November 7, 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: ECONOMIC SIMPLIFIED BOILING WATER REACTOR CHAPTER 9 OPEN ITEMS

Dear Mr. Brown:

As you are aware, the U. S. Nuclear Regulatory Commission staff is preparing the safety evaluation report (SER) for the Economic Simplified Boiling Water Reactor (ESBWR) design certification application submitted by GE-Hitachi Nuclear Energy Americas LLC (GEH) on August 24, 2005. The staff has identified 66 open items (OIs) for SER Chapter 9, which are enclosed for your information. The staff is prepared to review your response to the OIs and have conference calls and meetings with your staff, as appropriate, to resolve these OIs to support issuance of the SER.

Please provide a response date for any late or unscheduled OIs discussed in the enclosure.

This open item letter is based on the staff's review of the ESBWR Design Control Document (DCD) Revision 3, and Request for Additional Information (RAI) responses received to date. The staff will continue its review as additional RAI responses and other deliverables are submitted. The staff will inform cognizant GEH staff of any resulting changes to the status of Chapter 9. If you have any questions, please contact Dennis Galvin at (301) 415-6256 or djg3@nrc.gov or Amy Cubbage at (301) 415-2875 or aec@nrc.gov.

Sincerely,

/RA/

Mohammed Shuaibi, Chief
ESBWR/ABWR Projects Branch 1
Division of New Reactor Licensing
Office of New Reactors

Docket No. 52-010

Enclosure:
As stated

cc: See next page

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As stated
cc: See next page
Distribution: See next page
ADAMS ACCESSION NO. ML072690546

OFFICE	PM:NGE1	PM:NGE1	LA:NGE1	BC:SRSB	BC:CIB2
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DATE	10/17/2007	10/18/07	11/06/2007	10/21/07	10/25/07
OFFICE	BC:SBCV	TL:SFPT	BC:ICE2	BC:SBPB	BC:NGE1
NAME	MSnodderly	RRadlinski	IJung	PWilson	MShuaibi
DATE	10/22/07	10/18/07	10/24/07	10/29/07	11/7/2007

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Letter to Robert E. Brown from Mohammed Shuaibi dated November 7, 2007

SUBJECT: ECONOMIC SIMPLIFIED BOILING WATER REACTOR CHAPTER 9 OPEN ITEMS

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<u>GE-Hitachi Nuclear Energy Americas LLC</u>
<u>ESBWR Preliminary Open Items</u>
<u>Chapter 9</u>
<u>Auxiliary Systems</u>

<u>RAI 9.1-3, Supplement No. 1, 05/03/07, ML071770018</u>

Response is insufficient to conclude that measures have been taken to provide adequate cooling for high density racks. Provide information such as assembly dimensions, center-to-center distance, array layouts and location within the pool to facilitate NRC review.

In addition, there is no basis for concluding that the adequate cooling will be provided since neither the size of the pool nor the required cooling capacities are known. This information should be provided in the Design Control Document (DCD) to complete the review.

Status: GEH responded on 8/17/2006, MFN-06-309, Supplement 6. GEH's response is under staff review. However, resolution of this RAI is dependent on the GEH submittal and the NRC review of licensing topical report NEDO-33373. GEH has committed to provide NEDO-33373 by November 8, 2008.

<u>RAI 9.1-8, Supplement No. 1, 06/26/07, ML072150010</u>

RAI 9.1-8, Supplement 1 (MFN-06-309, September 8, 2006), in its response to RAI 9.1-8, the applicant stated that the steam generated by the spent fuel pool (SFP) is released to the atmosphere through a relief panel in the Fuel Building. The applicant also stated that the water inventory is sufficient to ensure that the core will be covered for 72 hours, and that there are no engineered safety feature atmosphere cleanup systems in the Fuel Building.

Please provide the following information:

1. Discuss under what conditions are these relief panels expected to open.

2. If the relief panels open (under normal or accident conditions), will there be any radioactive releases to the environment? If so, how are these monitored in accordance with GDC 64, and accounted for in the design basis accident.

