

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

TO: Timothy Dwyer, Technical Director
FROM: Rory Rauch, Site Representative
SUBJECT: Oak Ridge Activity Report for Week Ending October 26, 2012

Board member S. Sullivan and Board staff member R. Tontodonato visited Y-12, Oak Ridge National Laboratory, and the Transuranic Waste Processing Center this week to discuss recent areas of concern related to nuclear safety and to walk down select defense nuclear facilities.

Microwave Casting: B&W's reattempt to melt uranium metal in the production microwave furnace (see 8/17/12 report) has been delayed by two recently discovered safety basis issues. The first issue arose after project team members discovered cracking in the insulation during the latest round of startup testing in August 2012. The cracking led safety basis personnel to postulate that shards of cracked insulation could block a safety-significant pressure relief device inside the microwave. The device was credited to prevent personnel injury from the shrapnel caused by overpressurization of the furnace following water intrusion. B&W addressed the issue by performing a technical evaluation that demonstrates the scenario is not credible and subsequently changing the Building 9212 safety analysis report to eliminate the accident scenario and control in question. NPO recently approved the change.

The second issue arose last week after a quality engineer discovered that the insulation used on the lid of the crucible, which is credited as a safety-significant design feature, may not meet safety basis requirements. Specifically, there was no documented proof that the insulation had an attribute that was explicitly identified in the safety basis as being necessary for the insulation to perform its safety function. B&W declared a violation of a credited hazard control since it operated with this discrepant insulation during the initial attempts to melt uranium metal in the microwave furnace last fiscal year. B&W is re-evaluating the calculation supporting the control to determine whether this attribute is necessary for the insulation to perform its credited safety function. B&W also plans to evaluate how this insulation passed quality acceptance inspection last year and why the issue was never communicated to safety basis personnel. Startup of the production microwave furnace will be delayed until B&W can resolve this issue.

Criticality Safety: This week, during field verification activities supporting the implementation of a revised criticality safety evaluation, production personnel discovered that two fissile material storage areas in Building 9204-2E did not meet the minimum 5 ft. separation distance required by the currently effective criticality safety evaluation (personnel measured the distance at 4.5 ft.). Production personnel took immediate actions consistent with abnormal condition response procedures. The responsible criticality safety engineer subsequently directed production personnel to take one of the arrays out of service before restoring personnel access to the area. Criticality safety engineering has developed the technical basis to support returning the array to service, but production personnel plan to keep it out of service until the new version of the criticality safety evaluation has been fully implemented. Production personnel also evaluated the other fissile material storage arrays in Building 9204-2E and found that they comply with the 5 ft. spacing requirement. B&W plans to critique the issue next week.

Airborne Release Fraction (ARF)/ Respirable Fraction (RF): B&W is conducting experiments to characterize the nature and amount of uranium particles dispersed when uranium metal is subjected to a fire. The experiments could provide a basis for using ARF and RF values in the safety basis that are lower than the bounding values specified in DOE Handbook 3010-94 (see the Board's 1/17/08 letter to NNSA). B&W recently completed Phase II testing, which was intended to establish an order-of-magnitude range of ARF/RF values. These runs yielded ARF/RF values consistent with the median values in the DOE-HDBK-3010-94. Phase III testing will involve a parametric evaluation needed to produce statistically significant results.