

May 6, 2008

Mr. Robert E. Brown  
Senior Vice President, Regulatory Affairs  
GE Hitachi Nuclear Energy  
3901 Castle Hayne Road MC A-45  
Wilmington, NC 28401

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 189 RELATED TO  
ESBWR DESIGN CERTIFICATION APPLICATION

Dear Mr. Brown:

By letter dated August 24, 2005, GE Hitachi Nuclear Energy 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 U. S. 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.

If you have any questions or comments concerning this matter, you may contact me at 301-415-2375 or [leslie.perkins@nrc.gov](mailto:leslie.perkins@nrc.gov) or you may contact Eric Oesterle at (301) 415-1365 or [eric.oesterle@nrc.gov](mailto:eric.oesterle@nrc.gov).

Sincerely,

*/RA/*

Leslie Perkins, Project Manager  
ESBWR/ABWR Projects Branch 2  
Division of New Reactor Licensing  
Office of New Reactors

Docket No. 52-010

Enclosure:  
Request for Additional Information

cc w/encl: See next page

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Leslie Perkins, Project Manager  
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SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 189 RELATED TO  
ESBWR DESIGN CERTIFICATION APPLICATION DATED MAY 6, 2008

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**Request for Additional Information (RAI)  
ESBWR Design Control Document (DCD), Revision 4**

<b>RAI Number</b>	<b>Reviewer</b>	<b>Question Summary</b>	<b>Full Text</b>
14.3-204 SO1	Thomas G Gilmer J Clifford P.	ITAAC for Fuel and Control Rods	<p>(1) Relocate the Design Descriptions that were submitted in Tier 1 Sections 2.8.1 (Fuel Rods and Bundles) and 2.8.2 (Fuel Channel) in Revision 3 of the DCD to Tier 2, Appendix 4B under 4B.1 GENERAL CRITERIA in Revision 5 of DCD.</p> <p>(2) The design and construction of Fuel Assemblies and Control Rods should be verified by ITAAC, including the number of fuel bundles and control rods, equipment qualification of these components such as Seismic qualification and compliance with ASME code. In addition, ITAAC verification of the configuration of the fuel bundles and the control rods in the core should be provided</p> <p>(a) Add Fuel Bundles, Control Rods and the Mechanical equipment associated with Fuel Bundle and Control Rods to Tier 1, Nuclear Boiler System Section 2.1.2, Table 2.1.2-1 and include Seismic qualification and ASME applicability.</p> <p>(b) Add an ITAAC in Table 2.1.2-3 to verify the following:</p> <p>The Fuel Rods, Bundles, Fuel Channels and Control Rods and associated mechanical equipment listed in Table 2.1.2-1 have been designed and constructed in accordance with the established design requirements (Design Commitment)</p> <p>An Analysis/Inspection is performed of the reactor Core Design and construction (Inspections, Testing, Analyses)</p> <p>A report exists and concludes that The Fuel Rods, Bundles, Fuel Channels and Control rods listed in Table 2.1.2-3 have been designed and constructed in accordance with the established design requirements (Acceptance Criteria)</p>

