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LWP-95-117

ComEd

January 5, 1996

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Reference: Quad Cities Nuclear Power Station
Docket Number 50-254, DPR-29, Unit One

Enclosed is Licensee Event Report (LER) 95-008, Revision 00, for Quad Cities Nuclear Power Station. This report is submitted as a voluntary License Event Report (LER).

The following commitments are being made by this letter:

1. A request for preventive maintenance has been initiated on the local HPCI junctions boxes for both units and on the stop valve limit switches for both units. This PM will be implemented by February 15, 1996.

2. The current test interval for the motor speed changer interlock of once per cycle will be reviewed to determine if a shorter test interval would be appropriate. The decision will be made by February 1, 1996 whether an increased test frequency is required.

3. Vibrations on the Unit 1 HPCI stop valve junction box will be measured during a turbine run by the Vibration Monitoring Expert and the junction box supports will be analyzed to determine if additional supports are needed to reduce the vibrations. This will be completed by March 31, 1996.

4. After the final HPCI run of the current operation cycle, the connections in the stop valve junction box will be checked to verify tightness. This will be completed by March 1, 1996.

5. A review will be performed of the Station's past history of loose connections and a determination will be made concluding whether additional actions are needed to address this issue. This conclusion and recommendations will be made by March 31, 1996.

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If there are any questions or comments concerning this letter, please refer them to Nick Chrissotimos, Regulatory Assurance Administrator at 309-654-2241, ext. 3100.

Respectfully,

COMMONWEALTH EDISON COMPANY
QUAD CITIES NUCLEAR POWER STATION

L. W. Pearce
Station Manager

LWP/NC/plm
Enclosure

cc: J. Schrage
C. Miller
INPO Records Center
NRC Region III

Licensee Event Report
Reviewer Assignment Form

Revised 12/01/94

LER # 2541809500800 Date: December 6, 1995

Subject: High Pressure Coolant Injection Turbine Stop Valve Inoperable due to Loose Connections and Fouled Limit Switch Contacts.

Signatures of reviewers indicating review and approval of item:

Systems Eng. Supv:	David Gaddy 1/4/96 Date	/ Date
Operating Eng.:	Alex L. Mink 1/4/96 Date	/ Date
	/ Date	/ Date
	/ Date	/ Date

Approved: Station Manager/PORC Chairman 1/5/96 Date

LICENSEE EVENT REPORT (LER) Form Rev. 2.0

Facility Name (1)	Docket Number (2)	Page (3)
Quad Cities Unit One	0 5 0 0 0 2 5 4	1 of 0 6

Title (4)

High Pressure Coolant Injection Inoperable Turbine Stop Valve Inoperable due to Loose Connections and Fouled Limit Switch Contacts.

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)
1 2	0 6	9 5	9 5	-- 0 0 8	-- 0 0	0 1	0 5	9 6		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	POWER LEVEL (10)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)			
4	1 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)	X 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)	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
Nick Chrissotimos, Regulatory Assurance, Ext. 3100	AREA CODE 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

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:

On December 6, 1995 at 0115 hours the Unit One High Pressure Coolant Injection (HPCI) [BJ] System was declared inoperable when the HPCI turbine stop valve failed to open within the acceptable range of the In Service Test (IST) program. The apparent stop valve opening time was slow due to a combination of loose connections in the stop valve junction box and high resistance across the stop valve limit switch and not due to degraded valve motion. The root cause for the loose connections is suspected to be vibration. The root cause for the high resistance limit switch contacts is suspected to be infrequent preventive maintenance (PM). These problems caused the light indication which is used to measure the time of the stop valve to be inaccurate. As a result, this voluntary Licensee Event Report is being submitted. During the investigation other loose connections and another high resistance limit switch contact were found. This other high resistance limit switch contact involved an interlock to the HPCI Motor Speed Changer (MSC). All loose connections were tightened and the same junction box for the Unit Two HPCI stop valve was checked for tightness with no deficiencies noted. The Unit 1 HPCI stop valve limit switches were cleaned. Further corrective actions will be taken to verify that the loose connections were vibration induced and to correct these vibrations, if necessary. These junction boxes and stop valve limit switches will be added to the PM program.

PLANT AND SYSTEM IDENTIFICATION:

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

EVENT IDENTIFICATION: High Pressure Coolant Injection Inoperable Turbine Stop Valve Inoperable due to Loose Connections and Fouled Limit Switch Contacts.

A. CONDITIONS PRIOR TO EVENT:

Unit: One Event Date: December 6, 1995 Event Time: 0115
Reactor Mode: 4 Mode Name: RUN Power Level: 100%

This report was initiated by Licensee Event Report 254\95-008.

