

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

July 16, 2021

**TO:** Christopher J. Roscetti, Technical Director  
**FROM:** Matthew Duncan and Brandon Weathers, Resident Inspectors  
**SUBJECT:** Oak Ridge Activity Report for Week Ending July 16, 2021

**Nuclear Criticality Safety:** Since October 2020, CNS has been collecting data on residual material that operators remove from the bottom of chip cylinders after cleaning them (see 10/30/20 report). In addition to the removable material, personnel were aware of material that was fixed to the bottom of the cylinders and began performing non-destructive assay measurements of the emptied cylinders. Based on an evaluation of the data that had been collected to date, CNS reported this issue in DOE's Occurrence Reporting and Processing System due to the need for additional nuclear criticality safety controls on the two-cylinder chip dollies. One of the compensatory measures that CNS implemented in October was to reduce the chip cylinder maximum loading mass. Prior to the loading restriction, operators had previously loaded many chip cylinders above the lower loading limit specified in the compensatory measure. Last Friday, CNS issued direction to place those previously loaded chip cylinders that were above the lower loading limit under administrative control. The maximum combination of removable material and fixed holdup that was known in October, combined with the loading information for chip cylinders in storage, would have resulted in several chip cylinders being over the original maximum loading limit. CNS' uncertainty about the origin of the residual material contributed to the long amount of time that this issue was effectively in a data collection and evaluation state. CNS is considering whether improvements can be made to more timely resolve issues such as this. CNS had previously performed a nuclear criticality safety analysis that supported the conclusion that the overloaded chip cylinders had margin to a criticality accident under abnormal conditions during storage.

CNS has not performed chemical analysis of the residual material removed from the chip cylinders to determine exactly what it is. Many of the chip cylinders had been in storage for an extended period of time. The resident inspectors reported a prior event where unexpected characteristics (visual appearance and pyrophoric behavior) were observed when operators compressed machining chips that had been stored for a prolonged period (see 12/7/18 report). In 2018, CNS also discovered that a gel-like substance contained uranium holdup in the ultrasonic chip cleaning system that is used to clean uranium chips after unloading them from the chip cylinders (see 6/21/18 report). Without further investigation of the solvent and residual material to better characterize it and understand changes that may have occurred to the uranium chips, it is difficult to determine whether any of the prior events are correlated to the current issue or if the length of storage time is a factor to consider in developing safety requirements.

**Y-12 Infrastructure:** CNS recently found a bagged HEPA filter that had mud-like residue in a storage area with a floor that appeared to be wet. Last year, CNS found rainwater on the floor in the same area (see 11/13/20 report). The resident inspectors reviewed prior water intrusion events and found that rainstorms repeatedly result in several nuclear criticality safety impacts, with many of the same areas affected. CNS treats most of these events in a reactive manner. For instance, CNS continues to store used HEPA filters on the floor in an area with known water issues and recommends storing them on pallets only after discovering water impacts.