

August 3, 2006

Mr. David H. Hinds, Manager, ESBWR  
General Electric Company  
P.O. Box 780, M/C L60  
Wilmington, NC 28402-0780

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 48 RELATED TO  
ESBWR DESIGN CERTIFICATION APPLICATION

Dear Mr. Hinds:

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 enclosure to this letter. Questions 16.2-1 through 16.2-8 relate to the Technical Specifications (TS) reactor coolant system leakage, 16.2-9 relates to the offsite dose calculation manual, and 16.2-26 through 16.2-29 relate to instrumentation, as discussed in the ESBWR design control document, Tier 2, Chapter 16 TS. Questions 16.2-1 through 16.2-8 were sent to you via electronic mail on May 1, 2006, and were discussed with your staff during a telecon on June 26, 2006. Question 16.2-9 was sent to you via electronic mail on May 9, 2006, and was discussed with your staff during a telecon on June 7, 2006. Questions 16.2-26 through 16.2-29 were sent to you via electronic mail on May 22, 2006, and were discussed with your staff during a telecon on June 8, 2006, originally numbered draft RAI 16.2-10 through 16.2-19. This set of draft RAI was discussed at the public meeting that was held with GE on June 28, 2006 on the ESBWR TS section 3.3. The June 28, 2006, meeting summary provides a discussion of these RAI. You agreed to respond to the RAI on the following schedule:

August 7, 2006: 16.2-1 through 16.2-9 and 16.2-26 through 16.2-29.

D. Hinds

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If you have any questions or comments concerning this matter, you may contact me at (301) 415-4115 or [mcb@nrc.gov](mailto:mcb@nrc.gov) or you may contact Amy Cabbage at (301) 415-2875 or [aec@nrc.gov](mailto:aec@nrc.gov).

Sincerely,

*/RA/*

Martha C. Barillas, Project Manager  
ESBWR/ABWR Projects Branch  
Division of New Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 52-010

Enclosure: As stated

cc: See next page

D. Hinds

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If you have any questions or comments concerning this matter, you may contact me at (301) 415-4115 or [mcb@nrc.gov](mailto:mcb@nrc.gov) or you may contact Amy Cubbage at (301) 415-2875 or [aec@nrc.gov](mailto:aec@nrc.gov).

Sincerely,

*/RA/*

Martha C. Barillas, Project Manager  
ESBWR/ABWR Projects Branch  
Division of New Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 52-010

Enclosure: As stated

cc: See next page

ACCESSION NO. ML062150443

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|--------|------------|------------|
| OFFICE | NESB/PM    | NESB/BC    |
| NAME   | MBarillas  | JColaccino |
| DATE   | 08/03/2006 | 08/03/2006 |

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Distribution for DCD RAI Letter No. 48 dated August 3, 2006

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**Requests for Additional Information (RAIs)**  
**ESBWR Design Control Document (DCD) Tier 2, Chapter 16**

| RAI Number | Reviewer | Summary                                  | Full Text   |
|------------|----------|--|---|
| 16.2-1     | Li C     | Sensitivity of Gaseous Radiation Monitor | <p>Since the issuance of RG 1.45 in 1973, fuel performance has improved (i.e., failed fuel is much less likely to occur) thus greatly diminishing the value of monitoring gaseous radioactivity for leakage detection purposes. Based on the experiences of operating reactors, the gaseous radiation monitor, which was originally designed to detect reactor coolant system (RCS) leakage of 1 gpm within one hour may take much longer time than one hour to detect 1 gpm leakage. NRC Information Notice 2005-24, indicated that the reactor coolant activity assumptions used for operating reactors for containment radiation gaseous monitors might be non-conservative.</p> <p>In DCD Section 11.5.3.2.12, it is indicated that the gaseous radiation monitor is able to detect 1 gpm within one hour. In addition, ESBWR TS LCO 3.3.4.1 (b) requires one channel of the drywell fission product monitoring system be operable. It enters Action B.1 only if both drywell fission product monitoring channels (gaseous and particulate) inoperable.</p> <p>RG 1.45 states that "it is important to be able to associate a signal or indication of a change in the normal operating conditions with a quantitative leakage flow rate. Except for flow rate or level change measurements from tanks, sumps, or pumps, signals from other leakage detection systems do not provide information readily convertible to a common denominator. Approximate relationships converting these signals to units of water flow should be formulated to assist the operator in interpreting signals. Since operating conditions may influence some of the conversion procedures, the procedures should be revised during such periods." Please provide the "approximate relationships" used for correlating ESBWR radiation monitor signals to leakage flow rates.</p> <p>Demonstrate that ESBWR gaseous channel of the drywell fission product radiation monitor is able to detect one gpm within one hour by assuming a "realistic primary coolant radioactivity concentration." What is the fuel failure assumption for the primary coolant radioactivity concentration? Justify the validity of this assumption.</p> |

