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RLB-92-092

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U. S. Nuclear Regulatory Commission
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Reference: Quad Cities Nuclear Power Station
Docket Number 50-265, DPR-30, Unit Two

Enclosed is Licensee Event Report (LER) 92-008, 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)(iv). The licensee shall report any event or condition that resulted in manual or automatic actutation of any Engineered safety feature.

Respectfully,

COMMONWEALTH EDISON COMPANY
QUAD CITIES NUCLEAR POWER STATION

R. L. Bax
Station Manager

RLB/TB/plm

Enclosure

cc: J. Schrage
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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 6

Title (4)

Inadvertent ESF Actuation Due To Inadequate Test Equipment During RCIC Logic Functional Test

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)
										Quad Cities Unit One	0 5 0 0 0 2 5 4
0 3	1 6	9 2	9 2	---	0 0 8	0 0	0 4	1 5	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)			
		___ 20.402(b)	___ 20.405(c)	X 50.73(a)(2)(iv)	___ 73.71(b)
POWER LEVEL (10)	0 0 0	___ 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)	___ 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
Nick Radloff, Tech Staff System Engineer Ext. 2942	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:

On March 16, 1992, at 1315 hours, Unit Two was in the REFUEL mode and the reactor core fuel loading was in progress. The Reactor Core Isolation Cooling (RCIC) system was out-of-service for maintenance work. At this time, Electrical Maintenance (EM) personnel were performing QCEMS 350-3, RCIC Logic Functional Test. During removal of a jumper, the jumper momentarily brushed terminal 1 of relay 1430-106A. This sent a false momentary initiation signal to the Core Spray and 1/2 Diesel Generator systems.

The systems reacted accordingly to the false initiation signal. The Unit One and Unit Two NSO's reacted immediately to the annunciator alarms and responded by taking compensating actions.

The cause of this event is due to a design deficiency from a human factors viewpoint with the way the lead wire was landed on relay 1430-106A. This made the removal of the jumper more difficult.

EM performed a surveillance of other relays possibly having similar problems. Three other relays were found to have terminal leads that could obstruct jumpers. Work Requests were initiated to correct this problem.

This event is being reported in accordance with 10CFR50.73(a)(2)(iv).

PLANT AND SYSTEM IDENTIFICATION:

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

EVENT IDENTIFICATION: Inadvertent ESF Actuation Due To Inadequate Test Equipment During RCIC Logic Functional Test.

A. CONDITIONS PRIOR TO EVENT:

Unit: Two Event Date: March 16, 1992 Event Time: 1315
Reactor Mode: 2 Mode Name: REFUEL Power Level: 00%

This report was initiated by Deviation Report D-4-2-92-038.

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:

On March 16, 1992, at 1315 hours, Unit Two was in the REFUEL mode at 0 percent rated core thermal power and fuel loading was in progress. The Reactor Core Isolation Cooling (RCIC) [BN] system was already isolated and taken out-of-service for maintenance work. At this time, Electrical Maintenance (EM) personnel were performing QCEMS 350-3, RCIC Logic Functional Test.

Per procedure, EM was required to remove a jumper between terminals 3 and 4 of relay 1430-106A[RLY] in Cabinet 902-32-3W located in the auxiliary electric room. When the alligator clip of the jumper was lifted, the test director noticed the contacts of various nearby relays changing states. Also, the test director heard audible annunciators [ANN] over the headphone set that was patched into the control room. EM immediately stopped the test in order to investigate the situation.

Operations personnel investigated the causes of the alarms. The Unit One NSO discovered the 1/2 Diesel Generator (DG) [LC] cooling water pump started and running. Also, the 1/2 DG [EK] TROUBLE, AUTO START, and FAIL TO AUTO START, annunciator alarms energized. The 1/2 DG RUN light [IL] was on, however the U-1 NSO verified the DG was not running by observing no load indication on the frequency [HZM] and voltage [EI] indicators in the 901-8 panel.

