October 23, 2002

Mr. John Moyer, Vice President
H. B. Robinson Steam Electric Plant
Carolina Power and Light Company
3581 West Entrance Road
Hartsville, SC 29550

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION (RAI) REGARDING SEVERE ACCIDENT MITIGATION ALTERNATIVES FOR THE H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT 2

Dear Mr. Moyer:

The staff has reviewed Carolina Power and Light Company's analysis of severe accident mitigation alternatives (SAMAs) submitted in support of its application for license renewal for the H. B. Robinson Steam Electric Plant, Unit 2, and has identified areas where additional information is needed to complete its review. Enclosed is the staff's request for additional information.

We request that you provide your responses to these RAIs by December 16, 2002, in order to support the license renewal review schedule. If you have any questions, please contact me at (301) 415-1590.

Sincerely,
/RA/
Richard L. Emch, Jr., Project Manager
Environmental Section
License Renewal and Environmental Impacts Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No.: 50-261

Enclosures: As stated

cc w/enclosures: See next page

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Request for Additional Information Regarding
Severe Accident Mitigation Alternatives (SAMAs) for Robinson Nuclear Plant (RNP)

1. The SAMA analysis is based on the most recent version of the RNP Probabilistic Safety Assessment (PSA) model for internal events (i.e., the MOR99 model), which is a modification to the original Individual Plant Examination (IPE) developed in 1992 and the updated PSA developed in 1997. Please provide the following information regarding this PSA model:

   a. a summary description of the internal and external peer reviews of the level 1, 2, and/or 3 portions of this PSA,

   b. a characterization of the findings of the Westinghouse Owners Group peer review conducted in 2001, and the impact of any identified weaknesses on the SAMA identification and evaluation process,

   c. a description of the major differences from the IPE model, including the plant and/or modeling changes that have resulted in the new core damage frequency (CDF) and the large early release frequency (LERF),

   d. a breakdown of the internal event CDF and LERF by major contributors, in a format similar to that used in either the IPE or the 1997 PSA summary report,

   e. a breakdown of the population dose (person-rem per year within 50 miles) by containment release mode in the following form, or equivalent:

Containment Release Mode	Fraction of Population Dose
SGTR	
Interfacing Systems LOCAs	
Containment isolation failure	
Early containment failure	
Late containment failure	
No containment failure	

   f. for each containment release category (including LERF and non-LERF contributors): the associated release frequency, release magnitude (fractions), and MACCS-calculated conditional consequence measures (where available). Please identify those release categories that are considered to contribute to LERF, and those categories to which SGTR and ISLOCA releases are assigned,

   g. justification for neglecting large late release categories in establishing the baseline estimate of offsite consequences, given that large late releases could result in population doses comparable to those for large early releases. Include a justification for not using RC-1A and/or RC-1BA to represent large late releases, given that these release categories result in greater releases of volatile

fission products and potentially greater releases of non-volatile fission products than RC-1B,

h. the definition of LERF used to distinguish a large-early release from a small-early or a large-late release, and

i. clarification of whether the reported CDF and LERF is per reactor year or per calendar year.

2. It is not clear that the set of SAMAs evaluated in the environmental report (ER) address the major risk contributors for RNP. In this regard, please provide the following:

a. a description of how the dominant risk contributors at RNP, including dominant sequences and cutsets from the PSA and equipment failures and operator actions identified through importance analyses, were used to identify potential plant-specific SAMAs for RNP. Indicate how many sequences and cutsets were considered and what percentage of the total CDF they represent,

b. a listing of equipment failures and human actions that have the greatest potential for reducing risk at RNP based on importance analysis and cutset screening,

c. for each dominant contributor identified in (b), provide a cross-reference to the SAMA(s) evaluated in the ER that address that contributor, and

d. a list of the subset of SAMAs (Table F-8, Phase 1 SAMAs) that are considered unique/specific to Robinson, since it is not clear from the "Source Reference" in the table.

3. The SAMA analysis did not include an assessment of SAMAs for external events. The RNP IPEEE study has shown that the CDF due to internal fire initiated events is about 9.2×10^{-5} per reactor year. In addition, the risk analyses at other commercial nuclear power plants indicate that external events could be large contributors to CDF and the overall risk to the public. In this regard, the following additional information is needed:

a. NUREG-1742 ("Perspectives Gained From Individual Plant Examination of External Events (IPEEE) Program," Final Report, 4/02), lists the significant fire area CDFs for Robinson (page 3-26 of Volume 2). While we recognize that these CDFs are often conservative, they are still large in comparison to the Robinson internal events CDF. For each fire area, please explain what measures were taken to further reduce risk and explain why these CDFs cannot be further reduced in a cost-effective manner.

b. NUREG-1742 lists seismic outliers and improvements for Robinson (page 2-30 of Volume 2). Please summarize the disposition of the 33 issues/anomalies related to seismic interactions, maintenance, or housekeeping and the 47 components that were identified as outliers. If no plant modifications were implemented, please explain why within the context of this SAMA study.

