February 19, 2009

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. 306 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, or you may contact Amy Cubbage at 301-415-2875 or amy.cubbage@nrc.gov.

Sincerely,

/RA A. Cubbage for:/

Leslie Perkins, 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

February 19, 2009

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. 306 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, or you may contact Amy Cubbage at 301-415-2875 or amy.cubbage@nrc.gov.

Sincerely,

/RA A. Cubbage for:/

Leslie Perkins, 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
Distribution: See next page

ADAMS ACCESSION NO. ML090420283 NRO-002

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SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO.306 RELATED TO ESBWR DESIGN CERTIFICATION APPLICATION DATED FEBRUARY 19, 2009

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Requests for Additional Information (RAIs)
ESBWR Design Control Document (DCD), Revision 5

RAI Number	Reviewer	Question Summary	Full Text
14.3-436 S01	Pieringer P	Restriction of Scope of HFE to safety-related items	In response to RAI 14.3-436, GEH indicates they will retain the ITAAC limitations. The basis provided for this decision is derived from NUREG-0800, Section 14.3, which states in part "The type of information and the level of detail in Tier 1 are based on a graded approach commensurate with the safety significance of the structures, systems, and components (SSCs) for the design. The top-level information selected should include the principal performance characteristics and safety functions of the SSCs and should be verified appropriately by ITAAC. Design-specific and unique features of the facility should be considered carefully for inclusion in Tier 1." It further explains that, "While the Tier 1 information must address the complete scope of the design to be certified, the amount of design information is proportional to the safety-significance of the structures and systems of the design." In addition it states, "ITAAC are limited to the design features and requirements that must be verified prior to fuel loading." The staff applies the material quoted in the response as one of the generic principles guiding the content and level of detail contained in the Tier 1 DCD. While ITAACs are expected to verify the top-level information contained in Tier 1, Tier 1 does not define the complete ITAAC scope. With respect to HFE, NUREG-0711 outlines the goals and scope which provide necessary definition and scope to ITAACs. Criterion (1) and (3) quoted below are particularly applicable to our position that the current ITAAC limitation in DCD revision 5 are not appropriate.

RAI Number	Reviewer	Question Summary	Full Text
			NUREG-0711, Section 2.4.1 General HFE Program Goals and Scope (1) HFE Program Goals - The general objectives of the program should be stated in “human centered" terms, which, as the HFE program develops, should be defined and used as a basis for HFE test and evaluation activities. Generic "human-centered" HFE design goals include the following: • personnel tasks can be accomplished within time and performance criteria • the HSIs, procedures, staffing/qualifications, training and management and organizational support will support a high degree of operating crew situation awareness • the plant design and allocation of functions will maintain operation vigilance and provide acceptable workload levels i.e., to minimize periods of operator underload and overload • the operator interfaces will minimize operator error and will provide for error detection and recovery capability (3) Applicable Facilities - The HFE program should address the main control room, remote shutdown facility, technical support center (TSC), emergency operations facility (EOF), and local control stations (LCSs). First Criterion (3) defines the applicable facility. The focus is on operating locations, NOT safety verses non safety related systems. Criterion (1) reinforces this perspective by stating human performance goals that are not associated with SSC safety classification. The staff uses this as their basis for conducting an integrated Main Control Room HFE design

RAI Number	Reviewer	Question Summary	Full Text
			evaluation. Omitting any subset of SSCs located in the control room introduces the potential that the HFE program goals listed in criterion (1) will not be accurately assessed. ITAACs in turn must be structured to verify the complete main control room design, not a subset of SSCs. This is consistent with 10CFR50.34(f)(2)(iii) which requires a control room with state-of-art HFE. The staff believes the RAI response has not fully addressed the staff's concern and requests that GEH revise Tier 1, Section 3, to remove the limitation of HFE scope to SR and selected non-SR items, and make the scope for HFE the same as in Tier 2,Chapter 18, and in the HFE implementation plans that have been reviewed.
14.3-449	Gardner R Cerne T	The use of functional arrangement in Tier 1	The use of the "Functional Arrangement" Tables associated with several of the different ESBWR systems appears inappropriate and, if not corrected, will result in significant "inspectability" concerns. The functional arrangement of any system is typically the first ITAAC in any system ITAAC Table and "functional arrangement" is defined in the Tier 1 "Definitions", as follows: "**Functional Arrangement (for a System)** means the physical arrangement of systems and components to provide the service for which the system is intended, and which is described in the system Design Description." This is augmented by another Definition: "**Verification of the functional arrangement** of a system, as used in an ITAAC, means verifying that the system is constructed as depicted in the Tier 1 design description and design drawings, including equipment and instrument locations, if applicable."

