DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Nuclear Safety Oversight in New Mexico

Presented to

New Mexico State Legislature's
Radioactive and Hazardous Materials Committee

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Agenda

- Overview of the Board.
- Interface with the Department of Energy (DOE).
- Complex-wide Board Actions.
- Nuclear Safety Oversight in New Mexico.
  - Los Alamos National Laboratory (LANL).
  - Waste Isolation Pilot Plant (WIPP).
  - Sandia National Laboratories (SNL).

Nuclear safety at DOE's defense nuclear facilities in New Mexico remains adequate, but the Board continues to advise safety improvements.

Board Overview

- Established by Congress in 1988.
- Five Presidentially-appointed, Senate-confirmed members (bipartisan).
- Statutory mission: *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 defense nuclear facilities**, including with respect to the health and safety of employees and contractors at such facilities.*
- The Secretary of Energy determines how best to apply the information provided by the Board.

Current Board Members

Joyce L. Connery
Chair

Thomas A. Summers
Vice Chair

Jessie Hill Roberson
Board Member

Vacant

Vacant

Board Overview—Major Statutory Authorities

- Statutory safety oversight activities:
  - Review and evaluate the content and implementation of standards.
  - Investigate events or practices that may adversely impact public health or safety.
  - Analyze design and operational data.
  - Review facility design and construction.
- Statutory authorities:
  - Issue formal recommendations to the Secretary of Energy.
  - Levy reporting requirements on the Secretary of Energy.
  - Conduct open or closed hearings and meetings to include subpoenaing witnesses (if needed).
  - Conduct investigations and special studies.

Transuranic waste shipment leaving Los Alamos

TRU waste shipment approaching the WIPP site

DOE is required by law to grant the Board "prompt and unfettered access to such facilities, personnel, and information as the Board considers necessary to carry out its responsibilities."

Board Overview—Scope of Safety Oversight

- Nuclear safety oversight of:
  - Complex, high-hazard operations involving the assembly or disassembly of nuclear weapons, or the operation of nuclear facilities related to DOE's national defense mission.
  - Remediation of nuclear wastes and legacy facilities from more than 70 years of DOE defense nuclear operations.
  - Design and construction of new DOE defense nuclear facilities.
  - Aging and deteriorating mission critical infrastructure at DOE defense nuclear facilities/sites.
  - Adequacy of DOE safety standards related to design, construction, operations, and decommissioning of defense nuclear facilities.

Dome 49 at LANL's Area G

Mobile Loading Transuranic Waste at LANL's Area G

Resident Inspectors perform onsite oversight at Hanford, Los Alamos, Pantex, Savannah River Site, and Y-12.

Interface Between DOE and DNFSB

- The interface between DNFSB and DOE must be consistent with the roles assigned by Congress:

  - Maintain DOE's responsibility for self-regulating to provide reasonable assurance of adequate protection from radiological hazards; identify and mitigate risks to an acceptable level in operating its defense nuclear facilities; and conduct government oversight of its contractors.

  - Maintain the Board's independence and access to facilities, personnel, and information to conduct safety oversight at Defense Nuclear Facilities to provide advice and make recommendations to the Secretary.

DOE/DNFSB Interface Developments

- DOE Order 140.1, *Interface with the DNFSB*
  - Revised in June 2020 to resolve language that was inconsistent with the Atomic Energy Act and to make changes consistent with congressional direction in the fiscal year 2020 National Defense Authorization Act.
  - Board confirmed that changes to the order resolved the statutory concerns.

- Memorandum of Understanding (MOU) between DOE and DNFSB
  - FY 2021 congressional committee and conference reports directed development of the MOU.
  - DOE and DNFSB established charter for MOU development in October 2020.
  - DOE and DNFSB collaboration on MOU began in November 2020.
  - Good DNFSB-DOE progress underway.

Complex-wide Board Actions

- Recommendation 2020-1, *Nuclear Safety Requirements.*
- Technical Report 47, *Seismic Hazard Assessments.*
- Safety of Solid Nuclear Waste.

