DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Washington, DC 20004-2901

June 18, 2025

The Honorable Christopher Wright
Secretary of Energy
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-1000

Dear Secretary Wright:

The Defense Nuclear Facilities Safety Board (Board) recently conducted a review of critical infrastructure at the Waste Isolation Pilot Plant (WIPP). The review focused on shafts and escapeway hoists used by facility personnel to access WIPP's underground transuranic waste disposal area.

At WIPP, vertical shafts and associated hoists are used for worker emergency egress from a radiological event at the waste disposal area of a defense nuclear facility located more than 2,000 feet below ground. The Salt Handling Shaft exhibited significant age-related degradation, and all existing hoists relied on for underground worker evacuation at WIPP have been identified as obsolescent by site management**.**

Despite long-standing recognition of underlying problems, age-related degradation and technical obsolescence issues with the shafts and hoists used for emergency egress have not been addressed in a timely manner. Lessons learned from recent aging infrastructure management challenges should be used to consider improvements to site programs in support of WIPP's essential role as a linchpin in the national strategy for safe disposition of transuranic waste.

Pursuant to 42 United States Code § 2286b(d), the Board requests a briefing and report from DOE within 120 days of receipt of this letter that describe: (1) the timeline and plan to reduce the risk from degraded escapeway hoists to facility workers, including any interim compensatory measures necessary to ensure the safety of ongoing operations; and (2) an

evaluation of the adequacy of existing site aging infrastructure management processes based on recent experiences with degraded shafts and escapeway hoists.

Sincerely,

Thomas A. Summers
Acting Chairman

Enclosure

c: Mr. Roger Jarrell, Acting Assistant Secretary, DOE Office of Environmental Management
Mr. Mark Bollinger, Manager, Carlsbad Field Office
Mr. Joe Olencz, Director, Office of the Departmental Representative to the Board

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Report

March 28, 2025

Evaluation of Waste Isolation Pilot Plant (WIPP) Shafts and Escapeway Hoists

Summary. Members of the Defense Nuclear Facilities Safety Board's (DNFSB) staff conducted a review of WIPP shafts and escapeway hoists, with a particular emphasis on the degrading conditions of the Salt Handling Shaft and its associated hoist and conveyance system. Since vertical shafts and hoists provide the only means of emergency egress from WIPP's underground transuranic waste (TRU) disposal area, the staff team focused on evaluating potential impacts to facility worker safety during radiological events. The staff team examined technical documents, conducted on-site interactions with the Department of Energy's (DOE) Carlsbad Field Office (CBFO) and representatives of the site contractor, Salado Isolation Mining Contractors, LLC (SIMCO), on April 16, 2024, to discuss lines of inquiry. Preliminary staff observations were discussed with CBFO and SIMCO personnel on August 26, 2024.

The staff team identified two safety observations related to the implementation of DOE safety requirements and management of aging infrastructure:

- All escapeway hoists at WIPP are identified as obsolescent and may not perform reliably when required. As of February 2025, CBFO and SIMCO acknowledged that plans to replace or refurbish the obsolescent hoists remained in the conceptual phase and the overall schedule to complete this work was uncertain. These obsolescent hoists are needed to support evacuation of the subterranean nuclear facility during an emergency event, such as a fire or radiological release.

- The lack of timely resolution of long-standing safety issues involving age-related degradation of the Salt Handling Shaft and technical obsolescence of escapeway hoists indicates potential weaknesses in existing site processes governing aging infrastructure management.

CBFO and SIMCO management agreed that safety issues exist but noted that SIMCO's maintenance program and processes are monitoring structures, systems, and components and regular maintenance is applied to ensure continued operability. Further, SIMCO noted that the issues are identified in the site's risk register and the long-term mitigation strategy may be addressed by the Hoisting Capability Project, which is currently at the conceptual planning stage. The staff team acknowledges that CBFO and SIMCO management intend to further improve and replace obsolescent equipment.

Background. WIPP is the nation's only deep geological repository for nuclear waste. WIPP's mission is to provide a safe and permanent disposal location for transuranic wastes. The

current WIPP mission includes the disposal of both remote-handled and contact-handled waste in the underground repository. The disposal area is located approximately 2,150 feet beneath the surface in a deep-bedded salt formation. WIPP is a Nuclear Hazard Category 2 facility with the potential for significant onsite consequences.