The U-2 NSO also discovered the 2A Core Spray (CS) [BM] pump started, Motor Operated (MO) 2-1402-25A valve, CS Inboard Injection Valve [INV], displaying duel indication and MO2-1401-38A, CS Minimum Flow Bypass Valve [V], displaying open indication. He verified there was no initiation signal, and subsequently closed the MO2-1402-25A and MO2-1402-38A valves and placed the control switch for the 2A CS pump in the pull-lock-position. This stopped the pump and prevented it from starting again. Core Spray was not declared inoperable when the pump was placed in the pull-to-lock position because this system was not required to be operable per Technical Specification 3.5. However, both Low Pressure Coolant Injection (LPCI) and CS systems were available at the time of this event.

Fuel handling personnel were then contacted on the refuel bridge. They verified CS had not injected into the Reactor Vessel.

At 1343 hours, the Shift Engineer (SE) halted fuel loading into the reactor vessel until further investigation could be completed.

Discussions ensued between EM and Operating. It was determined that during the removal of the jumper in the RCIC logic testing procedure, one of the other relay terminals was accidently brushed against. This energized other relays, which created a false initiation signal to the Core Spray and 1/2 Diesel Generator Safety Systems. The Engine Cooling Relay (ECR) of the DG had been energized and deenergized starting an 11 minute timer. This timer causes the DG to continue running for 11 minutes upon shutdown in order to partially cool down the DG. The timer was energized even though the DG did not start running. The SE declared the 1/2 DG fully operable. After the investigation, both the CS and 1/2 DG systems were returned to normal standby operation.

At 1420 hours on March 16, 1992, the SE allowed the fuel handlers to resume loading the reactor core and EM to proceed with RCIC logic testing.

At 1514 hours on March 16, 1992, the NRC was notified of the event via the Emergency Notification System (ENS) in order to comply with the requirements of 10CFR50.72(b)(2)(ii).

EM personnel resumed RCIC logic testing and successfully completed the remainder of the surveillance test at 2140 hours.

C. APPARENT CAUSE OF EVENT:

This report is being submitted in accordance with 10CFR50.73(a)(2)(iv): The license shall report any event or condition that resulted in manual or automatic actuation of any Engineering Safety Feature (ESF), including the Reactor Protection System (RPS).

The cause of this event is due to a design deficiency from a human factors standpoint with the way the lead wire was landed on relay 1430-106A causing an obstruction. QCEMS 350-3, RCIC logic functional test, had been completed to Step I.7.a. The RCIC logic had the following abnormal configuration as part of the logic test: 1) Jumper from contacts 3 to 4 on relay 1430-105A, 2) Jumper from contacts 9 to 10 on 1430-106B relay, and 3) Jumper from contacts 3 to 4 on 1430-106A relay. In Step I.7.b of the test, the jumper from contact 3 on relay 1430-106A was to be removed.

During this step, the electrician had removed the alligator clip at an approximate 45 degree angle due to a lead from terminal 5 on this relay obstructing terminal 3. The removal of the jumper in the angular direction as opposed to a jumper removal normally in a vertical direction, caused the electrician to brush the alligator clip against terminal 1 of the same relay. This energized relays 1430-127A, 1430-111A a.. 1430-112A. Energizing these relays caused other relays associated with CS and 1/2 DG initiation logic to energize.

D. SAFETY ANALYSIS OF EVENT:

The safety of the plant and personnel was not affected during this event. Per Technical Specification 3.5.E/4.5.E, RCIC is not required to be operable when reactor pressure is below 150 pounds per square inch gauge (psig). RCIC was isolated and out-of-service for maintenance throughout this event. Also, Unit Two was in the refuel mode, and refueling was in progress at the time of this event.

From all indications, the initiation logic and corresponding circuitry acted as designed. Because of the different relay timing characteristics, some relays did not have sufficient time to energize, thus not allowing certain signals to seal-in. This was evidenced by the fact that the DG did not auto-start but the CS pump did.

The actuation of the 2A CS system did not result in an actual injection into the vessel. If injection had occurred there would have been no damage to the fuel or danger to personnel. Any level changes within the reactor would have been noticed by the NSO or individuals on the refuel floor and immediate actions would have been taken. During this event, the reactor was 80.6 percent reloaded with all the control rods fully inserted. If CS had injected during this event the reactor would have remained subcritical. The CS system was available before and after this event.

