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RLB-92-082

April 5, 1992

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

Reference: Quad Cities Nuclear Power Station
Docket Number 50-265, DPR-30, Unit Two

Enclosed is Licensee Event Report (LER) 92-007, 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)(v)(D). The licensee shall report any event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident.

Respectfully,

COMMONWEALTH EDISON COMPANY
QUAD CITIES NUCLEAR POWER STATION

R. L. Bax
Station Manager

RLB/TB/plm

Enclosure

cc: J. Schrage
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)
Quad Cities Unit Two	0 5 0 0 0 2 6 5	1 of 0 5

Title (4)

2A and 2B RHR Room Coolers Plugged Due to Insufficient Cleaning

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
0 3	0 4	9 2	9 2	0 0 7	0 0	0 4	0 2	9 2		0 5 0 0 0

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)			
2		20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)		20.405(a)(1)(i)	50.36(c)(1)	X 50.73(a)(2)(v)	73.71(c)
0 0 %		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)	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
Mike Ford, Tech Staff Engineer Ext. 2119	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	MANUFAC-TURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	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:

At 1715 hours on March 4, 1992, Unit Two was in the Refuel Mode in the cold condition. At this time it was determined that both the 2-5746A and 2-5746B, Residual Heat Removal (RHR) Room Coolers were plugged in excess of their design margin. With both loops of the RHR system effected, the ability of the RHR system to provide long term cooling following an accident was put into question.

The 2A and 2B RHR room coolers were outside their design margin due to insufficient cleaning, which allowed accumulation of sediment and debris to block respectively 28 and 58 percent of the tubes.

The corrective action for this event was to immediately clean the room coolers. The stations implementation of Generic Letter 89-13 will insure that the coolers remain clear through periodic inspections and the installation of monitoring equipment.

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

PLANT AND SYSTEM IDENTIFICATION:

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

EVENT IDENTIFICATION: 2A and 2B RHR Room Coolers Plugged Due to Insufficient Cleaning.

A. CONDITIONS PRIOR TO EVENT:

Unit: Two Event Date: March 4, 1992 Event Time: 1715
Reactor Mode: 2 Mode Name: REFUEL Power Level: 00%

This report was initiated by Deviation Report D-4-2-92-035.

REFUEL 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 1715 hours on March 4, 1992, Unit Two was in the Refuel Mode in the cold condition. At this time, it was determined that both the 2A and 2B Residual Heat Removal (RHR) [BO] Room Coolers [CLR] were plugged in excess of their design margin. With both loops of the RHR system effected, the ability of RHR to provide long term core cooling following an accident was put into question.

On January 21, 1992, the 2A RHR room cooler was inspected by station Technical Staff personnel. A precleaning inspection was being performed in accordance with the commitment to Generic Letter (GL) 89-13, "Fouling of Safety Related Service Water Systems." This inspection determined that 14 out of 48 tubes on the first pass were plugged, resulting in a loss of 28 percent of the flow. The remainder of the cooler had only four more tubes blocked. This resulted in a total of 18 out of 196 tubes being blocked.

The results of this inspection were discussed with corporate engineering to determine if sufficient design margin existed to ensure that the room cooler would have been capable of performing its design function.

At 1300 hours on January 23, Engineering contacted the station and stated that based on the first pass blockage, there was insufficient margin for the room cooler to be considered operable.

At 1604 hours, a courtesy call was made to the Nuclear Regulatory Commission (NRC) to inform them that the 2A RHR room cooler was inoperable. It was determined that the loss of one room cooler would not have seriously degraded the ability of the RHR system to perform its design function.

Following the initial inspection, the working group was directed to clean the room cooler. On January 22, a post cleaning inspection was performed. This inspection determined that all tubes were clean, and free of debris.

The fouled condition of the 2A RHR room cooler required that the 2B room cooler be inspected for similar plugging. GL 89-13 requires that the sister components be inspected if components are found to be fouled during the initial inspection. At this time, the station decided to expand the inspection to cover the "B" trains of the Core Spray (CS) [BM] and RHR room coolers, due to similar design and function.

Inspection of the 2A and 2B Core Spray room coolers determined that they were both sufficiently clean to perform their design function.

On March 4, at 1715 hours, the 2B RHR room cooler was inspected. This inspection found that 28 of 48 tubes in the first pass were plugged, and 38 tubes out of a total of 192 were blocked in the room cooler.

At 2111 hours, a courtesy call was made to the Nuclear Regulatory Commission to inform them that the 2B RHR room cooler was plugged such that it was beyond its design margin.

On March 5, at 1430 hours, further review of the two events determined that an Emergency Notification System call was warranted. This was because the plugging of the 2A and 2B room coolers resulted in both loops of the RHR system being degraded. The room coolers may not have been able to remove the required heat from the rooms during a design base accident (DBA). This degraded the ability of the RHR system to provide long term heat removal.

At 1557 hours, a 4-hour non-emergency notification was made to the NRC to inform them of the degradation to the RHR system.

Following the inspection, the 2B RHR room cooler was cleaned. On March 11, a post cleaning inspection was performed. This inspection determined that all tubes were clean, and free of debris.

C. APPARENT CAUSE OF EVENT:

This report is being submitted in accordance with the requirements of 10CFR50.73.(a)(2)(v)(B) which requires the reporting of any event that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident.

The 2A and 2B RHR room coolers were outside their design margin due to insufficient cleaning, which allowed accumulation of sediment and debris to block respectively 28 and 58 percent of the tubes.