Recommendation 2020-1, *Nuclear Safety Requirements*

- DOE is responsible for ensuring its defense nuclear facilities are designed, constructed, operated, and decommissioned in a manner that provides adequate protection of the public.
- DOE's regulatory framework for ensuring the health and safety of the public from its defense nuclear facility activities is 10 CFR 830, *Nuclear Safety Management.*

August 2018: DOE began rulemaking to revise 10 CFR 830.

February 2020: Board issued Recommendation 2020-1.

June 2020: DOE rejected most of the Board's sub-recommendations.

October 2020: DOE finalized the rulemaking.

December 2020: Board held a public meeting to discuss DOE's response to 2020-1.

June 2021: Board reaffirmed Recommendation 2020-1.

September 2021: Secretary of Energy accepted the Board's recommendation.

Continued—Recommendation 2020-1

Intended to strengthen DOE's nuclear safety regulatory framework, maintain and improve federal accountability mechanisms, and maintain and improve fundamental nuclear safety processes.

The reaffirmed recommendation includes five sub-recommendation areas:

Aging infrastructure: DOE lacks a formal, complex-wide regulatory structure for identifying, prioritizing, and performing infrastructure upgrades.

Hazard categories: Deficiencies, inconsistencies, and non-conservatisms in the DOE safety standards.

DOE approvals: Need for periodic DOE review of safety basis documents to evaluate for cumulative impacts or latent defects.

Evaluation of safety basis preparation and review processes: Evaluation of reasons the annual approval periodicity proved problematic.

Safety basis process and requirements: Improvements to DOE's nuclear safety framework to ensure adequate implementation.

The Board will evaluate DOE's Implementation Plan, once submitted.

Technical Report 47, *Seismic Hazard Assessments*

- For sites with high estimated radiological consequences to the public from seismic events, DOE requires the periodic assessment of the seismic hazard.
  - This requirement applies to LANL, but not WIPP or SNL.

- DOE performs the assessment at least every 10 years or whenever there is a significant change that could impact the seismic hazard.

- Changes that could influence the seismic hazard include:
  - New models that provide a better understanding of seismic sources and wave propagation.
  - Updated regional seismicity data (i.e., recently recorded seismic events since the last assessment).
  - Discovery of a new fault or new information about a fault.

Paleoseismic Trenching Near LANL

Continued—*Seismic Hazard Assessments*

- Board performed a complex-wide review on past DOE implementation of the seismic hazard process and found:
  - Several sites did not immediately assess the need for compensatory controls for their facilities after identifying an increase to the seismic hazard. Notably, only LANL performed this assessment.
  - Most DOE field offices have not been approving seismic hazard assessments as required in DOE directives.
  - Sites have been slow to analyze the impact to their facilities after identifying an increased seismic hazard.
  - DOE's directives lack sufficient guidance and standardization on conducting seismic hazard assessments.
- Board issued Technical Report 47 on June 10, 2021, and requested DOE explain any actions they plan to take to address the identified issues.
  - On August 31, 2021, DOE requested a 45-day extension.

Column Capital Testing for
LANL Plutonium Facility

The Board is currently awaiting DOE's response.

