

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

February 2, 2024

TO: Katherine R. Herrera, Acting Technical Director
FROM: Sonia G. Thangavelu, Cognizant Engineer
SUBJECT: Nevada National Security Site (NNSS) Report for January 2024

DNFSB Staff Activity: During the week of January 22, S. Thangavelu performed walk downs at various defense nuclear facilities at NNSS, observed operations, and discussed the status of safety basis deliverables and site activities with Nevada Field Office (NFO) and Mission Support and Test Services, LLC (MSTS) as part of routine oversight. On January 30, a DNFSB staff team participated in discussions with MSTS and NFO regarding the design pressure strategy for containment plugs for the Z-Pinch Experimental Underground System (ZEUS) testbed and U1a Complex Enhancement Project (UCEP) testbed projects at the Principal Underground Laboratory for Subcritical Experiments (PULSE) facility.

Positive Unreviewed Safety Question Determination (USQD) for Pressure Relief Dampers at PULSE. The safety function of the credited fire barriers and exhaust dampers in PULSE is to limit the migration of fire, heat, and smoke from a fire to the remainder of the underground facility. The exhaust dampers are credited to close in response to an alarm signal created by the credited fire detection system. However, the general service (GS) pressure relief dampers attached to the exhaust duct are designed to remain open in the event of a fire. The pressure relief dampers provide an air inlet to the exhaust ducting, maintain the flow of fresh air to the face of the fire barrier, and prevent excessive vacuum from forming in the exhaust duct due to the exhaust dampers closing. MSTS determined if excess vacuum occurred in the duct, the safety significant exhaust dampers may not adequately close, allowing heat and smoke to migrate across the fire barrier. Accordingly, the pressure relief dampers need to be credited to perform their intended function to ensure the exhaust dampers can perform their function. MSTS entered the potential inadequacy in the safety analysis process, which resulted in a positive USQD. MSTS issued a timely order to prohibit insertion of special nuclear material at PULSE until the functional classification of the GS pressure relief dampers is upgraded to safety significant. MSTS performed a commercial grade dedication for the pressure relief dampers in January and plans to perform an independent verification review in February. MSTS is developing the Evaluation of the Safety of the Situation for NFO approval.

Update to ZEUS Safety Basis. In December 2023, NFO completed its review of the 60% draft ZEUS preliminary documented safety analysis (PDSA) and issued a safety review letter. NFO concluded the draft PDSA meets preliminary design requirements per DOE Standard 1189-2006, *Integration of Safety into the Design Process*, and the design strategy is sufficient to continue with the design efforts. NFO identified eight conditions of approval and three open items to incorporate in the 100% draft PDSA submittal. Some of the conditions of approval include ensuring the credited anchor bolts and rock bolts can meet their safety functions through in-service inspections, evaluating inconsistencies for risk bin reduction of several controls in various accident scenarios, and adequacy of control derivation for several hazard scenarios. NFO identified the hybrid (water and inert) fire suppression system design and zero-point operation area crane design as open items that could impact the ZEUS project schedule.