DEFENSE NUCLEAR FACILITIES SAFETY BOARD

June 2, 2023

TO: Katherine Herrera, Acting Technical Director
FROM: Daniel B. Bullen, Ph.D., P.E., Cognizant Engineer
SUBJECT: Sandia National Laboratories (SNL) Report for May 2023

Proposed Review Guidance for Reactor Protection Controls (RPC) for the Alternate Methodology for the Documented Safety Analysis (DSA) and Technical Safety Requirements (TSR): In June 2020, the Sandia Field Office (SFO) approved the use of an alternate methodology for hazard and accident analyses for the Annular Core Research Reactor (ACRR) DSA and TSRs that includes RPCs. Since that time, National Technology and Engineering Solutions of Sandia, LLC (NTESS) has provided SFO periodic updates on progress implementing the alternate methodology, most recently on December 15, 2022, during which SFO committed to provide guidance on RPCs to NTESS. On May 3, 2023, SFO provided the following guidance on RPCs. NTESS concurred with this guidance on May 24, 2023.

- RPCs are a third control classification, after safety class and safety significant, to protect a fourth receptor, the reactor fuel, after the facility worker, co-located worker, and public/environment,
- If controls are needed to protect the public, workers, or environment, then the controls will be designated as safety class or safety significant and not as RPCs,
- RPCs shall be developed in accordance with the Alternate Methodology by supplementing DOE-STD-3009-2014 with NUREG-1537 and other sources to ensure that the control set derived from the hazard and/or accident analysis provides adequate prevention of damage to the reactor fuel,
- RPCs will be integrated into the TSRs, and existing TSR rules will be used to implement all TSRs,
- The DSA shall contain a separate section to describe RPCs, and the TSRs shall include a summary description of the RPCs,
- Violation of an RPC is a violation of a TSR consistent with other violations of any TSR (e.g., an RPC Safety Management Program (SMP) will be considered to be violated if the SMP fails to a degree that renders the DSA summary invalid),
- RPCs shall be preventative and not mitigative as the stated purpose of RPCs in the approved alternate methodology is to protect the reactor and not the public, workers, or environment,
- RPCs will be designated as Design Features, Limiting Conditions of Operations, Specific Administrative Controls, or SMPs with a hierarchy similar to how safety class and safety significant controls are categorized (e.g., those RPCs included in the RPC SMP are of less importance), and
- When needed to justify conservatisms and/or uncertainties, models and calculations will be used to support numerical values and can be documented in the DSA, separate reports, or published calculations.

ACRR Pool Water Resistivity and Pool Stratification Positive Unreviewed Safety Questions Determination (USQD): On May 2, 2023, NTESS issued an Occurrence Reporting and Processing System (ORPS) report for a positive USQD in response to a Potential Inadequacy of the Safety Analysis noting that ACRR pool water resistivity and pool stratification issues represented a potential increase in the probability of an accident previously evaluated in the facility's approved safety basis. NTESS employs pool water resistivity measurements to prevent long-term corrosion and damage to the ACRR fuel cladding. ACRR facility management implemented compensatory measures outlined in a directive issued on April 25, 2023, that enhanced ACRR pool mixing to combat potential stratification of the pool water. NTESS submitted an Evaluation of the Safety of the Situation (ESS) and a Justification for Continued Operations (JCO) to SFO on May 15, 2023. NTESS noted that the facility is operating normally and requested that all normal operations remain permissible while the JCO is in effect. SFO is evaluating the ESS and JCO.