April 25, 2007

Mr. Robert E. Brown
General Manager, Regulatory Affairs
General Electric Company
3901 Castle Hayne Rd MC A-45
Wilmington NC 28401

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 99 RELATED TO ESBWR DESIGN CERTIFICATION APPLICATION

Dear Mr. Brown:

By letter dated August 24, 2005, General Electric Company (GE) submitted an application for final design approval and standard design certification of the economic simplified boiling water reactor (ESBWR) standard plant design pursuant to 10 CFR Part 52. The Nuclear Regulatory Commission (NRC) staff is performing a detailed review of this application to enable the staff to reach a conclusion on the safety of the proposed design.

The NRC staff has identified that additional information is needed to continue portions of the review. The staff's request for additional information (RAI) is contained in the enclosures to this letter. RAI question 4.3-10 is related to NEDC-33239P, rev. 0, "GE14 for ESBWR Nuclear Design Report."

Pursuant to 10 CFR 2.390, we have determined that the enclosed RAI contains proprietary information. The proprietary information is indicated in brackets and underlined in Enclosure 1. We have prepared a non-proprietary version of the RAI (Enclosure 2) that does not contain proprietary information. We will delay placing this document in the public document room for a period of ten (10) working days from the date of this letter to provide you with the opportunity to comment on the proprietary aspects only. If you believe that any additional information in the enclosure is proprietary, please identify such information line by line and define the basis pursuant to the criteria of 10 CFR 2.390 before the public release date of May 9, 2007.

To support the review schedule, you are requested to respond to this RAI question by June 8, 2007.

If you have any questions or comments concerning this matter, you may contact Amy Cubbage at (301) 415-2875 or aec@nrc.gov.

Sincerely,

/RA/

Amy E. Cubbage, Senior Project Manager
ESBWR/ABWR Projects Branch 1
Division of New Reactor Licensing
Office of New Reactors

Docket No. 52-010

Enclosures: 1. Request for Additional Information (Proprietary)
2. Request for Additional Information (Non-Proprietary)

cc: See next page (w/o enclosure 1)

If you have any questions or comments concerning this matter, you may contact Amy Cubbage at (301) 415-2875 or aec@nrc.gov.

Sincerely,

/RA/

Amy E. Cubbage, Senior Project Manager
ESBWR/ABWR Projects Branch
Division of New Reactor Licensing
Office of New Reactors

Docket No. 52-010

Enclosures: 1. Request for Additional Information (Proprietary)
2. Request for Additional Information (Non-Proprietary)

cc: See next page (w/o enclosure 1)

ACCESSION NO. ML071140048-Package

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Distribution for DCD RAI Letter No. 99 dated April 25, 2007

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Request for Additional Information
ESBWR DCD Tier 2 Rev. 3 Section 4.3, LTR NEDC-33239P, rev. 0

RAI number	Reviewer	Question Summary	Full text
4.3-10	Yarsky P	Provide additional information regarding the capability of the control rod system to ensure subcriticality	In Rev. 3 to the DCD, the applicant provided the control rod assignments to specific HCUs (Figure 4.3-5 in Section 4.3.3.3 of Tier 2). In Reference 4.3-8 (NEDC-33239P, rev. 0) the applicant provides the shutdown margin calculated assuming one control rod stuck out at the BOC, MOC, and EOC. The applicant identified the BOC as the limiting scenario (minimum R) and the control rod located at [ ] as the highest worth rod (i.e. the rod stuck out that results in the minimum shutdown margin). (A) Correct Figure 3-34 through Figure 3-36 of NEDC-33239P In Figures 3-34 through 3-36 of Reference 4.3-8, there are values in locations [ ], yet no HCU assigned to these locations according to DCD Tier 2, Rev. 3. Since there does not appear to be a control blade in these locations, correct the figure in the next revision of NEDC-33239P to remove these values. (B) SDMs quoted in Figures 3-35 and 3-36 do not correspond to control rods There are SDMs quoted for control rods in Figures 3-35 and 3-36 of NEDC-3239P that do not have a corresponding HCU assigned in Figure 4.3-5 of the DCD, Tier 2, rev. 3. The SDM for these stuck out rods should be consistent with the fully controlled eigenvalue. The staff calculated the eigenvalue based on the reported stuck out rod SDM for these rod locations and found the values to be consistent with 0.9508 as presented in Table 4.3-1 of the DCD for BOC. Include the MOC and EOC fully controlled eigenvalues in NEDC-33239P. For completeness also include the cycle exposure for the MOC point.

