

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

October 12, 2018

TO: Christopher J. Roscetti, Technical Director
FROM: Matthew Duncan, Resident Inspector
SUBJECT: Oak Ridge Activity Report for Week Ending October 12, 2018

DNFSB Staff Activity: C. Berg and S. Thangavelu were at Y-12 to attend training and provide resident inspector augmentation.

Building 9212: The technical safety requirements for Building 9212 have an operational restriction for “delivery of aqueous secondary extraction solutions that may contain bulk organic tributyl phosphate solutions to heated locations.” If these solutions come into contact with concentrated nitric acid at high temperature, red oil (nitrated organic material) can form and rapidly decompose, resulting in exothermic generation of gases. If not adequately vented, an overpressurization event and even an explosion can occur under certain conditions. An explosion could cause significant consequences to any nearby workers. It could also cause an inadvertent nuclear criticality due to equipment and fissile material movement. The operational restriction supplements several credited controls derived from the safety analysis. There are two credited passive engineered controls. The phase separators prevent bulk transfer of organic tributyl phosphate solutions from the solvent extraction process. Component vents ensure that any red oil or fume-off reaction will not result in explosive failure of system components. There is also a specific administrative control that includes pre-run density checks to help ensure proper operation of the phase separators. CNS recently submitted a proposed change to the safety basis that would provide an exclusion to the operational restriction to allow concurrent operation of the secondary extraction and high capacity evaporator processes. NPO reviewed the proposal and approved it via a safety evaluation report with no conditions of approval. NPO noted that the high capacity evaporator has excess vent capacity based on conservative calculations and that eight years of post-run density check data demonstrated that the phase separators have been performing their safety function ever since the specific administrative control for pre-run density checks was implemented.

Highly Enriched Uranium Materials Facility (HEUMF): NPO approved a revised justification for continued operations and evaluations of the safety of the situation related to unanalyzed materials within HEUMF (see 5/4/18, 5/11/18, 5/18/18, and 6/8/18 reports). Specifically, the documented safety analysis for HEUMF did not analyze certain ignitable, potentially pyrophoric, or expandable materials. CNS concluded that the materials could have higher respirable release fractions than currently analyzed for fire scenarios. CNS proposed two technical safety requirement-level compensatory measures: (1) ensure containers with the ignitable material are not moved or opened and (2) maintain a label on the containers that prohibits repackaging into specific containers without inner containment vessels. CNS also concluded that an inadvertent nuclear criticality as a result of a localized fire is not a concern due to the credited safety-significant fire suppression system protecting container integrity. As a result, CNS recognized the slight increase in dose consequences to the public and workers for fire scenarios, but concluded that the compensatory measures coupled with the fire suppression system provide adequate protection.