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GGC-94-118

September 19, 1994

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) 94-006, Revision 00, for Quad Cities Nuclear Power Plant 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 actuation of any Engineered Safety Feature.

The following commitments are being made by this letter:

- Review current training requirements and consider additional training for all work groups at the station reiterating the sensitivity of the MSL high flow instrument racks and other racks identified as vibration sensitive.
- Add to the permanent barrier in the 1B RHR room to protect the rack from items dropped from above.
- Extend the barrier in the 2B RHR room to include the rack support legs.
- Investigate a method to reduce the vibrational sensitivity of the MSL high flow actuation switches.

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
QUAD CITIES NUCLEAR POWER STATION

L S Tucker

for G.G. Campbell
Station Manager

GGC/TB/plm

Enclosure

cc: J. Schrage — INPO Records Center
C. Miller — 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)
Unit Two Main Steamline (MSL) High Flow Group I Isolation From Rack Vibration By Contractor Personnel

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 8	2 3	9 4	9 4	-- 0 0 6	-- 0 0	0 9	1 9	9 4		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)			
4		20.402(b)	20.405(c)	X 50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)	0 9 9	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
Joe Manemann, Regulatory Assurance, Ext. 3190	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 August 23, 1994, Unit 2 was in the RUN mode at approximately 99% power. Contractor Instrument Maintenance (IM) personnel had received permission to calibrate the 2B Reactor Recirculation pump seal pressure transmitter located on an instrument rack immediately adjacent to one of the two Main Steamline (MSL) high flow instrument racks. At 0827 a Group I primary containment isolation (PCI) was received from a main steamline high flow signal. A Reactor Scram followed from Main Steam Isolation Valves not being full open while in the Run mode.

The root cause of this event was inadvertent vibrational disturbance to the MSL high flow instruments by contractor IM personnel working at the rack. This vibration resulted in the trip of the MSL high flow switches. A full Group I PCI and Reactor Scram then occurred. The Causal Factors for this event are attributed to Lack of awareness of the need for concern and Design configuration.

Corrective actions that have been completed include: installation of vibration dampening pads, construction of an additional temporary barrier and placement of 'CAUTION Sensitive Equipment' signs around the instrument racks. Corrective actions to be completed include: review current training requirements and consider additional training for all work groups at the station reiterating the sensitivity of the MSL high flow instrument racks and other racks identified as vibration sensitive, improving the permanent rack barriers and investigating a method to reduce the vibrational sensitivity of the MSL high flow actuation switches.

PLANT AND SYSTEM IDENTIFICATION:

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

EVENT IDENTIFICATION: Unit Two Main Steamline (MSL) High Flow Group I Isolation from Rack Vibration by contractor personnel.

A. CONDITIONS PRIOR TO EVENT:

Unit: Two Event Date: August 23. 1994 Event Time: 0827
Reactor Mode: 04 Mode Name: Run Power Level: 99

This report was initiated by Licensee Event Report 265\94-006.

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. DESCRIPTION OF EVENT:

On August 23, 1994, Unit 2 was in the RUN mode at approximately 99% of rated core thermal power. Contractor Instrument Maintenance (IM) personnel had requested permission from the U2 Unit Supervisor to calibrate the 2B Reactor Recirculation [AD] pump seal pressure transmitter [PIT]. This transmitter is located on an instrument rack that is immediately adjacent to one of the two Main Steamline (MSL) [SB] high flow instrument racks. The work had been stopped on the previous day due to the potential for a ½ Group I isolation [JM] signal from instrument rack vibration while a surveillance was in progress that was also giving ½ Group I isolations. The Unit Supervisor considered the risk potential, re-emphasized to the IMs that bumping the instrument rack may cause the unit to scram, and allowed the work to resume.

Station Instrument Maintenance (IM) personnel had requested permission from the U2 Unit Supervisor to perform the power weekly surveillance on Nuclear Instrumentation [IG] and Main Steamline radiation monitors [IL]. The Unit Supervisor allowed the Nuclear Instrumentation portion of the surveillance, which gives ½ scrams, to be performed but postponed the Main Steamline radiation monitor portion until the contractor IMs completed their calibration because that portion of the surveillance also gives ½ Group I isolations.

At 0827 the IM gave the first ½ Scram from the Nuclear Instrumentation portion of the surveillance and approximately one second later a full Group I isolation and full Reactor Scram was received. Approximately 50 seconds after the Reactor Scram, Auxiliary power transferred causing some in-plant lighting to dim momentarily.