			(C) Provide information regarding cold criticality given the failure of a single HCU Based on the shutdown margin map provided in Reference 4.3-8 the staff calculated the control rod worth for each control rod at the BOC. The control rod worth of the rod at location [ ] was estimated to be [ ] using the relative eigenvalue difference between the rod stuck out eigenvalue and the fully controlled eigenvalue of 0.9508 in DCD Rev. 3 Tier 2 and the [ ]. The control rod paired with the control rod at [ ] is located at [ ]. The staff similarly calculated the control rod worth for the control rod at this location and found the reactivity worth to be [ ]. Assuming that the SDM values quoted account for the change in global eigenvalue from the local perturbation from cold conditions, and assuming that the distance between these control blades is sufficient such that the control blades are decoupled, the staff would expect the combined reactivity worth of this rod pair to be [ ]. Verify that the PANAC11 calculations were performed using [ ]. Considering a cold fully controlled eigenvalue of 0.9508, it would appear to the staff that a failure of the [ ] HCU would preclude the core from being made subcritical under cold conditions at the BOC without SLCS injection. The staff reached similar conclusions in regards to the following HCUs: [ ]. If GE has reached a different conclusion, provide the basis for this conclusion and revise Reference 4.3-8 to include this information.

			(D) Provide the basis for compliance with GDC 26 in terms of the RPS Section 4.3.1.2 in DCD Rev. 3 Tier 2 states that compliance with GDC 26 is demonstrated by assuring that the core can be made subcritical, with margin, in the most reactive condition throughout the operating cycle with the highest worth rod pair stuck out. Please clarify this statement in regards to the reactivity control system which is intended to comply with this requirement of GDC 26. GDC 26 speaks specifically to exceeding SAFDLs. Please describe the aspects of the RPS which ensure that SAFDLs are not exceeded following a SCRAM in which the single failure is one of the aforementioned HCUs. (E) Provide the basis for compliance with GDC 25 in terms of cold shutdown capability Clarify if it is the intent to ensure that SAFDLs are not exceeded by demonstrating cold shutdown margin with the control rod system assuming a single failure. If this is not the intention, specifically provide a discussion of the performance of the RPS to meet GDC 25 during a limiting AOO assuming a failure of one of the aforementioned HCUs. (F) Clarify Appendix 4B.3 Criteria Include demonstration of compliance with Appendix 4B.3 criterion 6: “The core is capable of being made subcritical with margin in the most reactive condition throughout the operating cycle with the most reactive control rod, or rod pair, in the full-out position and all other rods fully inserted” as an explicit COL action item for the first cycle core. If criterion 6 is not fulfilled solely by the control rod system, state this explicitly in Appendix 4B in the next revision to the DCD.

			(G) Describe the means for assuring compliance with the Technical Specification SDM requirement Demonstrate compliance with a technical specification SDM limit of 0.0038 including any uncertainty in 3D MONICORE/PANAC11 predicted cold controlled eigenvalue. Update Reference 4.3-8 to include a condition, administrative limit, or acceptance criterion on the method of calculation of the shutdown margin that explicitly accounts for the technical specification limit as well as calculational uncertainties besides those accounted for the [ ]. (H) Update the DCD Revise the DCD accordingly in the next revision. Update the DCD to include: • Each clarification requested in items D through F • A table of the minimum reactivity margin to criticality at cold conditions attributed to only the control rod system assuming the highest worth rod pair is fully withdrawn for BOC, MOC, and EOC Support the DCD statements by including information in the revised DCD text that is qualitatively similar in content to Figures 3-29 through 3-36 of Reference 4.3-8: NEDC-33239P.

			(I) Update the LTR NEDC-33239P (Reference 4.3-8) • Include a disposition of the discrepancies in items A through C in the LTR revision • Include the information requested in item G • Update Reference 4.3-8 in the next revision to state that the HCU assignments are not an item for the COL applicant. • In the next revision to Reference 4.3-8 provide the table of the minimum reactivity margin to criticality at cold conditions attributed to only the control rod system assuming the highest worth rod pair is fully withdrawn for BOC, MOC, and EOC • Provide in the LTR a description of the calculations performed to develop the table of the reactivity margin. If PANAC11 is used to perform any of these analyses confirm that the calculations were performed using 3D simulations (and not the [ ]) and incorporated the [ ]. If the difference between the reactivity margin calculated by PANAC11 for the strongest rod pair withdrawn and the condition on the method of calculation mentioned in item G above is less than [ ], then estimate the impact of control blade depletion on the shutdown margin. Alternatively verify that the aforementioned item G condition or acceptance criterion on the calculation accounts for control blade depletion.

cc:

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