April 18, 1996

Mr. W. R. Campbell
Vice President
Brunswick Steam Electric Plant
Carolina Power & Light Company
Post Office Box 10429
Southport, North Carolina 28461

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2, INDIVIDUAL PLANT EXAMINATION FOR EXTERNAL EVENTS (GL 88-20, SUPPLEMENT 4) - (TAC NOS. M83598 AND M83599)

Dear Mr. Campbell:

As a result of our ongoing review of your submittal dated June 30, 1995, in accordance with Generic Letter (GL) 88-20, Supplement 4, "Individual Plant Examination if External Events (IPEEE) for Severe Accident Vulnerabilities, 10 CFR 50.54(f)," for the Brunswick Steam Electric Plant, Units 1 and 2, we have determined a need for additional information. The request for additional information (RAI) is related to the internal event analysis in the IPE including the accident sequence core damage frequency analysis, the human reliability analysis, and the containment performance analysis. The Enclosure contains the detailed questions.

We request that you provide written responses to the RAI within 60 days of the receipt of this letter.

Sincerely,

(Original Signed By)

Brenda Mozafari, Project Manager
Project Directorate II-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket Nos. 50-325
and 50-324

Enclosure: RAI

cc w/enclosure: See next page

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

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Division of Reactor Projects - I/II
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ENCLOSURE

REQUEST FOR ADDITIONAL INFORMATION

REGARDING THE INDIVIDIDUAL PLANT EXAMINATION FOR EXTERNAL EVENTS

FOR THE

BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2

A.2 Seismic

1. NUREG-1407 requests that a screening criteria be applied to non-seismic failures and human actions. Please provide the details of this screening analysis for the Brunswick Steam Electric Plant (BSEP): (1) a list of the operator actions that are required to ensure availability of the chosen success paths; (2) for each human action, the time the operator action is required and its location; (3) the human error probabilities which account for seismic affects on operator actions; (4) a list of the random failures (and their failure rates) having the most significant potential to compromise availability of the success paths; and, (5) the screening criteria applied to rates of random failures and operator errors and report the results of your screening evaluation.

   Please discuss how plant emergency operating procedures have been modified to ensure availability of success paths. (As an example, discuss any changes or enhancements in procedures for resetting relays following a seismic event. If no changes to the emergency operating procedures have been made as a result of the seismic IPEEE, please justify why not.)

2. Table 5-1 and the table in Appendix B of the report by your consultant, EQE, Inc., (which is Appendix A of the overall submittal report) are highly valuable, but they do not provide a clear, complete description of all seismic IPEEE findings. Please provide a separate table that identifies the following findings for all safe shutdown equipment list (SSEL) items, including structures and equipment: (1) maintenance concerns, housekeeping concerns/issues; (2) seismic interaction concerns; (3) equipment anchorage concerns; (4) remaining seismic capacity concerns; and other concerns noted in all aspects of USI A-46/IPEEE reviews. In the table, please indicate those concerns that relate to USI A-46 only, to IPEEE only, and to both USI A-46 and IPEEE. For those items that relate to both USI A-46 and IPEEE, and to IPEEE only, clearly state the nature of the concern and indicate how the concern is being resolved. For each item common to both USI A-46 and IPEEE, describe (briefly but explicitly) not just the USI A-46 concern, but its specific resolution approach, and also the IPEEE concern and specifically how the USI A-46 resolution approach adequately addresses the IPEEE concern. If your resolution of USI A-46 has been completed by the time you prepare this table, and if any USI A-46/IPEEE item has been determined to have a high confidence in low probability failure (HCLPF) capacity below 0.3g, please report all such HCLPF capacities and indicate any corresponding changes to the plant and containment HCLPF capacities.

It is important that the findings listed in this new table are both complete and consistent with the findings documented in the submittal report itself. For instance, in the submittal report (Section 5.8.1 of the EQE report), the existence of several potential outliers in cable trays and conduit was noted, and these were to be dispositioned by analysis and/or modification. However, the table in Appendix B of the EQE report simply states that cable trays and conduit have been screened out and makes no mention of any resolution (USI A-46 or other) for the noted concerns. Please ensure, therefore, that the new and existing tables consistently and completely summarize all evaluation findings.

3. The discussion in Section 8.5 of the EQE seismic IPEEE report, pertaining to seismic-induced floods, does not address tanks failures nor failures of piping other than fire-water piping. Please report the findings of your walkdown and resulting evaluation pertaining to seismic-induced floods that may be caused by tank failures and non-fire-water piping failures. (Many such potential flooding sources are not included in the SSEL.)

4. Appendix D of the EQE seismic IPEEE report was not included in the submittal. Appendices D-F of the Success Path Development report (Appendix C of the EQE report) were also not included. Please provide a copy of these missing appendices.

5. Please identify the manufacturers and model numbers of low-ruggedness relays found at BSEP, indicating in which circuitry they exist, and whether this circuitry pertains to USI A-46 only, to both USI A-46 and IPEEE, or to IPEEE only.

6. Table 5-1 of the EQE seismic IPEEE report notes that CP&L will review masonry walls based on plant upgrade programs. Section 5.9.1 discusses anchor-bolt discrepancies and increased functional requirements that apply to the upgraded condition, and notes that masonry walls were re-visited. A sampling of critical block walls was performed, suggesting that the walls have a capacity greater than the review level earthquake (RLE.) Please clarify: Is it your position that all masonry walls that may affect SSEL components have been screened out? If not, please report the results of your HCLPF calculations for all outlier masonry walls. In any case, please provide calculations and completed walkdown work sheets -- for a critical block wall that may cause an SSEL component to fail -- which substantiate your finding that masonry walls have a HCLPF capacity in excess of the RLE. Please select a bounding case (i.e., critical block wall with lowest expected capacity) for this analysis.

