Mr. William R. McCollum
Catawba Site Vice President
Duke Power Company
P. O. Box 1006
Charlotte, NC 28201

April 30, 1996

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION REGARDING BREAKER COORDINATION, CATAWBA NUCLEAR STATION, UNITS 1 AND 2 (TAC NOS. M86367, M86368)

Dear Mr. McCollum:

As you are aware, the NRC staff is evaluating the issue of breaker coordination as discussed in previous Duke Power Company letters dated March 2, 1994 and December 29, 1994. Additional information, as discussed in the enclosure, is required from the Duke Power Company in order for the staff to complete its review. The topics in the enclosure were discussed with your staff in a meeting at the Catawba Nuclear Station site on April 17 and 18, 1996. We request that the responses to these requests for additional information be provided within 14 days of your receipt of this letter.

Sincerely,
Original signed by:
Robert E. Martin, Senior Project Manager
Project Directorate II-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket Nos. 50-413 and 50-414

Enclosure: Request for
Additional Information

cc w/encl: See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

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Docket Nos. 50-413

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Additional Information

cc w/encl: See next page

Mr. W. R. McCollum
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Catawba Nuclear Station

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REQUEST FOR ADDITIONAL INFORMATION

CATAWBA, BREAKER COORDINATION

I. Probabilistic Safety Assessment Issues

In general the Licensee's PRA submittal for continued plant operation with uncoordinated circuit breakers in the 125 Volt DC EPL system and 600 Volt AC EPE system should address the impact of (1) initiating event (IE) frequency, (2) conditional impact of the IE on plant operation, (3) recovery of the plant mitigation capability, and (4) accident recovery via SSF. The Licensee's submittal should specifically address the following:

I.A 125 Volt DC Vital I&C Power System, EPL

1. Estimate initiating event frequency: The breaker coordination study provided with the letter dated March 2, 1994, from D.L. Rehn, Duke Power, excluded line-to-line cable faults in the outgoing feeders of the EPL load distribution centers. Based on the discussion presented in CNC-1535.00-00-0007, line-to-line cable faults appear rare. Using historical event data and estimated total number of cables from all of Duke's nuclear power facilities (i.e. Oconee, McGuire, and Catawba), and other industry data, e.g. IEEE Standard 500-1984, estimate the probability of a cable fault tripping any of the 125 Volt DC load groups (e.g. 1EDA, 1EDB, 1EDC, and 1EDD). Address the advantages in the use of the 2 kV rated interlocked armor cable. If no cable faults have occurred, assume one single line-to-line fault to estimate the EPL cable fault initiating event frequency. Also discuss any cable enhancement programs at Duke that would provide additional assurance that the probability of cable faults at Duke facilities will continue to remain small.

2. Plant Response: Describe the plant response and conditional loss of mitigating equipment in the event of loss of each of the load group distribution centers.

3. Plant Recovery: For each of the cable faults that result in plant transients described in response to question 2 above, provide the conditional probability of mitigation failure, without taking credit for the safe shut down facility (SSF). Describe any credit taken for operator recovery actions.

4. Safe Shutdown Facility: For each scenario described in response to question 3, provide the credit that could be taken for the SSF, i.e. the conditional probability of failure of the SSF given each of the scenarios described in response to questions 2 and 3 above.

5. Calculation CNC-1535.00-00-0007, page 5, considered the initiating event from the loss of Vital I&C bus, T14, only. Discuss the impact on CDF from loss of other Vital I&C buses in the EPL system. Specifically, provide the rationale for the following statements in paragraph 2, page 5 of the calculation:

   a. "The worst case faults result in a loss of one of four load distribution centers, 1EDA, 1EDB, 1EDC, or 1EDD. These load group distribution centers are important to normal operation but none are essential for plant shutdown."

b. "None of the faults examined caused the complete loss of Auctioneered Distribution Center 1EDE, although power from one of the two auctioneered diode assemblies providing power to 1EDE would be lost when its associated load group distribution center fails by fault. The second of the auctioneered distribution center's power supplies is a train of the 125V dc Diesel Essential Auxiliary Power System which is unaffected by any of the documented breaker coordination problems."

