October 10, 2006

Mr. David H. Hinds, Manager, ESBWR
General Electric Company
P.O. Box 780, M/C L60
Wilmington, NC 28402-0780

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 75 RELATED TO ESBWR DESIGN CERTIFICATION APPLICATION

Dear Mr. Hinds:

By letter dated August 24, 2005, General Electric Company (GE) 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. This RAI, containing questions 3.4-1 thru 8, 3.6-20 and 21, 3.8-108 and 109, and 3.11-1 through 5, concerns Sections 3.4, 3.6, 3.8, and 3.11 of Revision 1 of the ESBWR Design Control Document. To support the review schedule, you are requested to respond to this RAI by November 22, 2006.

To support the review schedule, you are also requested to respond to questions 3.6-6b and 3.6-11 thru 19 by November 22, 2006. Questions 3.6b and 3.6-11 thru 19 were sent to GE on August 3, 2006, in our RAI letter number 45, but without a requested response date.

If you have questions or comments concerning this matter, please contact me at (301) 415-2863 or lwr@nrc.gov or you may contact Amy Cubbage at (301) 415-2875 or aec@nrc.gov.

Sincerely,

/RA/

Lawrence Rossbach, Project Manager
ESBWR/ABWR Projects Branch
Division of New Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 52-010

Enclosure: As stated

cc: See next page

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Docket No. 52-010

Enclosure: As stated

cc: See next page
ACCESSION NO. ML062830158

OFFICE	NESB/PM	NESB/BC(A)
NAME	LRossbach	JColaccino
DATE	10/10/2006	10/10/2006

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Distribution for DCD RAI Letter No. 75 dated October 10, 2006

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Requests for Additional Information (RAIs)
ESBWR Design Control Document (DCD), Revision 1
Section 3.4, Water Level (Flood) Design

RAI Number	Reviewer	Question Summary	Full Text
3.4-1	Jones S	Describe flood conditions that may develop in the Nuclear Island access tunnel and how the features that protect the reactor and control buildings from flooding in the tunnel (watertight doors) conform to Regulatory Guide 1.102.	DCD Tier 2, Revision 1, Section 3.4.1.4 states that the control building and reactor building are provided with watertight doors at the access from the electric building tunnel. DCD Tier 2, Revision 1, Figure 1.2-3 indicates that this tunnel is Seismic Category II, and therefore not necessarily constructed to withstand ground water and external flood conditions based on the description of flood protected structures described in DCD Tier 2, Revision 1, Section 3.4. Describe the flood conditions that may develop in the below-grade Nuclear Island access tunnel during design basis external flood and groundwater conditions and how the features that protect the reactor and control buildings from flooding in the tunnel (watertight doors) conform to the guidance of Regulatory Guide 1.102, Revision 1, September 1976.
3.4-2	Jones S	Describe the methodology and acceptance criteria applied in the designation of non-seismic piping segments as “seismically analyzed” or “seismically qualified.”	DCD Tier 2, Revision 1, Section 3.4.1.4 describes that several systems identified as non-seismic in DCD Tier 2, Revision 1, Table 3.2-1 are “seimically analyzed” or “seismically qualified.” Seismic Category I systems are assumed to develop only leakage cracks rather than the larger pipe breaks to which non-seismic piping is subject for flood protection analysis. Describe the methodology and acceptance criteria applied in the designation of non-seismic piping segments (as specified in DCD Tier 2, Revision 1, Table 3.2-1) as “seismically analyzed” or “seismically qualified” for purposes of limiting postulated breaks in moderate energy piping systems to leakage cracks for flood protection analyses.