3. Are these relief panels safety-related? How are they tested?

4. Verify that the water inventory is sufficient to provide adequate shielding with the SFP loaded to maximum capacity. What is the expected level of water relative to the top of active fuel at 72 hours?

5. Discuss the rationale for not providing a safety-related atmospheric cleanup system.

Status: GEH has committed to a response by 11/5/2007.

<u>RAI 9.1-9, Supplement No. 2, 10/15/07, ML072690278</u>

The intent of the RAI is to clarify how sufficient coolant inventory will be maintained in the reactor building buffer pool during accident conditions, such as the loss of the non-safety related forced cooling system for 72 hours. In its response to RAI 9.1-9 S01, GEH described how the fuel and auxiliary pools cooling system (FAPCS) is designed to withstand a single failure during normal refueling conditions. This response does not address the conditions identified in the RAI. Please provide an analysis to demonstrate that the volume provided by the buffer pool is sufficient to provide cooling and shielding without makeup. If the analysis relies on additional water inventory in the reactor building, such as from the reactor well and the dryer storage pool, please provide a description of the controls relied upon to ensure this inventory is available to the buffer pool whenever there is fuel present.

Status: GEH has not yet committed to a response date.

<u>RAI 9.1-10, Supplement No. 2, 10/15/07, ML072690278</u>

In its response to RAI 9.1-10 S01 the applicant stated that the FAPCS cooling and cleanup trains are not used to satisfy GDC 44, and that GDC 44 is satisfied by passive pool boiling for 72 hours and subsequent makeup. The staff does not agree with this statement; GDC 44 and GDC 61 require an evaluation of the system under both normal operating and accident conditions. The water inventory may be credited for accident conditions; however, during normal conditions FAPCS provides forced cooling to the SFP and Reactor Building pools. Please provide a summary heat balance of the FAPCS including initial assumptions and performance requirements.

Status: GEH has not yet committed to a response date.

<u>RAI 9.1-13, Supplement No. 1, 08/16/07, ML072150479</u>

Demonstrate how the proposed total makeup flow rate of 200 gpm is bounding for accidents shortly after a refueling outage.

Status: GEH has not yet committed to a response date.

<u>RAI 9.1-14, Supplement No. 1, 08/16/07, ML072150479</u>

Pursuant to 10 CFR 52.79(b) and 52.47(a)(1)(vii) provide makeup line pipe size and analyses demonstrating pipe size is adequate for the limiting flow to each pool. Revise the DCD to include this information. Note that the response should be consistent with the response to the staff's inquiry in RAI 9.1-13 regarding the required make up capacity (i.e., the response should incorporate any requirement changes made in response to RAI 9.1-13).

Status: GEH has not yet committed to a response date.

RAI 9.1-15, Supplement No. 1, 05/03/07, ML071770018

The response is insufficient. Provide analyses demonstrating that the pool liner will retain its leak-tight integrity after impact by a dropped fuel assembly, describe an alternate method of assuring an adequate pool inventory will be maintained following a fuel handling accident, or provide redundant safety-related makeup capability.

Status GEH responded on 8/13/2007, MFN-06-309, Supplement 7.
GEH response is under staff review.

RAI 9.1-18, Supplement No. 2, 10/15/07, ML072690278

The RAI response was insufficient. The amount of water between the top of active fuel and the SFP low level alarm must be specified to ensure that the operators are able to detect a condition that may result in loss of decay heat removal or excessive radiation levels. Since the applicant stated that no operator actions are needed for 72 hours, the staff requests the applicant to demonstrate that the low level setpoint is set such that there are at least 72 hours before the top of active fuel is reached, assuming a loss of forced cooling during the maximum decay heat load conditions.

Status: GEH has not yet committed to a response date.

