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March 26, 1993

Dr. Thomas E. Murley, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Attn: Document Control Desk

Subject: Quad Cities Nuclear Power Station Units 1 and 2
10 CFR 50.46 Thirty Day Report
NRC Docket Nos. 50-254 and 50-265

Dr. Murley:

Enclosed is a 10 CFR 50.46 thirty (30) day report which describes an error in the application of an approved ECCS Evaluation Model for Quad Cities Nuclear Power Station.

This report is submitted in accordance with the requirements of the Code of Federal Regulations, Title 10, Part 50.46: The licensee shall report the nature of any significant change to or error discovered in the limiting emergency core cooling system (ECCS) analysis and its estimated effect.

The report discusses the impact of an error recently identified in the Low Pressure Core Injection (LPCI) time assumed by General Electric when the analysis of record was performed. Substantial margin remains to the 10 CFR 50.46 acceptance criteria and there is no impact on the safety operations. The Attachment also summarizes previous Peak Clad Temperature (PCT) evaluations relative to the Quad Cities ECCS analysis of record, and corrects information previously provided in the referenced report. This includes the cumulative effect of PCT impact since the most recent ECCS analysis of record was performed.

If there are any questions or comments, please contact John L. Schrage at 708-663-7283.

Sincerely,

John L. Schrage
Nuclear Licensing Administrator

Attachment

cc: A.B. Davis, Regional Administrator - Region III
C. Patel, Project Manager - NRR
T. Taylor, Senior Resident Inspector, Quad Cities
IDNS - Office of Nuclear Safety

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Attachment

DESCRIPTION OF LOCA ANALYSIS CHANGES

Previous Quad-Cities LOCA Analysis Change:

Extended Operating Domain/Equipment Out Of Service (EOD/EOOS)

A report identified as "Extended Operating Domain and Equipment Out Of Service for Quad-Cities Nuclear Power Station Units 1 and 2", GE Document NEDC-31449, Revision 1, April 1992 analyzed Quad-Cities for an Extended Operating Domain (EOD) allowing Increased Core Flow above nominal values. Included as part of this analysis were the following Equipment Out-Of-Service (EOOS) and Extended Operating Domain (EOD) operating modes: Feedwater Heaters Out-Of-Service (FWHOOS), Single Loop Operation (SLO), Relief Valve Out-Of-Service (RVOOS), Increased Core Flow (ICF), and Final Feedwater Temperature Reduction (FFWTR). The implementation of the Extended Load Line Limit (ELLLA) region and the ICF region of the power/flow map was supported for all fuel types used. Table 1 below summarizes the combined modes of operation analyzed in the EOD and EOOS document for Quad Cities. Note that with the exception of the SLO condition, the EOOS analyses are valid for the Increased Core Flow Region.

Table 1

Equipment Out of Service Analysis and Operating Domain for Quad Cities Units 1 and 2

<u>EQUIPMENT OUT OF SERVICE</u>	<u>APPLICABLE OPERATING DOMAIN</u>
RV-OOS	EOD Including ICF Region
FWH-OOS	EOD Including ICF Region
FWH-OOS and RV-OOS	EOD Including ICF Region
SLO	EOD Excluding ICF Region
SLO and RV-OOS	EOD Excluding ICF Region

The conclusions of the Extended Operating Domain and Equipment Out Of Service report for Quad-Cities assessed the impact on LOCA PCT as less than 10 degrees F. This was an insignificant impact on PCT.

Previous Quad-Cities LOCA Analysis Changes: Motor Control Center Relay Setpoint Drift

A change in the Quad-Cities Peak Clad Temperature (PCT) was documented in letter RLB-90-130, from R. L. Bax to U. S. Nuclear Regulatory Commission, dated May 11, 1990, "Special Report 04-02-90-016," as revised in letter RLB-90-140, dated June 13, 1990.

On April 11, 1990, Unit 2 was in a Refuel outage. At 1820, QTS 170-12, MCC 18/19-5(28129-5) Auto-Transfer Logic Operability Surveillance, was completed for Motor Control Center (MCC) 28/29-5. Part of this surveillance includes timing the transfer from Bus 29 to Bus 28 during a simulated loss of offsite power (LOOP) and failure of the Unit 2 Diesel Generator (DG). The transfer was timed at 38.99 seconds.

