



**Commonwealth Edison**

Quad Cities Nuclear Power Station  
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LWP-95-010

February 17, 1995

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) 95-002, 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)(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.

There are no additional comments being made by this letter.

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 COMPANY  
QUAD CITIES NUCLEAR POWER STATION

*L. W. Pearce* (for)

L. W. Pearce  
Station Manager

LWP/TB/plm  
Enclosure

cc: J. Schrage  
C. Miller  
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) 0   5   0   0   0   2   5   4	Page (3) 1   of   0   6
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Title (4)  
Improperly Sized Thermal Overloads Found On The Control Room HVAC System Due To Inadequate Original Design Analysis

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   1	2   0	9   5	9   5	-- 0   0   2	-- 0   0	0   2	1   7	9   5	Quad Cities Unit 2	0   5   0   0   0   2   6   5	
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OPERATING MODE (9) 1

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

<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.405(c)	<input type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 73.71(b)
<input type="checkbox"/> 20.405(a)(1)(i)	<input type="checkbox"/> 50.36(c)(1)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> 73.71(c)
<input type="checkbox"/> 20.405(a)(1)(ii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> Other (Specify in Abstract below and in Text)
<input type="checkbox"/> 20.405(a)(1)(iii)	<input type="checkbox"/> 50.73(a)(2)(i)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	
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POWER LEVEL (10) 0 | 0 | 0

LICENSEE CONTACT FOR THIS LER (12)

NAME: Mike Harms, System Engineering Department, Ext. 2159	TELEPHONE NUMBER AREA CODE: 3   0   9 6   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
B	V   1	2   3	W   1   2   0	N					

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If you complete EXPECTED SUBMISSION DATE)  NO

Expected Submission Date (15)

Month	Day	Year

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

**ABSTRACT:**

On 1/9/95, Quad Cities Station received notification of a Dresden Station Control Room (CR) Heating, Ventilation and Air Conditioning (HVAC) event involving undersized thermal overloads in the system booster fans.

A review of Quad Cities CR HVAC system determined that the same problem existed at the station. The thermal overloads were replaced with properly sized parts, and the system was tested satisfactory on 1/21/95.

The cause of the event was attributed to failure of the B CR HVAC design analysis to consider operation under degraded voltage conditions.

Corrective Actions involved completion of an issue screening and engineering evaluation. All of the Safety-Related motors in the B CR HVAC system were evaluated in addition to the booster fans. The B CR HVAC system was declared inoperable and an ENS phone call was made. The thermal overloads were replaced, and the B CR HVAC system was returned to service after testing.

ComEd currently has appropriate engineering procedures and a tracking mechanism in place to evaluate the load additions to Quad Cities station Safety-Related systems as they relate to degraded voltage conditions.

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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: Improperly sized thermal overloads found on the Control Room HVAC system due to inadequate original design analysis.

A. CONDITIONS PRIOR TO EVENT:

Unit: One                                      Event Date: January 20, 1995                      Event Time: 2020  
 Reactor Mode: 01                              Mode Name: Shutdown                                      Power Level: 0

This report was initiated by Licensee Event Report 254\95-002.

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:

During a normal surveillance run on 1/3/95 of the Safety-Related Control Room (CR) heating, ventilating, and air conditioning (HVAC) system at Dresden Station, the Air Filtration Unit A booster fan tripped 2 times. An engineering evaluation to explain the fan trips was completed on 1/7/95, and stated that the booster fan motor thermal overloads [23] were improperly sized. The improper sizing could prevent the fan from operating during a degraded voltage condition. The fans were declared inoperable and the overloads were replaced with the correct size per the engineering evaluation.

On 1/9/95, at 1600 hours, Quad Cities Unit 1 was in cold shutdown for a forced outage, and Unit 2 was at 94% power. At this time Quad Cities Station received notification of the Dresden Station CR HVAC event. A Problem Identification Form (PIF) was initiated, and an issue screening was generated to evaluate the CR HVAC [VI] configuration at Quad Cities. This was done because the system at Quad Cities is almost identical in design to Dresden's system.

An issue screening for the CR HVAC system was completed on 1/20/95. The screening utilized the original evaluation from Dresden Station, as well as an additional evaluation. The new evaluation expanded the scope of the original Dresden screening. All of the Safety-Related motors in the B CR HVAC system were evaluated in addition to the booster fans. A review of other system thermal overloads was not warranted due to the unique design associated with the B CR HVAC.

Both evaluations determined that the same condition existed at Quad Cities Station for the booster fans and the B CR HVAC supply fan. The B CR HVAC was declared inoperable at 1900 hours, and the station entered a 14 day, dual unit, Limited Condition of Operation (LCO).

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

The A train CR HVAC was not declared inoperable since it is not Safety-Related, and does not have any associated Technical Specifications.

An Emergency Notification System phone call was made at 2020 hours, and Nuclear Work Request (NWR) #Q19763 was written to replace the thermal overloads with properly sized parts.

Setpoint changes for the CR HVAC booster fans and supply fan were written to replace the thermal overloads per the engineering evaluation. The thermal overloads were replaced with properly sized parts on 1/21/95, and the system was tested the same day.

All testing was satisfactorily completed, the LCO was exited, and the B CR HVAC system was returned to service on 1/21/95.

**C. APPARENT CAUSE OF EVENT:**

This event is being reported under 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 cause of the event was attributed to failure of the B CR HVAC design to consider operation under degraded voltage conditions. The B CR HVAC system was installed under a modification (M04-1/2-82-002) in response to control room habitability concerns approximately in 1982. The overloads design and installation was specified by the HVAC Motor Control Center (MCC) vendor. Final acceptance and approval was performed by ComEd personnel.

