DEFENSE NUCLEAR FACILITIES SAFETY BOARD

September 20, 2019

TO: Christopher J. Roscetti, Technical Director
FROM: Matthew Duncan and Brandon Weathers, Resident Inspectors
SUBJECT: Oak Ridge Activity Report for Week Ending September 20, 2019

Modular Facility Operation: CNS personnel are completing engineering evaluations to justify that a nuclear criticality accident is precluded for operations that are planned within a new modular facility (see 7/5/19 report). Two series of burn tests have been conducted by the Y-12 Development organization. The first set of burn tests used small sample coupons and the results were scaled to the production values of mass and surface area. When scaled to the production mass, the result was close to the upper safety limit used in the nuclear criticality safety calculations. A second burn test was performed with a larger sample mass and still resulted in a scaled result that was close to the upper safety limit. Additional assumptions and measures are being considered by CNS to support the justification that the operation will remain subcritical during credible abnormal conditions. NPO recently transmitted an assessment plan to CNS that will evaluate the project's determination that the modular facility is non-nuclear and that a nuclear criticality accident is not credible.

Building 9212: A fact finding was reconvened this week to gather additional information after two 55 gallon drums were found to be over the allowed fissile material mass limit established by the nuclear criticality safety evaluation. The discovery was made by a manager after he requested a report from the nuclear material control and accountability software system to review loadings of combustible drums in storage arrays within his area. After identifying the first drum, nuclear criticality safety personnel were contacted and the manager found a second overloaded drum while reviewing an updated report that he requested for additional drums. No prior nuclear criticality safety deficiencies could be found for the two drums. A nuclear criticality safety administrative control boundary was established and a deficiency was issued. Prior to being transferred to the storage array, the drums underwent non-destructive assay (NDA) scans in the NDA laboratory within Building 9212. The NDA equipment software alerts the user when a result is above the nuclear criticality safety limit for the container loading. A review of the NDA equipment software log confirmed that the alert was given, but the NDA operators could not recall why they did not enter the appropriate abnormal operating procedure. The nuclear material control and accountability software does not flag nuclear criticality safety mass violations and the NDA equipment software alert can be acknowledged with a mouse click. The procedure on containers and material handling has fissile material handing requirements that state only containers loaded in accordance with their respective limits are to be used and to confirm fissile material loading before movement or use. Despite these requirements, the drums were moved from the NDA laboratory to a storage array and one of the drums was moved five times within its material balance area. In response to this discovery, other fissile material storage areas of Building 9212 were investigated and no additional violations were found.

Later on the day of the fact finding, a NDA laboratory measurement of an unrelated, newly packaged drum found that it was above the fissile material mass limit for the container. This time when the NDA equipment software alerted the NDA operator, the appropriate actions were taken in accordance with the applicable abnormal operating procedure.