

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

February 28, 2020

TO: Christopher J. Roscetti, Technical Director
FROM: Matthew Duncan and Brandon Weathers, Resident Inspectors
SUBJECT: Oak Ridge Activity Report for Week Ending February 28, 2020

Building 9212: Further investigation into the unexpected material found in a phase separator led to discovering that the initially suspected cause is not likely the source (see 2/14/20 and 2/21/20 reports). Twenty-one safe bottles were poured into tanks that feed the high capacity evaporator. This phase separator is upstream of the high capacity evaporator and is a design feature credited to reduce the frequency of explosions due to fume-off or red oil reactions by preventing bulk organic material from reaching heated equipment. A safe bottle from the analytical chemistry laboratory was initially suspected to cause the unexpected material. When the phase separator was drained, the unexpected material did not break up in the manner that would have been expected based on the contents of material sent from the analytical chemistry laboratory. Instead, it appeared similar to organic material that is separated from safe bottles in Building 9212. One of the twenty-one safe bottles contained material from this source in Building 9212. Typically, safe bottles from this Building 9212 source contain an organic layer on top of an aqueous layer. After separating the organic layer, the aqueous layer can be processed in the high capacity evaporator system. Samples are collected of the bottom layer and sent to the non-destructive assay laboratory. The bulk of the bottom layer (assumed to be aqueous) was poured into the high capacity evaporator system tanks. Following draining and rinsing the system last week, the non-destructive assay sample from the Building 9212 safe bottle solution was checked to determine if it was an organic solution. The immiscibility and density checks confirmed it to be an organic solution. The two phases that were in this sample bottle, prior to separating the top layer, were both organic and thus the bottom organic layer was poured into the high capacity evaporator system tanks. During the reconvened fact finding meeting this week, the procedure for filtering and separating a phased layer from a safe bottle was put on hold while changes are developed and implemented to require that the bottom layer of the safe bottle solution be checked to determine if it is an organic solution.

While material transferred from the analytical chemistry laboratory is no longer suspected to have caused the event, it still poses an issue related to the Building 9212 safety basis. Chemicals in that safe bottle were not on the list of analyzed and approved materials for Building 9212, but were allowed to be transferred into the facility. CNS has declared a potential inadequacy of the safety analysis and is evaluating whether an unresolved safety question exists due to this transfer.

Building 9212: A casting stack tipped over while it was being moved along a conveyer into a cooling tunnel. The tip over occurred when the top of the crucible contacted a gate that is manually raised to allow movement of the casting stack. An equipment malfunction is suspected. Administrative control was established in the area and appropriate notifications were made. The nuclear criticality safety engineer provided guidance for the 15 foot administrative boundary to remain around the spilled material. The primary and backup breathing air systems were inoperable during the casting operation and resulted in a delay in being able to access the area and correct the situation. Prior to resuming operations, one of the corrective actions is to establish a method to ensure the gate is fully open before transferring a casting stack assembly.