| RAI Number | Reviewer       | Summary   | Full Text   |
|------------|----------------|---|---|
| 16.2-2     | Roth D         | RCS leakage surveillance frequency                            | SR 3.4.2.1 "Verify RCS unidentified and total LEAKAGE are within limits", lists a Frequency of 12 hours. The BWR Standard Technical Specifications (STS) recommends a frequency of 8 hours. Please provide technical justification for extending the surveillance frequency to 12 hours.  |
| 16.2-3     | Roth D         | RCS leakage instrumentation                                   | LCO 3.4.2 "RCS Operational LEAKAGE" states a limit for total leakage. The bases also state that a "Violation of this LCO indicates an unexpected amount of LEAKAGE and, therefore, could indicate new or additional degradation in an (reactor coolant pressure boundary) RCPB component or system". Please explain what instrument is used to verify that the limit for total leakage is not exceeded and why this instrument is not included in TS 3.3.4.1 as required by 10 CFR 50.36. |
| 16.2-4     | Li C<br>Roth D | RCS leakage rate of increase limit                            | LCO 3.4.2 "RCS Operational LEAKAGE" does not list a limit for rate increases in unidentified Leakage. The BWR STS provides LCOs on increases in leakage rates. 10 CFR 50.36 requires TS on instrumentation designed to detect a significant abnormal degradation of the RCPB. Please discuss why the rate-of-change leakage TS is not provided for the ESBWR.   |
| 16.2-5     | Roth D         | Allowable outage time for drywell floor drain sump monitoring | TS 3.3.4.1 "Reactor Coolant System (RCS) Leakage Detection Instrumentation", Condition A, allows the Drywell floor drain high conductivity waste (HCW) sump monitoring system to be inoperable for 30 days. Please explain how SR 3.4.2.1 "Verify RCS unidentified and total LEAKAGE are within limits" is met with the Drywell floor drain HCW sump monitoring system inoperable (i.e. How is leakage quantified?)   |
| 16.2-6     | Roth D         | Atmospheric monitoring system operability                     | TS 3.3.4.1 "Reactor Coolant System (RCS) Leakage Detection Instrumentation", Condition B, only lists a Required Action of "Analyze samples of drywell atmosphere" once 12 hours. The BWR STS also recommends restoring the atmospheric monitoring system to Operable status within 30 days. Please explain what would require returning the atmospheric monitoring system to Operable status.   |

| RAI Number | Reviewer | Summary                                   | Full Text   |
|------------|----------|---|---|
| 16.2-7     | Roth D   | RCS leakage detection action statements   | <p>(A) TS 3.3.4.1 “Reactor Coolant System (RCS) Leakage Detection Instrumentation”, Condition E, only lists a required action to be in Mode 3 within 12 hours. The BWR STS also recommends entering Cold Shutdown within 36 hours. Please provide technical justification for not entering Mode 5.</p> <p>(B) TS 3.3.4.1 “Reactor Coolant System (RCS) Leakage Detection Instrumentation”, Condition E, only lists a required action to be in Mode 3 within 12 hours for a Condition of “All required Leakage detection systems inoperable”. The BWR STS recommends entering LCO 3.0.3 which requires being in a Cold Shutdown condition within 37 hours. Please provide a technical justification for not entering LCO 3.0.3 and being in Mode 5 within 37 hours when all required leakage detection systems are inoperable.</p> |
| 16.2-8     | Roth D   | RCS leakage detection instrumentation LCO | <p>TS 3.3.4.1 “Reactor Coolant System (RCS) Leakage Detection Instrumentation” states LCO 3.0.4.c is applicable. The bases states that this is allowed since other instrumentation is normally available to monitor leakage. If this “other” instrumentation is potentially the only equipment available to monitor leakage, then it should be included in the LCO as required by 10 CFR 50.36 and the statement of “LCO 3.0.4.c is applicable” should be eliminated.</p>   |

| RAI Number | Reviewer | Summary | Full Text |
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| 16.2-9 | Dehmel JC | A review of DCD Tier 2, Section 16.5.5 (Programs and Manuals) revealed that it is inconsistent with its stated basis document. | A review of DCD Tier 2, Section 16.5.5.1.c. (Offsite Dose Calculation Manual (ODCM)) indicates that the requirements for the submission of the ODCM is inconsistent with its stated basis document (NUREG-1434, Vol. 1, Rev. 3.) As written, Section 16.5.5.1.c of the DCD assumes that an ODCM already exists and that only changed portions of the ODCM specific to ESBWR design features would need to be submitted to the NRC for review. DCD Section 16.5.5.1.c should be revised to consider the possibility of an initial submission of an entirely new ODCM as the first submittal to the NRC. This change would make the commitments in this section consistent with NUREG-1434 on which Chapter 16 of the DCD is based. Update text in this section accordingly. |
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| RAI Number | Reviewer   | Question Summary                     | Full Text  |
|------------|------------|--------------------------------------|--|
| 16.2-26    | Schulten C | Define SRs for ESBWR TS Section 3.3. | Provide a list identifying each component for each instrument function tested by TS defined surveillance requirement (SR) terms: Channel Functional Test, Channel Calibration, and Logic System Functional test. |



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|---------|------------|---|--|
| 16.2-27 | Schulten C | Provide a list of excluded safety systems per 10 CFR 50.36(c)(ii)                     | Provide a list of safety systems that were excluded from the proposed TS by comparison to TS criteria in 50.36(c)(ii).   |
| 16.2-28 | Schulten C | Provide a list of excluded non-safety systems per 10 CFR 50.36(c)(ii) (RTNSS systems) | Provide a list of non-safety systems that were excluded from the proposed TS by comparison to TS criteria in 50.36(c)(ii). Which of these non-safety systems have been identified for availability controls. |
| 16.2-29 | Schulten C | Identify instrumentation functions which have indefinite completion times             | Identify the instrumentation functions that permit indefinite operation with the required actions met in accordance with LCO 3.0.4.  |

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