RAI 9.1-19, Supplement No. 2, 10/15/07, ML072690278

In its response to RAI 9.1-19 S01 the applicant provided a rationale to demonstrate that sufficient net positive suction head will be available to the FAPCS pumps when performing its low pressure injection and suppression pool cooling functions. However, the applicant did not provide an actual analysis for FAPCS. Since the applicant has not provided the performance criteria for FAPCS pumps, the staff is unable to perform an independent analysis. The NPSH required for these functions must be known in order to conclude that the pumps will be successful in performing the functions that are assumed in the PRA. Provide calculations to demonstrate adequate NPSH to the FAPCS pumps.

Status: GEH has not yet committed to a response date.

RAI 9.1-20, Supplement No. 2, 10/15/07, ML072690278

In its response to 9.1-20 S01 the applicant stated that a single train of FAPCS is sufficient to perform the suppression pool cooling functions. However, the applicant did not provide the performance requirements nor was a method provided for calculating them. The staff is unable to perform an independent analysis. Provide calculations demonstrating that a single train of FAPCS is able to perform the RTNSS functions credited in the PRA.

Status: GEH has not yet committed to a response date.

RAI 9.1-21, 08/23/06, ML062290265

DCD Tier 1, Figure 2.6.2-1 indicates that the emergency makeup header to the IC/PCCS pools is not redundant and that manual valve F426 separating the fire protection system from the makeup header is normally closed and located inside the reactor building. DCD Tier 2, Section 6.3.1.1.2 states that long-term cooling requirements call for the removal of decay heat from the drywell via the passive containment cooling system. DCD Tier 2, Section 6.2.2 describes that the passive containment cooling system removes heat beyond 72 hours with pool makeup.

SRP 6.3, Revision 2, April 1984, Criterion III.20, states that an intermediate heat transport system used to provide long-term cooling capability should be capable of sustaining a single active or passive failure without loss of function. Describe how the long-term cooling function of the primary containment cooling system is satisfied assuming an active failure of valve F420 or a passive failure of the emergency makeup header pressure boundary.

Status: *GEH responded on 9/8/2006, MFN-06-309.*
GEH response is under staff review. However, resolution of this RAI is dependent on the resolution of RAI 6.3-79. GEH responded to RAI 6.3-79 on 8/24/2007, MFN-07-377. GEH response to RAI 6.3-79 is under staff review.

RAI 9.1-28, Supplement No. 1, 08/31/07, ML072420399

It is still not clear to the staff what type of neutron absorbing panels GEH will be using in the SFP. In the RAI response, GEH stated that the sample coupons are fabricated from the same borated stainless steel (BSS) material used in construction of the interlocking panels.

1. Identify the material specification for the BSS, e.g., ASTM Standard. Identify your plans to use composite materials such as Boral or Metamic.

2. Please provide the composition and physical properties of BSS and /or the composite materials, the manufacturing process, the results of long term stability and corrosion testing, the resistance to radiation damage, and minimum poison content.

3. For the material you plan to use as your neutron absorbing panel, please provide the following for your material testing program:

   A. the size and types of coupons to be used,
   B. the technique for measuring the initial elemental boron or boron carbide content of the coupons,
   C. the frequency of coupon sampling and its justification,
   D. the tests to be performed on coupons (e.g., weight measurement, measurement of dimensions (length, width and thickness), and poison content). These tests should also address, as a minimum, any bubbling, blistering, cracking, flaking, or areal density changes of the coupons, any dose changes to the coupons; and,

E. the effects of any fluid movement and temperature fluctuations of the pool water on long term stability.

Status: GEH has not yet committed to a response date.

RAI 9.1-33, 05/30/07, ML071490166

Although fuel handling system components are not required to function following an SSE, critical components of the fuel handling system are designed to Seismic Category II requirements so that they will not fail in a way that would result in unacceptable consequences, such as fuel damage or damage to safety-related equipment. GEH stated that standard dynamic analyses using the appropriate response spectra are preformed to demonstrate compliance to the seismic design requirements. However, GEH has not provided the dynamic analyses for staff review. Provide the dynamic analyses to demonstrate how the design satisfies the requirements of general design criteria (GDC) 2 and the guidelines of RG 1.29, Rev 2, Positions C.1 and C.2.

