DEFENSE NUCLEAR FACILITIES SAFETY BOARD

July 4, 2025

TO: Technical Director
FROM: Sandia National Laboratories (SNL) Cognizant Engineer
SUBJECT: SNL Report for June 2025

Defense Nuclear Facilities Safety Board (Board) Staff Interactions: A Board staff review team was on site from June 9 through 12, 2025, to conduct a review of the Annular Core Research Reactor (ACRR) Fuel Health Program.

ACRR Fuel Health Program Review: From June 9 through 12, 2025, a Board staff review team was on site at SNL to conduct a review of the ACRR Fuel Health Program. The review team completed discussions with Sandia Field Office (SFO) and National Technology and Engineering Solutions of Sandia, LLC (NTESS) staff to evaluate the effectiveness of the ACRR Fuel Health Program, including the processes and criteria for conducting fuel element cladding inspections, the inspection techniques and frequency, and any corrective actions resulting from inspection results. The review team also assessed whether the inspection methods are appropriate to evaluate fuel cladding health, including an evaluation of the tools and techniques developed to conduct the fuel inspections. The review team walked down the ACRR facility and discussed reactor operations and fuel element inspections with ACRR managers and staff. In addition, the review team observed a computed tomography x-ray scan of an irradiated ACRR fuel element.

Potential Inadequacy of the Safety Analysis (PISA) for the ACRR: On June 10, 2025, the ACRR facility manager declared a PISA based on analysis of the results of historical nuclear reactor transient experiments that provided additional information on potential facility worker consequences in analyzed accidents for the ACRR facility. The Atomic Energy Commission conducted numerous reactor transient experiments in the 1960s at the National Reactor Testing Station (now Idaho National Laboratory) as part of the Special Power Excursion Reactor Test (SPERT) Program. Two tests in the SPERT program employed a UO_2-fueled, open-pool reactor to conduct potentially damaging transients. The tests included well-instrumented worker dosimetry phantoms around the reactor vessel (approximately five feet from the reactor tank) and film badges suspended from the reactor bridge directly above the pool. Based on the results of the SPERT tests, ACRR staff calculated a scaling factor comparing the measured radiation dose from the SPERT experiments to the expected dose from an ACRR pulse, assuming a proportional relationship between radiation dose and pulse power. ACRR staff applied the scaling factor to approximate the dose to a facility worker for the postulated ACRR waterlogged fuel element accident. ACRR staff determined that the potential worker dose exceeded the threshold for the current worker consequence analyses in the ACRR documented safety analysis. The ACRR facility manager issued a directive that personnel shall remain five feet or farther from the edge of the ACRR reactor pool tank while the reactor is operated in pulse mode. NTESS will submit an Evaluation of the Safety of the Situation and a Justification for Continued Operation to SFO by July 17, 2025.