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RLB-92-121

May 24, 1992

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) 92-014, 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
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) Quad Cities Unit One Docket Number (2) 0 5 0 0 0 2 5 4 Page (3) 1 of 0 5
 Title (4) Unit One LPCI Inoperable Due To Preservice Design Error That Resulted In The Inability Of Valves To Operate During A Degraded Voltage Condition

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 4	2 4	9 2	9 2	0 1 4	0 0	0 5	2 2	9 2		0 5 0 0 0 1 1 0 5 0 0 0 1 1

OPERATING MODE (9) 4
 POWER LEVEL (10) 1 0 0
 THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)

<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.405(c)	<input type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 73.71(b)
<input type="checkbox"/> 20.405(a)(1)(i)	<input type="checkbox"/> 50.36(c)(1)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> 73.71(c)
<input type="checkbox"/> 20.405(a)(1)(ii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> Other (Specify in Abstract below and in Text)
<input type="checkbox"/> 20.405(a)(1)(iii)	<input type="checkbox"/> 50.73(a)(2)(i)	<input type="checkbox"/> 50.73(a)(2)(vii)(A)	
<input type="checkbox"/> 20.405(a)(1)(iv)	<input type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)	
<input type="checkbox"/> 20.405(a)(1)(v)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)
 Name Michael Ford, RHR System Engineer Ext. 2118 TELEPHONE NUMBER 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) X NO

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

ABSTRACT:

On April 24, 1992, at 1330 hours, Unit One was in the RUN Mode at 100 percent of rated core thermal power. A preliminary engineering evaluation determined that the Low Pressure Coolant Injection (LPCI) valves would not open during a degraded voltage condition due to improper setting of the degraded voltage trip setpoints. The LPCI mode of Residual Heat Removal (RHR) was administratively declared inoperable.

The apparent cause of this event was the reconciliation between the current design analysis and the original design analysis. Present computer modeling and analysis techniques provide greater analytical evaluation capability that was not available during the modification installation.

The immediate corrective action for this event was to administratively declare the LPCI mode of RHR inoperable. The valve contactors were replaced with contactors which had lower pickup voltage to ensure proper operation during a degraded voltage condition. Modifications will be installed during the next Unit One refuel outage to rectify the degraded voltage condition. This report is being submitted in accordance with 10CFR50.73(a)(2)(v).

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TEXT Energy Industry Identification System (EIIS) codes are identified in the text as [XX]

PLANT AND SYSTEM IDENTIFICATION:

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

EVENT IDENTIFICATION: Unit One LPCI inoperable due to preservice design error that resulted in inability of valves to operate during a degraded voltage condition.

A. CONDITIONS PRIOR TO EVENT:

Unit: One	Event Date: April 24, 1992	Event Time: 1330
Reactor Mode: 4	Mode Name: Run	Power Level: 100%

This report was initiated by Deviation Report D-4-1-92-040.

RUN Mode (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. DESCRIPTION OF EVENT:

On April 24, 1992, at 1330 hours, Unit One was in the RUN Mode at 100 percent of rated core thermal power. A preliminary engineering evaluation performed by the Nuclear Engineering Department (NED) determined that the Low Pressure Coolant Injection (LPCI) [BO] valves [V] would not open during a degraded voltage condition. Valve contactor [CNTR] pickup voltages would not be sufficient to align LPCI valves during a Loss of Coolant Accident (LOCA) coincident with degraded voltage at the valve Motor Control Center (MCC). The LPCI mode of Residual Heat Removal (RHR) [BO] was administratively declared inoperable. QCOS 1000-17, LPCI Outage Report was entered, placing Unit One in a seven day Limiting Condition of Operation (LCO).

On April 7, 1992, preliminary calculations performed by NED had determined that the present Unit Two, Division II degraded voltage setpoint was non-conservative. Under these conditions, the present relay [RLY] setpoint of 3840 volts would not ensure adequate motor [MO] terminal voltage for continuous duty 480 volt electrical equipment under maximum credible loading conditions. This event is documented in Licensee Event Report (LER) 2-92-013.

