



Commonwealth Edison

Quad Cities Nuclear Power Station
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RLB-92-063

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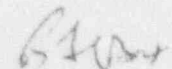
Reference: Quad Cities Nuclear Power Station
Docket Number 50-254, DPR-29, Unit One

Enclosed is Licensee Event Report (LER) 92-006, 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 actuation 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
T. Taylor
INPO Records Center
NRC Region III

Handwritten signature/initials

LICENSEE EVENT REPORT (LER)

Form Rev 2.0

Facility Name (1)

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Quad Cities Unit One

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Title (4) Loss of Main Control Room Annunciators on Unit One and Control Room Ventilation Isolation Following Loss of Line 0405 Due to a Lightning Strike

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)
01	21	49	29	2	006	01	03	12	92	015101012541
OPERATING MODE (9)			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)							
1			20.402(b)		20.405(c)		<input checked="" type="checkbox"/> 50.73(a)(2)(iv)		73.71(b)	
POWER LEVEL (10)			20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)	
00%			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

Michael Harms Ext. 2159

AREA CODE

309 654-1241

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	
X	I	B	F	U	B	S	16	19	N		

SUPPLEMENTAL REPORT EXPECTED (14)

Expected Submission Date (15)

Month | Day | Year

Yes (If yes, complete EXPECTED SUBMISSION DATE) ☒ NO

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

ABSTRACT:

On February 14, 1992, Unit One was in the SHUTDOWN mode at 0 percent of rated core thermal power. Unit Two was in the REFUEL mode at 0 percent of rated core thermal power. At 2235 hours, a lightning strike in or near the 345 KV switchyard [FK] caused line 0405 to trip. When this line tripped, all Unit One annunciators [ANN] were lost and the Control Room (CR) ventilation [VI] isolation dampers [DMP] failed closed.

The apparent cause of the loss of the CR annunciators was a power surge due to the lightning strike which caused fuse [FU] failures. The apparent cause of the CR vent isolation was a power surge or failure to the Toxic Gas Analyzer panel [PL].

The corrective actions taken for the loss of annunciators included checks on the breakers [BKR] and fuses, replacement of fuses, a walkdown of 125 VDC panels, and requests for Site Engineering studies to increase the station's lightning protection. The corrective actions taken for the CR vent isolation included verifying proper manual and automatic operation of the isolation dampers.

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

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TEXT Energy Industry Identification System (EIIIS) 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: Loss of Main Control Room Annunciators on Unit One and Control Room Ventilation Isolation Following Loss of Line 0405 due to a Lightning Strike.

A. CONDITIONS PRIOR TO EVENT:

Unit: One Event Date: February 14, 1992 Event Time: 2235
Reactor Mode: 1 Mode Name: Shutdown Power Level: 00%

This report was initiated by Deviation Report D-4-01-92-017.

SHUTDOWN (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 February 14, 1992, Unit One was in the SHUTDOWN mode at 0 percent of rated core thermal power. Unit Two was in the REFUEL mode at 0 percent of rated core thermal power. At 2235 hours, lightning struck in or near the 345 KV switchyard [FK]. Transmission line 0405 tripped and all of the Unit 1 annunciators [ANN] were lost.

At 2240 hours, a Generating Station Emergency Procedure (GSEP) Alert was declared. Per QEP 200-T1, "Quad Cities Emergency Action Levels", the loss of annunciators on the Emergency Core Cooling System panel (901-3), Reactor Control panel (901-5), and the Electrical panel (901-8) in the main Control Room [NA] (CR) requires a GSEP declaration.

A Shift Foreman (SF) and Equipment Operator (EO) were immediately dispatched to the Unit One battery charger [BYC] room to determine the condition of the DC feed breaker [BKR] for the 901-34 panel, annunciator control panel. All DC power for the Control Room annunciator panels is fed from the 901-34 panel. The SF and EO reported that the annunciator feed breaker was in the normal ON position and no problems were found.

The SF and EO proceeded to the 901-34 panel located in the Auxiliary Electric Room. The EO pulled the fuse [FU] block [BLK] that contained the main positive and negative fuses for the 901-34 panel. Electrical Maintenance (EM) personnel performed a continuity check on the fuses and determined that the fuses had not blown. At 2256 hours, the fuse block was reinstalled with the original fuses and annunciator power was restored except for the 901-6 panel.

