



Commonwealth Edison

Quad Cities Nuclear Power Station
22710 206 Avenue North
Davenport, Illinois 61242
Telephone 309/694-2241

RLB-92-016

January 13, 1992

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Reference: Quad Cities Nuclear Power Station
Docket Number 50-245, DPR-29, Unit One

Enclosed is Licensee Event Report (LER) 91-027, 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)(i). The licensee shall report the completion of any nuclear plant shutdown required by the plant's Technical Specifications.

Respectfully,

COMMONWEALTH EDISON COMPANY
QUAD CITIES NUCLEAR POWER STATION

Gary Spill
R. L. Bax *for RLB*
Station Manager

RLB/TB/plm

Enclosure

cc: J. Schrage
T. Taylor
INPO Records Center
NRC Region III

STMGR 256

9201270031 920115
PDR ADOCK 05000254
5 PDR

TE22

LICENSEE EVENT REPORT (LER)

Form Rev 2.0

Facility Name (1) Quad Cities Unit One										Docket Number (2) 0 5 0 0 0 2 5 4				Page (3) 1 of 0 6			
Title (4) U-1 Shutdown From Water Leaking Onto Bus 14-1																	
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)				
1 2	1 6	9 1	9 1	0 2 7	0 0	0 1	1 1	9 2					0 5 0 0 0 1				
OPERATING MODE (9) 4			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11):														
POWER LEVEL (10) 1 0 0			20.402(b)			20.405(c)			50.73(a)(2)(iv)				73.71(b)				
			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				
			20.405(a)(1)(iii)			50.73(a)(2)(i)			50.73(a)(2)(viii)(A)				in Abstract				
			20.405(a)(1)(iv)			50.73(a)(2)(ii)			50.73(a)(2)(viii)(B)				below and in				
			20.405(a)(1)(v)			50.73(a)(2)(iii)			50.73(a)(2)(x)				Text)				
LICENSEE CONTACT FOR THIS LER (12)																	
Name David Luebke, Tech Staff Engineer, Ext. 2146										TELEPHONE NUMBER 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	MANUFAC- TURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFAC- TURER	REPORTABLE TO NPRDS							
SUPPLEMENTAL REPORT EXPECTED (14)												Expected Submission Date (15)					
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 December 16, 1991, Unit One was in the RUN mode at 100 percent of rated core thermal power. A large leak was discovered to be coming from an open drain valve in the U1 Reactor Building ventilation [VA] heating steam system. The water drained through a floor pipe penetration onto Emergency Bus [BU] 14-1 switchgear [SWGR]. Several alarms were received in the control room, including "4kV Overcurrent," "125 V Battery Ground," and "Diesel Gen 1 Relay Trip." The U1 Diesel Generator (DG) [DG] was then declared inoperable. The leak was isolated, Bus 14-1 was covered with plastic, and a load drop was started at 1430 hours for removal of Bus 14-1 from service. Bus 14-1 was removed from service at 1450 hours. The station entered Technical Specifications (TS) LCO 3.0.A due to one whole division of Emergency Core Cooling System (ECCS) pumps and the U1 DG being inoperable. A Generating Station Emergency Plan (GSEP) Unusual Event was declared due to TS LCO 3.0.A. Unit One was manually scrammed at 0113 hours on December 17, 1991. Unit One was in COLD SHUTDOWN at 0622 hours. TS LCO 3.0.A and the GSEP Unusual Event were then terminated.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

Form Rev 2.0

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			Page (3)		
		Year	///	Sequential Number	///	Revision Number	
Quad Cities Unit One	0 5 0 0 0 2 5 4	9 1	-	0 2 7	-	0 0	0 2 OF 0 6

TEXT Energy Industry Identification System (EIIS) 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: U-1 Shutdown From Water Leaking Onto Bus 14-1.