The 2A and 2B RHR room coolers have not been cleaned in over ten years. Regular inspection and cleanings were not required or performed for the Emergency Core Cooling System (ECCS) room coolers.

Generic Letter (GL) 89-13 was issued to inform the nuclear industry of the need to insure that service water systems are able to provide required cooling in the event of a design base event. In response to this letter, Quad Cities Station committed to testing or inspecting various components of the service water systems. This commitment requires the station to test or inspect the components of one loop per refueling outage. It was during the inspection of the Unit Two "A" loop components that the 2A RHR room cooler was found to be plugged.

This determination required the station to expand its inspection to cover the "B" loop room coolers. The inspection of the 2B RHR room cooler determined similar fouling.

The room cooler cooling water is supplied by the Unit Diesel Generator Cooling Water (DGCW) Pump. The DGCW pumps take a suction from the Residual Heat Removal Service Water (RHRSW) pump suction header. This system uses Mississippi river water as the heat sink. The river water that is pumped through the system contains silt and small debris. Blockage may occur over time due to accumulation in regions of low flow, or during periods while the pumps are off.

Per the implementation of GL 89-13 and the results of the RHR inspections, both the 2A and 2B Core Spray room coolers were also inspected at this time. The Core Spray (CS) room cooler are smaller than the RHR coolers (18 tubes per pass). Although these coolers are fed from the same DGCW pump, and are similar in design there was very little fouling of the CS coolers.

A walkdown of the room cooler piping was performed to investigate the effect of piping configurations on fouling rate. The piping arrangement is such that debris could flow to either the CS or RHR rooms equally. However, two aspects of the system could explain why the Core Spray room coolers were cleaner than the RHR room coolers. Because the RHR coolers see a higher flow rate, heavier debris may remain suspended in the water and can be carried to cooler. Further, the High Pressure Coolant Injection (HPCI) system room cooler taps off from the bottom of the supply line to the CS coolers. This would allow heavier debris to drop out of the flow to the CS coolers and be directed to the HPCI room cooler. The HPCI room coolers are known to foul at a higher rate. HPCI room coolers are cleaned each outage to insure operability of the system. These factors could account for why the Core Spray coolers were cleaner that the RHR coolers when neither have been cleaned in over ten years.

D. SAFETY ANALYSIS OF EVENT:

The safety consequences of this event were minimal. Engineering calculations have verified that the fouling of the RHR room coolers would not have prevented the RHR system from performing its immediate design safety function. There was no damage to the RHR system, plant operating parameters or to station personnel.

The design heat removal for the room coolers is based on a cooling water temperature of 95 degrees. The maximum historical Mississippi river temperature recorded at the station was 88.7 degrees. A computer model of the coolers, using the cooler that had 58 percent blockage, determined that at a maximum river temperature of 87 degrees the cooler would have been able to provide adequate heat removal. The majority of the historical river water temperature data is significantly less than 87 degrees. This study would indicate that the 2A RHR room cooler would have been capable of removing the design heat load at all times, as it was only 28 percent plugged.

The partial plugging of a room cooler would still allow some heat removal from the room. A gradual temperature increase would occur if the fouling and a high river temperature prevented adequate heat removal.

The Environmental Qualification temperature for the RHR corner rooms is 150 degrees. This would mean that the RHR system would have been available for a period of time before the room temperature reached the upper limit.

A previous study performed by Nuclear Fuel Services (NFS) determined that the ECCS room coolers are not required for rooms that are open to the reactor building. This would exempt the 2A cooler from being required to be operable. The study indicates that the fouled cooler would not degrade the RHR system. Although this study has not yet been implemented by the station, it further demonstrates the probability that adequate cooling was available at all times.

E. CORRECTIVE ACTIONS:

The immediate corrective action after the initial inspections was to direct the working group to clean the room coolers. To determine the effect on the system, corporate engineering was asked to determine if sufficient margin existed for the coolers to have performed their design function during previous operation.

After the room coolers were cleaned, a post cleaning inspection was performed. These inspections determined that all tubes were clean and free of debris. As these room coolers have not been cleaned in over ten years, and the plugging was only partial, it is believed that the fouling was a gradual process. Per the station commitment to GL 89-13, one loop of room coolers will be inspected each outage. Due to similar design, the station has expanded its commitment to GL 89-13, to inspecting both the "A" and "B" loops of the RHR and CS room coolers each outage. This will prevent the reoccurrence of significant fouling due to long periods without cleaning.

Per the station commitment to generic letter 89-13, a method of monitoring the condition of these room coolers is being implemented. Modification M4-1(2)-87-026, ECCS Room Cooler Mod, is installing pressure gauges on the inlet and outlet of the coolers. Unit One gauges were installed during (Q1R11), 1991, and the Unit Two instrumentation was installed during this (Q2R11) refuel outage. A procedure to trend and analyze these pressures has been developed. This will insure that if a cooler is becoming blocked, action can be taken before the design margin is exceeded.

During the previous Unit One refueling outage the room coolers associated with GL 89-13 were inspected. Similar fouling was found during those inspections. The coolers were cleaned and reinspected prior to reassembly and unit start-up.

F. PREVIOUS EVENTS:

No previous deviation reports have been written for an ECCS room cooler being inoperable due to fouling.

The fouling found during the previous Unit One refuel outage (Q1R11) was not considered to be reportable at that time. Review of this event has resulted in an after-the-fact report for the Unit One RHR coolers being fouled. The plugging of the Unit One coolers will be reported in Licensee Event Report (LER) 4-1-92-008.

G. COMPONENT FAILURE DATA:

There was no component failure associated with this event.