



Commonwealth Edison

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RLB-93-075

May 14, 1993

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) 93-010, 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). Any event or condition that resulted in the condition of the nuclear power plant, including its principal safety barriers being seriously degraded, or that resulted in the nuclear plant being in a condition that was outside the design basis of the plant.

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)		

1/2 Diesel Generator Cooling Water Pump Failure To Start Due To Original Design Deficiency

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 2	9 3	9 3	0 1 0	0 0	0 5	1 8	9 3		0 5 0 0 0 1 1

OPERATING MODE (9)		1		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(a)(1)(i)	20.405(a)(1)(ii)	20.405(a)(1)(iii)	20.405(a)(1)(iv)	20.405(a)(1)(v)	20.405(c)	50.36(c)(1)	50.36(c)(2)	50.73(a)(2)(i)	50.73(a)(2)(ii)	50.73(a)(2)(iii)	50.73(a)(2)(iv)	50.73(a)(2)(v)	50.73(a)(2)(vii)	50.73(a)(2)(viii)(A)	50.73(a)(2)(viii)(B)	50.73(a)(2)(x)	73.71(b)	73.71(c)	Other (Specify in Abstract below and in Text)

LICENSEE CONTACT FOR THIS LER (12)

Name	TELEPHONE NUMBER
Randy Charneski, Technical Staff Engineer Ext. 2175	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
B									

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 April 22, 1993, at 1322 hours, Unit Two was in the SHUTDOWN mode at 0 percent of rated core thermal power. At that time, Technical Staff personnel were performing 4kV Bus 23-1 Undervoltage Functional Test, QOS 6500-4. During performance of this surveillance the 1/2 Diesel Generator Cooling Water Pump (1/2 DGCWP) failed to start as required. An Emergency Notification System (ENS) notification was completed at 2145 hours on April 22, 1993.

The root cause for the 1/2 DGCWP failing to start is a design deficiency in the Bus 28 breaker close logic that has existed since the plant was originally designed. This deficiency causes the breaker to lockup following an undervoltage condition. The design deficiency has also existed on the Bus 18 breaker control logic since the installation of modification M04-1/2-83-014 in 1985. However, the lockup on Unit One would only occur if the power selector switch was in the Bus 18 position. Corrective actions included a modification to add an undervoltage contact in the Bus 28 close logic to the 1/2 Diesel Generator Cooling Water Pump

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

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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 - 25.1 MWT rated core thermal power.

EVENT IDENTIFICATION: 1/2 Diesel Generator Cooling Water Pump failure to start due to original design deficiency.

A. CONDITIONS PRIOR TO EVENT:

Unit: Two Event Date: April 22, 1993 Event Time: 1522
Reactor Mode: 1 Mode Name: Shutdown Power Level: 0%

This report was initiated by Deviation Report D-4-2-93-029.

SHUTDOWN Mode (1) - In this position, a reactor scram is initiated, power to the control rod drives is removed, and the reactor protection trip systems have been deenergized for 10 seconds prior to permissive for manual reset.

B. DESCRIPTION OF EVENT:

On April 22, 1993, at 1322 hours, Unit Two was in the SHUTDOWN mode at 0 percent of rated core thermal power. At that time, Technical Staff personnel were performing 4kV Bus 23-1 Undervoltage Functional Test, QOS 6500-4. During performance of this surveillance the 1/2 Diesel Generator Cooling Water Pump (1/2 DGCWP) failed to start as required. After approximately two minutes, the Equipment Operator at the Unit 1/2 Emergency Diesel Generator [DG] [EK] took the 1/2 DGCWP Feed Power Selection Switch from the Bus 28 [BU] position through the NORMAL position to the Bus 18 position and then back to the Bus 28 position. The 1/2 DGCWP started when the switch was moved from the Bus 28 position. The Unit 1/2 DG was declared inoperable and troubleshooting began with Electrical Maintenance, Operations and Tech Staff personnel. At 2145 hours, a design deficiency was identified in the 1/2 DGCWP Bus 28 close logic circuitry that would not allow the pump to automatically restart if it had been fed from Bus 28 and received an undervoltage trip signal.

An Emergency Notification System (ENS) notification of this event was completed at 2145 hours on April 22, 1993, to comply with the requirements of 10CFR50.72 (b)(1)(ii)(B).

Quad Cities Station Interim procedure # 133 was written and successfully performed on April 23, 1993, to demonstrate the 1/2 DGCWP operability to Unit One. There were no other systems or components inoperable at the beginning of this event which could have contributed to the event.

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C. APPARENT CAUSE OF EVENT:

This Licensee Event Report is being submitted in accordance with 10CFR50.73 (a) (2) (ii) (B), which requires reporting any event or condition that resulted in the condition of the nuclear power plant, including its principal safety barriers, being seriously degraded, or that resulted in the nuclear plant being in a condition that was outside of the design basis of the plant.

The root cause for the 1/2 DGCWP not starting is a design deficiency in the Bus 28 breaker close logic that has existed since the plant was originally designed. This design deficiency would prevent the 1/2 DGCWP from auto-starting if it was running on Bus 28, received a Bus 28 undervoltage trip and subsequently power was restored to Bus 28.

The problem was introduced into the Bus 18 pump control logic during the installation of modification M04-1/2-83-014 in 1985. This modification added the 1/2 DGCWP Feed Power Selector Switch to address Appendix R concerns. However, the problem only exists for the Bus 18 feed if the selector switch is placed in the Bus 18 position. The Bus 18 position of the switch is not the normal lineup for the 1/2 DGCWP.