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The Unit One Nuclear Station Operator (NSO) tested all panel annunciators satisfactorily except the 901-6 panel and determined that there were no unusual alarms. At 2308 hours, the SF and EO found a blown fuse in the 901-34 panel associated with the control room 901-6 annunciator panel circuitry. The EO replaced the fuse and the 901-6 annunciators were restored.

At 2329 hours, an Electrical Maintenance Foreman recommended replacing the main fuses that were previously removed and reinstalled. The Foreman could not explain why this action restored power to the annunciators. On February 16, 1991, the main fuses removed from the 901-34 panel were continuity tested a second time. One of the fuses tested bad indicating a loss of fuse integrity. At 2332 hours, the fuses were replaced with like-for-like fuses. In addition, a 1 hour Emergency Notification System (ENS) telephone call and a Nuclear Accident Response System (NARS) call were made at this time.

At 2340 hours, an EO was dispatched to inspect DC batteries and busses for damage and later reported that no damage was found and the DC systems appeared normal. At 2354 hours, the GSEP Alert was terminated because all Unit One annunciators were working properly. At 2358 hours, ENS and NARS telephone calls were made for the GSEP termination. Operating personnel were cautioned to closely monitor indications and alarms over the next several days to verify proper annunciator response. Line 0405 was reclosed at 1615 hours on February 15, 1992.

Also at 2235 hours, immediately following the lightning strike, the CR ventilation system [VI] automatically entered the recirculation mode of operation and the "Control Room Standby HVAC System Major Trouble" alarm [ALM], G-12, annunciated on the 912-1 panel in the Main CR. An Equipment Operator (EO) was dispatched to the Toxic Gas Analyzer panel, 1/2-9400-103, and the CR Standby Heating, Ventilation, and Air Conditioning (HVAC) local control panel, 1/2-9400-105. The EO identified that the "Toxic Gas Concentration High" and the "Toxic Gas Analyzer Trouble" alarms were annunciating on the 1/2-9400-105 panel. However, the EO identified that no alarms were present on the Toxic Gas Analyzer panel. The EO then acknowledged and reset alarms on the 1/2-9400-105 panel. The EO also verified that the CR isolation dampers [DMP] had failed closed as per design. A Shift Foreman (SF) was dispatched to the panels to further investigate. The CR isolation dampers were then reset, manually isolated, and reset again to verify proper manual operation of the system. At 0200 hours on February 15, 1992, the Instrument Maintenance Department (IMD) performed QIS 79-2, "Chlorine Analyzer Functional Test Procedure," and verified that the dampers isolated properly from an automatic isolation signal. An Emergency Notification System (ENS) phone call was made at 0207 hours per 10CFR50.72(b)(2)(ii).

C. APPARENT CAUSE OF EVENT:

This report is being submitted in accordance with 10CFR50.73(a)(2)(iv), which requires the reporting of any event or condition that results in manual or automatic actuation of an Engineered Safety Feature (ESF).

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The apparent cause of the loss of annunciators was a lightning strike in the vicinity of the plant. The lightning strike initiated a power surge which caused one of the main power fuses, F1 and F2, for the 901-34 panel to fail. The power surge also blew fuse F24 in the 901-34 panel which protects circuitry associated with the 901-6 annunciator panel located in the CR.

The main power fuse failure was determined to be a mechanical failure rather than a purely electrical failure. This would explain why the fuse was found to have good continuity on February 14 when it was originally checked and reinstalled and poor continuity after Electrical Maintenance recommended replacing the fuse. The metal inside the fuse that carries current was degraded by the lightning strike to where it was making fluctuations in continuity influenced by physical movement of the fuse. If the fuse failed electrically, the current carrying metal would have disintegrated so that continuity through the fuse would have been impossible. The EM Foreman also noted the fuse to be warm at the time it was replaced which was attributed to a high resistance internal fuse connection.

The apparent cause of the CR ventilation isolation was a power surge or disruption to Motor Control Center [MCC] (MCC) 16-3-1 due to the lightning strike. MCC 16-3-1 is the source of power for the Toxic Gas Analyzer panel, 1/2-9400-103. Upon a power loss or surge to this panel, the CR isolation dampers are designed to fail in the safe direction of closed.