Status: GEH has committed to a response by 9/21/2007.
No response has been submitted as of the date of this letter.

RAI 9.1-34, 05/30/07, ML071490166

With regard to the inclined fuel transfer system (IFTS), in DCD Tier 2, Revision 3, Section 9.1.4.12, GEH states that there is sufficient redundancy and diversity in equipment and controls to prevent loss of the load (carriage with fuel is released in an uncontrolled manner). There are no modes of operation that allow simultaneous opening of any set of valves that could cause draining of water from the upper pool in an uncontrolled manner.

Describe in detail how the sufficient redundancy and diversity in equipment are achieved and what are the controls designed to prevent loss of the load (carriage with fuel is released in an uncontrolled manner).

Status: GEH has committed to a response by 9/21/2007.
No response has been submitted as of the date of this letter.

RAI 9.1-35, 05/30/07, ML071490166

With regard to the IFTS, in DCD Tier 2, Revision 3, Section 9.1.4.12, GEH states that the IFTS tubes and supporting structure can withstand an SSE without failure of the basic structure or compromising the integrity of adjacent equipment and structures. Therefore, the portion of the IFTS transfer tube assembly from where it interfaces with the upper fuel pool, the portion of the tube assembly extending through the building, the drain line connection, and the lower SFP terminus equipment (tube, valve, support structure, and bellows) are designated as nonsafety-related and Seismic Category I. The remaining equipment is designated as nonsafety-related and Seismic Category NS.

It is not clear to the staff where the exact boundaries of the seismic design classifications are (nonsafety-related and Seismic Category I, nonsafety-related and Seismic Category II, or nonsafety-related and Seismic Category NS) for the components of the IFTS. Revise the Figure 9.1.2, “Inclined Fuel Transfer System,” to show the interfaces of seismic design classifications for the IFTS components.

Status: GEH has committed to a respond by 9/21/2007.
No response has been submitted as of the date of this letter.

<u>RAI 9.1-36, 05/30/07, ML071490166</u>

The new fuel inspection stand is a vertical frame mounted in a pit that supports two fuel bundles contained in a mechanically driven inspection carriage. However, the seismic design classification has not been addressed for the new fuel inspection stand. Provide a detailed discussion to demonstrate that the failure of the new fuel inspection stand during an SSE will not cause the damage of any safety-related structures, systems and components (SSCs).

Status: GEH has committed to a response by 9/21/2007.
No response has been submitted as of the date of this letter.

<u>RAI 9.1-37, 05/30/07, ML071490166</u>

In DCD Tier 2, Revision 3, Section 9.1.4.12, GEH states dryer and chimney head/separator strongback and head strongback/tensioner meet the requirements of NUREG-0612, “Control of Heavy Loads at Nuclear Power Plants” and ANSI-14.6, “Standard for Special Lifting Devices.” However, GEH has not described how the design of the chimney head/separator strongback and the head strongback/tensioner has met the above cited NUREG-0612 and ANSI-14.6. Provide discussion to demonstrate how (including the sections or subsections of) NUREG-0612 and ANSI-14.6 are applied to specific components.

Status: GEH has committed to a response by 9/21/2007.
No response has been submitted as of the date of this letter.