The calculations for Unit Two determined that contactors designed to pickup at 75 percent of rated voltage would be required to ensure proper operation of the Unit Two LPCI valves. While testing actual minimum contactor pickup voltages for Unit Two, questions arose concerning the type of contactors that existed on Unit One. Unit One contactors were designed to pickup at 85 percent of rated voltage. Calculations had not been completed determining actual Unit One degraded voltage levels. NED was requested to provide the required voltages for Unit One.

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On April 24, preliminary calculations for Unit One determined that contactors for MO-1-1001-29A and 29B would not pickup during a degraded voltage event. It was determined that the LPCI mode of the Residual Heat Removal system should be administratively declared inoperable.

The station initiated replacement of the affected contactors to assure that the system would function as designed during a degraded voltage event. New contactors, designed to pickup at 75 percent of rated voltage, were installed for the LPCI valves.

On April 26, 1992, at 0220 hours, the LPCI valves were successfully stroke tested to verify proper operation. The LPCI mode of RHR was declared operable, and the LCO was exited.

C. APPARENT CAUSE OF EVENT:

This report is being submitted in accordance with 10CFR50.73(a)(2)(v), which requires the reporting of any event or condition that alone could have prevented the fulfillment of a safety system function.

The apparent cause of this event was the reconciliation between the current design analysis and the original design analysis. Present computer modeling and analysis methods provide greater analytical evaluation capability that was not available at the time of the installation of the second level undervoltage relay modification. Several factors contributed to the incorrect voltage setpoint. The load data used to determine required voltage was originally taken from the source (bus) rather than from the motor terminals. Based on today's standards the modeling and calculations of transformer loading, impedance losses and increased motor current draw due to lower voltages in the original analysis resulted in an inadequate design.

D. SAFETY ANALYSIS OF EVENT:

The safety consequences of this event were minimal. The determination that the LPCI injection valves would not open during a degraded voltage condition requires that the system be administratively inoperable. This would not have prevented the RHR system from performing its design function during all other events. The extremely low probability of having a degraded voltage concurrent with a LOCA limits the safety significance of the event.

The Core Spray (CS) [BO] system was not affected by this event and would have been available during a degraded voltage condition.

During a LOCA coincident with a degraded voltage condition, Core Spray would have actuated as required. Core Spray is sufficient to ensure that no core damage occurs during a Design Base Accident (DBA) without the support of LPCI.

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The failure of the 1-1001-29A and 29B valves to reposition would have prevented the LPCI injection mode of RHR from operating. The containment cooling modes of RHR would still have functioned properly. The use of containment spray and containment cooling to remove heat and pressure would ensure protection of primary containment during a DBA.

Compensatory measures were initiated for Unit One that would allow Unit One operation during the present cycle. In the event of a degraded voltage condition, the bus would be isolated, and the Emergency Diesel Generator would be used to provide required emergency loads.

E. CORRECTIVE ACTIONS:

The immediate corrective action for this event was to administratively declare the LPCI mode of RHR inoperable and complete the required surveillances to ensure proper function of supporting systems.

The determination that the LPCI injection valves were inoperable required the immediate replacement of the valve contactors. These contactors were replaced with contactors designed to pickup during a degraded voltage condition. Replacement of these contactors insured that LPCI would be able to perform its design base function.

Further corrective actions will be to complete the design of modifications to rectify the undervoltage conditions. These modifications are dependent on final calculation completion by NED. Modifications are expected to be similar to those implemented on Unit Two, and will be installed during the next Unit One Refuel Outage (Q1R12) (NTS #2542009204001).

F. PREVIOUS EVENTS:

Two related Licensee Event Reports (LER) document recent events where the Second Level Undervoltage Design was determined to be deficient.

LER 4-2-92-013, documents the Unit Two second level undervoltage setpoint being non-conservative. A supplement to LER 4-2-92-13, presently in the review process, documents an inaccurate second level undervoltage setpoint for Unit One.

At Dresden Station, LER 92-021/050237, documents findings during the Electrical Distribution System Function Inspection (EDSFI) that their second level undervoltage setpoint would not provide adequate protection for Class 1E equipment.

All of these events are similar in their cause and method of discovery. Original design calculations were non-conservative, and therefore, the system did not provide adequate protection. Corrective actions have required modifications, design changes, and implementation of compensatory measures.

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G. COMPONENT FAILURE DATA:

There was no component failure associated with this event.