I.B <u>600 Volt AC Essential System, EPE</u>

1. Estimate initiating event frequency: The breaker coordination study provided with the letter dated March 2, 1994, from D.L. Rehn, Duke Power, excluded cable faults in the outgoing feeders of the EPE system Motor Control Centers (MCCs). Using historical event data and estimated total number of cables from all of Duke's nuclear power facilities (i.e. Oconee, McGuire, and Catawba), and other industry data e.g. IEEE Standard 500-1984, estimate the probability of a cable fault tripping any one of the 11 EPE MCCs. Address the advantages in the use of the 2 kV rated interlocked armor cable. If no cable faults have occurred, assume one cable fault to estimate the EPE system cable fault initiating event frequency. Also discuss any cable enhancement programs at Duke that would provide additional assurance that the probability of cable faults at Duke facilities will continue to remain small.

2. Plant Response: Describe the plant response and conditional loss of mitigating equipment in the event of loss of each of the MCCs.

3. Plant Recovery: For each of the cable faults that result in plant transients described in response to question 2 above, provide the conditional probability of mitigation failure, without taking credit for the safe shut down facility (SSF). Describe any credit taken for operator recovery actions.

4. Safe Shutdown Facility: For each scenario described in response to question 3, provide the credit that could be taken for the SSF, i.e. the conditional probability of failure of the SSF given each of the scenarios described in response to questions 2 and 3 above.

5. Calculation CNC-1535.00-00-0007, page 6, only considered the failure probability of MCC 1EMXG from a fault in the Control Room Air Handling Unit (AHU) #1 only. Discuss the impact on CDF from loss of other loads in the EPE system.

6. It appears that the 600 Volt MCC incoming breakers may be rated for 10,000 IAC. Discuss the impact on the above results (I.B, 1-5) of having used 10,000 IAC breakers in circuits where the fault currents are higher than 10,000 Amperes.

I.C EPL and EPE Systems

1. Confirm that the cable and equipment discussed in response to I.A and I.B above, are not inside containment, or potentially exposed to harsh environments caused by design basis events that could cause a lack of breaker coordination in the EPE and EPL systems. In addition, confirm that no single breaker miscoordination in the EPE and EPL systems can cause simultaneous trip of both Units.

II. Electrical Engineering Issues

1. On page 5 of Attachment 3 contained in the December 29, 1994 submittal, it is indicated that EPL load group distribution centers 1EDA, 1EDB, 1EDC, and 1EDD are important for normal plant operation but none are essential for plant shutdown. Provide a discussion to address if this refers to a plant shutdown following a plant transient that may be caused by the loss of one of these distribution centers or if accident conditions are also being considered. In addition, for non-accident conditions, address if the plant can be safely shutdown with loads that are powered only from the two auctioneered distribution centers. The response should be applicable to both units.

2. The EPL system design includes tie breakers that may be used to connect load group distribution center EDA to EDC and load group distribution center EDB to EDD. Identify and discuss any condition for which the tie breakers are to be used to re-configure the EPL system in this manner. The response should also address existing measures to limit the time period that such a configuration can be maintained and return the system to its normal configuration of four electrically independent distribution centers.

3. If an EPL distribution center is lost, discuss the provisions and measures taken to assure that the redundant load group distribution center loads are operable.

4. Provide a discussion for all single line to ground faults that have occurred on the EPL system within the last five years. The discussion should address the nature of these faults including the length of time that the fault existed, any corrective actions taken to preclude recurrence of such faults, any inoperability period of the EPL ground fault detection system/alarm, and actions taken or to be taken if the fault detection system is inoperable.

5. Describe the post modification/maintenance testing used to verify that no detrimental conditions are induced in the 600 Vac essential auxiliary power system (EPE) equipment prior to returning this equipment to operation.

6. Provide a clarifying discussion to explain the meaning of "10,000 IAC". In addition, include data sheets that provide the current interrupting ratings for the EPE MCC load breakers and incoming and load breakers for the EPL distribution centers.