<u>RAI 9.1-38, 05/30/07, ML071490166</u>

In DCD Tier 2, Revision 3, Section 9.1.5.2, GEH stated that:

1. The designs conform to the relevant requirements of General Design Criteria 2, 4, and 61 of 10 CFR 50, Appendix A.

2. The lifting capacity of each crane or hoist is designed to at least the maximum actual or anticipated weight of equipment and handling devices in a given area serviced. The hoists, cranes, or other lifting devices comply with the requirements of NRC Bulletin 96-02, NUREG-0554, ANSI N14.6, ANSI B30.9, ANSI B30.10 and NUREG-0612 Subsection 5.1.1(4) or 5.1.1(5). Cranes and hoists are also designed to criteria and guidelines of

NUREG-0612 Subsection 5.1.1(7), ANSI B30.2 and CMAA-70 specifications for electrical overhead traveling cranes, including ANSI B30.11, and ANSI B30.16 as applicable.

However, GEH has not described how the design of each component in the light and overhead heavy load handling systems (including upper drywell servicing equipment, lower drywell servicing equipment and main steam tunnel servicing equipment) has met the above cited GDCs, and how industry codes and standards are applied to specific components. Describe how the design has met the above cited GDCs, and how industry codes and standards are applied to specific components.

Status: GEH has committed to a response by 9/21/2007.
No response has been submitted as of the date of this letter.

RAI 9.1-41, Supplement No. 1, 10/15/07, ML072690278

The RAI response indicates that boiling water in the spent fuel pool (SFP) may introduce some inaccuracy in water level, but any errors would be conservative. The staff is not clear as to how a decrease in density of water in the spent fuel pool, will result in a conservative water level measurement. Provide a detailed description of the instrumentation to be used, including the elevation of the instrumentation taps in the SFP relative to the top of active fuel, how it will be affected by the increase in temperature and the boiling conditions, and why this results in a conservative estimate.

Status: GEH has not yet committed to a response date.

RAI 9.1-42, Supplement No. 1, 10/15/07, ML072690278

The RAI response indicates that some portions of the fuel and auxiliary pools cooling system (FAPCS) are safety-related and some are RTNSS. The response does not clearly specify what portions and functions of the FAPCS are safety-related. Provide a schematic identifying safety-related and RTNSS portions of the system. Include this figure in DCD Tier 2, Section 9.1. Also, for the safety-related portions identify the safety function.

Status: GEH has not yet committed to a response date.

RAI 9.1-43, 10/15/07, ML072690278

Compliance with the requirements of GDC 61 and GDC 62 for the fuel handling system depends on adherence to the guidance of ANSI/ANS 57.1, 1992. However, Section 9.1.4 does not contain a statement to indicate that the fuel handling system conforms to the industry standards of ANS 57.1 and thereby meets the requirements of GDC 61 and GDC 62. Revise the DCD to address conformance with ANS 57.1 and compliance with GDC 61 and GDC 62 for the fuel handling system.

Status: GEH has not yet committed to a response date.

RAI 9.1-44, 10/15/07, ML072690278

DCD Tier 2 Revision 4, Section 9.1.3.2 states,

“During a loss of the FAPCS cooling trains, the cooling to the Spent Fuel Pool and IC/PCC pools is accomplished by allowing the water to heat and boil. Sufficient pool capacity exists for pool boiling to continue for at least 72 hours post-accident, at which point post accident makeup water can be provided through safety-related connections to the Fire Protection System (FPS) or another onsite or offsite water source.”

However, the DCD does not identify the inventory of the water in the spent fuel pool or the amount of inventory that might be lost in 72 hours. Provide an analysis to demonstrate that the volume provided by the spent fuel pool is sufficient to provide cooling and shielding without makeup for 72 hours.

Status: GEH has not yet committed to a response date.

RAI 9.1-45, 11/02/07, ML073050003

The design bases provided in DCD Tier 2, Section 9.1.2, “Spent Fuel Storage,” does not expressly address compliance with GDC 2, 4, 61, 62, and 63. Revise the DCD to address how the design bases comply with GDC 2, 4, 61, 62, and 63 and conformance to associated regulatory guides and industry standards for spent fuel storage in accordance with the SRP.

Status: GEH has not yet committed to a response date.

