

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

April 12, 2019

TO: Christopher J. Roscetti, Technical Director
FROM: Matthew Duncan and Brandon Weathers, Resident Inspectors
SUBJECT: Oak Ridge Activity Report for Week Ending April 12, 2019

Building 9212: In February 2019, nondestructive assay (NDA) measurements were performed for the ultrasonic chip cleaning (USC) system's 1st Stage Evaporator / Stripper (see 3/8/19 report). The NDA gamma scan results were higher than expected and resulted in CNS personnel draining liquids from the equipment to determine whether the NDA results were indicative of fissile material in solution or deposited on the equipment internals. The results from sampling the drained liquids have recently been completed and indicate that most of the fissile material is deposited on the equipment internals. Calculations were also performed to estimate what mass of fissile material correlates to the NDA gamma scan results. The estimated mass of uranium-235 (including uncertainty) ranges from 2 kg to 10 kg in the Evaporator / Stripper and an additional estimate of 0.4 kg to 2 kg in the Vapor Body component. The USC system's criticality safety evaluation does not evaluate this accumulation of fissile material.

A similar discovery of fissile material accumulation not evaluated in the USC system's criticality safety evaluation resulted in a 3C-4 Occurrence Report in June 2018 (see 6/4/18 report). As of this week, CNS does not plan to submit a new Occurrence Report or update the June 2018 report based on the recent NDA results. The resident inspectors observed the following: (1) the Vapor Body is a similar diameter as the Phase Separator Tanks noted in the June 2018 Occurrence Report; (2) the total estimated fissile material in the Evaporator / Stripper and Vapor Body are greater than the previous discovery; and (3) this uranium accumulation was not discovered during the field walkdowns performed in April 2018 as part of CNS's immediate actions taken to address multiple uranium accumulation discoveries in 2017 and 2018. The NDA gamma scan that identified this accumulation was performed in February 2019 while other areas of the USC system have been known to have uranium accumulation concerns since June 2018. The USC system has remained on hold (suspended) since April 2018.

Building 9212: As previously reported, due to the possibility that anhydrous hydrogen fluoride had been released, the Plant Shift Superintendent declared an operational emergency further classified as an alert on Thursday, April 4 (see 4/5/19 report). The small leak was confined inside the cylinder enclosure which was designed to safely handle a spill of even the entire contents of a cylinder. The scrubber safely removed the hydrogen fluoride vapor from the enclosure exhaust, as designed. Chemical operators continued to operate the scrubber until the afternoon of April 5, when it was turned off temporarily to ensure the leak had stopped, per procedure. It had. CNS decided to keep the scrubber running over the weekend and continue to monitor the concentration. By Sunday afternoon, that monitoring was no longer deemed necessary. This week, CNS held extensive fact finding and critique meetings where CNS reviewed what happened and considered areas where improvements might be warranted.

Based on a visual inspection, a hole was identified in a calibration valve as a likely source of the leak. CNS is evaluating options to repair the leak and safely disposition the hydrogen fluoride that remains in process.