A. CONDITIONS PRIOR TO EVENT:

Unit: One Event Date: December 16, 1991 Event Time: 1335
Reactor Mode: 4 Mode Name: RUN Power Level: 100%

This report was initiated by Deviation Report D-4-1-91-155.

RUN Mode (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 December 16, 1991, at 1335 hours, Unit One was in the RUN mode at 100 percent of rated core thermal power. At that time, a contractor reported a large leak on elev. 658'10" of the Turbine Building. Subsequent investigation by Operating personnel revealed that the water coming from an open drain valve on the Unit One Reactor Building ventilation [VA] heating steam system. The water was dripping onto 4 kV Emergency Bus [BU] 14-1 switchgear [SWGR] (elev. 639'0").

At 1350 hours, the Control Room received the following alarms on 901-8 panel annunciators F-3, "4 kV Bus Overcurrent," and B-9, "125 V Battery Ground." The Bus Overcurrent alarm immediately cleared. At 1351 hours, the Control Room received an alarm on annunciator G-8, "Diesel Gen 1 Relay Trip." The U1 Diesel Generator (DG) [DG] was then declared inoperable. Bus 14-1 was covered with plastic at 1356 hours in order to prevent further water intrusion into the switchgear. The water leak was isolated at 1400 hours, and the U1 and U2 Reactor Building vents were isolated.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION														Form Rev 2.0	
FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)										Page			
		Year	///	Sequential Number	///	Revision Number									
Quad Cities Unit One	0 5 0 0 0 2 5 4	9 1	-	0 2 7	-	0 0	0 3	OF	0 6						
TEXT Energy Industry Identification System (EIIIS) codes are identified in the text as [XX]															

At 1430 hours, a load drop was commenced in preparation for removal of Bus 14-1 from service for inspection. After the power feed swaps for the "B" Reactor Protection System (RPS) (JC) and Safety-Related Bus 19 were completed, Bus 14-1 was removed from service at 1450 hours for inspection. All protective relaying functioned per design. The control switch for the 1/2 B Standby Gas Treatment System (SBGTS) [VI] was put in the "off" position and taken out of service in order to prevent the train's heater from running. This was done to eliminate the potential for additional loading on Bus 19 on a start signal to the 1/2 B SBGTS train.

When Bus 14-1 was removed from service, Quad Cities entered the following Technical Specifications (TS) Limiting Conditions for Operation (LCO):

- 3.0.A, which states that the unit must be in HOT SHUTDOWN within 12 hours and in COLD SHUTDOWN within the following 24 hours if the operating circumstances are in excess of those addressed in the Technical Specifications. In this case, TS 3.9.A.4.a, which requires the 4kV Emergency Buses to be energized while the reactor is critical, could not be met and no action statement is given, therefore TS 3.0.A was entered.
- 3.5.A, for the inoperability of "B" Residual Heat Removal (RHR) [BO] and "B" Core Spray (CS) [BM] loops. This requires unit shutdown within 7 days.
- 3.9.E.1, for the U1 DG being inoperable. This requires unit shutdown within 7 days.
- 14-1 to Bus 24-1 cross-tie. This requires a dual unit shutdown in 7 days.
- 3.7.B.1.a, for the 1/2 B SBGTS train being inoperable. This requires a dual unit shutdown in 7 days.

At 1450 hours, Quad Cities Station also declared a Generating Station Emergency Plan (GSEP) Unusual Event based on Emergency Action Level (EAL) 3.a and TS LCO 3.0.A for the required unit shutdown. The appropriate Nuclear Accident Reporting System (NARS) and Emergency Notification System (ENS) phone calls were made at 1503 and 1509 hours, respectively.