The contractor IMs had arrived at their work location and opened the door of the protective cage around the instrument racks. Approximately 30 seconds to one minute later they saw the lighting dim and noticed the MSL flow indicators that were previously on scale were now reading downscale. One IM called to notify the Control Room [NA] of what they had seen, and the Nuclear Station Operator (NSO) told the IMs to leave the area as it was and come to the control room.

The Group I primary containment isolation (PCI) [JM] was received from a main steamline high flow signal [PDIS]. A Reactor Scram [JC] followed from Main Steam Isolation Valves (MSIV) not being full open while in the Run mode. The expected reactor water level transient, due to the collapse of voids following the scram, caused reactor water level to drop below the low level setpoint of +8 inches. Group II and III Primary Containment Isolations (PCI) [JM] were received along with Reactor Building Ventilation Isolation [VA], Control Room Ventilation Isolation [VI] and Standby Gas Treatment (SBGT) [BH] initiation.

During the event, the Scram Discharge Volume (SDV) inboard drain valve [ISV] AO-2-0302-22C closed to dual indication. The outboard valve AO-2-0302-22D did close fully to isolate the line. The 3B Electromatic Relief Valve [RV] automatically opened at 1098 psig and was manually controlled by the NSO per emergency operating procedure QGA 100. At 0859 procedure QGA 100 was exited and at 0953 the scram was reset.

An Emergency Notification System (ENS) notification of this event was completed at 1102 hours on August 23, 1994 to comply with the requirements of 10 CFR 50.72 (b)(2)(ii) and (iii).

There were no systems or components inoperable at the beginning of this event which could have contributed to this event.

C. APPARENT CAUSE OF EVENT:

This report is being submitted in accordance with 10 CFR 50.73(a)(2)(iv), which requires the reporting of any event or condition that results in manual or automatic actuation of any Engineered Safety Feature (ESF) [JE], including the Reactor Protection System (RPS) [JC].

The root cause of this event was inadvertent vibrational disturbance to the MSL high flow instruments, located on rack 2203-10 in the 2B RHR room, by contractor instrument maintenance technicians working at the rack. This vibration resulted in the trip of the MSL high flow switches. A full Group I PCI and Reactor scram then occurred.

The following is a summary of Conclusions and Causal Factors (C/F) contributing to equipment malfunctions.

C/F: Lack of awareness of the need for concern

The contractor IM personnel had been cautioned of the sensitivity of these MSL high flow instruments on the previous day and on the day of the event. Both IMs stated that they were aware of the need to be careful not to bump the instrument rack. One IM stated that when he opened the door of the protective cage around the instruments, he had tools in his hands and the door may have opened into a cart near the cage. This could have provided the small amount of vibration required at full power to trip the instruments.

C/F: Design Configuration

The MSL high flow instruments are mercury switches which are susceptible to spurious trips from vibration of the instrument racks by workers in the area. This investigation included pressurizing the switches to 80 psid to simulate 100% MSL flow and then physically accelerating the switches on various portions of the instrument rack. The induced vibration to either the rack, the instruments, or the rack supporting legs caused ½ or full Group I isolation signals.

During the investigation of this event, the following other possible causes were investigated and ruled out as contributors to this event:

- All inboard and outboard MSIVs were walked down and stroked to verify no separation of the valve disk from its valve stem.
- All 16 high flow switch sensing lines were backflushed and found to be clear of obstructions.
- The performance of the power weekly surveillance on the Nuclear Instrumentation was determined to be coincidental in time and there is no electrical or physical tie to the MSL high flow isolation.
- Elevated temperatures were noted in localized areas of the drywell at the time of the event. The drywell was deinerted and a walkdown of the MSL high flow sensing lines was performed. There was no evidence of any steam leaks and the elevated temperatures were attributed to heat radiating from the 3B Electromatic Relief Valve tailpipe as steam was discharging to the suppression chamber.

D. SAFETY ANALYSIS OF EVENT:

The safety consequences of this event were minimal because the MSL high flow Differential Pressure switches performed their design function by causing a Group I isolation. The primary purpose of this instrumentation is to detect a break of the main steam line. A trip of this instrumentation results in closure of Group I PCI valves which include the Main Steam Isolation Valves, MSL drain valves, and recirculation sample valves. For the worst case accident, a main steamline break outside the Drywell, the trip setting of 140% of rated steam flow, in conjunction with the flow limiters and MSIV closure, limits the mass inventory loss such that fuel is not uncovered, fuel temperatures remain less than 1500°F, and release of radioactivity to the environs is well below 10 CFR 100 guidelines. There is a Reactor Scram signal when the MSIVs reach 10% closed from the full open position in anticipation of the pressure and flux transients which occur when the valves fully close. Consequently, public health and safety were never jeopardized.

