DEFENSE NUCLEAR FACILITIES SAFETY BOARD

December 6, 2024

TO: Timothy J. Dwyer, Technical Director
FROM: Daniel B. Bullen, Ph.D., P.E., Cognizant Engineer
SUBJECT: Sandia National Laboratories (SNL) Report for November 2024

Defense Nuclear Facilities Safety Board (Board) Staff Interactions: On November 12–14, 2024, the Board's cognizant engineer for SNL was on site to conduct routine oversight activities. The cognizant engineer, accompanied by the Board's Associate Technical Director (ATD) for Nuclear Facility Infrastructure and Projects (NFIP) and the Board's Director for Congressional and External Affairs, walked down Technical Area V (TA-V). The Board's team received a briefing on the status of the Combined Radiation Environments for Survivability Testing (CREST) facility design. In addition, the Board's team met with National Technology and Engineering Solutions of Sandia, LLC (NTESS) and Sandia Field Office (SFO) external affairs staff members. The cognizant engineer also met with NTESS and SFO managers and staff.

Evaluation of the Safety of the Situation (ESS) and Justification for Continued Operations (JCO) for the Annular Core Research Reactor (ACRR): On November 14, 2024, SFO approved the ESS and JCO for the ACRR Potential Inadequacy of the Safety Analysis (PISA) related to fuel cladding temperature. (See SNL Monthly Reports for June 2024 and July 2024). SFO completed a review of the ESS and JCO for the ACRR PISA in accordance with Department of Energy Standard 1104, *Review & Approval of Nuclear Facility Safety Basis Documents*. SFO concurred with the PISA declaration and the positive Unreviewed Safety Question Determination (USQD). SFO noted that the combined ESS/JCO indicates that the compensatory measures taken on June 25, 2024, are appropriate for the condition, based on current cladding temperature modeling calculations. The compensatory measures restrict reactivity insertion during pulsing to less than two thirds of the maximum pulse. With the operational restrictions in place, peak cladding temperatures are predicted to remain below the safety limit for all pulse and steady-state operations. SFO agreed that operations under the current restrictions are an acceptable risk due to limiting predicted peak cladding temperatures to a region in which the risk of cladding failure is known to be minimal.

The SFO approval letter also addressed recent computed tomography (CT) radiography of a safety rod, a control rod, and three fuel elements. The CT images raised questions about whether the ACRR Documented Safety Analysis (DSA) adequately bounds fuel conditions. In response to the conditions identified in the CT images, TA-V staff reevaluated the ACRR safety basis documents and determined that the source term and the potential accident consequences are bounded in the DSA. The DSA analysis uses release fractions for high burnup commercial fuel derived from U.S. Nuclear Regulatory Commission Regulatory Guide 1.183 (*Alternative Radiological Source Terms for Evaluation Design Basis Accidents at Nuclear Power Reactors*) to estimate the source term. TA-V staff also concluded that the DSA conditions would bound the ESS/JCO conditions. Finally, TA-V staff considered direct contact between fuel and cladding and concluded that temperatures resulting from the limited pulse height in the JCO will not present an additional challenge to the cladding. SFO concluded that with the operational restrictions in place, there is minimal immediate risk from operations during the one-year approval period for the JCO.