The acceptance criteria for the time delay was 20 ± 5 seconds. On April 12, 1990, CECo evaluated the 38.99 second time delay transfer. It was suspected that the time delay was outside the design basis for the Loss Of Coolant Accident (LOCA) analysis. The NRC was notified at 1836 hours using the Emergency Notification System (ENS) phone in accordance with 10CFR50.72 (b)(2)(i). It was later determined that this event did not fall under the 10CFR50.72 notification requirement because it was not outside the design basis; it was an unanalyzed condition which did not significantly compromise plant safety. On April 25, 1990, this event was determined reportable in accordance with 10CFR50.46. Electrical Maintenance Department (EMD) personnel removed the relay, reset it to its nominal 20 second setting, and returned it to service. On April 14, 1990, at 1023 hours, QTS 170-12 was performed again on MCC 28/29-5 with an acceptable transfer time delay of 21.3 seconds.

CECo had General Electric evaluate the consequences on a LOCA for this relay setpoint drift. General Electric practice has been to delay LPCI injection until the Recirculation Pump Discharge valve is completely closed. This valve requires power from MCC 18/19-5 (28/29-5). LPCI injection time is therefore the MCC 18/19-5 (28/29-5) transfer time plus the Recirculation Pump Discharge valve stroke time. This relay setpoint drift would have resulted in a LPCI injection time of 63 seconds (39 seconds for the as-found transfer time and 24 seconds for the slowest Unit 2 Recirculation Discharge Valve).

SAFETY SIGNIFICANCE:

The consequences of this event were minimal because with a delayed LPCI injection time (which was evaluated for 75 seconds), the PCT is well below the PCT limits. In this event, the as-found LPCI injection time would have provided an additional margin to the PCT GE evaluated using the delayed LPCI injection time (75 seconds).

CORRECTIVE ACTIONS:

A Justification for Interim Operation was written for Unit 1 on April 12, 1990 since it was in the Run Mode. The Justification for Interim Operation was based on the Recirculation pump discharge valves closure times. These valves were conservatively assumed to close in 45 seconds for the SAFER/GESTR analysis. Actual closure time was 26 seconds for the slowest valve. The LPCI injection time on Unit 1 was therefore 51 seconds (26 seconds plus 25 seconds for bus transfer) which was less than the 58 seconds which CECo understood to be used by GE in the analysis of record.

The time delay relays for MCC 18/19-5 were replaced with an Agastat relay under work request Q83923. These were tested and found to be within the 20 ± 5 seconds acceptance criteria.

QTS 170-12 was revised so that the Recirculation pump discharge valve stroke time and the time delay relay setpoint were added as a part of the surveillance procedure so that 58 seconds was not exceeded.

Current Quad-Cities LOCA Analysis Change: Error in Assumed LPCI Injection Time

On February 12, 1993, General Electric transmitted a letter to CECo which clarified the required Low Pressure Coolant Injection (LPCI) injection time specified in "Quad Cities Nuclear Power Station Units 1 and 2, SAFER/GESTR - LOCA, Loss Of Coolant Analysis" (General Electric document NEDC-31345P, Revision 2, July 1989). This clarification, which was requested to support upcoming modifications for NRC Generic Letter 89-10, stated that LPCI injection flow was analyzed to start at 48 seconds after the initiation of a Loss Of Coolant Accident (LOCA). CECo previously believed that the LPCI injection time used by GE in the LOCA analysis of record was 58 seconds based on General Electric information provided in support of a previous 10 CFR 50.46 report in 1990 (Special Report 04-02-90-016, Revision 01).

Quad-Cities Units 1 and 2 currently maintain LPCI injection times at 58 seconds or less. This is controlled by the station procedure QTS 170-12, MCC 18/19-5 (28/29-5) Auto-Transfer Logic Operability Surveillance. Therefore, both units are currently bounded by the 1990 GE evaluation (EBO-90-196, dated May 1, 1990). This evaluation assessed the impact of a time delay in LPCI injection due to MCC 18/19-5 (28/29-5) power transfer during a LOCA and Loss Of Offsite Power (LOOP) with a Battery Failure. The results of this evaluation demonstrated that the Peak Clad Temperature (PCT) remained well below the regulatory limit of 2200 degrees F for a LPCI injection delay of up to 75 seconds from the initiation of the LOCA.

