



**Commonwealth Edison**

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RLB-89-287

December 28, 1989

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) 89-022, Revision 00, for Quad Cities Nuclear Power Station. This report covers a deluge actuation resulting in High Pressure Coolant Injection system inoperability and the fire suppression system outage notification.

This report is submitted in accordance with the requirements of the Code of Federal Regulations, Title 10, Part 50.73(a)(2)(v): 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; and Technical Specification 3.12.C.3: Restore the system (fire suppression system) to operable status within 14 days or prepare and submit a report to the Commission pursuant to Specification 6.3.A.1 within the next 30 days.

Respectfully,

COMMONWEALTH EDISON COMPANY  
QUAD CITIES NUCLEAR POWER STATION

R. L. Bax  
Station Manager

RLB/MJB/ad

Enclosure

cc: R. Stols  
R. Higgins  
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) 05000254  
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Title (4)  
 Unit One HPCI Inoperable Due to Inadvertent Deluge System Actuation

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)
11	21	1989	1989	022	00	12	28	1989		05000254

OPERATING MODE (9) 4

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)

20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
20.405(a)(1)(i)	50.36(c)(1)	X 50.73(a)(2)(v)	73.71(c)
20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(v11)	X Other (Specify in Abstract below and in Text)
20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(v111)(A)	
20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(v111)(B)	
20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

Name: K. J. Hill, Technical Staff Engineer, Ext. 2150  
 TELEPHONE NUMBER: 309 554-2241

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
				Y					

SUPPLEMENTAL REPORT EXPECTED (14)

Expected Submission Date (15) \_\_\_\_\_

Yes (If yes, complete EXPECTED SUBMISSION DATE)  NO

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

At 0910 hours on November 28, 1989, the Unit One High Pressure Coolant Injection (HPCI) system was declared inoperable following an unexpected actuation of the HPCI Pump Room Deluge system. The actuation caused DC system grounds due to moisture intrusion in the various turbine auxiliary electrical equipment. The actuation occurred while operating personnel were in the process of returning the deluge system to service.

The root cause of the HPCI deluge actuation is not known. The electrical equipment affected by the deluge actuation was tested and dried as necessary to remove the DC grounds. The HPCI system was successfully tested and returned to service at 1045 hours on December 1, 1989.

Corrective actions will include a procedure revision and operator training.

The deluge system remains out of service to allow installation of a preaction system to prevent any future inadvertent actuations. Fire watch frequency will be increased and a temporary procedure will be initiated. On December 11, 1989, the period of time that the deluge system was inoperable exceeded the 14-day reporting requirement of Technical Specification 3.12.C.3.

This event is being submitted in accordance with 10CFR50.73(a)(2)(v)(D) and Technical Specification 3.12.C.3.



LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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

The deluge system actuation on November 28, 1989, occurred as Operating personnel were in the process of returning the system to service after the previous event described above. The Equipment Attendant (EA) who was assigned the return to service found the deluge manual isolation valve closed as expected and noted that a paper card was inserted between the valve [V] stem and a tamper switch [33] mounted on the valve stem. The card had apparently been placed in order to silence the system trouble horn [ALM] which is not the preferred practice. Normally the supervisory relay is blocked to silence the system trouble alarm. The EA then proceeded to return the system to service in accordance with QOP 4100-4, Resetting Fire System Deluge Valve. After checking the latching mechanism and verifying the valve was properly reset, the EA slowly opened the valve until water could be heard to fill the chamber. The EA stopped opening the valve and made a visual check of the room to verify no water was being discharged from the spray nozzles. Following the visual check, the EA proceeded to fully open the valve. However, before the valve was full open, the card inserted between the valve stem and tamper switch fell out and the deluge system trouble horn sounded and fire alarm gong [ALM] actuated indicating the system had actuated. The EA immediately closed the valve to stop the spraying of water in the HPCI room.

The actuation of the deluge system resulted in the receipt of a 125 VDC system ground alarm [ALM] in the Control Room which was caused by moisture intrusion into the miscellaneous DC equipment in the HPCI room. The HPCI system was declared inoperable at 0910 hours on November 28, 1989, and HPCI System Outage Report, QOS 2300-01 was initiated. Work Request Q80367 was written for Electrical Maintenance personnel to megger the DC equipment to detect any electrical shorts to ground. NRC notification of the HPCI system inoperability was completed via the Emergency Notification System (ENS) phone system at 1013 hours on November 28, 1989, to comply with the requirements of 10CFR50.72(b)(2)(iii)(D).

At 1030 hours on November 28, 1989, the HPCI DC motors located in the room were taken out of service. This included the turbine turning gear [TGR], turbine auxiliary oil pump [P], emergency bearing oil pump [P], turbine gland seal leakoff blower [BLO], gland seal condensate pump [P], turbine motor speed changer [MO] and motor gear unit [MO]. Of the motors checked, only the gland seal leakoff blower exhibited indications of a ground; however, the motor was subsequently dried and readings returned to normal.

The HPCI deluge system temperature switches were functionally tested per Temporary Procedure 5994 by Instrument Maintenance personnel. All the temperature switches were found to trip at temperatures well above the ambient temperature of the room. The switches were inspected for damage; none was found.

