UNIVERSITY OF MISSOURI

Research Reactor Facility

Research Park
Columbia, Missouri 65211
Telephone (314) 882-4211

March 13, 1981

Director of Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Reference: Docket 50-186
University of Missouri
License R-103

Subject: Report as required by Technical Specification 6.1.h(2).

Description

On February 13, 1981 while performing a reactor startup, Nuclear Instrumentation (NI) Channel 3, one of two period channels, failed to respond positively to changes in reactor subcritical multiplication. Each period channel is required to provide a rod run-in at a 10 second period and a reactor scram at an 8 second period. With the instrument failing to respond correctly, the associated rod run-in and scram trips were inoperable, which is a deviation from Technical Specifications 3.3.a and 3.4.c.

Analysis

During the reactor startup on February 13, 1981, the reactor operator noted that N.I. Channel 3 indicated power level decreased while the source range, channel 2, and Channel 4 had increased due to subcritical multiplication. The console operator ceased rod withdrawal to investigate the Channel 3 detector compensation voltage setting, at which time the detector positive high voltage (HV) and negative HV cables were found reversed. The reactor was promptly shutdown by a manual scram at 2316 to comply with Technical Specifications 3.3.a and 3.4.c and the cable connections switched.

The reactor had been shutdown since 1345 on February 13, 1981 when N.I. Channel 3 failed causing a reactor scram. To isolate the cause of the Channel 3 failure, the three (3) cables that exit the drawer and go to the compensated ion chamber detector were exchanged with the same cables for the other period channel. This was done to determine if the problem was associated with either the detector and cables or with the instrumentation drawer. The test indicated the problem was

A020
S
1/0

8103180552

5

in the detector and cables so the cable connections into the drawers were re-installed on their respective drawers, but the positive (HV) cable and the compensation negative HV cable were reversed on Channel 3 due to them being terminated with the same type connector. The cables are marked as to their location (J6;+HV), (J7;-HV) by a white tag connected to the cable.

The failure of Channel 3 was due to pool water leaking into its detector drywell via a pin hole leak that had developed at the refuel bridge level. The drywell was repaired and tested, then the detector was installed with new cables. Prior to reactor startup, the Channel 3 detector was response checked with a source to insure that it would respond.

There was no failure of the safety system, since N.I. Channel 2 was operable and would have provided the required rod run-in or scram protection due to high period.

Corrective Action

As stated in the analysis, the reactor was shutdown and the cables properly connected. A front panel check was made on Channel 3 drawer verifying its operability. To avoid this problem, the high voltage connectors will be changed to use two different styles, which will mechanically prevent the cables from being improperly connected.

Sincerely,

J. C. McKibben
Reactor Manager

Endorsement
Reviewed and approved:

R. M. Brugger
Director

JCMK:vs

cc: James Keppler, Director
Regulatory Operations - Region III
Document Management Branch, NRC
Reactor Advisory Committee
Reactor Safety Subcommittee