

**Commonwealth Edison**

Quad Cities Nuclear Power Station  
22710 208 Avenue North  
Corrova, Illinois 61242  
Telephone 808/654-2241

RLB-91-294

December 31, 1991

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  
Docket Number 50-265, DPR-30, Unit Two

Enclosed is Licensee Event Report (LER) 91-024, 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)(ii)(b). The licensee shall report any event or condition that resulted in the condition of the nuclear power, including its principal safety barriers, being seriously degraded, or that resulted in the nuclear power plant being in a condition that was outside the design basis of the plant.

Respectfully,

COMMONWEALTH EDISON COMPANY  
QUAD CITIES NUCLEAR POWER STATION

*R. L. Bax*  
R. L. Bax  
Station Manager

RLB/TB/plm

Enclosure

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

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   4
Title (4) Failure of CO2 Extinguishing Systems Due to Inadequate Flow Rates		

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 Name	Docket Number(s)
1   2	0   3	9   1	9   1	0   2   4	0   0	1   2	3   0	9   1	Quad Cities Unit Two	0   5   0   0   0   2   6   5
										0   5   0   0   0   1   1

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

OPERATING MODE (9) POWER LEVEL (10)	20.402(b)	20.405(a)(1)(i)	20.405(a)(1)(ii)	20.405(a)(1)(iii)	20.405(a)(1)(iv)	20.405(a)(1)(v)	20.405(c)	50.36(c)(1)	50.36(c)(2)	50.73(a)(2)(i)	50.73(a)(2)(ii)	50.73(a)(2)(iii)	50.73(a)(2)(iv)	50.73(a)(2)(v)	50.73(a)(2)(vi)	50.73(a)(2)(vii)	50.73(a)(2)(viii)(A)	50.73(a)(2)(viii)(B)	50.73(a)(2)(ix)	73.71(b)	73.71(c)	Other (Specify in Abstract below and in Text)	
4					X																		

LICENSEE CONTACT FOR THIS LER (12)

Name Jay Rolfe, Ext. 2160	TELEPHONE NUMBER AREA CODE 3   0   9   5   5   4   -   2   2   4   1
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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)

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 November 21, 1991 at 0225 hours, Unit One was in the RUN mode at 98 percent of rated core thermal power. While performing Special Test 1-170, the CO2 flooding system [KQ] for the Unit One Diesel Generator [EK] (DG) room did not meet the specified concentration requirement, and the system was declared inoperable. On December 3, 1991 at 1400 hours, the Unit 1/2 DG room CO2 system was declared inoperable. Based on flow rate calculations, it was determined that the required discharge time for the CO2 systems for the Unit One and Unit 1/2 DG rooms exceeded the required time of one minute. On December 3, at 1429 hours, an Emergency Notification System call was made in accordance with 10CFR50.72(b)(1)(ii)(B).

This report is being submitted in accordance with 10CFR50.73(a)(2)(ii)(B) and Technical Specification 3.12/4.12.D.5. The apparent cause of the event was improper system installation.

The immediate corrective action included establishing backup fire suppression and fire watches for the affected areas. The discharge nozzles will be replaced with larger nozzles, and the systems will be further tested.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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TEXT Energy Industry Identification System (EIS) 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: Failure of CO2 Extinguishing Systems Due to Inadequate Flow Rates.

A. CONDITIONS PRIOR TO EVENT:

Unit: One    Event Date: December 3, 1991                                  Event Time: 1400  
Reactor Mode: 4    Mode Name: RUN    Power Level: 100%

This report was initiated by Deviation Report D-4-1-91-145.

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 November 21, 1991 at 0225 hours, Unit One was in the RUN mode at 98 percent of rated core thermal power. Special Test 1-170 was being performed to measure the CO2 concentration achieved upon actuation of the CO2 flooding system [KQ] for the Unit One Diesel Generator [EK] (DG) room. The measured CO2 concentration was 40 percent in the day tank room and was between 22 and 27 percent in the DG room within one minute of discharge. The theoretical and design concentrations specified by the National Fire Protection Association (NFPA) Code 12, Carbon Dioxide Extinguishing Systems, for the specific hazard in the DG room are 28 and 34 percent within one minute, respectively.

The CO2 flooding system for Unit One DG room was declared inoperable, a twice per shift fire watch was initiated, and backup fire suppression equipment was provided for the affected area in accordance with Technical Specification 3.12/4.12.D.4, and was documented on QOS 4100-03, Fire Suppression System Outage Report. In addition, an hourly fire watch and backup fire suppression equipment was established by the Fire Marshal for the Unit 1/2 DG room as a precaution since the CO2 flooding system for this area had not been tested.