On March 8, 1993, this event was determined reportable in accordance with 10CFR50.46 as a thirty day report because information provided in the referenced 1990 10CFR50.46 report erroneously stated that the LPCI Injection time which GE assumed in the SAFER/GESTR analysis was 58 seconds and not the actual 48 seconds assumed in the analysis. It was determined that this event did not fall under the 10CFR50.72 notification requirement since substantial margin remains to the 2200 degrees F PCT limit for a LPCI injection time of 58 seconds.

SAFETY SIGNIFICANCE:

The consequences of this error were minimal because with a delayed LPCI injection time (which was evaluated for up to 75 seconds), the PCT is well below the PCT limits. The LPCI injection time is controlled by plant procedures and provides additional margin relative to the PCT evaluated.

CORRECTIVE ACTIONS:

The LPCI injection on both units is less than 58 seconds but greater than the 48 seconds assumed in the SAFER/GESTR analysis. The previous bounding evaluation of May 1990, with a delayed LPCI injection time of up to 75 seconds, is still bounding and justifies continued operation.

The bounding evaluation for single loop operation requires that MAPLHGR be less than 90% of the license basis dual loop MAPLHGR. Limiting the single loop MAPLHGR to 85% of the dual loop MAPLHGR assures that two loop operation with Battery Failure is the limiting case PCT. Due to the reduced core thermal power achievable in Single Loop Operation, Quad Cities always met this limitation each time it has operated in Single Loop.

10 CFR 50.46 requires a thirty day report after finding a greater than 50°F error in the last LOCA analysis with an acceptable model. Based on the available margin from the 1990 GE assessment, reanalysis is not required at this time. Because a license amendment which would authorize resumption of SLO is pending NRC approval, an additional corrective action has been initiated to amend the COLR for reduced MAPLHGR in single loop operation (SLO) prior to SLO being authorized.

REFERENCES:

1. Letter RLB-90-140, from R. L. Bax to U. S. Nuclear Regulatory Commission, dated June 13, 1990, (Special Report 04-02-90-016, Revision 01).

TABLE 2
CUMULATIVE EFFECT
LARGE BREAK LOCA

PLANT NAME: QUAD-CITIES
UTILITY NAME: COMMONWEALTH EDISON

I. Dual Loop Operation

- | | | |
|----|---|--|
| A. | ANALYSIS OF RECORD Licensing Basis PCT= 1382 deg F
(Comments: GE SAFER/GESTR analysis
NEDC-31345P, Rev.2, July 1989) | |
| B. | PRIOR LOCA MODEL ASSESSMENT
(Temporary Assessment of PCT Margin-
Letter #: RLB-90-140, Motor Control
Center Relay Setpoint Drift,
June 13, 1990) | Δ PCT= +288 deg F |
| C. | PRIOR LOCA MODEL ASSESSMENT
(Permanent Assessment of PCT Margin-
GE Extended Operating Domain/
Equipment Out Of Service analysis
NEDC-31449, Rev.1, April 1992)
Applies to all EOD/EOOS operations | Δ PCT= +10 deg F |
| D. | CURRENT LOCA MODEL ASSESSMENT
(Permanent Assessment of PCT Margin-
Delayed LPCI injection to 75 seconds
after LOCA Initiation) | Δ PCT= 0.0 deg F
(INCLUDED IN B) |

DUAL LOOP LICENSING BASIS PCT= 1680.0 deg F

TABLE 2
CUMULATIVE EFFECT
LARGE BREAK LOCA
(Continued)

II. Single Loop Operation

- | | | |
|----|---|---|
| A. | ANALYSIS OF RECORD
(Comments: GE SAFER/GESTR
analysis NEDC-31345P, Rev.2,
Appendix A, July 1989)
MAPLHGR Multiplier = 1.0 | $\Delta PCT = +111 \text{ deg F}$
(See Note) |
| B. | CURRENT LOCA MODEL ASSESSMENT
(Permanent Assessment of PCT Margin-
Delayed LPCI injection to 75 seconds
after LOCA Initiation)

MAPLHGR Multiplier ≤ 0.85 | $\Delta PCT = -111.0 \text{ deg}$ |

Net Single Loop $\Delta PCT = 0.0 \text{ deg F}$

(See Note)

Note: Two Loop operation license basis PCT bounds one Loop operation PCT when the single loop MAPLHGR is less than 85% of the license basis Two loop MAPLHGR.