The 1/2 DG also did not start due to the short duration of the signal. If the 1/2 DG had started, the circuit breaker connecting the 1/2 DG to the bus would have remained opened. This would have resulted in the 1/2 DG running normally without supplying any load to bus 13-1. The 1/2 DG would not have been able to supply any load to the 23-1 bus when it received an initiation signal because the keylock switch was in the OFF position.

The Low Pressure Coolant Injection (LPCI) [BO] mode of Residual Heat Removal (RHR) system was available throughout this event.

E. CORRECTIVE ACTIONS:

The immediate corrective actions were to halt the RCIC logic testing and investigate the alarms for the Unit Two Core Spray and 1/2 Diesel Generator systems.

One U-2 NSO placed the CS pump control switch in the pull-to-lock position, stopping the pump, and closed MO2-1402-25A and MO2-1402-38A valves.

The U-2 NSO verified the 1/2 DG did not auto-start. Afterwards, he returned the DG and DG pump back to their normal standby conditions and the SE declared the system fully operable.

The SE halted fuel moves while the event was under investigation. When the investigation was completed, the SE allowed the fuel handlers to start moving fuel bundles again.

EM performed an inspection of the relays in Unit 2 panels 902-32, 33, 39, 46, 47, and 48 of the Auxiliary Electric room in order to identify other relays having similar problems with lead removal. A similar surveillance will be performed for relays in Unit 1 panels (NTS 2652009203801). Three other relays were found on Unit Two to have terminals leads that could obstruct jumpers. Work Requests (Q98896 through Q98899) have been initiated to rotate the lugs of the obstructing leads to improve access to the terminals (2652009203802).

Electrical Maintenance will investigate other types of jumper clips and safety equipment that will allow easier placement of jumpers across terminals of relays and reduce the possibility of causing shorts during installation and removal of jumpers (NTS# 2652009203803).

Training will be provided to the Electrical Maintenance, Instrument Maintenance and Operating Departments. This training will review this event and include specific guidance to personnel regarding responsibilities for the placement of jumpers in difficult locations (NTS 2652009203804 through 2652009203806).

A precaution will be placed in the following procedures to instruct the worker to consider different means of installing jumpers in difficult locations. This precaution will instruct the worker to consider using a different jumper or with managements concurrence, a different point to attach the jumper.

QCEM 700-14 "Lifting and Landing Leads"
QCEM 700-7 "Maintenance Temporary Alterations for Troubleshooting"
QCEMS 350-1 "Automatic Blowndown Logic Test
QCEMS 350-2 "LPCI and Containment Cooling Modes of RHRS Logic Test"

QCEMS 350-3 "RCIC Logic Funtional Test"
QCEMS 350-4 "HPCI Logic Functional Test"
QCEMS 350-5 "Core Spray Logic Functional Test"
(NTS #2652009203807)
QAP 300-12 "System Temporary Alteration"
(NTS #2652009203808)
QCIP 100-20 "Instrument Maintenance Department Diagnostic Work Control Procedure"
QCIP 100-13 "Instrument Maintenance Department Alteration Procedure"
(NTS #2652009203809)

F. PREVIOUS EVENTS:

A review of the LER's and Deviation Reports from 1985 to present revealed no previous events involving ESF actuations from RCIC logic testing.

A Nuclear Plant Reliability Data Search (NPRDS) was not conducted as there was no failed component associated with this event.

Other similar events that involved jumper lead problems are listed below:

DVR Number	Title
4-2-87-59	HPCI inject into vessel due to improper relay block installation.
4-2-88-35	RWCU isolation due to review of jumper removal inadequate.
4-1-88-50	MCR isolation due to improper jumper installation because of unfamiliar layout.
4-1-89-106N	1/2 SCRAM due to blown fuse when jumper touched ground.

G. COMPONENT FAILURE DATA:

There was no failed component associated with this event.