RAI 9.2-6, Supplement No. 1, 03/20/07, ML072150026

The RAI requested the applicant to include system drawings (P&IDs) for the plant service water system (PSWS) and reactor component cooling water system (RCCWS) in the DCD showing system function, major equipment, components, piping classes, instrumentation, and interface systems. In its response dated, December 12, 2006 (MFN-06-417), GEH did not provide P&IDs for the PSWS and RCCWS in the DCD. The level of detail in ESBWR DCD Tier 2 Figures 9.2-1 and 9.2-2 are not consistent with that in the DCDs of AP1000 and ABWR. Further the PSWS and RCCWS were recently scoped into regulatory treatment of non-safety systems (RTNSS). Due to the importance of these systems, drawings of equivalent detail to drawing No.105E3890 (RCCWS) and No.105E3893 (PSW) in GEH letter MFN 05-164 dated December 12, 2005 should be added to the DCD to supplement or replace existing figures 9.2-1 and 9.2-2.

Status: GEH responded on 4/25/2007, MFN-06-417, Supplement 1.
GEH response is under staff review.

RAI 9.2-8, Supplement No. 2, 06/26/07, ML072150010

In RAI 9.21-8 S01, the NRC staff indicated that the radiation monitoring and sampling provisions in the DCD are not consistent with SRP Section 11.5 with respect to the continuous radiation monitoring/sampling for the service water system.

GEH response states the DCD requires continuous effluent monitoring, but it can be either directly on the effluent of PSWS or another downstream process effluent. It discussed the reasons that the radioactive leakage into PSWS is highly unlikely. Further, it states that the PSWS design includes provisions for obtaining a grab sample in the event that there is a RCCWS radiation monitor alarm; and that the COL holder will also provide provisions for monitoring, sampling, or analyzing the cooling tower blowdown to ensure monitoring prior to release to the environment. The markups of COL applicant item in Section 9.2.4 and COL holder item in Section 11.5.7.3 of the DCD Tier 2 are provided.

The staff reviewed the response including the DCD markups for Section 9.2.4 and 11.5.7.3, but still cannot confirm in the revised DCD on the statement in GEH response that it requires continuous radiation monitoring either directly on the effluent of PSWS or another downstream process effluent. Clarify where in the DCD says that it requires continuous radiation monitoring.

Status: GEH responded on 10/29/2007, MFN-06-417, Supplement 4.
GEH response is under staff review.

RAI 9.2-11, Supplement No. 2, 10/15/07, ML072690278

In RAI 9.2-11, the staff asked the applicant to discuss the potential for water hammer as well as operating and maintenance procedures for avoidance of water hammer in the PSWS and RCCWS. In its response, the applicant listed provisions to mitigate water hammer and included in DCD tier 2 Revision 3. The staff finds the above responses acceptable. However, the applicant has not identified a COL holder Item in the DCD to address the procedures discussed in the DCD.

The staff looked into DCD Section 13.5.3, a COL information item for plant operating procedures; it refers to Section 13.5.3.4 of the DCD, which refers to the procedures as delineated in ANSI/ANS-3.2. RG 1.33 endorses ANS-3.2, and its Appendix A listed typical safety-related activities that should be covered by written procedures. Service water system and component cooling water system are listed in the Appendix A to RG 1.33.

However, the PSWS and RCCWS in ESBWR are not safety-related, so the above generic COL information item may not cover the nonsafety-related systems such as PSWS and RCCWS in the ESBWR. If GEH decides to refer the generic COL information in DCD Section 13.5.3 as the resolution to RAI 9.2-11, some clarification or modification of DCD Section 13.5.3.4 would be needed to ensure the general plant operating procedures will include the PSWS and RCCWS.

Status: GEH has not yet committed to a response date.

RAI 9.2-13, Supplement No. 2, 06/26/07, ML072150010

In the RAI response (page 4 of 6), GEH intended to restate RAI 9.2-13 and its initial response, but misused the content from RAI 9.2-9 instead of RAI 9.2-13.