RUN (4) - In this position the reactor system pressure is at or above 825 psig, and the reactor protection system is energized, with APRM protection and RBM interlocks in service (excluding the 15% high flux scram).

B. EVENT DESCRIPTION

On December 6,1995 at 0115 hours with Unit 1 operating in the RUN mode at 100% power, QCOS 2300-5, HPCI Pump Operability Surveillance Test, was being performed when the High Pressure Coolant Injection (HPCI)[BJ] Turbine Stop Valve exhibited an opening stroke time outside of the acceptable range of the In-Service Test (IST) program. The valve opened in a time of 20.8 seconds from the actuation of the HPCI turbine reset switch until the red open indicating light illuminated. The acceptable opening stroke time for this valve is from 4.9 seconds to 14.6 seconds. The HPCI system was declared inoperable in accordance with Technical Specification 3.5.C and QCOS 2300-2, HPCI Outage Report was initiated. An event notification was made to the Nuclear Regulatory Commission (NRC) at 0253 hours as required by 10CFR 50.72(b)(2)(iii)(D). The remainder of the surveillance was completed to verify proper pump operation and an action request was written to repair the valve. The HPCI system remained in standby until repairs were made.

Repairs were started by troubleshooting the stop valve indicating circuit. Meters were installed on the stop valve limit switches to observe their operation and the stop valve was stroked under the same conditions as established in the surveillance. The stop valve opened in a time of approximately 9.5 seconds which was consistent with the time exhibited by the valve in the previous several quarterly surveillance s. The stop valve was stroked and timed open again with the same results. Operation of the stop valve was observed during both of these strokes and no abnormalities were observed. During this troubleshooting however, it was observed that there were loose connections within the stop valve indication circuitry which could have caused an apparent excessive stop valve opening time. All connections in this junction box were checked and a total of five loose connections were found. These connections were tightened. These connections were contained within the following circuits:

1. To red open indicating light for the HPCI stop vlv.

2. To green closed indicating light for the HPCI stop vlv.

3. To a circuit that is not used.

4. To an interlock for the HPCI Auxiliary (Aux) Oil Pump starting circuit.

5. To an interlock for the HPCI Motor Speed Changer (MSC).

The loose connection in the red indicating light circuit could have caused the red light in the control room to not come on which would have resulted in an apparent slow stroke time for the stop valve. The green closed indicating light circuit is not used for the timing of the stop valve and appeared to work properly during the surveillance test. The interlock to the Aux Oil Pump was working properly because the pump had been started prior to the stop valve timing as part of the normal actions of the surveillance. The interlock to the MSC was made up properly by the time the stop valve indicated open because the MSC was run up to its high speed stop as part of the quarterly surveillance. The same junction box on Unit Two was checked and no loose connections were found.

The stop valve was then taken out of service and the limit switches were checked for proper operation. The red open indication limit switch was found to have a high resistance across its contacts. The open limit switch which provides the interlock to the MSC was also found to have high resistance across its terminals. Both of these switches had an initial resistance reading from 70 to 104 ohms. These limit switches were cleaned so that the resistance across their terminals as left was less than 1 ohm. The stop valve was then stroked three times and the opening times were each between 9 and 10 seconds.

The deficiencies noted in the stop valve indicating circuit would not have caused the HPCI system to be inoperable; however, the loose connection and increased resistance found in the MSC interlock circuit could have caused the HPCI system to be inoperable. This interlock is tested once per cycle and the injection time was 39.8 seconds during a test conducted on April 5, 1995.

The stop valve was returned to service and the HPCI system was declared operable.

C. APPARENT CAUSE OF THE EVENT

This event is being reported as a voluntary Licensee Event Report.

The cause of the slow open stroke time measurement of the stop valve was the high resistance across the limit switch and the loose terminal in the junction box and not due to degraded valve motion. It has been concluded that the stop valve opened in the proper amount of time but that the red open indicating light did not illuminate for several seconds due to the high resistance in the circuit. The resistance could have been reduced by a slight vibration in the local stop valve junction box thereby energizing the red light.

The other cause considered during the investigation was an actual slow stroke time of the stop valve caused by interference/damage in the stop valve or an obstruction in the oil lines going to the stop valve operator. Potential stop valve interference/damage as a cause was eliminated by observing the stop valve through two strokes. The stop valve operated smoothly with no abnormalities noted. Additionally, there was no leakage noted out of the stop valve operator that could have caused opening problems. The history of oil sampling for the HPCI oil reservoir was checked and no particles or other foreign material have been noted in these samples over the last two years. This and the stop valve operation observations indicate that there is no obstruction in the oil system feeding the stop valve operator. Additionally, the maintenance history of the stop valve was reviewed and no items were found that would have indicated a cause for stop valve slow stroke time.