WIPP Shafts, Hoists, and Conveyances—There are currently four WIPP shafts: Air Intake, Salt Handling, Waste, and Exhaust. The principal components of the first three WIPP shafts are the shaft, hoisting equipment, shaft conveyance, and supporting structure/equipment. The Exhaust Shaft consists of only a shaft. A fifth shaft, referred to as the Utility Shaft or Shaft 5, was recently completed but is not yet connected to the existing mine.

The Air Intake Shaft is the primary source of fresh air for underground ventilation. The Salt Handling Shaft is the only means of hoisting large quantities of mined salt. The Waste Shaft provides the only means of lowering TRU and mixed TRU for disposal. The Waste Shaft conveyance, Salt Handling Shaft conveyance, and Air Intake Shaft conveyance are used for primary, secondary, and tertiary emergency egress, respectively. The Exhaust Shaft provides the only path for the exhaust of air from the underground.

Salt Handling Shaft Salt Pocket—The Salt Pocket is located at the bottom of the Salt Handling Shaft and contains mining equipment and electrical controls for the Salt Handling Hoist. Over time, salt creep exerts continuous lateral compressive forces that have weakened the Salt Pocket's structural steel frame such that it has degraded and is demonstrating plastic deformation. Due to structural steel members of the frame having recently sheared, deflected, and snapped, site personnel relocated all electrical controls requiring manual operation to a station outside of the Salt Pocket to mitigate personnel exposure to the risk of falling objects. Ultimately, the structural issues prevented the salt bucket at the bottom of the conveyance from being aligned for loading, which resulted in the loss of normal salt removal capabilities. The Salt Pocket is being remined and refurbished by a subcontractor, Cementation, with an estimated project completion of June 2025.

Discussion. The DNFSB staff team has identified two safety observations related to the implementation of DOE safety requirements and management of aging infrastructure at WIPP.

Age-Related Degradation and Technical Obsolescence of Hoists—CBFO and SIMCO have identified all escapeway hoists as obsolescent. SIMCO is developing a Hoisting Capability Project that could ensure escapeway hoists provide a reliable means of egress, but this project has not progressed beyond the conceptual planning stage.

The three hoists of safety concern are associated with the Air Intake Shaft, Salt Handling Shaft and Waste Shaft. All three associated hoists are designated for use as emergency egress from the underground mine. In accordance with Title 30, Code of Federal Regulations, Part 57, *Safety and Health Standards—Underground Metal and Nonmetal Mines*, two escapeways (in this case, hoists) must be available to support a one-hour evacuation requirement while the mine is operational. The Waste Shaft Hoist can meet this time requirement while carrying a capacity of 75 personnel per trip with a normal underground occupancy limit of approximately 150 personnel. If the Waste Shaft Hoist is not available, operational practice is to reduce the number

of personnel in the underground to 60. This is within the Salt Handling Shaft Hoist capacity of transporting 15 personnel per trip with four trips per hour to meet the time requirement. The Air Intake Shaft conveyance can carry approximately five personnel per trip but could not by itself meet the one-hour time requirement under most conditions if the mine is operational. Failure to be able to evacuate within the one-hour time limit requires the availability of an underground refuge. SIMCO's predecessor procured eight refuge chambers after the 2014 WIPP Radiological Release event but never installed them.

All existing hoists relied on for underground worker evacuation at WIPP have been identified as obsolescent by site management**.** All three escapeway hoists have significant material condition issues based on age that affect reliability. The three hoists and associated components are over 30 years old and are no longer being manufactured. Maintaining the reliability of the three hoists have been difficult due to availability of vendors to supply refurbished components. For instance, in late 2024, the Air Intake Shaft Hoist was placed out of service due to a bad bearing but later returned to service with a limited expected life of one to two years of emergency service. The Salt Handling Shaft Salt Pocket exhibited salt creep that exerted lateral compressive forces that weakened the structural steel and prevented the alignment of the salt bucket for loading, which resulted in the loss of normal salt removal capabilities. SIMCO contracted for the remining and refurbishment of the Salt Pocket, but specific action to address the obsolescent hoist is outside this scope of work. The Waste Shaft Hoist motor was recently identified as requiring replacement. SIMCO plans to replace the motor during a future maintenance outage with their only available spare, which is already 30 years old. A decrease in reliability of the escapeway hoists is also evident in the frequent, recurring, unplanned maintenance needs. Troubleshooting has not always identified the root cause of outages but escapeway hoists are nevertheless returned to service after a successful operational test.

