December 19, 2007

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

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 129 RELATED TO ESBWR DESIGN CERTIFICATION APPLICATION

Dear Mr. Brown:

By letter dated August 24, 2005, GE-Hitachi Nuclear Energy Americas, LLC (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.

To support the review schedule, you are requested to provide the requested additional information within 45 days of the date of this letter.

If you have any questions or comments concerning this matter, you may contact me at 301-415-3179 or ixb3@nrc.gov or you may contact Amy Cubbage at (301) 415-2875 or aec@nrc.gov.

Sincerely,

/RA/

Ilka Berrios, 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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ACCESSION NO. ML03521482 Template: NRO-002

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DATE	12/18/2007	12/19/2007	12/19/2007

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SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 129 RELATED TO ESBWR DESIGN CERTIFICATION APPLICATION

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Request for Additional Information (RAI)
ESBWR Design Control Document (DCD)
Chapter 18 "Human Factors Engineering"

RAI Number	Reviewer	Question Summary	Full Text
9.5-65	Radlinski R	Specified qualifications for membership in the fire brigade are not in accordance with the regulatory guidance	The new description in DCD Tier 2, Revision 4, Section 9.5.1.15.4.2 for the qualifications for membership in the fire brigade is not in accordance with regulatory guidance provided in Regulatory Guide (RG) 1.189, Regulatory Position (RP) 1.6.4.1. The qualifications described in the DCD make no distinction among the members of the brigade. The guidance in RP 1.6.4.1 has unique qualifications for the fire brigade leader; for two members with knowledge of the effects of fire suppressants on safe-shutdown capability; and, for a fire team advisor for plants with dedicated professional fire departments. In addition, the annual physical should include a determination that the fire brigade members are able to perform strenuous firefighting activities.
9.5-66	Radlinski R	Clarify apparent errors and omissions on the Fire Protection (FPS) Simplified Diagram	There are apparent errors and omissions on the FPS Simplified Diagram (DCD Tier 2, Revision 4, Figure 9.5-1) as follows: a. Figure 9.5-1 does not show the SC I/SC II interface between the discharge line from the primary electric motor driven pump (indicated as SC II) to the reactor building header (indicated as SC I). b. The makeup interface in the turbine building should be identified (what system is it going to) and it appears that the check valve in this line is shown incorrectly - the makeup flow arrow is pointing out of the reactor building header and the orientation of the check valve symbol in this line indicates that flow can only be into the header. c. The class break between the turbine and reactor buildings refers to Seismic Category N according to Section 3.2.1, shouldn't this be NS? d. In the event of an earthquake, the Seismic Category NS turbine building header could fail. The P&ID indicates that this would create two large (the header connections are assumed to be at least 6-inch diameter pipe) open flow paths from the Seismic Category I reactor building header to waste until the manual isolation valves in the interconnecting piping could be closed. Has this been considered in the system design?

RAI Number	Reviewer	Question Summary	Full Text
9.5-67	Radlinski R	Correct inconsistencies between figure and fire hazards analysis table	DCD Tier 2, Revision 4, Figure 9A.2-33 identifies the fire pump enclosure as fire area F7170, whereas Table 9A.5-7 identifies the fire pump enclosure as fire area F8250 for electric fire pump A and fire area F8260 for diesel fire pump B. The DCD should be revised to provide consistent numbering for the fire pump fire areas. Figure 9A.2-33 also indicates a Note 5 near the transformers, but there are only three (3) notes in the figure legend, and they are numbered sequentially from 1 to 3.
9.5-68	Radlinski R	Clarify the extent to which the plant design provides smoke control in accordance with NFPA 92A	DCD Tier 2, Revision 4, Section 9.5.1.11 states that smoke control in accordance with NFPA 92A guidelines is provided for unsprinklered areas where the FHA identifies a potential for heavy smoke or heat conditions. The 2006 Edition of NFPA 92A (the edition identified in DCD Tier 2, Table 1.9-22) applies to a specific method of smoke control that relies on maintaining a differential pressure across fire area boundaries to prevent the spread of smoke from the area on fire to adjacent areas, or in the case of stairwells, prevent smoke from entering the stairwell. Regarding Tables 9A.5-1 through 9A.5-7 of the FHA in Appendix 9A of DCD Tier 2, Revision 4, the staff is not able to find any unsprinklered areas where a potential for heavy smoke or heat conditions is identified by GEH and none of the fire area descriptions indicate that smoke control is provided in accordance with NFPA 92A. These tables would be the appropriate place to identify any provisions for smoke control for specific fire areas. The DCD should be revised to indicate in Tables 9A.5-1 through 9A.5-7 any areas that are provided with smoke control in accordance with NFPA 92A or should include a statement that no areas meeting the criteria for this type of smoke control have been identified and provide the criteria for “heavy smoke or heat conditions”. DCD Tier 2, Revision 4, Section 9.5.1.12 quotes the regulatory guidance that it should be demonstrated that smoke, hot gases, or the fire suppressant does not migrate into other fire areas to the extent that safe shutdown capabilities, including operator actions, could be adversely affected and states that the ESBWR fire protection design satisfies this guidance with a combination of fire dampers and other barriers, smoke evacuation capabilities, and minimal required operator manual actions. Fire dampers that are not smoke dampers do not provide an effective means of preventing smoke from passing through a ventilation duct that penetrates a fire barrier. The smoke evacuation capabilities described in the DCD are generally for smoke clearing after the fire has been extinguished. If smoke control measures are required during a fire to prevent the migration of smoke from one fire area to another in order to achieve and maintain safe

