



ARMED FORCES RADIOBIOLOGY RESEARCH INSTITUTE
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January 3, 2005

U.S. Nuclear Regulatory Commission
ATTN: Pat Isaac, NRR/DRIP/RNRP
Mail Stop 12-G13
Washington, DC 20555-0001

Sir:

On December 14, 2004, an instrument malfunction occurred at the AFRRRI reactor (License R-84, Docket 50-170) that is reportable under Sections 1.21.b and 6.5.2 of the reactor Technical Specifications and 10 CFR 50.72. This malfunction has previously been reported to you telephonically as required by Section 6.5.2 of the Technical Specifications.

On that date, an operator trainee was operating the reactor console as part of a licensing examination being administered by an NRC examiner. A licensed senior reactor operator was present in the control room at the same time. The trainee performed several power level changes and made appropriate entries in the reactor operations logbook. After the examination ended, the licensed SRO who had been in the control room reviewed the logbook for completeness. During that review, he noticed that the recorded readings for fuel temperature safety channel #1 were significantly lower than expected for the power levels involved. The Reactor Facility Director was informed and the reactor was declared non-operational until the cause of the low fuel temperatures could be determined. The recorded readings for fuel temperature safety channel #2 and a third instrumented element providing a signal to a chart recorder were as expected at the 900 KW power level. The required electronic checks of the fuel temperature scrams (TS Section 4.2.3.a) and the required weekly fuel temperature channel test (TS Section 4.2.3.c) had been successfully performed shortly before the console examination.

The next day, fuel temperature safety channel #1 was again electronically checked. This check involved all channel components from the reactor core support carriage through the reactor console, excluding the thermocouple. All electronic and wiring components functioned normally. The channel scram function and set point were tested and found to be operational and correctly calibrated. This testing indicated that the problem was most likely caused by a failed thermocouple within the B-ring instrumented fuel element. That element was replaced by an element from storage. The reactor was then stabilized at several different power levels, through 900 KW, and the temperature readings were correct at all tested power levels. At that point, the Reactor Facility Director agreed that both fuel temperature safety channels were functioning correctly, and the reactor was returned to operational status.

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During some part of the trainee's licensing examination, the reactor was apparently operated with only one operable fuel temperature safety channel. This is a violation of Technical Specifications Section 3.2.1 that requires two operable fuel temperature safety channels for operations. The 600°C scram set point on both fuel temperature channels remained operational, so there was no violation of TS Section 3.2.2. During the incident, the reactor power never exceeded the demand power of 900 KW. At that power level, based on over 40 years of operational records, fuel temperature in both channels remains less than 400°C. During the run in question, this was confirmed by both the C-ring instrumented fuel element (safety channel #2) and by a third instrumented element providing a signal to a chart recorder that provides a written record. There is no possibility that fuel temperature anywhere in the core exceeded either the 600°C Limiting Safety System Setting (TS Section 2.2) or the 1000°C Safety Limit (TS Section 2.1).

To prevent any future use of the defective instrumented fuel element, the thermocouple connectors have been removed and the inventory record for that element has been annotated to highlight the inoperable thermocouple.

The point of contact concerning this incident is the undersigned at (301) 295-9245 or 1290.

I declare under penalty of perjury that the foregoing is true and correct. Executed on January 3, 2005.



Stephen I. Miller
Reactor Facility Director