A walkdown of the CO2 piping and an inspection of the CO2 nozzles [TB] was performed subsequent to the test to document the as-built configuration of the CO2 flooding system for the Unit One and 1/2 DG rooms. This information was given to the Chemtron Division of ASCOA Fire Systems, for calculation of the flow rate and discharge times required to achieve the design concentration based on the as-built configuration of the piping and dimensions of the affected rooms.

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The computer flow calculations were completed on December 3, 1991, and the required discharge times to achieve the design concentration by the CO2 flooding systems for the Unit One and Unit 1/2 DG rooms were 88 seconds and 80 seconds, respectively. This exceeded the NFPA requirement of achieving the design concentration within one minute. Therefore, on December 3, 1991 at 1400 hours, while Unit One and Unit Two were at 100 percent and 70 percent of rated core thermal power, respectively, the CO2 flooding system for the Unit 1/2 DG room was declared inoperable.

A twice per shift fire watch was initiated in conjunction with the backup fire suppression equipment which was previously established for the Unit 1/2 DG room in accordance with Technical Specification 3.12/4.12.D.4, and was documented on QOS 4100-03, Fire Suppression System Outage Report. In addition, the hourly fire watch initiated by the Fire Marshal remained in effect for the Unit One and Unit 1/2 DG rooms. On December 3, 1991, at 1429 hours, an Emergency Notification System (ENS) phone call was made in accordance with 10CFR50.72(b)(1)(ii)(B).

C. APPARENT CAUSE / EVENT:

This report is being submitted in accordance with 10CFR50.73(a)(2)(ii)(B). This report also meets the reporting requirements of Technical Specification 3.12/4.12.D.5.

The apparent cause of the event was improper installation. The discharge nozzles installed were different in size than those specified in the original design. This discrepancy was not identified at the time of construction in 1971 because NFPA Code 12 did not specifically require a full discharge test at the time.

D. SAFETY ANALYSIS OF EVENT:

The safety consequences of the event were minimal. The CO2 flooding systems were functional during the event and would discharge a considerable volume of CO2 during a fire. The average peak CO2 concentration measured in the Unit One DG room was 27.5 percent, which was slightly less than the 28 percent theoretical concentration needed for the specific hazard. If the initial discharge of CO2 failed to put out a fire, additional CO2 could be discharged to extinguish the fire. In addition, the fire detection in the DG rooms was operable, and would provide both local and control room fire alarms to alert operating personnel of the fire. In the worst case scenario, assuming a total loss of equipment in a single DG room with a simultaneous loss of off-site power, the unit affected could still be safely shutdown using the other diesel generator.

E. CORRECTIVE ACTIONS:

The immediate corrective actions included establishing backup fire suppression equipment and a twice per shift fire watch per Technical Specification 3.12/4.12.D.4., and documenting this on QOS 4100-03, Fire Suppression System Outage Report. In addition, an hourly fire watch was initiated by the Fire Marshal for the Unit 1 and 1/2 DG rooms as an added compensatory measure.

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Additional flow calculation were performed by Chemetron to determine suitable corrective measures to bring the CO2 concentration to the acceptable level. Based on the calculations and discussions with Professional Loss Control and Chemetron consultants, a decision was made to install larger nozzles in the Unit 1 and 1/2 DG rooms prior to further testing. The test for the Unit 1/2 DG/CO2 system is currently scheduled for January 27, 1992. The retest for the Unit 1 DG CO2 system will be performed following the test of the Unit 1/2 system (NTS #254 200 91 14501).

Upon successful performance of the CO2 concentration tests, the CO2 flooding systems for the Unit One and Unit 1/2 DG rooms will be declared operable, and the Fire Suppression System Outage Reports (QOS 4100-03) will be closed out.

F. PREVIOUS EVENTS:

REPORT NUMBER  
TITLE

D-4-1-80-29  
UNIT ONE DIESEL GENERATOR CO2 SYSTEM INOPERABLE DUE TO BLOWN FUSE

D-4-1-83-42  
INADVERTENT ACTUATION OF UNIT ONE DIESEL GENERATOR CO2 SYSTEM

D-4-1-83-44  
UNIT ONE DIESEL GENERATOR CO2 SYSTEM INOPERABLE DURING MAINTENANCE

D-4-1-83-99  
DIESEL GENERATOR CO2 SYSTEM INOPERABLE WHILE PERFORMING A MAINTENANCE SURVEILLANCE

This event is not reportable under the Nuclear Plant Reliability Data System (NPRDS).

G. COMPONENT FAILURE DATA:

Cardox low pressure carbon dioxide fire extinguishing system, manufactured by Chemetron Corporation.