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RLB-90-318

December 20, 1990

U. S. Nuclear Regulatory Commission
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Reference: Quad Cities Nuclear Power Station
Docket Number 50-254, DPR-29, Unit One

Enclosed is Licensee Event Report (LER) 90-031, Revision 00, for Quad Cities Nuclear Power Station.

This report is submitted in accordance with the requirements of the Code of Federal Regulations, Title 10, Part 50.73(a)(2)(ii)(B): The licensee shall report any event or condition that resulted in the nuclear power plant being in a condition that was outside the design basis of the plant.

Respectfully,

COMMONWEALTH EDISON COMPANY
QUAD CITIES NUCLEAR POWER STATION

R. A. Robey for
R. L. Bax
Station Manager

RLB/MJB/kas

Enclosure

cc: R. Stols
T. Taylor
INPO Records Center
NRC Region III

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LICENSEE EVENT REPORT (LER)

Form Rev 2.0

Facility Name (1)	Docket Number (2)	Page (3)
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Title (4)

HPCI Turbine Area High Temperature Switches Outside of Technical Specifications Due to Unknown Cause

Event Date (5)			LER Number (6)			Report Date (7)			Other Facilities Involved (8)	
Month	Day	Year	Year	Sequential Number	Revision Number	Month	Day	Year	Facility Names	Docket Number(s)
										0 5 0 0 0
1 1	2 0	9 0	9 0	0 3 1	0 0	1 2	2 0	9 0		0 5 0 0 0

OPERATING MODE (9)	2	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)			
POWER LEVEL (10)	0 0 0	___ 20.402(b)	___ 20.405(c)	___ 50.73(a)(2)(iv)	___ 73.71(b)
		___ 20.405(a)(1)(i)	___ 50.36(c)(1)	___ 50.73(a)(2)(v)	___ 73.71(c)
		___ 20.405(a)(1)(ii)	___ 50.36(c)(2)	___ 50.73(a)(2)(vii)	___ Other (Specify in Abstract below and in Text)
		___ 20.405(a)(1)(iii)	___ 50.73(a)(2)(i)	___ 50.73(a)(2)(viii)(A)	
		___ 20.405(a)(1)(iv)	X 50.73(a)(2)(ii)	___ 50.73(a)(2)(viii)(B)	
		___ 20.405(a)(1)(v)	___ 50.73(a)(2)(iii)	___ 50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

Name	TELEPHONE NUMBER AREA CODE
Ken Hill, Technical Staff Engineer ext. 2150	3 0 9 6 5 4 - 2 2 4 1

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
				Y					

SUPPLEMENTAL REPORT EXPECTED (14)

		Expected Submission Date (15)	Month	Day	Year
___ Yes (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

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

ABSTRACT:

At 0945 hours on November 20, 1990, Unit one was in the REFUEL mode as part of a refueling outage. While performing QIS 27-1, High Pressure Coolant Injection (HPCI) Turbine Area High Temperature Isolation Calibration, the setpoint of all four temperature switches was higher than that allowed by Technical Specifications. The system was not required to be operable, therefore no immediate action was required.

The switches on Unit One Reactor Core Isolation Cooling (RCIC) and Unit Two HPCI and RCIC system were calibrated but no other problems were found.

A definite cause of this event has not been determined, although several possible causes have been investigated.

The switches will be replaced and calibrated prior to the end of the refuel outage.

This report is being submitted in accordance with 10CFR50.73(a)(2)(ii)(B).

PLANT AND SYSTEM IDENTIFICATION:

General Electric - Boiling Water Reactor - 2511 MWt rated core thermal power.

EVENT IDENTIFICATION: HPCI Turbine Area High Temperature Switches Outside of Technical Specifications Due to Unknown Cause.

A. CONDITIONS PRIOR TO EVENT:

Unit: One Event Date: November 20, 1990 Event Time: 0945
Reactor Mode: 2 Mode Name: Refuel Power Level: 00%

This report was initiated by Deviation Report D-4-01-90-128

RFrUEL Mode (2) - In this position interlocks are established so that one control rod only may be withdrawn when flux amplifiers are set at the proper sensitivity level and the refueling crane is not over the reactor. Also, the trip from the turbine control valves, turbine stop valves, main steam isolation valves, and condenser vacuum are bypassed. If the refueling crane is over the reactor, all rods must be fully inserted and none can be withdrawn.

B. DESCRIPTION OF EVENT:

At 0945 hours on November 20, 1990, Unit One was in the REFUEL mode as part of a refueling outage. An Instrument Maintenance (IM) Foreman notified the Shift Engineer (SE) that all four High Pressure Coolant Injection (HPCI) [BJ] Turbine [TRB] Area High Temperature Switches [JM][TS], 1-2370A and D, tripped at a temperature higher than that allowed by Technical Specifications. The HPCI system and containment [NH] isolation system [JM] were not required to be operable, therefore no immediate action was required. NRC notification of the event via the Emergency Notification System (ENS) was completed at 1337 hours in order to comply with the requirements of 10CFR50.72(b)(2)(i).

The problem had been identified by IM personnel earlier while performing QIS 27-1, HPCI Turbine Area High Temperature Isolation Calibration. The results of the calibrations are as follows:

SWITCH:	SETPOINT:
1-2370A	202°F
1-2370B	192°F
1-2370C	178°F
1-2370D	184°F

By Technical Specification Table 3.2-1, the switches are required to trip at a temperature less than or equal to 170°F. The switches are set to trip at 155°F, plus or minus 5°F, to allow for any normal instrument drift.