4. The SAMA analysis did not include an assessment of the impact that PSA uncertainties and external event risk considerations would have on the conclusions of the study. Some license renewal applicants have opted to double the estimated benefits (for internal events) to accommodate any contributions for other initiators when sound reasons exist to support such a numerical adjustment, and to incorporate additional margin in the SAMA screening criteria to address uncertainties in other parts of the analysis (e.g., an additional factor of two in comparing costs and benefits of each SAMA). Please provide the following information to address these concerns:

   a. an estimate of the uncertainties associated with the calculated core damage frequency (e.g., the mean and median CDF estimates and the 5^{th} and 95^{th} percentile values of the uncertainty distribution),

   b. an assessment of the impact on the Phase 1 screening if risk reduction estimates are increased to account for uncertainties in the risk assessment and the additional benefits associated with external events, and

   c. an assessment of the impact on the Phase 2 evaluation if risk reduction estimates are increased to account for uncertainties in the risk assessment and the additional benefits associated with external events. Please consider the uncertainties due to both the averted cost-risk and the cost of implementation to determine changes in the net value estimate for these SAMAs. (Note that some of the SAMA candidates; e.g., Phase II SAMA 3 and 7, could potentially become cost-beneficial. Also, note that the cost for Phase II SAMA 3 is given as $50K in Table F-9 and as >$280K in Section F.6.3. Please clarify.)

5. Please provide the following information concerning the MACCS analyses:

   a. discuss the applicability of the standard MACCS core inventory (3412 MW thermal) to RNP (2339 MW thermal), and whether the inventory was scaled to account for the lower power level,

   b. please provide additional discussion to clarify what is meant by the following sentence in Section F.3.3, page F-6, “Each RNP category corresponded with a single release duration (either puff or continuous); MACCS category Te required multiple releases,” and

   c. the MACCS analysis assumes all releases occur at ground level and has a thermal content the same as ambient. These assumptions could be non-conservative when estimating offsite consequences. Please provide an assessment of the sensitivity of offsite consequences (doses to the population within 50 miles) to these assumptions.

6. In the Phase 2 assessment (Section F.6), the benefits associated with reducing population dose are reported in terms of percent reduction in LERF. Please provide this estimated benefit in terms of percent reduction in person-rem dose for each of the SAMAs that are quantitatively assessed.

7. According to the 1997 PSA summary document (Appendix B), three of the plant improvements identified in the IPE (items 3, 9 and 10) were canceled due to cost-benefit considerations. The associated cost-benefit methodology was not described and may differ from that used in the SAMA analysis. Please provide an evaluation of the costs and benefits of these three canceled SAMAs based on the current RNP risk profile and the cost-benefit methodology described in the ER.

8. for certain SAMAs considered in the ER, there may be lower cost alternatives that could achieve much of the risk reduction. In this regard, please provide the following:

   a. for the subset of plant-specific SAMAs identified in RAI 2d and for the Phase 2 SAMAs, discuss whether any lower-cost alternatives to those considered in the ER would be viable and potentially cost-beneficial,

   b. SAMAs 92 and 93 address added DC capability with costs estimated as being greater than $1.8M, thus, eliminating them from further consideration. Please provide the averted-risk benefit from these SAMAs, and address whether less costly alternatives to the SAMAs suggested might make these alternatives viable. Specifically consider and provide estimated costs and benefits for diesel-driven battery chargers, and cross-connects to the existing non-safety station batteries as two potential alternatives,

   c. a plant has recently installed a direct-drive diesel to power an auxiliary feedwater (AFW) pump for under $200K. Please provide the averted-risk benefit of supplemental AFW capability at Robinson, and an assessment of whether such a SAMA could be a cost-beneficial alternative to a motor-driven pump (Phase 1 SAMA 176), and

   d. please provide an assessment of the costs and benefits of an automatic safety injection pump trip on low refueling water storage tank level as an alternative to fully automating the switch-over from injection to recirculation (Phase 2 SAMA 8).

9. The RNP PRA does not utilize the Rhodes reactor coolant pump (RCP) seal LOCA model endorsed by the NRC. The use of this model could impact the risk from RCP seal LOCA events and the estimated benefits of associated SAMAs. Please discuss the RCP seal LOCA model used in the PSA and why this is judged to provide an appropriate representation of RCP seal LOCA events. Provide an assessment of the potential impact that use of the Rhodes model could have on the cost-benefit results for those SAMAs associated with RCP seal LOCAs. Also, provide an estimate of when RCP seals constructed of improved materials will be installed on pump “A” (see Phase 1 SAMA 14).

10. For SAMAs 59 and 60 -- SAMAs that have already been implemented at Robinson -- reference is made in Table F-8 to the suppression pool in discussions of the enhancements. Please explain the relevance of suppression pools to the SAMAs under consideration. Also, clarify the reference to suppression pools in the discussion of SAMA 116.

Mr. J. W. Moyer
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