3.4-3	Jones S	Describe how non-seismic drain piping is verified to be adequately sized and constructed to drain water at the necessary rate.	DCD Tier 2, Revision 1, Section 3.4.1.1 states that the floor drain piping system limits water accumulation in compartments with possible flooding. However, DCD Tier 2, Revision 1, Table 3.2-1 indicates that the drain piping performing this functionis non-seismic. Describe how non-seismic drain piping is verified to be adequately sized and constructed to drain water at the necessary rate to maintain water accumulation below the assumed levels following seismically induced failure of moderate-energy piping. In particular, describe how the necessary minimum flow area of the pipe is assured.
3.4-4	Jones S	Explain the methodology used to determine the bounding internal flood conditions for the reactor building and control building evaluations.	DCD Tier 2, Revision 1, Section 3.4.1.1 states that the floor drain piping system limits water accumulation in compartments with possible flooding. However, the method of establishing this capability was not specified. Explain the methodology used to determine the bounding internal flood conditions for the reactor building and control building evaluations (i.e., maximum flood rate (transient) analysis vs. maximum flood volume (static) analysis).
3.4-5	Jones S	Provide information regarding how the stated assumption in DCD 3.4.1.3 that floors are assumed to prevent water seepage to lower levels will be verified.	DCD Tier 2, Revision 1, Section 3.4.1.3 states that floors are assumed to prevent water seepage to lower levels. Provide information regarding how this stated assumption in DCD Tier 2, Revision 1, Section 3.4.1.3 will be verified, such as through inspections of the floor penetrations.

3.4-6	Jones S	Describe how the capability to maintain safe shutdown is assured during flooding conditions when the plant is initially in the refueling mode of operation with the reactor vessel head fully detensioned or removed.	In the refueling mode of operation with the reactor vessel head detensioned, the isolation condenser is unavailable and DCD Tier 2, Revision 1, Section 5.4.8 describes that decay heat is removed through the reactor water cleanup system in the shutdown cooling mode of operation. Consistent with the guidelines of Regulatory Guide 1.59, Revision 2, August 1977, with July 30, 1980 Errata correction, describe how the capability to maintain safe shutdown is assured during flooding conditions when the plant is initially in the refueling mode of operation with the reactor vessel head fully detensioned or removed.
3.4-7	Jones S	Describe how long term makeup to the isolation condenser and spent fuel pool will be provided with flood protected equipment considering that the flood may preclude access to the site for more than 72 hours.	DCD Tier 2, Revision 1, Section 9.1.3 describes that the isolation condenser pools require makeup after 72 hours for continued decay heat removal. Since some flooding conditions have restricted access to sites for more than 72 hours, describe how long term makeup to the isolation condenser and spent fuel pool will be provided with flood protected equipment considering that the flood may preclude access to the site for more than 72 hours.
3.4-8	Jones S	Identify the systems and components that are essential for safe shutdown from each potential mode of operation.	DCD Tier 2, Revision 1, Section 3.4 describes flood protection for certain systems and components, such as the control rod drive hydraulic control units and the Distributed Control and Information System. However, the complete scope of systems and components that must be protected from internal flooding is not identified. Identify the systems and components that are essential for safe shutdown from each potential mode of operation for flooding events.

Section 3.6, Protection Against Dynamic Effects Associated With The Postulated Rupture of Piping

RAI Number	Reviewer	Question Summary	Full Text
3.6-20	Jones S	Clarify the end state that safety systems are intended to achieve following a high energy line break and the basis for acceptability of that end state.	DCD Tier 2, Revision 1, Section 3.6.1.1 states that the objective of protection against pipe break event dynamic effects is to assure that the reactor can be shut down safely and maintained in a safe cold shutdown condition. DCD Tier 2, Revision 1, Tables 3.6-1 and 3.6-2 are described as identifying the systems necessary to achieve those objectives. However, systems necessary to reach cold shutdown in a timely manner are not included in the tables. Clarify the end state that safety systems are intended to achieve following a high energy line break and the basis for acceptability of that end state.
3.6-21	Jones S	Define the essential systems to achieve safe shutdown and the essential function the system performs.	DCD Tier 2, Revision 1, Table 3.6-2 lists safety-related systems, components, and equipment for mitigation of postulated pipe failures outside containment. However, the list appears to be incomplete in that the control rod drive hydraulic system and control units were not included, yet they would likely be used to perform the reactivity control and reactor coolant inventory makeup essential functions. To ensure the lists in DCD Tier 2, Revision 1, Tables 3.6-1 and 3.6-2 are complete, define the essential systems to achieve safe shutdown and the essential function each system is intended to perform for postulated pipe breaks inside and outside of containment, respectively.