The affected Bus 14-1 cubicles were inspected and dried by Electrical Maintenance (EM) personnel. Small amounts of water were found in several of the breaker cubicles. A small amount of water was also found standing in the Current Transformers (CT) for the U1 DG to Bus 14-1 Feed Breaker cubicle. The water was removed and the CTs were meggered with acceptable results. Operational Analysis Department (OAD) personnel inspected the Bus 14-1 protective relaying and found no problems with the bus relaying scheme. Bus 14-1 was also meggered phase-to-phase and phase-to-ground with acceptable results. In addition, the 125 VDC ground that had given the alarm in the control room had subsided and the alarm was reset.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

Form Rev 2.0

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)						Page (3)		
		Year	///	Sequential Number	///	Revision Number				
Quad Cities Unit One	0 5 0 0 0 2 5 4	9 1	-	0 2 7	-	0 0	0 4	Of	0 6	

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

Bus 14-1 was re-energized at 2210 hours, with no problems noted. Auxiliary power was then transferred to Reserve Auxiliary Transformer (RAT) [XFMR] 12 at 2222 hours, in preparation for a unit shutdown in accordance with TS LCO 3.0.A. With Bus 14-1 returned to service and the Bus 14-1 to 24-1 cross-tie now operable, TS LCO 3.9.C.1 was exited.

At 2305 hours, a UI DG Operability run was attempted. Phase voltage indication in the Control Room indicated approximately 2000 VAC on phases A-B and B-C, while phase A-C indicated approximately 4000 VAC. The UI DG was shutdown for investigation by OAD and EM personnel. The problem was found to be an incomplete connection of the primary disconnects for the UI DG Potential Transformers (PT) [XPT]. The disconnects were adjusted by EM personnel and tested by OAD to verify a satisfactory connection.

A conservative decision was made to take the unit to cold shutdown and remain in the Unusual Event unless all of the affected emergency equipment, the UI DG and the "B" loops of RHR and Core Spray, had been proven operable, even though power had been restored to Emergency Bus 14-1. On December 17, 1991, at 0100 hours, the Unit One turbine [TRB] was tripped. A manual scram was inserted on Unit One at 0113 hours. All expected actions occurred with Group II and III isolations. Normal power feeds for Bus 19 and "B" RPS were restored at 0407 and 0428 hours respectively.

At 0435 hours, Temporary Procedure 7242 (QCOS 1000-2), "Monthly RHR/RHRSW Pump Operability Test," QCOS 1000-3, "Monthly LPCI Motor-Operated Valve Test," and QCOS 1000-5, "Monthly RHR Containment Cooling Valve Operability Test" were all completed on "B" loop of RHR.

At 0445 hours, QCOS 1400-2, "Monthly Core Spray System Motor-Operated Valve Operability Test," and QCOS 1400-4, "Monthly Core Spray Pump Operability Test" were completed. With the "B" RHR and Core Spray loops declared operable, TS LCO 3.5.A was exited.

At 0542 hours, the 1/2 B SBGTS control switch was returned to service, terminating TS LCO 3.7.B.1.a for Unit Two.

At 0622 hours, Unit One was in Cold Shutdown and the GSEP Unusual Event was terminated. TS LCO 3.9.E.1 for UI DG operability was also exited.

At 1257 hours, the UI DG was started and synchronized to Bus 14-1 for QOS 6600-1, "Diesel Generator Monthly Load Test" for post-maintenance operability testing. The operability run was completed at 1507 hours with voltage indication functioning properly.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION												Form Rev 2.0	
FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)						Page (3)					
		Year	///	Sequential Number	///	Revision Number							
Quad Cities Unit One	0 5 0 0 0 2 5 4	9 1	-	0 2 7	-	0 0	0 5	OF	0 6				
TEXT Energy Industry Identification System (EIIIS) codes are identified in the text as [XX]													

With all Technical Specification Limiting Conditions of Operations being exited for Unit One and all required equipment being declared operable, Unit One startup commenced at 1728 hours. The reactor was critical at 2140 hours and the U1 generator was synchronized to the grid at 0400 on December 18, 1991.

