

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

February 19, 2021

TO: Christopher J. Roscetti, Technical Director
FROM: Matthew Duncan and Brandon Weathers, Resident Inspectors
SUBJECT: Oak Ridge Activity Report for Week Ending February 19, 2021

Building 9212: CNS determined that a potential inadequacy of the safety analysis exists for the oxide conversion facility. During a review, NPO raised a question about the hydrogen/uranium transfer interlock safety function. The technical safety requirements basis stated that this interlock is credited to provide protection against the release of hydrogen to the UO₃ glovebox or the hydrofluorination bed to prevent creation of a flammable mixture. However, the safety function for this control in the documented safety analysis does not include the hydrofluorination bed. CNS determined that the interlock needs to protect both the UO₃ glovebox and the hydrofluorination bed, as stated in the technical safety requirements. No compensatory measures were needed since the current control is adequate.

Separately, NPO issued a safety evaluation report to approve changes associated with a criticality safety evaluation for the air emissions control exhaust system. CNS previously evaluated this system with four separate criticality safety evaluations and has now consolidated the analysis into one. CNS proposed a revision to the wording of an existing specific administrative control for sampling the contents of certain tanks. In the approval, NPO directed one change to include additional features of the control that improve its reliability.

Projects: NPO concurred with CNS's determination that a project to install a new high-energy linear accelerator x-ray system in Building 9204-2E does not constitute a major modification per 10 CFR 830, *Nuclear Safety Management*, and DOE Standard 1189-2016, *Integration of Safety into the Design Process*. The project would replace an existing 9 MeV system with a commercially available system with switchable nominal peak beam energies of 9 MeV and 15 MeV. The system is capable of energies up to 20 MeV. In addition, the project would likely upgrade a computed tomography part positioner. For now, only 9 MeV operation is planned and CNS's major modification determination and NPO's approval was contingent on preventing operation at higher energy levels. Future operation at 15 MeV—which NNSA expects will be required for future missions—will require a separate project and a new major modification determination. It would also require compliance with DOE Order 420.2C, *Safety of Accelerator Facilities*, which is normally required for x-ray generators capable of energies above 10 MeV. CNS proposed three controls to prevent use of the system at energies above 9 MeV, a mechanical lock and blocking device, configuration management of utilities to the energy level switch, and a software interlock provided by the vendor. None of these controls would be safety significant although one would be graded as risk significant. Based on this, the major modification determination answered yes for whether it would change an existing process or add a new process resulting in the need for a safety basis change requiring DOE approval. For all other questions in Table 5-1 of DOE Standard 1189-2016, CNS answered no. For example, regarding whether it involves a hazard not previously evaluated in the documented safety analysis, CNS noted operation at 9 MeV is already analyzed and determined there was no credible failure mode of the three controls combined, and that the switch on the system would preclude inadvertent switching of modes.