The event raised concerns about the temperature switches on the Unit One Reactor Core Isolation Cooling (RCIC) [BN] system and Unit Two HPCI and RCIC system. The temperature switches of the Unit One RCIC system were tested the day prior to testing the HPCI switches and all setpoints were found to be acceptable.

The temperature switches of the Unit Two HPCI and RCIC systems could not be removed and tested all at once because the Reactor [RCT] was in operation and the switches must be operable or placed in a tripped condition for the system to remain operable. It was decided to install jumpers across two switches at a time to allow the switches to be removed and tested. This would still allow the affected system to remain operable.

On November 21, 1990, the Unit Two RCIC switches were removed, two at a time, and new ones installed. The switches that were removed were tested and all setpoints were found to be acceptable.

On November 23, 1990, the Unit Two HPCI switches were removed, tested, and reinstalled two at a time. All setpoints were found to be acceptable.

C. APPARENT CAUSE OF EVENT:

This event is being reported in accordance with the requirements of 10CFR50.73(a)(2)(ii)(B) which requires that the licensee report any condition that resulted in the nuclear power plant being in a condition that was outside the design basis of the plant.

The cause of this event is not known. The cause of the high switch setpoint is either functional testing of the switches using a hot air gun, instrument drift, or failure to properly calibrate the switches during the previous refuel outage.

Technical Staff performed functional testing of the switches following installation of Modification MO-4-1-84-21A. This modification reduced the number of temperature switches from 16 to 4 and decreased the trip setpoint from 185°F to 155°F. Technical Staff heated the switches with hot air guns to verify proper relay [RLY] and annunciator [ANN] actuation. Communications were set up between the Control Room [NA], the Auxiliary Electric room, and the turbine room so that the heat gun could be immediately removed once the relay actuated.

Instrument Maintenance performs the refuel outage calibration using a hot oil bath and functional testing of the circuitry using a jumper.

Following the event, Instrument Maintenance and Technical Staff performed a functional test of one of the switches in the shop to simulate the modification test, but the instrument drift observed in this event could not be repeated. The switch was heated with a hot air gun until it tripped, and, heated several seconds more to allow for any additional time lag due to communications used during the modification testing. The switch was calibrated and no setpoint drifting was found. The steps were repeated several more times, with longer heating periods, and no setpoint drift was found. The temperature was maintained below the maximum rated temperature of the switch during this part of the testing. Finally, the switch was heated above the maximum rated temperature. The switch was calibrated and the setpoint was found to have increased approximately 150°F. This indicates that the functional testing is not a likely cause of the high switch setpoint since a more dramatic change in the switch setpoint would have been observed.

All four temperature switches may have drifted high during the operating cycle, however, based on past calibration data, this is extremely unlikely. During the past seven refuel outages at Quad Cities station, a total of two hundred twenty-four calibrations have been performed on these switches and only one calibration resulted in a setpoint greater than the Technical Specification limit.

Another possible cause of the high setpoint is that the switches were not set at the correct setpoint before they were installed. During the installation of the modification, all sixteen switches were removed and taken to the shop for calibration to determine an as found setpoint. Of the sixteen switches, four were recalibrated to the new lower setpoint. It is possible that the four switches that were recalibrated were not the ones installed, and that four of the other remaining switches removed from the system were reinstalled.

D. SAFETY ANALYSIS OF EVENT:

Although this event is significant in that it involved a condition of the plant being outside of the design basis as defined in Technical Specifications, the ability of HPCI turbine area high temperature isolation system to perform its safety function was not severely degraded.

The HPCI high temperature instrumentation is provided to detect a break in the HPCI turbine steam piping and isolate the piping.

The trip setting is such that core uncovery is prevented and fission product release is below 10CFR100 guidelines. The system is redundant to the steamline high flow isolation system [JM] which was operable at all times during the previous cycle.

An increased setpoint would increase system response time and therefore increase any release to the environment in an actual steamline break. Due to the small increase in switch setpoint, the increase in release would have been minimal.

The increase in system response time varies depending on the size of the steam leak. Calculations were performed for the system modification which correlate the system response time to the size of a steam leak. These calculations were reviewed to determine the difference in system response for a setpoint of 200°F and 170°F. In a full steamline break, room temperature would increase immediately and the difference in response time would be negligible. At a leakage of 5 gallons per minute, or 1.7% of total steam flow under rated conditions, system response time increases from 40.5 minutes to 57.7 minutes.

E. CORRECTIVE ACTIONS:

No immediate corrective actions were necessary since the HPCI and containment isolation systems were not required to be operable. As a precaution, the Unit Two temperature switches were calibrated by removing them two at a time so that the effected system could remain operable. No other high switch setpoints were found.

The Unit One HPCI temperature switches will be replaced and calibrated prior to the end of the refuel outage. (NTS 2542009012801)

This event will be discussed at an IM tailgate meeting (NTS 2542009012802). During the investigation of this event, it was identified that a specific procedure for calibration of temperature switches using a hot oil bath does not exist, therefore, a procedure will be developed. (NTS 2542009012803)

The station procedure for development of tests for modifications will be revised to include a precaution that when testing temperature switches with a hot air gun to avoid overheating. (NTS 2542009012804)

F. PREVIOUS EVENTS:

There have been no previous reportable events involving a failure of the HPCI or RCIC turbine area high temperature isolation system.

G. COMPONENT FAILURE DATA:

The temperature switches are manufactured by United Electric, type F7, model 88B.