

June 3, 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. 211 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 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.

Note that for Chapter 18 RAIs, GEH tracks the "ESBWR DCD Chapter 18, Human Factors Engineering - RAI to DCD Roadmap Document," provided in MFN 07-334, dated June 27, 2007, as a supplemental response to individual RAIs while the NRC does not. To facilitate consistent tracking of supplements, the staff is assigning RAI supplement numbers based on the GEH responses.

RAI 18.8-2 S02 has been augmented to be consistent with other 18.8 RAIs in this letter and supersedes the version sent in RAI letter 178, dated May 6, 2008.

R. Brown

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If you have any questions or comments concerning this matter, you may contact me at 301-415-6256 or Dennis.Galvin@nrc.gov or you may contact Amy Cubbage at 301-415-2875 or Amy.Cubbage@nrc.gov.

Sincerely,

/RA/

Dennis Galvin, 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

R. Brown

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

RAI Number	Reviewer	Question Summary	Full Text
18.2-10 Supplement 3 (MFN 08-088, March 8, 2008)	Bongarra J	Describe the process management tools that will be used by the HFE team.	In RAI 18.2-10 S02, the staff requested that GEH provide specific details the on process management tools that will be used by the human factors engineering (HFE) team. The GEH response stated that the process management tools are described in the work instructions and identified seven work instructions: (1) Human Factors Issue Tracking System, (2) Operating Experience Review, (3) System Function Requirements Analysis, (4) Plant Function Requirements Analysis, (5) Task Analysis, (6) Human System Interface Design, and (7) Human Reliability Analysis. The staff position is that the HFE Implementation plan needs to specifically describe the process management tools. Please include this information in the HFE implementation plan or submit the appropriate work instructions for staff review.

RAI Number	Reviewer	Question Summary	Full Text
18.4-16(b) Supplement 3 (MFN 08-154, April 1, 2008)	Bongarra J	Provide the specific criteria used in the allocation of function decision making process.	<p>In RAI 18.4-16(b) S02, the staff noted that while the NEDO-33220 contains many criteria for allocating functions, most are stated at a very general level. The staff requested the applicant to provide the more specific criteria available for analysts to use as part of the decision making process. GEH's response stated that the NEDO contains descriptions for each of the decision blocks for the allocation process figures and those descriptions contain the specific criteria to be used. The staff agrees, however, this does not address the question. For example, for NEDO-33220, Section 4.1.3.1, Item (2), "Automatic Actuation Required," the description instructs the analyst to consider nine criteria when determining if automatic actuation is required. The nine criteria are presented in a bullet list. The bullets are typically only a few words, such as "human cognitive limitations" and "human response time limitations." This is where the staff's concern lies. These bullet lists do not actually provide criteria or methods that can be used by an analyst to make decisions. They are lists of things to consider. How would the analyst decide that a particular actuation should be automated based on human cognitive limitations? The staff realizes that precise and objective criteria for many of these considerations are beyond the state-of-the-art. And the staff recognizes that the methodology is based on "a qualitative process relying heavily on judgment of the expert teams." However, it is expected that the plan will provide the analyst with guidance to help evaluate the items presented in the bullet lists.</p> <p>GEH's response further indicated that "The criteria and guidance of NEDO-33220 is implemented in a systematic and consistent manner through the use of a work instruction." The staff position is that the HFE Allocation of Function Implementation plan needs to provide the specific criteria the analysts will use in the decision making process. Please include this information in the implementation plan or submit the appropriate work instructions for staff review.</p>

RAI Number	Reviewer	Question Summary	Full Text
18.5-5 Supplement 3 (MFN 07-624, January 17, 2008)	Bongarra J	Describe how the task analysis methodology is actually performed.	In RAI 18.5-5, the staff requested that GEH identify how the task analysis methodology is actually performed rather than just present it in outline form. The RAI response indicates that the detailed step-by-step methodology is contained in a Task Analysis Work Instruction document that has been developed and refined as their pilot analyses have taken place. GEH further indicated that the cognizant engineer will use the work instruction document for guidance in conducting the analysis. GEH indicated that no changes to the NEDO are planned. The staff position is that the Task Analysis implementation plan needs to specifically describe how the task analysis methodology is actually performed. The implementation plan that should contain sufficient detail that the methodology can be reliably used by a design engineer. Please include this information in the Task Analysis implementation plan or submit the Task Analysis Work Instructions for staff review.
18.5-26 Supplement 2 (MFN 07-624, January 17, 2008)	Bongarra J	Describe how task analysts will perform the aspects of the workload analysis.	In RAI 18.5-26, the staff requested that GEH describe how workload assessments as part of task analysis (as per Sections 4.1.3.6 and 4.2.3.6 of NEDO 33221, Revision 1) are accomplished. The RAI response addresses workload assessment in general. For Stage 1 workload analysis, GEH indicates that a questionnaire type instrument is used by analysts to evaluate workload. Such an instrument is not referenced in or included in the NEDO. GEH indicated that for Stage 2 workload analyses, known ranking systems such as the NASA-TLX are used. However, the TLX is typically used to collect ratings from participants performing tasks on a simulator or in an actual plant. GEH states that the detailed methods for assessing workload and stress are described in a workload assessment detailed work document or work instruction currently under development and that the workload assessment work instruction fulfills guidance as set forth by NUREG-0711. GEH further indicated that no changes are planned for the NEDO. The staff position is that the Task Analysis implementation plan needs to specifically describe how the task analyst will perform the aspects of the workload analysis described in Sections 4.1.3.6 and 4.2.3.6 of NEDO 33221, Revision 1. Please include this information in the Task Analysis implementation plan or submit the appropriate Work Instructions (Task Analysis or Workload Assessment) for staff review.