RAI Number	Reviewer	Question Summary	Full Text
14.3-242 S01	Beacom R	Deviation from 10 CFR 50.55; IEEE Std. 603-1991 definition.	<p>(c) Add a core configuration diagram to Tier 1 showing the relative positions of the fuel bundles and control rods, and an ITAAC to verify internal component configuration necessary to ensure the core configuration will be installed as designed.</p> <p>Conformance to IEEE Std. 603-1991, which the definition of the term "division" is a normative part of, is required by 10 CFR 50.55(a)(h). As a result of RAI 7.1-46, MFN 06-482, dated December 31, 2006, the applicant committed to revising this definition to meet that of the requirements and to be incorporated Revision 3 of the DCD. This change was completed.</p> <p>The usage of the term "division" as defined by IEEE Std. 603-1991 is required by 10 CFR 50 and as referenced by 10 CFR 52. This term is to be used not just for future designs, as the response suggests, but the completed designs and operating reactors as well. The completed design must establish and always have the capability to maintain the three types of independence noted.</p> <p>In Revision 4 of the DCD, GEH changed the definition. As RAI 14.3-242 states, the applicants definition of the term "division" is a deviation from IEEE Std. 603-1991 and, therefore 10 CFR 50.55(a)(h) and would require an exemption. The applicant should refer to 10 CFR 50.12, "Specific Exceptions" which discusses the necessary application, conditions and circumstances necessary for the Commission to grant an exemption from the requirements if the applicants intend to propose a change to the definition of "division."</p>
14.3-253 S01	Beacom R	Monitoring, alarming, and process variables have been removed.	<p>A) The DCD does not sufficiently explain the necessity for recharging the manually operated nitrogen and sodium pentaborate solution supply systems. If recharging of the accumulator pressure is required in order for the accumulator to perform its safety function, then adequate time to recharge, or delay until that function can be utilized, is a functional requirement that is part of the design basis. Per IEEE Std. 603-1991, the design basis shall include, per Criterion 4.5.1, "The points in time and the plant conditions during which manual control is allowed." Therefore, if recharging of the accumulator is required to perform its safety function, then this design attribute should be included in Tier 1.</p>

RAI Number	Reviewer	Question Summary	Full Text
14.3-257 S01	Beacom R	Revise description of design commitment 2.	<p>B) The level, or concentration, of boron is critical to shutdown of the reactor. If the boron concentration to be achieved, identified in the ITAAC referenced, can be done without measurement then how that level of concentration is assured should be identified in Tier 1. If measurement or monitoring is necessary, it should be identified in Section 2.2 as it was in Revision 3. This is also part of the Safety System Designation, Criterion 4, design basis of IEEE Std. 603-1991.</p>
14.3-371 S01	Kleeh E	ITAAC Table 2.10.1-2, Item 2	<p>Per SECY-92-053, "Use of DAC during 10 CFR Part 52 Design Certification Reviews", DAC should be "clear" and then "objectively" verifiable. The description of Design Commitment 2, which currently references Table 2.2.6-2, merely identifying "controls" should be further defined beginning with the descriptions in the RAI response. Perhaps "fixed or dedicated controls in the RSS" would better describe the intent of design commitment (DC) 2 and reference to Figure 2.2.6-1, which was removed from the DCD in Rev. 4. Figures should be included in Tier 1 Design Descriptions per NUREG-0800, Section 14.3. The applicant can propose a new description of DC 2 in the supplemental response upon a more thorough review of the design.</p> <p>With regards to Table 2.2.6-2, the RAI response states " defines the minimum level of diversity to be provided in the hardware design of each RSS to ensure compliance with GDC 19." This statement, or the information, is not in Tier 1 or Tier 2, and should be added. Tier 2 merely states that the RSS conforms with GDC 19 but does not attempt to specifically show how that is implemented. Also, the applicant is requested to explain what is meant by "minimum level of diversity" with regards to GDC 19. This "Control Room" requirement does not require diversity for equipment inside or outside the control room.</p> <p>It is assumed that GEH intends to deal only with the piping in this ITA therefore - GEH's proposed revisions are not quite acceptable as written. The way the ITA has been revised it may be interpreted to mean they intend to use the B31.3 testing procedure for all the API and BPVC code units as well as the piping. If the ITA and AC were revised as shown below, they would be acceptable.</p> <p><b>ITA</b> " A hydrostatic test in accordance with ASME/ANSI B31.3 will be conducted on the LWMS piping systems, except (1) at atmospheric tanks where no isolation valves exist, (2) when such testing would damage equipment, and (3) when such testing could seriously interfere with other systems or components required to be</p>

RAI Number	Reviewer	Question Summary	Full Text
			<p>hydrostatically tested by the API or ASME codes and standards per Regulatory Guide 1.143, Revision 2.”</p> <p><b>AC</b> “The reports document that the results of the hydrostatic test of the LWMS piping systems in accordance with ASME/ANSI B31.3 conform with the requirements in the ASME Code per Regulatory Guide 1.143, Revision 2 indicate no unacceptable pressure boundary leakage.”</p>

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(Revised 04/22/2008)

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