Although WIPP reduces mine occupancy limits when hoists are out of service, the reliability issues associated with these escapeways raise safety concerns about the ability to safely evacuate workers during a major fire or radiological release in the underground.

Management of Aging Infrastructure at WIPP—WIPP's shafts and escapeway hoists represent the only means of access to a defense nuclear facility located more than 2,000 feet underground, making them mission-essential and critical for worker evacuation during fire and radiological emergencies. In accordance with DOE directives, WIPP's contractor employs multiple methods to monitor and evaluate the condition, age-related degradation, and technical obsolescence of critical infrastructure. Condition assessments for all real property assets at WIPP are conducted at least every five years to comply with DOE Order 430.1C, *Real Property Asset Management*. Additionally, the site's nuclear maintenance management program incorporates evaluations for age-related degradation and technical obsolescence as required by DOE Order 433.1B, *Maintenance Management Program for DOE Nuclear Facilities*.

Site processes previously identified age-related degradation issues affecting the Salt Handling Shaft and recognized that hoists providing access to the underground transuranic waste disposal area were facing challenges due to technical obsolescence. Although current aging infrastructure management practices effectively identified these problems, existing processes have not ensured the timely and effective resolution of critical infrastructure issues. Evaluating

recent site experiences with shaft degradation and hoist obsolescence can provide important insights to strengthen WIPP's aging infrastructure management and system health monitoring protocols. Improvements in these areas will support WIPP's ongoing evolution from a limited-life pilot plant to a long-term facility expected to operate beyond 2050.

Conclusion. Despite long-standing recognition of underlying problems, age-related degradation and technical obsolescence issues with the shafts and hoists used for emergency egress have not been addressed in a timely manner. At WIPP, shafts and escapeway hoists are mission-critical infrastructure that are essential for worker egress in the event of an underground emergency. To support WIPP's enduring role as a linchpin in the national strategy for safe disposition of defense-related transuranic waste, DOE should identify a timely plan to address age-related degradation and technical obsolescence of shafts and hoists vital to worker safety. Additionally, DOE should evaluate the need to strengthen implementation of site processes governing aging infrastructure and equipment obsolescence management.

References

1. *Waste Isolation Pilot Plant Documented Safety Analysis*, DOE/WIPP 07-3372, Rev 9c, March 2024.

2. Waste Isolation Pilot Plant, *Design Engineering Report, Salt Station Structural Steel Evaluation*, Revision 0, April 25, 2017.

3. Waste Isolation Pilot Plant, *Technical Operability Evaluation, Underground Occupancy Limit per MSHA Requirements*, ETO-Z-310, October 14, 2019.

4. Waste Isolation Pilot Plant, *Technical Operability Evaluation, Salt Shaft Conveyance Continued Use,* ETO-H-401, May 15, 2017.

5. Waste Isolation Pilot Plant, *Salt Handling Shaft Hoist Operation,* WP 04-HO1002, Revision 14, December 02, 2013.

6. Waste Isolation Pilot Plant, *System Health Walkdown and Health Reports,* WP 09-CN3025, Revision 20, November 10, 2016.

7. Waste Isolation Pilot Plant, *Evaluation of Technical Operability Adequacy of Facility Systems, Structures, and Components,* WP 09-12, Revision 2, April 28, 2016.

8. W*aste Isolation Pilot Plant Risk and Opportunity Management Plan,* WP 15-PI.03, Revision 1, March 23, 2023.

9. W*aste Isolation Pilot Plant Nuclear Maintenance Management Plan,* Revision 6, August 12, 2021.

10. Department of Energy, *Maintenance Management Program for DOE Nuclear Facilities*, DOE Order 433.1B, Chg. 1, March 12, 2013.

11. Department of Energy, *Real Property Asset Management*, DOE Order 430.1C, Chg. 2, September 17, 2020.