Section 3.8, Seismic Category I Structures

RAI Number	Reviewer	Question Summary	Full Text
3.8-108	Ashar H	Correct editorial errors by replacing IWE with IWL.	Reference is made to ASME Section XI, IWE-2410 and Table IWE-2500-1 in DCD, Tier 2, Revision 1, Section 3.8.1.7.3.4. Reference is made to ASME Section XI, IWE-2300 in DCD, Tier 2, Revision 1, Section 3.8.1.7.3.6. These appear to be editorial errors. Please replace IWE with IWL or explain why IWE is correct.
3.8-109	Ashar H	Revise the DCD to describe modular construction, a special construction technique.	Special construction techniques, including modular construction, are reviewed by the staff as described in Standard Review Plan (SRP) Sections 3.8.1 thru 3.8.5, Draft Revision 2, April 1996. Revise the DCD to describe modular construction to be used in constructing the ESBWR.

Section 3.11, Environmental Qualification of Mechanical and Electrical Equipment

RAI Number	Reviewer	Question Summary	Full Text
3.11-1	Scarbrough T	Section 3.11.2.2 - Description of Harsh Environment Qualification for Mechanical Equipment	DCD, Tier 2, Revision 1, Section 3.11.2.2 states that safety-related mechanical equipment located in a harsh environment are qualified by analysis of materials data, which are generally based on test and operating experience. Provide examples of the environmental qualification methods and standards applied to mechanical equipment (including pumps, power-operated valves, safety-related valves, and check valves) located in harsh environments. Identify the nonmetallic subcomponents, applicable environmental conditions, required operating life, capabilities of the nonmetallic subcomponents, and basis for the environmental qualification of mechanical equipment located in a harsh environment. Discuss the surveillance and maintenance program to be developed for mechanical equipment located in a harsh environment to ensure functionality during their design life.
3.11-2	Scarbrough T	Section 3.11.2.2 - Description of Mild Environment Qualification for Mechanical Equipment	DCD, Tier 2, Revision 1, Section 3.11.2.2 states that vendors of equipment located in a mild environment are required to submit a certificate of compliance certifying that the equipment has been qualified to assure the required safety-related function in the applicable environment. The DCD also states that a surveillance and maintenance program shall be developed to ensure the operability during its design life. Provide examples of the environmental qualification methods and standards for mechanical equipment (including pumps, power-operated valves, safety-related valves, and check valves) located in mild environments, and the surveillance and maintenance program to be developed to ensure functionality during their design life.

3.11-3	Scarbrough T	Section 3.11.5 - Environmental Qualification Document preparation by the COL holder	DCD, Tier 2, Revision 1, Section 3.11.5 states that the COL holders shall prepare the Environmental Qualification Document (EQD) summarizing the qualification results for all equipment identified in DCD Section 3.11.1. Provide the basis for environmental qualification of safety-related mechanical equipment being addressed by the COL holder, rather than the COL applicant.
3.11-4	Scarbrough T	Section 3.11.5 - Qualification Records	DCD, Tier 2, Revision 1, Section 3.11.5 states that the COL holders shall record and maintain the results of the qualification tests in an auditable file in accordance with the requirements of 10 CFR 50.49(j). In that 10 CFR 50.49(j) applies to electrical equipment, discuss the provisions for recording and maintaining the results of environmental qualification of safety-related mechanical equipment.
3.11-5	Scarbrough T	Section 3.11 - Performance degradation for adverse environments	DCD, Tier 2, Revision 1, Section 3.11 discusses the environmental qualification of safety-related mechanical equipment. Discuss the evaluation of the degradation of the performance of ESBWR equipment under adverse environments (such as the reduction in electric motor output under high temperature conditions).

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