Personnel inside the room at the time of the deluge actuation did not observe any steam leaks or other heat sources which could have tripped the temperature switch. Ambient temperature at the time of the actuation was estimated to be 90 degrees Fahrenheit.

Mechanical Maintenance personnel removed all the spray nozzles, connected a drain hose to one nozzle fitting and plugged all others. The EA involved with the event then reset the multistatic valve under observation of the Station Fire Marshal and his action was determined to be correct in accordance with the procedure. The system was left in operation with the plugs installed for a 24-hour period and no problems were observed.

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A chart recorder was connected to the deluge control circuit and the EA's actions were repeated with a card placed between the tamper switch and the valve stem. The card fell out as it did during the event, but the system did not trip. The switch was manually operated more than seven times with no resultant system actuation; however, the chart recorder did detect small voltage spikes in the deluge control system. The plugs were removed from the piping and the nozzles reinstalled; however, the deluge valve remains out of service in order to prevent an inadvertent actuation.

At 1045 hours on December 1, 1989, the Unit One HPCI system was successfully tested and returned to service. The HPCI system outage report was terminated.

The Unit One HPCI deluge system remained out of service, and a fire watch was initiated as required by Technical Specification 3.12.C.2, in order to allow time to evaluate the existing system to determine if the system can be modified to prevent any future inadvertent actuations. On December 11, 1989, the period of time that the deluge system was inoperable exceeded the 14-day reporting requirement of Technical Specification 3.12.C.3.

C. APPARENT CAUSE OF EVENT:

The HPCI system inoperability is being reported in accordance with 10CFR50.73(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. The fire sprinkler system being inoperable greater than 14 days is being reported in accordance with Technical Specification 3.12.C.3: "Restore the system to operable status within 14 days, or prepare and submit a report to the Commission pursuant to Specification 6.3.A.1 within the next 30 days outlining the cause of inoperability, the action taken, and the plans for restoring the system to operable status."

The root cause of the HPCI deluge actuation is not known. Many likely causes have been ruled out. The actuation could have been caused by a trip of one or more of the thermal detectors. However, none of the switches were tripped prior to returning the system to service as it would have prevented the valve from being reset. Personnel in the room did not observe any steam leak or other source of heat which could have caused a sporadic trip of a switch. Therefore, the actuation was not caused by a trip of a thermal switch. The actuation could have been caused by an error by the EA when returning the valve to service in that he may have accidentally tripped the operating relay for the system as it is located in a small panel near the deluge isolation valve. This would have required that the EA physically contact the relay in order for it to trip. The EA repeated the operation under observation from the station Fire Marshal and the actuation could not be repeated. Since the EA was opening the valve when the actuation occurred, he could not have bumped the operating relay to trip the system.

The actuation could have been caused by a sudden voltage spike in the control circuit for the deluge system. Minor voltage spikes were detected during testing following the event; however, the magnitude of the spikes was much less than that required for actuation of the deluge solenoid or thermal switch operating relay. Also, this valve is cycled once per month for operating surveillance and no problems have occurred.

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

D. SAFETY ANALYSIS OF EVENT:

The safety of the plant and public was not affected during this event. Per Technical Specification 3.5.C.1, the HPCI subsystem shall be operable whenever the reactor pressure is greater than 90 psig. After declaring Unit One HPCI inoperable, testing of backup systems was initiated in accordance with the Limiting Condition for Operation as specified in Technical Specification 3.5.C.2. All backup systems were found to be operable and all necessary testing was successfully performed until the time that HPCI was declared operable. Therefore, adequate means to shut down the reactor and maintain it in a safe shutdown condition were available throughout this event.

Per Technical Specification 3.5.C.2, continued reactor operation is permitted for a period of seven days after the date HPCI is found to be inoperable, provided all required backup systems are operable.

With the Unit One HPCI Deluge system inoperable, the necessary backup fire suppression equipment was provided and fire watch established in the area twice per shift as required by Technical Specification 3.12.C.2.

E. CORRECTIVE ACTIONS:

The immediate corrective action consisted of closing the HPCI deluge valve to stop the spray of water in the HPCI room. The Unit One HPCI system and deluge system were taken out of service to investigate the cause of the actuation and determine the extent of damage to the electrical equipment in the HPCI room. All HPCI electrical equipment sprayed by the deluge system was inspected, tested and dried as necessary to remove any moisture intrusion. The HPCI system was successfully tested and declared operable at 1045 hours on December 1, 1989. Procedure QOP 4100-4 will be revised to provide instructions for the out-of-service of the deluge system (NTS 2542008911201). Training will be completed on the procedure revision (NTS 2542008911202).

The HPCI deluge system remains out of service to allow installation of a preaction system to prevent any inadvertent actuation in the future (NTS 2542008911203). As a contingency, the fire nozzles will remain installed so the system can be manually operated. A temporary procedure will be written to provide operator action in the event of a fire in the HPCI pump room (NTS 2542008911204). In the interim, the fire watch inspections will be increased to once an hour (NTS 2542008911205).

F. PREVIOUS EVENTS:

There have been no previous events involving inadvertent initiation of the HPCI deluge system.

G. COMPONENT FAILURE DATA:

No component failure could be identified in this event.