DEFENSE NUCLEAR FACILITIES SAFETY BOARD

March 5, 2021

TO: Christopher J. Roscetti, Technical Director
FROM: Matthew Duncan and Brandon Weathers, Resident Inspectors
SUBJECT: Oak Ridge Activity Report for Week Ending March 5, 2021

Nuclear Criticality Safety: CNS determined that several plutonium-beryllium sealed sources in an out of service system in Building 9212 do not have a criticality safety evaluation or equivalent as required by the current nuclear criticality safety program. A nuclear criticality safety engineer discovered the issue while working as part of a team that is planning for eventual deactivation of the process, which has not operated in more than 25 years. CNS established an administrative control boundary around the applicable area and issued a nuclear criticality safety deficiency. The combined fissile mass of the sealed sources exceeds the subcritical single parameter limit for aqueous mixtures in ANSI/ANS-8.1-2014, *Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors*. CNS determined there was no immediate criticality hazard considering that the fissile mass of each source is below the subcritical single parameter limit, that they are physically isolated from each other, and that the process is out of service. The responsible manager elected to use the event investigation process. The investigation and critique resulted in several actions, including (1) performance of an analysis of the sources, (2) implementation of any additional controls, (3) performance of an extent of condition of all other fissile or fissionable sealed sources at Y-12, and (4) revision of the applicable Enterprise and Y-12 command media.

CNS recently performed a nuclear criticality safety operational review for a stack ventilation system in Building 9215. The personnel conducting the review discovered three previously unidentified low points in the ductwork that could allow liquid to accumulate to a depth that would require installation of a drain per the criticality safety evaluation. Nuclear criticality safety engineers classified the event as a minor non-compliance. Their investigation of historical non-destructive assay measurements indicated U-235 masses were well below the subcritical single parameter limit for aqueous mixtures in ANSI/ANS-8.1-2014 and showed little change in the U-235 holdup between 2001 and 2016 for these regions of the ductwork.

CNS transmitted a report to NPO that described what they consider the key actions that have been taken and that remain to be completed to address issues and improve the nuclear criticality safety program. As a result of feedback from NPO last year, CNS categorized the actions as either corrective actions or improvement actions. Some of the areas with key corrective actions that are still in progress include process drift, training, the criticality safety evaluation update cycle, and the inadvertent accumulation prevention program. CNS forecast that the key corrective actions will be completed this fiscal year and the key improvement actions will be completed by the end of the calendar year.

Building 9212: Chemical operators successfully executed a revised abnormal operating procedure to disposition a loaded reduction reactor vessel that had a damaged liner (see 7/31/20 report). The operators separated the broken liner from the fissile material and reactants. Then they loaded the fissile material and reactants into a different reactor vessel with an intact liner for further processing.