The apparent root cause of the loose connections in the stop valve circuit and the MSC interlock circuit is vibration. Although the vibrations on the Unit 1 HPCI turbine are not in the alert range and are only slightly higher than the Unit 2 HPCI turbine, when the HPCI system was run on January 2, 1996, the vibrations measured on the Unit 1 stop valve junction box were five times higher than the vibrations measured on the Unit 2 stop valve junction box. The last time that the Unit 1 stop valve junction box connections were disturbed was during maintenance in December 1992 and there is indication in this work package (NWR# 910065490) that the connections were tight when maintenance was completed. The root cause of the limit switch contacts having high resistance is infrequent preventive maintenance.

In order to verify that the slow stop valve indication was remedied and to verify that the increased resistance in the stop valve circuit was the cause of the slow stroke time, increased stop valve stroke timing was implemented. The valve was stroked daily for thirteen days and always timed acceptably between 9.5 and 10.7 seconds. The stroke time of the stop valve was again measured on January 2, 1996, two weeks after the last stroke timing, and was acceptable with a time of approximately 9.5 seconds.

D. SAFETY ANALYSIS OF THE EVENT

The consequences of this event were minimal since the HPCI system was still available to inject water into the reactor vessel and the back-up systems for HPCI were operable. The stop valve did open within the required time, only the valve indication was failed.

In the event that the connection to the MSC interlock opened completely, HPCI would be inoperable and not automatically inject into the vessel. The system; however, would still have been available to be manually started and injected into the vessel using the control switch in the control room for the MSC. If off-site power were to remain available during a postulated loss of coolant event, all three Reactor Feed Pumps [SJ] were available to inject high pressure water. In the event of the loss of all high pressure water to the reactor, the Automatic Depressurization System (ADS) was fully available to depressurize the reactor so that the Low Pressure Coolant Injection (LPCI) [BO] and Core Spray (CS) [BM] systems would inject.

E. CORRECTIVE ACTIONS

The corrective actions completed are:

1. The stop valve limit switch for both the indicating light and the MSC interlock were cleaned and verified to be operating properly.

2. The loose connections found in the stop valve junction box were tightened.

3. The Unit 2 stop valve junction box was checked for loose connections with none found.

4. The stop valve opening time was measured three times after limit switch cleaning with acceptable results prior to declaring the HPCI system operable.

5. Increased testing was initiated and completed on the stop valve timing. The stop valve was timed an additional thirteen times on a daily basis with each stroke time being within the acceptable range(4.9 to 14.6 seconds). The surveillance interval has now reverted to quarterly.

6. The vibrations on both the Unit 1 and Unit 2 stop valve junction boxes were measured during HPCI system operation and the Unit 1 vibrations were found to be five times greater than the Unit 2 vibrations.

Additional corrective actions to be completed are:

1. A request for preventive maintenance has been initiated on the local HPCI junctions boxes for both units and on the stop valve limit switches for both units (NTS# 2541809500801, Engineering Maintenance Staff). This PM will be implemented by February 15, 1996.

2. The current test interval for the motor speed changer interlock of once per cycle will be reviewed to determine if a shorter test interval would be appropriate (NTS# 2541809500802, System Engineering). The decision will be made by February 1, 1996 whether an increased test frequency is required.

3. Vibrations on the Unit 1 HPCI stop valve junction box will be measured during a turbine run by the Vibration Monitoring Expert and the junction box supports will be analyzed to determine if additional supports are needed to reduce the vibrations. (NTS# 2541809500803, Support Engineering). This will be completed by March 31, 1996.

4. After the final HPCI run of the current operating cycle, the connections in the stop valve junction box will be checked to verify tightness (NTS# 2541809500805, System Engineering). This will be completed by March 1, 1996.

5. A review will be performed of the Station's past history of loose connections and a determination will be made concluding whether additional actions are needed to address this issue. (NTS# 2541809500804, System Engineering). This conclusion and recommendations will be made by March 31, 1996.

F. PREVIOUS EVENTS

The only previous event of HPCI Stop Valve failure identified occurred in February 1992 and is documented in LER 92-1-002. The failure in this event was caused by interferences within the valve.

The only previous event of HPCI MSC failure identified occurred in March 1995 and is documented in LER 1-95-004. The failure in this event involved an improperly set limit switch located on the MSC itself. This was caused by inadequate written communication.

G. COMPONENT FAILURE DATA

1. Component Description: Turbine Trip Stop Valve

   Manufacturer/Type: Atwood & Morril Co. Inc./Xomox A585

   Model Number: SEE 20747-H