7. Please discuss the ability of the preferred and alternate shutdown paths to respond to medium and large loss of coolant accidents (LOCAs) resulting from stuck-open safety-relief valves (SRVs) and how many SRVs would have to be stuck open in order for loss of coolant to exceed the level of a small LOCA. Explain how such potential occurrences of beyond-small-LOCA conditions are addressed for mitigation by means of the chosen success paths.

8. Please provide HCLPF calculations and results, completed screening evaluation work sheets (SEWSs), walkdown notes/checklists and photographs for the Emergency Diesel Generator Panel.

9. Please provide a discussion pertaining to potential seismic interactions of the torus suppression pool structure with vent piping and bellows. If relevant potential interactions were screened out, please provide the basis for the screening evaluation (e.g., walkdown findings, documentation review, comparisons with screening criteria, etc.).

A.3 Fire

1. For inter-zone fire propagation and assessment of cable/equipment damage, the analysis performed to address the issues raised by the Sandia Fire Risk Scoping Study has been used to assert that the fire zone boundaries are sufficiently robust and that they will effectively limit such phenomena. Please provide adjacent fire compartments linked with active fire barriers (e.g., fire dampers and normally open doors) that contain cables and equipment from multiple safety trains. It should be noted that the failure rate of such devices can be as high as 0.2 per demand. Assuming this failure rate, how will the conclusion that inter-zone fire propagation and its effects are of minimal risk significance be affected?

2. The fire compartment interaction analysis (FCIA) should consider fire brigade accessing the fire area through adjacent fire zones that contain cable and equipment from an opposite safety train. Please provide fire scenarios that involve this situation, and describe how they have been considered in the IPEEE submittal.

3. Please provide an analysis of the effect on fire-induced CDF if the potential for cross zone fire propagation is considered for high hazard areas such as the turbine building, diesel generator room, switchgear rooms and lube oil storage.

4. On page 4-42 of the submittal, adjacent fire zones have been screened out with open penetrations between them. Please provide justification for screening fire scenarios from lower elevations affecting operation, equipment and cables in the higher elevations. In addition, please provide a description for fire scenarios in the lower elevations which may propagate into higher elevations through open penetrations and identify such penetrations through which cables pass.

5. Are there any vertical cable risers or shafts at BSEP? If such areas exist, do they contain safety related cables from multiple trains? If yes, how were these areas considered in the analysis?

6. For the cable spreading room, there is a mismatch between the core damage frequency presented in Table 4.5-3 (for fire zone C-6) and that presented in Table 4.5-7. Please identify the correct core damage frequency for the cable spreading room.

7. On the top of page 4-42 of the submittal it is stated that "Only the fire Zones CB-5, 6, 20, 21, 23, and 26 contain equipment important to plant safety . . ." However, in Table 4.5-1, several other fire zones from the Control Room Area have been kept for further analysis. Please provide an explanation of the statement on page 4-42 and the screening results of the fire zones in the Control Room fire area.

8. When Tables 4.5-1 and 4.5-3 are compared, some discrepancies are noticed. For example, fire zones CB-9 and CB-10 have not been screened out in Table 4.5-1, yet they do not appear in Table 4.5-3. Please provide an explanation for the discrepancies between the two tables.

9. From the submittal, it is clear that the licensee has considered the possibility of an interfacing-systems LOCA caused by hot-short failures in control cables. Hot shorts can also affect normal system operation by moving valves from their normal operating positions. This possibility is especially important when there are cross-ties between the redundant trains of a system. Please provide a discussion regarding the inclusion of the possibility of valves moving from their safe position as a result of hot shorts.

10. The procedure for control room evacuation for BSEP leads to isolating normal and emergency power (i.e., a self-induced station blackout). Please describe how this procedural action was considered in the analysis.

11. The submittal does not include a discussion on the issues raised as part of USI A-45. Please provide such a discussion and describe how CP&L resolved USI A-45.

12. BSEP is a two-unit plant with a shared control room. In control room evacuation scenarios, has the possibility of multiple unit core damage been considered? Please provide a discussion regarding the possibility of two unit core damage. Also, how is the possibility of self-induced station blackout incorporated into the analysis for two unit core damage?

13. From the submittal, it is not clear if there are shared elements other than the control room (i.e., compartments and systems) between the two units. If there are such shared compartments and systems, please provide a discussion of how they have been modeled in the fire analysis, giving special attention to the simultaneous effect of damage on both units.

14. For fire scenarios other than those originating in the control room, the submittal does not provide any information as to how operator error probabilities are quantified. It appears that the operator error probabilities for the IPE were used in these scenarios. Please provide the basis of the operator error probabilities used to quantify fire scenarios other than those originating in the control room, including a discussion of the pertinent performance shaping factors.

15. From the information provided in the submittal, it is difficult to understand what system failures lead to core damage for various fire scenarios. Please provide a listing of dominant core damage sequences in terms of system-train failures, and other pertinent information, for the most significant fire scenarios.

16. The analysis assumes that the failure probabilities of the automatic detection and suppression system presented in FIVE are applicable to BSEP. This data is acceptable for systems that have been designed, installed and maintained in accordance with appropriate industry standards, such as those published by the National Fire Protection Association (NFPA). Please provide the bases for the assumed failure probabilities for the automatic detection and suppression systems at BSEP.

A.4 High Winds, Floods, and Other Accidents (HFOs)

1. Please provide details of the accident sequences pertaining to loss of offsite power events due to hurricane and hurricane-induced floods. Specifically, please provide a discussion of how the 3.0×10^{-4} conditional containment failure probability (CCDP) given a hurricane was calculated. Given a hurricane-induced flood, describe what consideration was given to the possibility of other equipment failures caused by the flood, as well as any associated impact on recovery actions.