RAI Number	Reviewer	Question Summary	Full Text
<p>18.8-2 Supplement 2 (MFN 08-050, March 11, 2008)</p> <p>(Supersedes RAI 18.8-2 Supplement 2 in RAI Letter 178, May 6, 2008)</p>	<p>Bongarra J</p>	<p>Provide detailed step-by-step instructions for HSI design and clarify the level of style guide specificity.</p>	<p>In RAI 18.8-2, the staff requested that GEH provide detailed step-by-step instructions for HSI design. GEH indicated that the detailed step-by-step methodology is contained in a HSI Design Work Instruction. GEH further indicated that the cognizant engineer will use the work instruction document for guidance in conducting the analysis. GEH indicated that “The overall approach to work instructions is to provide designers with a step-by-step approach in sufficient detail to complete the task consistently without compromising the ability of the designer to use good engineering judgment.” The staff position is that the HSI Design implementation plan needs to provide detailed step-by-step instructions for HSI design. The implementation plan should contain sufficient detail that the methodology can be unambiguously understood by NRC and GEH personnel. Please include this information in the HSI Design implementation plan or submit the appropriate HSI Work Instructions for staff review.</p> <p>GEH’s response partially clarified Part B of the staff’s question regarding the level of style guide specificity. GEH indicated that the guide will consist of a compilation of requirements from NUREG-0700 and -0711 that are entered into an industry-standard software requirements tracking/traceability tool. GEH’s response provided general information about the contents of the guide. However, NUREG-0700 guidance is often presented at a high-level (since it is used to review many different design implantations). The staff expects the style guide to be specific to the ESBWR design; i.e., described at a level to ensure consistency in application across users of the guide. As an example, NUREG-0700 Guideline 4.1.4.2-1 indicates that “General HSI features (e.g., a data display zone, control zone, or message zone) should be displayed in consistent locations from one display to another.” A design specific implementation of this guideline would be “Each screen will be divided onto four zones: the upper zone provides a label and identifying information, a left zone providing navigation controls, a lower zone providing alarms and status messages, and a large center zone displaying user selected information.” Please clarify whether GEH’s style guide will simply repeat the guidance in NUREG-0700 or if GEH will provide ESBWR specific guidance on how the</p>

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			guidance is applied to the design. In addition, GEH's response did not "clarify the relationship between the HSI guidelines in the NEDO and those to be included in the style guide." Please provide the clarification as requested.
18.8-35 Supplement 3 (MFN 08-050, March 11, 2008)	Bongarra J	Describe the HSI evaluation methods	In RAI 18.8-35, the staff requested that GEH describe the evaluation methods GEH uses to implement NUREG-0711, Section 8.4.6. GEH's response states that the HSI work instructions describe the methods for HSI Tests and Evaluations per NUREG-0711. The staff position is that the HSI Design implementation plan needs to specifically describe the HSI evaluation methods. Please include this information in the HSI Design implementation plan or submit the appropriate HSI Work Instructions for staff review.
18.8-50 Supplement 1 (MFN 08-050, March 11, 2008)	Bongarra J	Describe how the HFE Team will develop the concept of operations.	In RAI 18.8-50, the staff requested that GEH describe how the HFE Team will develop the concept of operations. GEH's response indicates that the methods for HFE Team coordination and collaboration in developing the concept of operations are described in the HSI Work Instruction. The staff position is that the HSI Design implementation plan needs to specifically describe how the concept of operations will be developed. Please include this information in the HSI Design implementation plan or submit the appropriate HSI Work Instructions for staff review.
18.8-51 Supplement 1 (MFN 08-050, March 11, 2008)	Bongarra J	Describe how functional requirements specifications are developed.	In RAI 18.8-51, the staff requested that GEH describe how functional requirements specifications are developed. GEH's response indicates that the methodology for developing functional requirements specifications is provided in the HSI Work Instruction. The staff position is that the HSI Design implementation plan needs to provide the methodology for developing functional requirements specifications. Please include this information in the HSI Design implementation plan or submit the appropriate HSI Work Instructions for staff review.

RAI Number	Reviewer	Question Summary	Full Text
18.8-52 Supplement 1 (MFN 08-050, March 11, 2008)	Bongarra J	Describe how the HSI detailed design and integration objectives will be achieved.	In RAIs 18.8-52 to 18.8-58, the staff requested GEH to describe how Human System Interface (HSI) detailed design and integration objectives would be achieved. These objectives correspond to review criteria 3-9 of NUREG-0711, Section 8.4.5. The staff asked this question because NEDO-33268, Revision 2, Section 3.3.4, "General Approach" essentially repeats these objectives without describing how they will be achieved. In the response to RAIs 18.8-52 to 18.8-58, GEH states that the ESBWR HSI Work Instructions provide the methodology. The staff position is that the HSI Design implementation plan needs to specifically describe how the HSI detailed design and integration objectives will be achieved. Please include this information in the HSI Design implementation plan or submit the appropriate HSI Work Instructions for staff review. RAIs 18.8-53 to 18.8-58 will remain open pending the resolution of 18.8-52 S01.
18.8-59 Supplement 1 (MFN 08-050, March 11, 2008)	Bongarra J	Describe how trade-off evaluations will be performed	In RAI 18.8-59, the staff's RAI requested GEH to describe how trade-off evaluations will be performed. GEH's response indicates that the methodology for trade-off evaluations is provided in the HSI Work Instruction. The staff position is that the HSI Design implementation plan needs to specifically describe how trade-off evaluations will be performed. Please include this information in the HSI Design implementation plan or submit the appropriate HSI Work Instructions for staff review.

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(Revised 05/27/2008)

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