C. APPARENT CAUSE OF EVENT:

This Licensee Event Report is being submitted in accordance with 10CFR50.73(a)(2)(i), which requires reporting of a plant shutdown required by the plant's Technical Specification.

The apparent cause of the event was a leak from the Reactor Building ventilation heating system through a manual drain valve which was open. The valve was seen to be leaking on Saturday, December 14, 1991, and was closed. The valve was then verified to be closed on Sunday, December 15, 1991, by a Shift Foreman. The valve was then found to be open at the time of the event. A review of the Out of Service logs revealed that no work was being done during that time period which would have resulted in the valve being open. Due to the limited accessibility to the valve, it is believed that inadvertent manipulation of the valve is highly unlikely. Although the cause of the valve being open could not be determined it is suspected that the valve opened as a result of vibration.

The leaking water then drained through floor pipe penetrations onto 4 kV Emergency Bus 14-1, located on the floor below. The water then seeped into several of the switchgear compartments, causing spurious alarms. Bus 14-1 was removed from service in order to verify that water had not damaged switchgear relaying and equipment, and to eliminate the potential of a bus fault.

Investigation by OAD personnel revealed no problem with the Bus 14-1 Protective relaying circuitry. It is believed that the alarms associated with Bus 14-1 and the U1 DG were due to the excessive moisture in the switchgear. All the alarms received in the Control Room had subsequently been cleared. The 125 VDC ground that had occurred was also the result of excess moisture. The ground gradually disappeared as the switchgear dried.

The U1 DG voltage indication discrepancy was the result of a misalignment resulting from opening and closing the DG Potential Transformer fuse door. The primary disconnect for "B" phase of the DG PT became slightly misaligned during the investigation of water intrusion in the switchgear. This caused the disconnect to fail to make contact with the bus when the PT door was re-installed, resulting in improper voltage readings to the Control Room.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

Form Rev 2.0

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)				Page (3)		
		Year	///	Sequential Number	///	Revision Number		
Quad Cities Unit One	0 5 0 0 0 2 5 4	9 1	-	0 2 7	-	0 0	0 6	OF 6

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

D. SAFETY ANALYSIS OF EVENT:

The safety consequences of the event were minimal because Bus 13-1 was available as well as all the redundant ECCS systems on Division 1. In addition, the Unit 1/2 DG was available if offsite power had been lost to Bus 13-1. "B" RPS and Bus 19 were transferred to their Division 1 feeds in order to maintain power to all RPS channels. The 1/2 A SGBTS was operable and would have functioned as designed if a start signal had been received.

E. CORRECTIVE ACTIONS:

Immediate corrective action was to close the heating system drain valve and to place plastic over Bus 14-1 prevent further water spray onto the bus.

Bus 14-1 was then removed from service to prevent a potential bus fault and to investigate the potential water intrusion concerns in the switchgear. OAD investigated the Bus 14-1 relaying scheme and found no problem. The water found in the bus was removed, and the bus integrity was verified by meggering.

MM personnel replaced the drain valve and plugged the drain line under WR Q96901. The valve was wired shut by Operating personnel. EM personnel investigated and adjusted the U1 DG PT disconnects under WR Q96929. WR Q97216 was written to verify open or clear all the floor drains on elev. 658'10" of the Turbine building (NTS# 254 200 91 15501). The U2 Reactor Building Supply heating steam system manual drain valve was also plugged and wired shut to avoid similar water draining onto the U2 4kV buses.

Future corrective actions include the designing of permanent covers to be installed over Buses 13-1, 14-1, 23-1, and 24-1 to avoid inadvertent showering of the buses. Preliminary design is expected by January 15, 1992. Shields will be created and installed prior to the end of non-outage period N05 (September 1993)(NTS 254 200 91 15502).

F. PREVIOUS EVENTS:

No previous events have occurred at Quad Cities in which a unit was shutdown due to water intrusion into a 4 kV Emergency Bus.

G. COMPONENT FAILURE DATA:

No component failures were involved in this event.