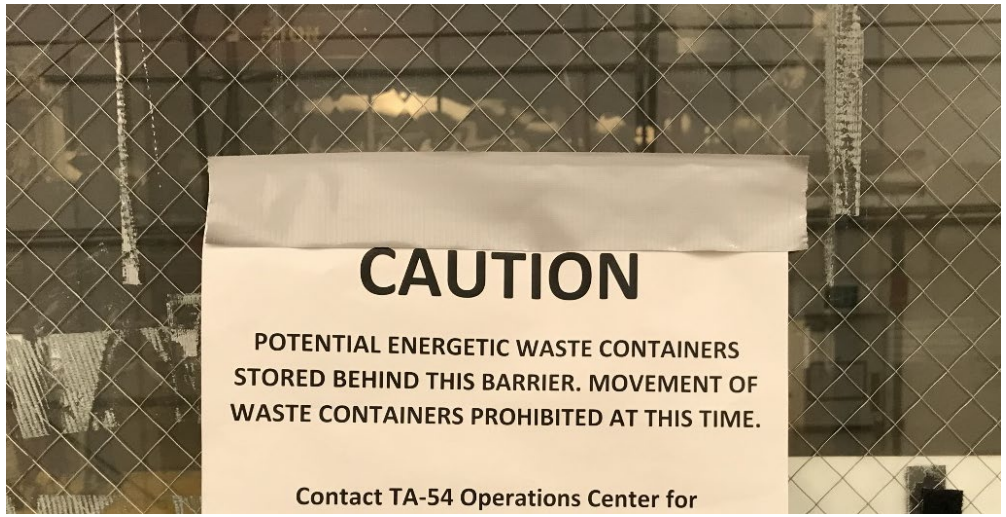
Safety of Solid Nuclear Waste

- DOE experienced two significant events in which energetic chemical reactions released radiological materials from waste drums:
  - 2014: WIPP.
  - 2018: Idaho National Laboratory (INL).
- Board pursuing concerns on several fronts:
  - Most recently, conducted a public hearing on June 20, 2019, and issued a letter dated July 26, 2021, on DOE's revision of DOE Standard 5506, *Preparation of Safety Basis Documents for Transuranic (TRU) Waste Facilities.*
  - Issued Technical Report 46, *Potential Energetic Chemical Reaction Events involving Transuranic Waste at LANL.*
  - Issued a letter on September 8, 2021, regarding Carlsbad Field Office direction on potentially reactive waste.

Waste Drum After Event at INL

Continued—Safety of Solid Nuclear Waste

- DOE issued a revision to DOE Standard 5506 in August 2021, following an effective dialog with the Board's staff.
- Improvements made to the revised Standard 5506 include new requirements for waste generator sites to identify potential undesired chemical reactions and updated methods for estimating the severity of potential accidents, informed by the 2014 WIPP event and 2018 INL event.
- Prompt implementation is important to realize the full benefits of the updated standard.



N3B Implemented Additional Safety Controls for Containers at LANL's Area G as a Result of Technical Report 46

Safety of Solid Nuclear Waste at LANL

- Board's Technical Report 46 highlighted the need for DOE to:
  - Incorporate chemical compatibility evaluations in hazard analyses.
  - Defensibly estimate radioactive material releases from accidents.
  - Incorporate multiple layers of safety protection.
- LANL experienced an unexpected sparking event involving pyrophoric materials during waste packaging at its Plutonium Facility in February 2021.
- DOE responded to Technical Report 46 in March 2021:
  - DOE is "adequately and consistently controlling" transuranic waste hazards at LANL.
  - DOE is using Technical Report 46 to aid their review of the sparking event.

Outdoor transuranic waste storage near the LANL Plutonium Facility

Inside of the Glovebox Involved in the Titanium Metal Fines Sparking Event at the LANL Plutonium Facility

The Board is evaluating DOE's response to Technical Report 46 and corrective actions that resulted from the sparking event.

LANL Plutonium Facility Safety Posture

Recent safety issues identified by the Board:

June 9, 2021	Reliability of safety systems
November 15, 2019	Safety systems and safety basis
November 12, 2019	Leak path factor methodology
November 28, 2018	Nuclear criticality safety
January 3, 2017	Seismic safety
May 12, 2016	Fire suppression system

LANL Plutonium Facility

Ongoing LANL efforts to improve safety:

- Completed multiple structural upgrades to the facility and is developing a sophisticated computer model to answer remaining questions about the seismic performance of the building by 2023.
- Planned safety system upgrades and expected completion: fire suppression system piping (2024); limited active confinement ventilation system improvements (2025); removing non-seismically qualified buildings from fire water loop (2026).
- Developing modern safety basis compliant with DOE Standard 3009-2014, including upgraded leak path factor analysis.