In addition, the following concerns were discovered during the investigation of this event:

1. Some electrical prints reviewed were found to be incorrectly or inadequately labeled.
2. Electrical drawing 4E-1351C does not show the internal breaker logic. This significantly hindered the detection of this design deficiency over the years.

D. SAFETY ANALYSIS OF EVENT:

The safety significance of this event is minimal. At all times the 1/2 DGCWP could have been started by taking the pump control switch to trip and then back to the auto after trip or close position. In addition, the original logic of the electrical feeds to the 1/2 DGCWP aligned the pump to be fed from Unit One at all times except when Bus 18 experienced an undervoltage condition. If Bus 18 was experiencing an undervoltage condition the feed to the pump would automatically transfer to Bus 28. If the pump was being fed from Bus 28 and an undervoltage condition occurred, the Bus 28 breaker would trip and the breaker would lock-up due to the anti-pump logic. If voltage was restored only to Bus 28, the pump control switch would have to be taken to the trip position or the power selector switch would have to be moved to the 18, normal or 28 position to clear the breaker anti-pump lockout.

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Assuming a worst case single failure, the plant design is required to safely handle a Loss Of Coolant Accident (LOCA) on one unit and provide normal shutdown of the other unit, coincident with a station Loss Of Offsite Power (LOOP). In the scenario with a LOCA on Unit Two coincident a loss of the Unit One 125 Volt DC battery system, the Unit Two Diesel Generator would fail to auto-start because of the loss of the Unit One 125 Volt DC battery system. The LOCA signal on Unit Two would cause the 1/2 Diesel Generator to load to Unit Two 4 kV Emergency Bus 23-1. Bus 28 would be available to power the Unit 1/2 DGCWP, however, the Bus 28 breaker would trip on a Bus 28 undervoltage and then lockup due to the anti-pump mechanism.

The cooling water pump would not transfer to Bus 18 because the 1/2 DG is powering Bus 23-1. The control room would receive annunciator A-4, Diesel Generator 1/2 Trouble on the 902-8 panel and would dispatch an EO to the 1/2 DG room as directed by procedure QCAN 902-8 A-4. In the 1/2 DG room, the EO would find alarm Diesel Cooling Water Pump Failure OR Diesel Cooling Water Pump Locked Out and would be directed by Procedure QCAN 2212-45 C-3 to place the power selector switch to the 28 position and manually start the pump.

E. CORRECTIVE ACTIONS:

The immediate corrective action was to declare the 1/2 Diesel Generator inoperable and begin troubleshooting. Permanent corrective actions involved the design and installation of partial modification M04-0-93-003A which added a Bus 28 undervoltage contact in the close circuit and changed the existing undervoltage contact in the trip logic to come off of the same relay as the contact installed in the close circuit of the Bus 28 feed to the 1/2 Diesel Generator Cooling Water Pump.

In addition the following corrective actions will be or already have been implemented:

1. Modification M04-0-93-003B will be designed to move the presently installed Bus 18 undervoltage contact to a common point in the close circuit to clear the close signal independent of the position of the power selection switch. This modification will be installed during refuel outage Q1R13 (NTS# 2652009302901).
2. Caution Cards have been placed on the 1/2 DGCWP Feed Power Selection Switch until Modification M04-0-93-003B is installed and tested.
3. Caution statements will be added to procedures identifying limitations with the power selection switch (NTS# 2652009302902).
4. Document Change Requests will be submitted to correct drawing deficiencies (NTS# 2652009302903).
5. Quad Cities Station has in place a Detailed System Walkdown Program (DSWP) to walkdown systems and correct drawing error/deficiencies.
6. The internal close circuit for both the Bus 18 and 28 feed breakers to the 1/2 DGCWP were verified to be wired per detail "A" of Quad Cities electrical drawing 4E-2657E on May 11, 1993.

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F. PREVIOUS EVENTS:

There have been two previous event involving inadequate design with the Diesel Generator.

<u>LER NUMBER</u>	<u>TITLE</u>
04-02-92-014	1/2 Diesel Generator Outside Design Basis - Inoperable to Unit Two
04-02-87-001	1/2 Diesel Generator failed to auto start during C.S. Logic test from a blown fuse due to an electrical drawing error

G. COMPONENT FAILURE DATA:

There was no component failure identified with this event.

ATTACHMENT H (Cont'd)

EVENT SUMMARY AND CAUSE CODES

DVR Number
4-2-93-029

<input type="checkbox"/> Lost Generation	<input type="checkbox"/> Reactor Trip	<input type="checkbox"/> NRC violation, level _____
<input type="checkbox"/> Cost > \$25,000	<input type="checkbox"/> ESF actuation	<input type="checkbox"/> GSEP event, class _____
<input type="checkbox"/> Hazard or Spill	<input checked="" type="checkbox"/> NRC reportable	<input type="checkbox"/> Tech Spec LCO
<input type="checkbox"/> Personnel injury	<input checked="" type="checkbox"/> LER	<input type="checkbox"/> Potential or future loss
	<input type="checkbox"/> PSE	<input type="checkbox"/> SALP functional area _____

Component Type	Failure Mode	Department
X		
X		
X		

Licensed? L or blank	Type	Detail code
Level	Department	
A		
A		
A		

Type	Detail Code	Department
B	D 4	
B		
B		
Type	Detail code	
C		

Type of deficiency	Detail code	Procedure type
D		
D		
D		

Type	Detail code	Department
E		
E		
E		