The vendor most likely sized the overloads to typical industry practices which emphasize motor protection rather than completion of system function. During normal operation, B CR HVAC thermal overloads are adequate. Only during a degraded voltage condition does the possibility exist that a CR HVAC fan could fail to operate due to improperly sized thermal overloads.

The thermal overloads were replaced with parts specified in the issue screening and engineering evaluations.

A contributing cause was a Quad Cities Station B CR HVAC system degraded voltage analysis in 1991 failed to identify the undersized thermal overloads. In the spring of 1991, a corporate audit was conducted of all systems required for mitigation of loss of coolant events. The audit (Electrical Distribution Systems Functional Inspection, EDSFI) was directed at a system assessment of the auxiliary power system. Part of the EDSFI was a degraded voltage analysis of the station's systems.

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

During the degraded voltage analysis, motors procured for the B CR HVAC system were found with a nameplate nominal rating of 480 Volts. Motors for this system should have been rated 460 Volts.

The vendor of the motors (Reliance) was contacted to determine the impact of sustained operation at degraded voltage for the higher nominal voltage rating. The motor was determined to be acceptable.

Walkdown information for all Safety-Related (SR) motors (440V, 460V, 480V) required to mitigate small or large break loss of coolant accidents were reviewed for the same motor nameplate discrepancy. No other motors were found to have a nominal rating of 480V.

A search was performed for other Safety-Related, three phase induction motors rated at 480V. All such motors installed at Dresden and Quad Cities were found to be rated 460V or 440V. Therefore, only the B CR HVAC motors were affected by this issue.

In 1991, the discrepancy of the motor nameplate voltage was not assessed against the sizing of the thermal overloads under the degraded voltage analysis. The thermal overloads are normally sized for continuous motor operation at 90% of the nominal rated voltage. With a motor that is rated for 480 Volts instead of 460 Volts, 90% is 432 Volts versus the assumed 414 Volts. The 414 Volts at the motor terminals failed to meet the acceptance criteria of 90% (NEMA MG-1).

**D. SAFETY ANALYSIS OF EVENT:**

The safety significance of the event could have been significant with respect to the scenario of Quad Cities Station experiencing a DBA LOCA congruent with a degraded voltage condition. Given this scenario, the B CR HVAC system could have failed due to the undersized thermal overloads found in this event. If the B CR HVAC system failed, unfiltered air could enter the CR subjecting the operators to increased dose.

Upon the failure of the B Train CR HVAC, the A Train HVAC system could be operated to maintain positive pressure in the CR.

Given the initial condition of the Quad Cities Station experiencing a DBA LOCA, without a congruent degraded voltage condition, the CR HVAC system would have performed as designed.

There is no past history that indicates that the affected B CR HVAC components would have tripped or failed to operate when required. The fans have not tripped during a surveillance or normal operation due to the thermal overloads. The likelihood of a degraded voltage condition during a DBA LOCA is very small.

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

**E. CORRECTIVE ACTIONS:**

**Corrective Actions Completed**

During the 1991 EDSFI Audit, walkdown information for all Safety-Related (SR) motors (440V, 460V, 480V) required to mitigate small or large break loss of coolant accidents were reviewed for the same motor nameplate discrepancy. No other motors were found to have a nominal rating of 480V.

A search was performed for other Safety-Related, three phase induction motors rated at 480V. All such motors installed at Dresden and Quad Cities were found to be rated 460V or 440V. Therefore, only the B CR HVAC motors were affected by this issue.

1. On 1/9/95, PIF 95-059 was written and an issue screening was generated.
2. On 1/20/95, the B CR HVAC system was declared inoperable at 1900 hours and an ENS phone call was made at 2020 hours per 10CFR50.72(b)(2)(ii).
3. NWR #Q19763 was generated to replace the undersized B CR HVAC thermal overloads.
4. On 1/21/95, Setpoint changes 95-001E, 95-002E, and 95-003E were generated to replace the B CR HVAC thermal overloads.
5. The B CR HVAC thermal overloads were replaced, and successfully tested under NWR #Q19763.
6. The B CR HVAC system was returned to service on 1/21/95, and the dual unit LCO was exited at 2157 hours.

Commonwealth Edison currently has appropriate engineering procedures and a tracking mechanism in place to evaluate the load additions to Quad Cities Station Safety-Related systems as they relate to degraded voltage conditions. The procedures and tracking mechanism are as follows:

1. "Thermal Overload Relay Element Selection for Motor Operated Valves" procedure (TID-E/I&C-02 dated 1/29/93).
2. "Thermal Overload Relay Element Selection for Continuous Duty Motors" procedure (TID-E/I&C-03 dated 1/29/93).
3. The Electrical Load Monitoring System (ELMS) data base. This database requires evaluating the effect of the proposed load addition on bus running voltage (as well as other relevant impacts on the auxiliary power system).

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Prior to any motor change, nameplate data is evaluated for fit, form, and function. If an evaluation reveals that the change is not like-for-like, a design change is performed. The design change process requires an ELMs review to ensure that degraded voltage issues are addressed.

**F. PREVIOUS EVENTS:**

A search of the Nuclear Tracking System (NTS) database indicated that there are no previous LER's where the B CR HVAC system was declared inoperable due to an inadequately sized component or thermal overload.

The B CR HVAC system is not NPRDS reportable, and a search was not performed.

**G. COMPONENT FAILURE DATA:**

The B CR HVAC thermal overloads did not fail to operate, but instead were replaced to address potential scenarios where a failure may occur.

The undersized B CR HVAC thermal overloads were Westinghouse models FH41 for the system booster fans and FH83 for the system supply fans.

The B CR HVAC thermal overloads were replaced with Westinghouse model FH42 for the system booster fans and model FH85 for the system supply fans.