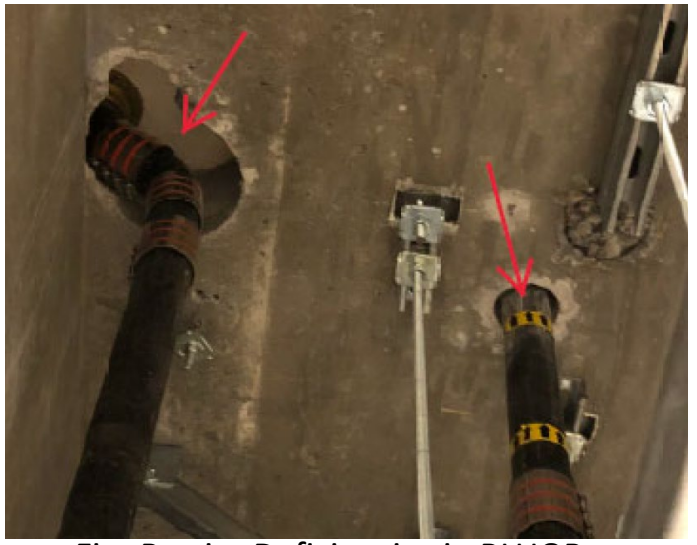
Challenge: Completing multiple high priority efforts to improve the safety posture of the Plutonium Facility on a schedule commensurate with an increased national security mission.

Supporting Facilities at LANL

Radiological Laboratory Utility Office Building (RLUOB)

- Upgrading to a hazard category 3 nuclear facility in mid-2022 to be called PF-400.
- Reduces reliance on seismically unsound Chemistry and Metallurgy Research Building.
- Safety basis indicates low potential accident consequences.
- LANL continues to resolve issues from a Board letter dated December 8, 2020, involving the code of record and LANL-identified fire protection deficiencies.

Aerial View of RLUOB/PF-400


Fire Barrier Deficiencies in RLUOB

Continued—Supporting Facilities at LANL

Transuranic Waste Facility (TWF)

- Board letter dated October 21, 2020, closed earlier concerns.
- LANL continues to resolve issues with upgrading the fire suppression system to a higher pedigree, four years after the facility began operations.

Waste drums in TWF building

RANT Shipping Facility

- Resolved issues from the Board letter dated December 17, 2014, by reducing nuclear material limits.
- Only indoor capability at LANL for loading transuranic waste for shipment to WIPP.
- Interface established and capability demonstrated to load legacy waste from Area G.

Transuranic waste shipment departing RANT

Area G

Aerial view of Area G

Practice FTWC handling

- Following identification of numerous issues with the outdated safety basis for Area G, N3B restricted operations in early 2021.
  - DOE recently approved supplemental safety basis documents that specify over 40 new administrative controls.
  - N3B will implement these controls until it can finalize and implement a new modern safety basis in late 2022.
- DOE continues efforts to address the four flanged tritium waste containers (FTWC) at Area G.
  - Risk of explosion increases with time until they are vented and repackaged.
  - Board's staff is overseeing: the development and implementation of the safety basis for venting, the rigor of readiness reviews, and the actual venting.

Planned Safety Reviews at LANL in Fiscal Year 2022

- Conduct of Operations and Training.
- Work Planning and Control of Decommissioning Activities.
- Glovebox Glove Integrity Program.
- New Safety Basis for Plutonium Facility.
- Updated Plutonium Facility Leak Path Factor Analysis.
- Updated Sitewide Atmospheric Dispersion Analysis.
- New Area G Safety Basis.
- Current Area G Safety Posture.
- Safety of Onsite Transportation of Radioactive Materials.

