

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

August 2, 2024

**TO:** Timothy J. Dwyer, Technical Director  
**FROM:** Sonia G. Thangavelu, Ph.D., Cognizant Engineer  
**SUBJECT:** Nevada National Security Site (NNSS) Report for July 2024

**DNFSB Staff Activity:** On July 25, 2024, the Board sent a letter to the Secretary of Energy that highlighted safety issues with the Enhanced Capabilities for Subcritical Experiments (ECSE) project portfolio and evaluation of seismic faults at the Principal Underground Laboratory for Subcritical Experimentation (PULSE). The Board's letter requested a brief and written report on actions the Nevada Field Office (NFO) and its contractor have taken or plan to take to ensure adequate characterization of seismic faults to derive new seismic controls; procure and implement a new device shipping container as an engineered control; adequate performance of the vessel confinement system; and improve means of egress to ensure safe evacuation of workers. The Board's staff conducted no onsite activities in July.

**Technical Safety Requirement (TSR) Violation of Flat-Top Critical Assembly Control Rods at National Criticality Experiment Research Center (NCERC).** The Flat-Top critical assembly consists of a fixed reflector, central core, two movable safety blocks, and control rods. The TSR states to enter shutdown mode, the Flat-Top critical assembly must be in the least reactive state (i.e., retraction of safety blocks and full withdrawal of control rods) following completion of an experiment. This configuration protects the critical assembly from an uncontrolled reactivity accident. On June 25, 2024, operators completed a high-power irradiation experiment on the Flat-Top critical assembly using the auto run-out command operation. During the operation, an operator noted a control rod did not fully withdraw, and several operators attempted to troubleshoot the automated system. The NCERC facility operations director instructed operators to enter shutdown mode and change the facility mode from hot operations to warm standby. On June 26, 2024, NCERC personnel concluded a violation occurred because the TSR shutdown mode was entered while the critical assembly was not in its least reactive state due to the stuck control rod. NCERC placed Flat-Top out-of-service and placed the building in an administrative hold.

**PULSE Seismic Exemption Request.** The Department of Energy (DOE) Standard 1020-2016, *Natural Phenomena Hazards Analysis and Design Criteria for Facilities* provides guidance to assign a seismic design category (SDC) to safety structures, systems, and components (SSCs) based on unmitigated consequences. The bounding seismic accident in the PULSE underground postulates a high explosive detonation from subcritical experiment activities, which results in an unmitigated dose that exceed 100 rem total to the collocated worker (CW). The Standard indicates this accident requires an assignment of SDC-3 to safety SSCs given the high consequences to the CW. In April 2024, NFO submitted an exemption request to the National Nuclear Security Administration (NNSA) cognizant secretarial officer for safety for approval. NFO requested an assignment of SDC-2 design criteria for the PULSE underground safety SSCs in lieu of the Standard's SDC-3 requirements. On July 17, 2024, the NNSA secretarial officer for safety approved NFO's exemption request with one condition of approval (COA). The COA states to revise the existing ECSE safety bases to evaluate the unmitigated consequences to the CW at 100 meters consistent with radiological dose criteria stated in DOE safety standards.