



November 22, 2013  
REL:13:048

U.S. Nuclear Regulatory Commission  
Director, Office of Nuclear Material  
Safety and Safeguards  
Attn: Document Control Desk  
Washington, D.C. 20555

Gentlemen:

**Subject: Thirty-day Follow-up Report to October 27, 2013 Incident Reported Under 10 CFR 70 Appendix A Criterion (a)(5) (NRC Event No. 49475); AREVA NP Inc. Richland Facility; License No. SNM-1227; Docket No. 70-1257**

On October 27, 2013, the AREVA NP Inc. Richland facility reported that a vacuum breaker on the UO2 building steam boiler had failed an annual PM. The boiler was down at the time of the PM and the system remained down until the vacuum breaker was replaced.

The initial report (NRC Event No.49475) was made because the plant condition potentially met the reporting criterion in 10 CFR 70 Appendix A (a)(5) in that the vacuum breaker (IROFS 3526) appeared to have been unable to perform the required safety function for more than 8 hours, leaving only one additional IROFS to prevent a potential reverse flow of uranium-bearing solution in three separate accident sequences. AREVA later determined that one of the three accident sequences did not meet the reporting criteria listed above because another applicable IROFS was available and reliable in preventing the subject accident condition.

This 30-day follow-up report is being submitted in accordance with 10 CFR 70 Appendix A (a).

Caller Identification

This condition was reported to the NRC Operations Center by Robert E. Link, AREVA Environmental, Health, Safety & Licensing (EHS&L) Manager, on October 27, 2013 at 1116 PDT (509-375-8409).

Date, Time, and Exact Location of Incident

The reportable condition was determined to exist on October 27, 2013 at approximately 1055 hours local time. This condition involved a vacuum breaker which is located on the UO2 Building steam boiler.

**AREVA NP INC.**

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### Incident Description

At approximately 0740 local time, October 27, 2013, an AREVA facility pipefitter notified the Uranium Conversion and Recovery (UCAR) supervisor that a vacuum breaker on the UO2 Building steam boiler failed to open as required during the annual PM which had been completed earlier that morning. The UCAR supervisor contacted a Nuclear Criticality Safety Engineer as required by procedure.

### Safety Significance of the Incident

The safety impact of this incident is low. No radiological or chemical releases nor emergency condition resulted from this incident.

Although two accident sequences (070-018 and 190-045), as listed in the ISA Summary, only had one remaining credited IROFS to prevent accidental nuclear criticality, that IROFS (IROFS 3527), when combined with the initiating events and enabling conditions for these accident sequences, maintained accidental nuclear criticality highly unlikely. An enabling condition for this sequence is that the steam in the boiler condenses, creating a vacuum in the steam system. The simultaneous initiating event is a tube-to-shell leak in a heat exchanger (one heat exchanger is used in each of these two process systems). Plant records indicate that a tube-to-shell heat exchanger leak has not occurred during the past 10 years. Also, a loss of temperature on the boiler during ADU line operation such that a vacuum was created in the boiler while uranium bearing solutions were in the subject tanks has not occurred during the last 10 years. The combination of the initiating event, the necessary enabling condition, and the remaining engineered IROFS for these two accident sequences, IROFS 3527, ensured that accidental nuclear criticality in the steam boiler remained at least highly unlikely.

AREVA did not make any other notifications to government agencies and did not issue a press release.

### Incident Response Actions

A number of actions were taken in direct response to this incident, as follows:

- A careful review of the event timeline was conducted.
- Correct functioning of other safety-related equipment associated with accident scenarios involving reverse flow of uranium-bearing solutions into the UO2 steam generator was confirmed.
- Appropriate internal and regulatory notifications were made.
- An apparent cause analysis (ACA) was initiated.

### Interim and Near-Term Corrective Actions

The vacuum breaker, a Watson McDaniel model WVBSS vacuum breaker, was replaced with a functional device from spare parts prior to restarting the system. This new vacuum breaker was later replaced with a Kadant-Johnson model VB8-51-SS-T-S-E vacuum breaker which, based

on previous plant performance history, as this model appears to be more reliable for this specific application.

Incident Cause

About a year ago, AREVA replaced the Kadant-Johnson model VB8-51-SS-T-S-E vacuum breaker with the Watson McDaniel model WVBSS vacuum breaker in full compliance with the AREVA configuration management system. This change was made for industrial safety reasons because the the Kadant-Johnson model VB8-51-SS-T-S-E vacuum breaker would pass steam into the room when the elastomer seat degraded.

The engineer responsible for the steam supply system and the safety reviewers all agreed that the WVBSS vacuum breaker was a good fit for this application and appeared to be at least as reliable as the Kadant Johnson vacuum breaker. The vendor represents a typical application of the WVBSS vacuum breaker for steam systems, "The WVBSS allows air to enter the steam or liquid system in order to 'break the vacuum' caused by the condensing of steam or draining of liquid from a system." All vendor recommendations regarding installation were followed, e.g. the vacuum breaker was installed in a vertical position and placed at an elevated location relative to the boiler.

The Watson McDaniel model WVBSS vacuum breaker failed because minor amounts of iron deposits that originated in the boiler coated a small 1/4" stainless steel ball, and caused it to become adhered to the stainless steel seating surface that when subjected to approximately 24-inches of Hg vacuum, it did not open to break the vacuum as designed/required.

Actions to Prevent Recurrence

AREVA has determined that an older style vacuum breaker, a Kadant-Johnson model VB8-51-SS-T-S-E vacuum breaker previously used at this location, is more reliable than the WVBSS vacuum breaker. AREVA has replaced the WVBSS vacuum breaker with the Kadant-Johnson model VB8-51-SS-T-S-E vacuum breaker on the UO2 boiler and in the spare parts inventory.

AREVA currently has one WVBSS vacuum breaker used in one other location in a non-IROFS function. AREVA is performing a careful review of this application and if appropriate may replace the WVBSS vacuum breaker with a Kadant-Johnson model VB8-51-SS-T-S-E vacuum breaker.

If you have questions about this incident or AREVA NP's associated response, please contact me on 509-375-8409.

Very truly yours,



R. E. Link, Manager  
Environmental, Health, Safety, & Licensing

USNRC  
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cc: U.S. Nuclear Regulatory Commission, Region II  
Attn: M. D. Sykes, Chief  
Fuel Facility Branch 3  
Marquis One Tower, 23 T85  
245 Peachtree Center Avenue N.E., Suite 1200  
Atlanta, GA 30303-8931