Technical Area 3 at LANL

Nuclear Safety Oversight Activity at WIPP

Recent safety challenges identified by the Board:

- September 8, 2021: Concern with DOE's technical basis for concluding wastes with polysaccharides exposed to nitric acid or nitrate salts become safe after a period of time.
- August 13, 2021: Safety Instrumented Alarm System.
- May 29, 2020: Safety basis weaknesses.
- August 27, 2019: Underground ventilation system.

Planned safety reviews for fiscal year 2022:

- 700-C Fan Restart.
- Underground Air Flow.
- Disposition of Containers Located at Waste Control Specialists.

700-C Fan

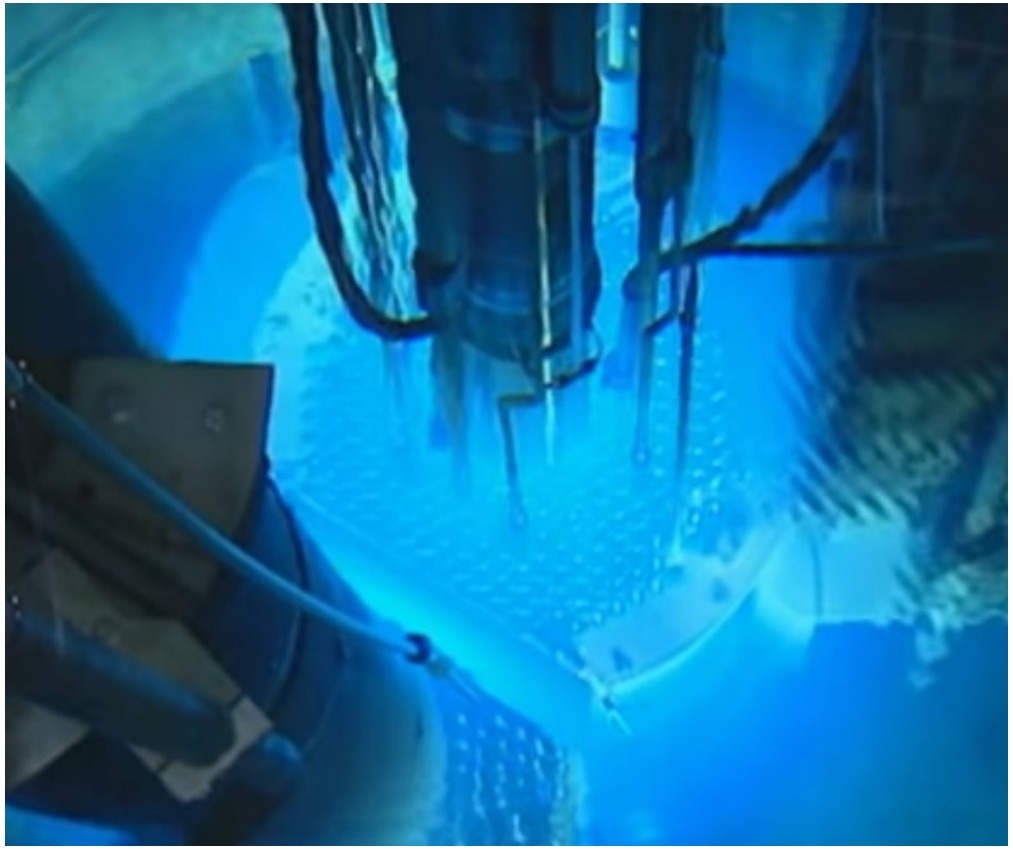
Nuclear Safety Oversight Activity at SNL

Recent staff oversight areas:

- 2021–Inspection of fuel elements from the Annular Core Research Reactor.
- 2019–Start-up of shipments to WIPP.
- 2018–Reactivity control system upgrade for the Annular Core Research Reactor.
- 2018–Electrical system safety.

Safety reviews underway:

- Conduct of Operations at Technical Area V.
- Emergency Preparedness and Response.



Annular Core Research Reactor Pulse

Questions?

Board communications, Resident Inspector weekly reports, public meeting and hearing information, and additional agency information are available at:

www.DNFSB.gov