E. CORRECTIVE ACTIONS:

Short term corrective actions included:

- Installed vibration dampening foam pads around the 2202-10 rack support legs that protrude outside the protective barrier in the 2B RHR room.
- Installed a temporary protective barrier around 2202-10 rack.
- Limited access to 1B RHR room until completion of the permanent barrier addressed by NTS# 2651809400602.
- Removed unused camera and cables from top of instrument rack in 1B RHR room.
- Placed "CAUTION sensitive equipment in this area may cause unit trip" signs on sensing lines on top of the Unit 2 torus and on the protective cages at rack 2201-10 in 1B RHR room and at racks 2202-10A and 10B in 2A and 2B RHR rooms. Determined that signs were not required on top of the Unit 1 torus.
- Monitored MSL sensing line temperatures during startup and weekly while at power to verify no steam leakage in the Drywell.
- Wrote a Problem Identification Form (PIF#94-2212) on the Sequence of Events Recorder (SER) documenting failure of recording the actuation of 595-102A relay.
- Placed an article in the "Daily Link" to raise the awareness of all plant personnel of the sensitivity of the MSL high flow instrument racks.

Long term corrective actions will include:

- Review current training requirements and consider additional training for all work groups at the station reiterating the sensitivity of the MSL high flow instrument racks and other racks identified as vibration sensitive (NTS # 2651809400601).

- Add to the permanent barrier in the 1B RHR room to protect the rack from items dropped from above (NTS # 2651809400602).

- Extend the barrier in the 2B RHR room to include the rack support legs (NTS # 2651809400603).

- Investigate a method to reduce the vibrational sensitivity of the MSL high flow actuation switches (NTS # 2651809400604).

F. PREVIOUS EVENTS:

A review of previous Licensee Event Reports (LER) at Quad Cities Station Units One and Two, since January 1, 1989 concerning MSL high flow isolations revealed one previous (Unit 1 LER 92-004) Group I isolation on February 7, 1992 from 100% power (root cause unknown, possibly spurious initiation of MSL high flow instruments or erratic output from the flow transmitter). Additional similar Group I isolation events since January 1, 1989 are listed below:

6/23/89 Unit 2 DVR 04-02-89-032	1/2 Group I isolation due to inadvertent bumping of a MSL high flow switch while performing a surveillance with the unit at 96% power.
1/30/90 Unit 2 DVR 04-02-90-003	1/2 Group I isolation due to MSL high flow from a contractor bumping an instrument rack with the unit at 78% power.
3/18/91 Unit 1 DVR 04-01-91-045	1/2 Group I isolation and Channel A MSL high flow alarm with the unit shutdown (spurious).
7/21/94 Unit 1 PIF 94-1815(254/1301)	Full Group I isolation from MSL high flow (unknown cause) while the unit is shutdown.

A search of the Nuclear Plant Reliability Data System (NPRDS) and General Electric (GE) Scram reports revealed no other plants reporting spurious or vibration induced main steamline isolations.

A GE Service Information Letter (SIL #143) addressed inadvertent jarring and bumping of local instrument racks during maintenance and testing. All of the recommended actions in the original SIL have been implemented. SIL #143 Supplement 1 has been included in the SIL re-review currently being conducted by the Station and is targeted for completion by March 1, 1995.

G. COMPONENT FAILURE DATA:

There is no component failure associated with this event.

Licensee Event Report
Reviewer Assignment Form

Revised 08/10/94

LER # 265\94-006 Date: August 23, 1994

Subject: Unit Two Main Steamline (MSL) High Flow Group I Isolation From Rack Vibration By Contractor Personnel.

Signatures of reviewers indicating review and approval of item:

Systems Eng. Supv:		9/14/94		9-14-94
		Date		Date
Operating Eng.:		9/14/94		9.14.94
		Date		Date
Technical Supt.:		9/14/94		9-15-94
		Date		Date
		9/14/94		
		Date		Date

Approved: _____ 9/20/94
alternate PORC Chairman (If not Station Manager) Date

Approved: _____ 9/20/94
for Station Manager Date