

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

August 25, 2017

**TO:** S. A. Stokes, Technical Director  
**FROM:** M. T. Sautman and Z. C. McCabe, Resident Inspectors  
**SUBJECT:** Savannah River Site Resident Inspector Report for Week Ending August 25, 2017

**Defense Waste Processing Facility:** The safety significant Chemical Process Cell (CPC) Primary Purge System provides an air/nitrogen purge to CPC and other vessels. Normally, air passes through air compressors into the air receiver tank before passing through an air dryer and CPC distribution purge header and ultimately the vessel. The primary purge system also includes a liquid nitrogen storage tank and vaporizer. The primary system is backed up by a safety class (SC) CPC Safety Grade Nitrogen (SGN) purge system. The primary system's air dryers remove moisture from the purge air (a non-credited function). These air dryers are near the end of their life and spare parts are no longer provided by the vendor. Replacement air compressors and dryers are at SRS, but installation will not be completed until December. After one dryer failed and the second's performance degraded, workers had to start draining gallons of water from system low points every hour (typically done every 6 hours). The higher moisture levels in the purge air resulted in a restricted flow through purge air filters causing the purge air flow rate to the Slurry Mix Evaporator (SME) Condensate Tank (SMECT) to fall below the Technical Safety Requirement (TSR) minimums. Changing the wet purge air filters increased the SMECT flowrate above the TSR minimum, but the flow rate fell below the TSR limit again before the required number of vapor space turnovers was reached.

While troubleshooting the primary system, SRR started using the SGN system instead, but encountered two issues involving degradation of the SC system. First, one of two purge flow instruments for the SME pegged high and remained stuck. SRR believes that a slug of water became trapped in the sensing line during the purge system swap and is preparing a package to blow the line down this weekend. Second, an operator noted during rounds that a very minor leak from the SGN system exit valve had worsened such that a stream of liquid nitrogen was visible. This unknown leak rate called into question the SGN system's ability to provide four days' worth of purging and SRR entered another Limiting Condition for Operations (LCO) condition. Over time, the leaking valve has frozen over which has minimized the leak rate. The SGN system is currently purging the CPC vessels and drying out the system. SRR is receiving two deliveries of nitrogen gas per day by truck to help maintain the nitrogen supply. However, since SRR will not repair the valve leak and make the system operable per the TSRs within 72 hours, a new LCO condition would be triggered that would require vessel agitators be stopped. Because SRR believes that stopping the agitators would actually make the vessels less safe since flammable gases may start to be retained in the waste (see 12/19/14 report), SRR is preparing a response plan per a generic LCO for DOE's approval. SRR believes the safer path forward is to maintain vessel agitation until the leaking valve is repaired. Meanwhile, SRR plans to repair the existing air dryers with aftermarket parts and restore the primary purge system to service. SRR is also trying to expedite the installation of the replacement system and exploring the possible use of a portable system.

**Savannah River National Laboratory:** Research and Development personnel have begun a common cause analysis of four recent events (see 5/5/17, 5/12/17, and 7/21/17 reports).