RAI Number	Reviewer	Question Summary	Full Text
			shutdown, the details of these smoke control capabilities should be described in the DCD. Also note that the ABWR certified design includes smoke control capabilities that use the methods described in NFPA 92A (differential pressure across the fire barrier) and the ABWR certified design includes ITAAC for the verification of that capability. Should the ESBWR credit similar NFPA 92A smoke control capabilities for post-fire safe shutdown, similar ITAAC would be required for the ESBWR. DCD Tier 2, Revision 4, Section 9.5.1.11 also states that safe egress and safe smoke refuge areas during a fire incident are provided in accordance with NFPA 92A guidelines for building occupants and the fire brigade. Section 9.4.4.2 states that the turbine building main stairwells are pressurized to prevent infiltration of smoke from other turbine building areas in the event of a fire. Section 9.4 does not identify any other stairwells in the plant that are pressurized. Are the turbine building stairwells the only stairwells in the plant that are pressurized to prevent smoke infiltration? As above, this provision should be identified in Tables 9A.5-1 through 9A.5-7 since it is relevant to the FHA.
18.9-1 S02	Bongarra J	Clarification of Procedure Development Plan	GEH's response to part A of this RAI is outdated in that it refers to DCD Chapter18, Appendix A and B that are now deleted. Revision. 2 of NEDO-33274 is still not clear on the development and use of ESBWR-specific EPGs and their submittal to NRC. Please provide more detail on the development process for the ESBWR-specific EPGs, and a schedule for their completion. If not planned for design certification, provide a justification as to why the EPGs are not required for design certification.
18.9-2 S01	Bongarra J	Clarification of Scope	Supplemental RAI for Part A of original RAI only. DCD Tier 2, Chapter 13.5 shows the commitment to ANSI/ANS-3.2 1994: R1999 (R=Reaffirmed), Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants, as endorsed by Regulatory Guide 1.33 Revision 2, February 1978. However it is not clear whether all aspects of procedure development addressed in RG 1.33 will be met, for example procedures in Appendix A of RG 1.33.
18.9-6 S02	Bongarra J	V&V of procedures	Supplemental RAI for Part C of original RAI only. In response to Item C, GEH provides a restriction in scope similar to NEDO-33274, Rev.

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			0. Per NUREG-0711, Element 11, both the HSI Task Support Verification and the HFE Design Verification should apply to HSIs that are contained in both normal and emergency procedures. The actual tests and verification would be selected using operational condition sampling of the V&V program. In the Purpose section, NEDO-33274, Rev. 2, does include Task Support Verification, but it does not appear in the methodology portion. Revision 2 also specifies that procedures are developed using an appropriate writer's guide, however, there doesn't seem to be a selective design verification that would check or verify the application of HGFE principles into procedures when they are completed. Please provide for verification of procedures per the V&V guidance of NUREG-0711.
18.9-8 S01	Bongarra J		NEDO-33274 states in Section 4.6 that "Sufficient laydown space is provided for hard copies of EOPs, other procedures and other documents required by the operators during accident management and the performance of their regular duties." However, it is not clear if this applies to the main control room only or if it also applies to the remote shutdown facility and appropriate local control stations. Please clarify. Also, while the loss of CBPs is noted in Operational Conditional Sampling in the V&V Plan, in item 4.3.1.4.1.1.b, it should be addressed in the Procedure Development Plan. GE Response: The main control room will have a lay down space for hard copies of EOPs and other procedures or documents required by the operators during accident management and the performance of their regular duties. The remote shutdown panel area and local control stations do not have dedicated lay down areas for plant procedures, but empty area room space is available for temporary procedure carts, work tables, or other devices for procedure use. Section 4.3.1.4.1.1.b of NEDO-33276, HFE Validation and Verification Implementation Plan, HSI failures, lists loss of processing and/or display capabilities for computer-based procedures. The original intent was to have back-up hard copies of all plant procedures for such a scenario when the computer based procedures were not available. The use of hard-copy paper procedures are discussed in Section 3.1 of NEDO-33274. Partially acceptable. The aspects related to lay-down space are acceptable. Further clarification is needed on how loss of CBPs will be addressed procedurally and in NEDO-33274.

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