RAI Number	Reviewer	Question Summary	Full Text
			The standard NRC interpretation of “functional arrangement” inspections would then typically involve walkdowns of as-built systems to verify visual and measurable attributes, as would be detailed on drawings, equipment specifications, and building layouts. The NRC staff does not assume that complex design requirements or analytical/testing results can be verified by such “functional arrangement” walkdown inspections alone. However, in the ESBWR DCD Draft Tier 1 (Revision 06), Table 2.2.12-5 specifies just one ITAAC for the entire Leak Detection and Isolation System (LD&IS). This one ITAAC commits to a LD&IS “functional arrangement”, as described in Table 2.2.12-1. Table 2.2.12-1 specifies safety-related, Seismic Category I features for the LD&IS; as well as component isolation function and logic requirements, “fail-safe” design attributes, and testing criteria. The ITA column for the one ITAAC specifies the conduct of “inspections and/or tests” while the AC requires the existence of a “Report” that concludes that the LD&IS conforms to the Table 2.2.12-1 provisions. The generic NRC concern with this approach is as follows: • This functional arrangement ITAAC does not comport with the two related “functional arrangement” definitions quoted above. • The ITAAC constrains “functional arrangement” to that which is described in Table 2.2.12-1. (Using this approach, a walkdown inspection of the system may not even be required.) • The ITAAC criteria listed in Table 2.2.12-1 expand the “functional arrangement” attributes to include the need for analysis (e.g., seismic), design feature (e.g., fail-safe, isolation) validation, and

RAI Number	Reviewer	Question Summary	Full Text
			test results that are not specifically identified as appropriate ITA and AC details. (Using this approach, a typical as-built walkdown inspection would certainly not be sufficient to verify ITAAC completion.) • This ESBWR approach for these ITAAC not only contradicts the Tier 1 Definitions, it renders the use of "functional arrangement" to be all those criteria listed in each separate system table, and only those attributes that are listed. • This approach does not appear to provide proper recognition of the unique importance and individuality of separate ITAAC requirements. Does not the seismic qualification (analyses and type testing, as applicable) deserve its own ITAAC line item? Should not the component and system isolation and fail-safe features be handled as separate lines items (as applicable) because they are distinct from the seismic requirements? If testing is required to confirm specific quantitative results (as listed in Table 2.2.12-1), should this not be a separate ITAAC line item? The example discussed above for the LD&IS, using Tables 2.2.12-1 and 2.2.12-5 for the one system ITAAC, is not the only occurrence of the problematic use of "functional arrangement" verification. In some cases (e.g., for the SLC system using Tables 2.2.4-1 and 2.2.4-6, Item 13), the Seismic Category I requirement is included both in the "functional arrangement" table and as a separate line item in the ITAAC table. In other cases, (e.g., for the RSS system using Tables 2.2.6-1 and 2.2.6-3), the "functional arrangement" table indicates a system is seismic, but there is no separate seismic ITAAC (even though, unlike the LD&IS, there may be other system ITAAC).

RAI Number	Reviewer	Question Summary	Full Text
			Therefore, based upon the examples provided above and the noted inconsistencies with the definitions for “Functional Arrangement” and “Verification of functional arrangement”, the NRC requests that GEH review and reevaluate the use of the system Functional Arrangement Tables. The NRC staff expects that the use of “functional arrangement” ITAAC would comport with the definitions provided in Tier 1 and quoted above; and thus would involve the type of verification activities that could checked with as-built system walkdown inspections, independent measurements, and/or visual examinations and/or location checks. With regard to the ESBWR “Functional Arrangement” Tables that accompany many systems, the NRC staff expects that unique and diverse technical attributes (such as analyses and test criteria) would be reevaluated for the purpose of being combined and/or separated, as applicable, into their own distinct ITAAC line items. If an attribute is listed in both in the “Functional Arrangement” Table, and also as a separate ITAAC line item (e.g., the SLC system “seismic” example noted above), this would be considered an unnecessary and redundant requirement. In summary, the NRC staff requests that the current, extensive use of Functional Arrangement Tables for the ESBWR DCD Draft Tier 1 (Revision 06) be reconsidered to make it not only more consistent, but also more compliant with the standard definitions and accepted usage of “functional arrangement” ITAAC. In accommodating this request, the NRC staff believes that improvements to the ITAAC, for “inspectability”, appropriate language interpretation, and final acceptability standpoints, will be the result.

cc:

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