May 27, 2008

Mr. Robert E. Brown
Senior Vice President, Regulatory Affairs
GE Hitachi Nuclear Energy
3901 Castle Hayne Road MC A-50
Wilmington, NC 28401

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 207 RELATED TO ESBWR DESIGN CERTIFICATION APPLICATION

Dear Mr. Brown:

By letter dated August 24, 2005, GE Hitachi Nuclear Energy (GEH) 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.

If you have any questions or comments concerning this matter, you may contact me at 301-415-3025 or Chandu.Patel@nrc.gov, or you may contact Eric Oesterle at 301-415-1365 or Eric.Oesterle@nrc.gov.

Sincerely,

/RA/

Chandu Patel, Senior Project Manager
ESBWR/ABWR Projects Branch 1
Division of New Reactor Licensing
Office of New Reactors

Docket No. 52-010

Enclosure:
Request for Additional Information

cc: See next page

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Enclosure:
Request for Additional Information

cc: See next page
Distribution: See next page
ADAMS ACCESSION NO. ML081440404 NRO-002

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SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 207 RELATED TO ESBWR DESIGN CERTIFICATION APPLICATION DATED MAY 27, 2008

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Requests for Additional Information (RAIs)
ESBWR Design Control Document (DCD), Revision 4

RAI Number	Reviewer	Question Summary	Full Text
3.8-120 S01	Chakrabarti S	Provide the technical basis for the use of A-709 HPS 70W material, and for the analysis and design approach of the multiple-layered reactor shield wall.	Part (b): 1. In Part (b) of the RAI response, dated April 3, 2008, GEH revised the applicable sections of DCD 3.8.2 and 3.8.3 to identify the material grade for the various steel materials used so that they will be consistent with the material properties assumed in design. However, for all locations in DCD 3.8.3 where the material A-709 HPS 70W is given, a footnote was added which refers to ASME Code Case N-763. Since DCD 3.8.3 applies to the containment internal structures, which are designed using the ANSI/AISC N690 specification, please explain the reason for referencing ASME Code Case. 2. The GEH response to RAI 5.2-50 indicates that A-709 HPS 70W is being added to the DCD as an option for the containment liner. Use of A-709 HPS 70W material for containment liner is currently under review by the ASME Standards Committee under a new code case (ASME Code Case N-763). As such, this needs to be approved by the ASME Code before it can be used for containment liner. The staff requests GEH to explain why an option is being given for use of the A-709 HPS 70W material. Also, based on the proposed revisions to the DCD, it is not clear as to what portions of the containment liner and appurtenances will use the currently specified ASME SA-516 Gr.-70 or the newly proposed material of ASTM A-709 HPS 70W. These should be clearly explained. 3. If the A-709 HPS 70W material will also be used for the containment liner and appurtenances, then GEH is requested to explain how the change in material (including the much higher yield strength) affects the analysis and design of the containment. This should include the effects of this new material on the overall finite element analysis of the entire containment structure for mechanical and thermal loads as well as the localized design of the liner and liner anchorages.

RAI Number	Reviewer	Question Summary	Full Text
			Part (c): In Part (c) of the RAI response, dated April 3, 2008, GEH indicated that the portion of the reactor shield wall using ASTM A709 HPS 70W with thicknesses exceeding 4 inches may be fabricated using one of the multiple layer construction techniques identified in ASME Code, Section VIII, Division 1. The staff notes that the reactor shield wall is not a pressure vessel, and if it was a pressure vessel for use in nuclear power plants, it would be subject to the rules of ASME Section III not Section VIII. 10 CFR 50.55a which is the basis for endorsing applicable sections of the ASME Code does not endorse ASME Section VIII. If GEH still wants to use some other method (such as the ASME Code, Section VIII, Division 1) rather than a conventional engineering design approach for treating multiple layers of cylindrical structures, then GEH is requested to fully describe the specific analytical approach that will be used and to demonstrate the technical adequacy of the approach. Simply referring to some Code and stating that using the construction techniques of that Code allows the multiple layer shells <u>to act as a solid wall</u> is not sufficient.
3.8-121 S01	Chakrabarti S	Provide the technical basis for the analysis and design approach used for the composite floor slabs in the reactor building.	The RAI response dated April 3, 2008, provided additional information related to the analysis and design of the composite floor slabs. This was needed because the analysis and design method being used is a unique approach to design composite floor slabs. The following parts (a) through (e), noted in the GEH's response require further information: (a) As requested in the original RAI, the technical basis (justification) for treating the steel plates as two orthogonal rebars and also designing the composite floor slabs using ASME Code Section III, Division 2, Subsection CC criteria was not provided. GEH is requested to provide this information. Also, how does this approach compare to other more conventional methods for design of composite floor slabs such as Section Q1.11 – Composite Construction of ANSI/AISC N690 or the International Building Code (IBC) which references ANSI/AISC 341? (b) How are the forces developed at the studs for design? What are the allowable values? Is the material and design of the studs performed in accordance with ANSI/AISC N690; If so, what sections of N690? If not, explain why.

RAI Number	Reviewer	Question Summary	Full Text
			(c) If the design code of record for the composite floor slabs is ANSI/AISC N690, then why are the allowable values for the concrete, rebar, and steel plate of the ASME Code utilized. How do these compare to a design done in accordance with N690 for steel and ACI-349 for concrete? (d) If temporary shoring is not used, why is the statement made that the steel plates are not affected by the initial stress during construction (e.g., concrete pour). How is this initial stress addressed in design of the composite floor steel plates. (e) The series of tests listed as references for composite floor slabs tested in Japan, as noted in the response, are in Japanese which is not useful. The other papers that are listed in the response as references are for composite walls (not floors), have plates on both sides (not one side as in the ESBWR design), and it is not evident if they include out of plane loading test results. Thus, it is not clear that there is any useful information in these papers to support the design approach being used. As requested in the original RAI, provide any test data and/or peer reviewed articles that could support the design approach being used. To expedite the review, the actual paper should be provided (not just a reference) and an explanation should be provided to show that the configuration of the specimens (e.g., wall thickness, plate thickness, anchorage type), material properties, and loading (bending, membrane, and shear) used for testing or the article are similar to or in the range of the design condition used for the ESBWR.

RAI Number	Reviewer	Question Summary	Full Text
RAI 14.3-210, Supplement 1	Oesterle E	Provide schedule for DAC closure	In response to RAI 14.3-210, GEH disagreed with the staff's request to add a COL information item to the DCD. During a May 21, 2008 telecon between GEH and the staff, GEH's response to RAI 14.3-210 was discussed. The staff reiterated that because DAC closure could be performed in several design phases, schedule information for closure is necessary for the staff to be able to appropriately schedule its activities related to DAC closure. This COL information item will ensure that every COL applicant referencing the ESBWR DCD provides the NRC with a schedule for DAC closure, even if the initial response to the COL information item is to make a commitment to provide such a schedule at a time when information is mature enough to be able to make reasonable schedule commitments. As such, the staff requests that GEH include a COL information item in the DCD for the COL applicants/holders to provide a schedule for DAC closure. In addition, the staff and GEH discussed comments associated with an appendix to Tier 2, Section 14.3 included in the response to RAI 14.3-210. The staff requests GEH to incorporate those verbal comments.

cc:

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