

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

November 25, 2022

TO: Christopher J. Roscetti, Technical Director
FROM: B. Caleca, P. Fox, and P. Meyer, Resident Inspectors
SUBJECT: Hanford Activity Report for the Week Ending November 25, 2022

Waste Treatment Plant (WTP): In August, BNI proposed further tailoring of their application of NFPA 69, *Standard on Explosion Prevention Systems*, to support design and operation of the High-Level Waste (HLW) Facility. Their action is relevant to a recent issue that the Board communicated to DOE. In a letter dated July 19, 2022, the Board noted that the current hydrogen control strategy for the HLW facility is inconsistent with the approved safety requirements for the WTP project. Without tailoring, NFPA 69 would normally require controls to maintain combustible gas concentrations at or below 25 percent of the lower flammable limit (LFL) unless the controls include automatic instruments with safety interlocks. In that case, a control limit of 60 percent of the LFL is permitted. BNI's previous DOE approved tailoring of the standard required BNI to establish controls that maintained combustible gas concentrations at or below 25 percent of the LFL during normal operations but allowed concentrations up to the LFL under upset conditions. Their justification for this tailoring is based on their conservative approach in determining combustible gas generation rates, mixing frequencies, combustible gas release quantities, and vessel headspace volumes. The changes BNI proposed to their previous tailoring are applicable only to the four melter feed preparation and feed vessels in the HLW Facility. Under the revised tailoring, combustible gas concentration in those vessels will now be allowed to exceed the LFL for up to 30 minutes during accident and upset conditions that render the agitators in the four HLW feed vessels inoperable. Without operable agitators, the waste in the vessels cannot be mixed and the combustible gases will build up until an episodic release occurs. The size of the release may be large enough to cause combustible gas concentrations above the LFL in the vessel headspace until the gases can be removed by a forced air purge. The air purge system will be sized to reduce the concentrations below LFL within the 30-minute limit. BNI's justification in the revised safety requirements document simply states that the event will occur but does not explain why it should be allowed. This week DOE approved the revised tailoring, which is now consistent with BNI's hydrogen strategy, without any conditions. The technical evaluation report that accompanies the approval provides some additional context to justify the approach. It notes there are no ignition sources in the vessel headspace besides the agitator and notes that restart of agitators will be controlled by an administrative control. The report also credits the conservatism of hydrogen generation calculations stating that actual event frequency and time at risk would be lower than shown in the calculations. Lastly, it states that emergency management actions are unlikely to allow the time at risk to continue indefinitely. Adequacy of this approach remains dependent on the development of supporting controls.

Tank Side Cesium Removal (TSCR) System: DOE approved the revised justification for continued operation (see 10/28/2022 report) and WRPS personnel are working to clean up the spilled waste material discovered last month (see 11/4/2022 reports). The leaking material had been located around a pressure indicating transmitter (PIT) that is attached to the process system by Swagelok® connections and surrounded by shielding. After the shielding was removed, personnel noted that one of these connections was the likely source of the leak, and the weight of the shielding may have put torsional stress on the connection causing it to loosen.