

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1): McGuire Nuclear Station - Unit 2
DOCKET NUMBER (2): 0 5 0 0 0 3 7 1 0
PAGE (3): 1 OF 0 3

TITLE (4): Reactor Trip While Subcritical Due to Source Range Spike

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)											
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	DIVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES											
1	2	11	8	5	8	5	0	3	0	0	0	0	0	0	0	0	0	0	0	0
1	2	11	8	5	8	5	0	3	0	0	0	0	0	0	0	0	0	0	0	0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11):

OPERATING MODE (8): 3	20.402(b)	20.406(c)	X	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10): 0 0 0	20.406(a)(1)(i)	50.38(c)(1)		50.73(a)(2)(v)	73.71(c)
	20.406(a)(1)(ii)	50.38(c)(2)		50.73(a)(2)(vi)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
	20.406(a)(1)(iii)	50.73(a)(2)(i)		50.73(a)(2)(vii)(A)	
	20.406(a)(1)(iv)	50.73(a)(2)(ii)		50.73(a)(2)(vii)(B)	
	20.406(a)(1)(v)	50.73(a)(2)(iii)		50.73(a)(2)(viii)	

LICENSEE CONTACT FOR THIS LER (12): Jerry Day, Licensing
TELEPHONE NUMBER: 7 0 4 3 7 3 - 7 0 3 3

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13):

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS
X	I Q	X E	W 1 2 0	YES					

SUPPLEMENTAL REPORT EXPECTED (14):
 YES (if yes, complete EXPECTED SUBMISSION DATE)
 NO
 EXPECTED SUBMISSION DATE (15):

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single space typewritten lines) (16):

On December 11, 1985, at 2022, the Unit 2 reactor tripped due to source range channel N31 spiking high. At the time of the incident, Unit 2 was in the latter stages of shutting down for maintenance work. The turbine was off-line; all control rod control banks were inserted; and the control rod shutdown banks were being inserted. The reactor was subcritical at zero power with approximately 10E3 counts per second (cps) on both source ranges. At 2022, source range channel N31 spiked high going above the high level trip setpoint of 10E5 cps, causing the reactor to trip. Indication from channel N31 remained erratic. It is believed that water in the detector canister caused the failure.

Unit 2 was in Mode 3, Hot Standby, at the time of the reactor trip.

The detector was replaced at which time the system operated properly. The reactor was subcritical at the time of the incident and essentially no transient occurred. The channel failed to the falsely high (conservative) condition, causing the reactor to trip.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

On December 11, 1985, at 2022, the Unit 2 reactor tripped due to source range channel [EIIS:IQ] N31 spiking high. At the time of the incident, Unit 2 was in the latter stages of shutting down for maintenance work. The turbine was off-line; all control rod [EIIS:AA] control banks were inserted; and the control rod shutdown banks were being inserted. The reactor was subcritical at zero power with approximately 10E3 counts per second (cps) on both source ranges. At 2022, source range channel N31 spiked high going above the high level trip setpoint of 10E5cps, causing the reactor to trip. Indication from channel N31 remained erratic. It is believed that water (from condensation) in the detector canister caused the failure.

Unit 2 was in Mode 3, Hot Standby, at the time of the reactor trip.

BACKGROUND

The Excure Nuclear Instrumentation System protects the reactor core by monitoring neutron flux and generating appropriate alarms and trips during all power levels from shutdown through full power operation. The system also provides secondary control functions by indicating reactor status during shutdown and through full power operations.

The Excure Nuclear Instrumentation System has three ranges of power indication. They are the source range, intermediate range, and power range. The source range has two detectors, N31 and N32, which have a scale of 10E0 to 10E6 counts per second. Both source ranges have a high level trip at 10E5 counts per second.

DESCRIPTION OF EVENT

On December 10, 1985, personnel started a controlled shutdown of Unit 2 to perform maintenance on Steam Generator (S/G) D. At 1854, Unit 2 was taken off line. All control rod control banks were fully inserted along with "A" control rod shutdown bank; "B" control rod shutdown bank was partially inserted. The Excure Nuclear Instrumentation (ENB) system had transferred from intermediate range to source range and both source range channels (N31 and N32) were reading correctly at approximately 1.5 x 10E3 cps. At 2022:31 source range channel N31 spiked high causing a reactor trip on 1 out of 2 source ranges greater than 10E5 cps. The reactor trip procedure was implemented and the feedwater isolation was reset to allow continued feed of the S/Gs.

It was first believed that a bad pre-amp was causing a noise problem which in turn caused N31 to spike high. The pre-amp was replaced with the same model pre-amp to verify that the pre-amp was indeed causing the noise problem. However, the noise was still in the system.

The pre-amp was then replaced with a newer model but the noise was still in the system. Cable connections were then checked and corrected as necessary; this also did not solve the problem.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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TEXT (if more space is required, use additional NRC Form 366A's) (17)

When the N31 detector (Westinghouse Model WL-23821) was checked it was discovered there was water in the detector. The detector was replaced, and the system was checked and verified free of the noise problem. McGuire has had this problem before on the same source range channel but personnel had previously concluded that water in the detector was causing ground loop noise. Detailed testing during this failure of N31 indicated that instead of ground loop noise, the N31 detector was sending pulses that varied from ~60 millivolts (normal) to ~1.5 volts (abnormal). It is believed that the water was causing this.

The new detector (also Westinghouse Model WL-23821) which was installed was of a slightly different design. It came from the manufacturer with a drainage hole drilled in the bottom of the detector. The other remaining source and intermediate range detectors will be replaced on an as required basis.

A review of past incident reports indicates that there are no previous reportable incidents involving bad source range or intermediate range detectors. However, it is still considered a recurring problem. As of September 1984, McGuire had experienced failures of two source range detectors due to water accumulation in the canister. A review of Nuclear Plant Reliability Data System (NPRDS) shows a total of nine incidents at other utilities involving source range failures due to water in the canister.

CORRECTIVE ACTIONS:

- Immediate: The reactor trip procedure was implemented.
- Subsequent: The N31 source range pre-amp was replaced.

All cable connections on the N31 channel were checked and repaired as required.

The N31 source range detector was replaced.
- Planned: Although it has since been determined that the manufacturer has already modified the detector assemblies to allow water drainage, a study will be performed to determine the best method to resolve the water problem in the source range and intermediate range detectors.

SAFETY ANALYSIS:

The source range detectors are used to monitor reactor levels only during the final stages of shutdown and the first stages of startup. When noise is introduced into the source range channels, the channels will falsely indicate a higher reactor level than actually exists. If this noise becomes great enough on one of the two source range channels, the reactor will automatically trip, failing to the safe position.

When source range channel N31 spiked high, the reactor, although sub-critical, tripped. No power operated relief valves lifted and no code safety valves lifted. Feedwater isolation valves closed as designed. Personnel immediately reset feedwater isolation valves and continued to feed the S/Gs. All safety systems operated properly.

The health and safety of the public were not affected.

DUKE POWER COMPANY

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HAL B. TUCKER
VICE PRESIDENT
NUCLEAR PRODUCTION

January 13, 1986

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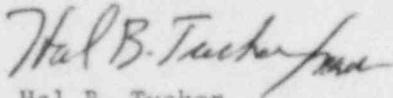
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: McGuire Nuclear Station, Unit 2
Docket No. 50-370
LER 370/85-30

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report 370/85-30 concerning a reactor trip while subcritical due to a source range spike. This event was considered to be of no significance with respect to the health and safety of the public.

Very truly yours,



Hal B. Tucker

JBD/jgm

Attachment

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