

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

August 6, 2021

**TO:** Christopher J. Roscetti, Technical Director  
**FROM:** Daniel B. Bullen, Ph.D., P.E., Cognizant Engineer  
**SUBJECT:** Lawrence Livermore National Laboratory (LLNL) Report for July 2021

### **Building 332 – Documented Safety Analysis (DSA) and Technical Safety Requirements (TSR)**

**Page Changes:** On July 2, 2021, Lawrence Livermore National Security, LLC (LLNS) transmitted proposed page changes to the Building 332 DSA and TSR to the Livermore Field Office (LFO) for review and approval. The page changes address issues related to safety system Conditions of Approval (COA), Recovery Glovebox Laboratory (RGL) resin impurity, and Hydrogen Gas Control System (HGCS) limiting conditions for operation (LCO) and surveillance requirements. The safety system COA addressed room ventilation system components and Increment 1 loft cross-bracing-frame and roof support structures. The RGL page changes addressed the evaluation of ion exchange resin purity to be used for RGL operations to determine if any level of impurities negatively affect the outcome of the accident analysis. The HGCS page changes address the LLNL response to LFO's comments on the LCO and surveillance requirements for the HGCS.

**Building 332 – COA Regarding Alarms Evaluation:** On July 13, 2021, LLNS provided responses to address an LFO requirement to evaluate alarms associated with safety class and safety significant systems that may require a facility operator, fire department, or off-shift maintenance mechanic response to take actions to comply with TSR commitments or verify facility conditions. LLNS performed an evaluation of the Building 332 alarms associated with safety class and safety significant systems. Operational safety systems with alarms that are credited in the DSA to provide notification of conditions and prompt specific worker responses include the Criticality Alarm System, the Fire Detection and Alarm System, and the Room Continuous Air-Monitoring System. LLNS verified that the safety significant alarms for these systems actuated in Building 332 and transmitted outside of Building 332 during the performance of TSR surveillance tests.

**Building 332 – New Thermal Analysis for the Passive Active Neutron (PAN) Shuffler:** On July 13, 2021, LLNS transmitted a new thermal analysis supporting a fire protection strategy for the PAN shuffler. The new thermal analysis re-baselines the fire model for Room 1377 using a new modeling methodology that integrates the current fire model results as input into a finite element analysis code to perform a heat transfer evaluation of the PAN shuffler. The new thermal analysis determines the air temperature-time curve for Room 1377 in the event of a hypothetical large fire. LLNS evaluated the impact of a fire on the PAN Shuffler, specifically the high-density polyethylene (HDPE) inside the PAN shuffler, and the potential contribution of the HDPE to the fire and the room air temperature-time curve. LLNS compared the results of the new thermal analysis to the American Society for Testing and Materials (ASTM) E119 Standard temperature-time curve that defines the fire rating of the Safety-Class room structure. LLNS concluded that the fire could cause a small portion of the HDPE to melt and potentially leak out of the PAN shuffler, form a pool, and combust. LLNS noted that the Room 1377 temperature-time curve remained bounded by the ASTM E119 Standard temperature-time curve for the entire duration of the fire.

**Extension to the Implementation Due Date for the 2019 Building 332 DSA and TSR:** On July 16, 2021, LFO approved a request by LLNS for a 30-day extension for the implementation of the November 2019 Building 332 DSA and TSR.