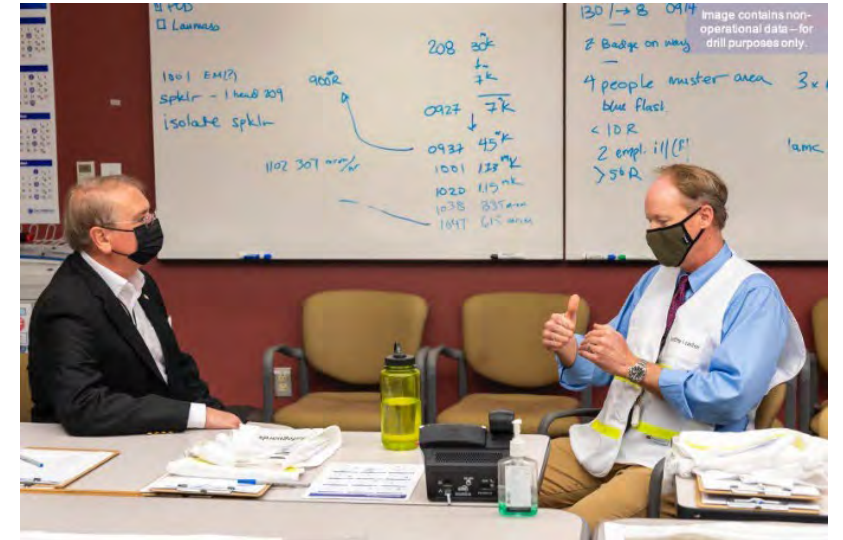
Safety Management Programs

Focus of Board reviews

- DOE policies, directives, and technical standards
- Safety basis including implementation of Standard 3009
- Nuclear criticality safety programs
- DOE safety oversight
- Conduct of operations
- Emergency preparedness and response

Board Actions

- A robust nuclear safety framework is fundamental to safe operations – the Board communicated to DOE on key directives in January 2024 and December 2023.
- Effective DOE oversight is a key component to nuclear safety oversight – the Board communicated to DOE on this topic in March 2023 and August 2022.
- Board interactions with DOE is improving the process of periodically assessing and addressing seismic hazards at DOE sites – the Board communicated to DOE on this topic in August 2023 and June 2022.



Board Vice Chair Thomas Summers (left) speaks with Facility Operations Division Leader following an emergency exercise at LANL



Questions?

Board communications, Resident Inspector weekly reports, public meeting and hearing information and other agency information are available at: www.DNFSB.gov



Back-up Slides



Hanford: Decontamination and Demolition of Legacy Facilities

- River Corridor Cleanup
 - 105-KW Basin deactivation and closure activities
 - Stabilization of Building 324 to support retrieval of highly contaminated soil from beneath the building
- Central Plateau
 - Preparations to move cesium and strontium capsules from Waste Encapsulation and Storage Facility basin to dry storage
 - Removal or stabilization of contaminated structures to support DOE end-state safety goals
 - Safe storage of transuranic waste pending transfer to WIPP
 - Infrastructure modifications and improvements to support direct feed low activity waste mission



Hanford Site Building 324 High Contamination Area Training



Inside 219-Z-9 Crib – December 2020

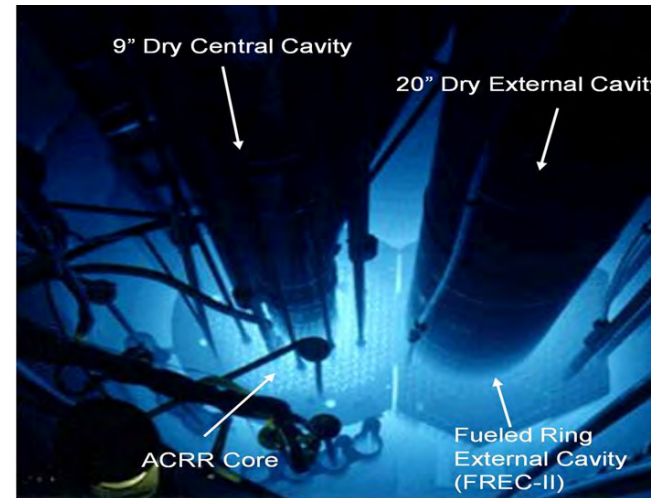


Lawrence Livermore and Sandia National Laboratories

- LLNL Plutonium Facility
 - Evaluation of updated seismic analysis
 - Software Quality Assurance for Plutonium Facility Continuous Air Monitors
 - Startup of New Recovery Glovebox Line
- SNL Annular Core Research Reactor
 - Development of alternate methodology for safety analysis
 - Conduct of operations
- SNL Emergency Preparedness and Response program
 - Evaluation of efforts to address safety deficiencies



Recovery Glovebox Line



Annular Core Research Reactor



Nevada National Security Site

- Quality of Safety Bases
 - Continuing inadequate quality of contractor safety basis submittals
- Device Assembly Facility/National Criticality Experiments Research Center
 - Revised safety basis to remove nuclear explosive operations
 - Deteriorated fire water supply tank
- U1a Complex
 - Enhanced Capabilities for Subcritical Experiments project



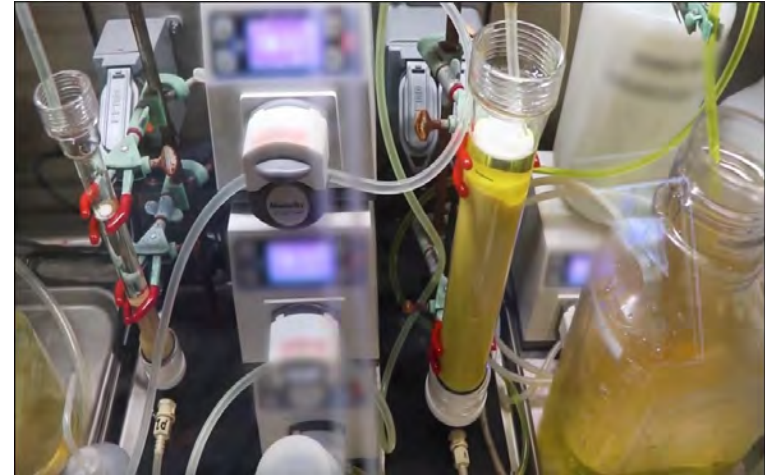
Device Assembly Facility



Oak Ridge National Laboratory

Downblending of U-233 oxide powders, metals, monoliths, and salts for offsite disposal

- Started up the Initial Processing Campaign in Building 2026 in early October 2022
- Currently only processing oxide materials
- The contractor has completed processing lower hazard oxides and is preparing for processing higher hazard oxides
- The Board continues to monitor the uranium-233 processing activities.



U-233 Processing in Glovebox

