

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

TO: Steven Stokes, Technical Director
FROM: William Linzau and Rory Rauch, Site Representatives
SUBJECT: Oak Ridge Activity Report for Week Ending August 1, 2014

Staff member M. McCoy was at Y-12 to support and observe site rep activities.

Building 9212/Nuclear Criticality Safety (NCS): This week, Building 9212 personnel encountered two abnormal casting events while attempting to cast surplus enriched uranium alloys into slugs. Both events occurred at essentially the same time. NCS personnel classified one of the events as a “mis-pour,” as unusual quantities of molten metal had flowed outside the mold and crucible in an uncontrolled geometry. In the other event, operators observed a crack in the crucible upon lowering the casting stack assembly from the furnace. Shortly thereafter, both assemblies began oxidizing in a more energetic manner than typical. At that time, the cracked crucible broke into several pieces, creating another uncontrolled geometry condition. Operators later observed cracking in the mold for the other assembly. The shift manager established administrative control of the area in accordance with NCS protocols. NCS personnel instructed operators to isolate the cooling water and hydraulic systems in order to minimize sources of moderation in the furnace. Both assemblies took longer than typical to cool to an acceptable handling temperature. The assembly with the fractured crucible took several days.

During the critique, NCS analysts indicated that these conditions, though unexpected, were bounded by the current analysis. CNS personnel indicated that a potential common contributor to the events was a failure to recognize a potential overflow condition, given that the operations involved some lower density metals at masses similar to those used for casting operations with pure uranium. The CNS casting subject matter expert (SME) also indicated that certain metals can react aggressively with the crucible and mold materials if exposed directly to these materials at the temperatures required for alloy casting. The CNS Y-12 Site Manager has temporarily suspended casting operations, pending the development of short-term corrective actions. CNS management has initiated an investigation to determine the cause of these events.

Unreviewed Safety Question (USQ) Program: NPO recently approved a revision to the Y-12 USQ procedure that involved two noteworthy changes. The first change added an appendix to the USQ procedure that contained more detailed guidance for analysts to use when processing changes or potential inadequacies in the safety analysis involving NCS documents. The second noteworthy change revised the definition of “margin of safety” to state that a margin of safety must be associated with a Safety Limit; linked to a Safety Class structure, system, or component; and explicitly defined in the Documented Safety Analysis (DSA) and Technical Safety Requirement (TSR) Bases. There are currently no Safety Limits in the Y-12 TSRs.

This week, the site reps, members of the Board’s staff, NPO and CNS representatives, and DOE advocates of the new definition held a conference call to discuss the recent change to the definition of margin of safety in the Y-12 USQ procedure. The Board’s staff SMEs expressed concern that the new definition was non-conservative and inconsistent with the definition in DOE G 424.1-1B, *Implementation Guide for Use in Addressing Unreviewed Safety Questions*. CNS and NPO personnel agreed to consider changing the margin of safety definition in the Y-12 USQ procedure to one that could be applied to the types of operations, hazards, and controls identified in Y-12 DSAs. Moving forward, Board staff and DOE SMEs plan to continue the dialogue regarding potential clarifications to the margin of safety definition in DOE G 424.1-1B.