D. SAFETY ANALYSIS OF EVENT:

Safety of the public and plant personnel was not affected by the loss of Unit One annunciators. Unit One was in cold shutdown during the event. This decreased the number of evolutions which could cause alarms to annunciate, thereby making it easier for the NSO to use monitoring instrumentation for the status of the unit.

A walkdown was performed immediately after the annunciators were restored, both in the CR and in the plant, to determine if any other equipment associated with the AC or DC distribution systems were effected. No other signs of equipment degradation or unusual indications were found.

Therefore, all indication and control equipment necessary to maintain the reactor in a safe shutdown condition were available and sufficient for operator use, if required.

The safety significance of the CR ventilation isolation was also minimal. When power to the Toxic Gas Analyzer panel surged or was interrupted, the CR isolation dampers failed closed causing the CR ventilation system to enter the recirculation mode of operation. This system response was the design response and was fail-safe.

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E. CORRECTIVE ACTIONS:

The immediate corrective action taken as a result of the loss of annunciators was to check the 901-34 panel supply breaker and main fuses. The supply breaker was determined to be closed and functioning properly. Therefore, the main fuses were satisfactorily tested for continuity, reinstalled, and the annunciators were reenergized. A fuse was replaced in the 901-34 panel to reenergize the 901-6 CR panel annunciators. All annunciators were then tested satisfactorily with no unusual alarms lit for the plant conditions.

Upon a recommendation by the EM Foreman, the main fuses for the 901-34 panel, previously continuity tested, were replaced.

The Operations department performed a walkdown of fuses in the CR, Auxiliary Electric room, and 345 KV relay [RLY] house. In addition, all 125 VDC panels were checked for tripped relays and breakers. No discrepancies were found.

On February 16, 1992, Nuclear Work Request Q98184 was initiated to inspect all of the Unit One annunciator fuses. The work package was completed with no degraded wiring or fuses found. The main fuses that were replaced were continuity tested a second time at the request of station Technical Staff personnel. One of the main fuses tested bad and was cut open. It was then observed that the fuse failed mechanically rather than electrically.

As further corrective action, Site Engineering will commission a study to determine enhancements that can be done to the Station's lightning protection system (NTS# 2542009201701).

The immediate corrective actions taken for the CR ventilation isolation were to dispatch an EO to the Toxic Gas Analyzer panel and the CR Standby HVAC local control panel. At the panels, the EO verified that the isolation dampers had failed closed as designed.

A SF was then dispatched to the panels to assist in the investigation. The EO and SF reset, isolated, and reset the dampers again to verify proper manual operation of the dampers. The IMD then performed QIS 79-2, "Chlorine Analyzer Functional Test Procedure," and verified proper automatic operation of the dampers.

No further corrective actions for the CR ventilation isolation are necessary.

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F. PREVIOUS EVENTS:

Previous events that involved a lightning strike in the vicinity of the station are as follows:

- 1) DVR 04-02-87-031 (LER 87-007), "RWC Isolation (Group III) and One Half of a Group I, Group II, and a Channel A 1/2 Scram From Loss of Bus 28 Due to Lightning Strike."
- 2) DVR 04-02-90-054, "Lightning Strike Causing Valve 1-220-45 to Close."
- 3) DVR 04-01-91-050 (LER 91-008), "Reactor Building Ventilation Isolation Due to Lightning Strike."

There was one previous event in the past five years that involved the loss of annunciators. Deviation Report 04-02-92-016 reported that all annunciators for Unit Two were lost due to a main fuse failure on the 902-34 panel during a modification to enhance the annunciator system.

Previous events where the CR isolation dampers failed closed due to a surge or loss of power to the Toxic Gas Analyzer panel are as follows:

- 1) DVR 04-01-87-048 (LER 87-010), "Control Room Ventilation Trip Due to Power Loss to Toxic Gas Analyzer - Design Deficiency and Late Notification - Personnel Error."
- 2) DVR 04-01-87-071 (LER 87-014), "Control Room Ventilation Isolation Caused by Chlorine Analyzer Spike During Electrical Storm."

G. COMPONENT FAILURE DATA:

The fuse was manufactured by Bussman, part number #NON-60.

There is no component failure data associated with the CR ventilation isolation.