Clarify the third method. Is it the grad sampling method following a high level alarm from the surge tank?

Status: GEH responded on 10/29/2007, MFN-06-417, Supplement 4.
GEH response is under staff review.

RAI 9.2-14, 05/29/07, ML071450138

According to the description of the hot water system (HWS) in Section 9.2.9.2 and Table 3.2-1 of the DCD Tier 2, Revision 3, the HWS is a non-safety system going through all over the plant without being seismically qualified. "All over the plant" includes the containment. Following a seismic event, a failure of the system components and piping could be assumed because the system is non-seismic. Clarify the following aspects of the system.

1. Whether the system piping penetrates the containment and meets the requirements of the containment penetration and isolation.

2. Whether the portions of the system inside the containment have proper seismic design.

3. How the system meets GDC 2 as related to RG 1.29, Revision 3, Positions C.1 and C.2.

Status: GEH responded on 10/17/2007, MFN-07-530.
GEH response is under staff review.

RAI 9.2-15, 10/15/07, ML072690278

The Chilled Water System (CWS) is identified as RTNSS systems in the response to RAI 14.3.69. Electrical power is assumed to be unavailable for 72 hours and then returned to service for RTNSS systems. Restarting the CWS presents an opportunity for dynamic effects associated with water hammer. Describe how water hammer has been addressed in the design of the CWS so that the CWS can meet its post 72 hour cooling RTNSS cooling function.

Status: GEH has not yet committed to a response date.

RAI 9.3-6, 06/22/2006, ML061720019

The boron injection path to the core is not described in the DCD. Discuss flow pattern (injection geometry) and movement of injected boron solution through the bypass region. Provide a diagram showing spargers in the core bypass region and show the header, feeder pipes, nozzles, discharge ports and the jets. Describe, in detail, positions of the injection points relative to the active length of the core.

Status: *GEH responded on 7/19/2006, MFN-06-216.*
GEH response is under staff review. However, resolution of this RAI is dependent on the approval of TRAC-G for ESBWR anticipated transients without scram (ATWS) events.

RAI 9.3-9, Supplement No. 2, 06/26/2007, ML072150010

GEH's supplemental response to RAI 9.3-9 is unacceptable. The staff requested that the applicant "update the DCD to discuss the capability to detect, collect, and control system leakage." The staff also requested that the applicant "update the DCD to discuss the capability to isolate portions of the system in case of excessive leakage or malfunctions."

Upon review of the referenced section of the DCD, the staff has determined that the depth of discussion required to support resolution of this RAI does not appear in the DCD; therefore, the DCD lacks the adequate technical basis for the staff to reach a conclusion with regards to leak isolation/suppression/detection.

Update the DCD to discuss the SLCS monitoring in greater detail. Include any alarms associated with SLCS monitoring to support the conclusion that "existence of either of these conditions would be investigated and corrected by the operator." Also discuss the Equipment and Floor Drain System (EFDS) or provide a cross-reference to the appropriate DCD section in Section 9.3.5.

Status: *GEH has committed to a response by 10/6/2007.*
No response has been submitted as of the date of this letter.

RAI 9.3-11, 06/22/2006, ML061720019

DCD Tier 2, Section 9.3.5.3 (Page 9.3-11) states, "The extremely rapid initial rate of isotopically enriched born injection ensures that hot shutdown boron concentration are achieved within several minutes of SLCS initiation based on initial reactor water inventory."

Specify the time is takes to reach hot shutdown in the most limiting ATWS scenario.

Status: *GEH responded on 9/8/2006, MFN-06-282.*
GEH response is under staff review. However, resolution of this RAI is dependent on the approval of TRAC-G for ESBWR anticipated transients without scram (ATWS) events.

RAI 9.3-12, 06/22/2006, ML061720019

DCD Tier 2, Section 9.3.5.3 (Page 9.3-12) states," The initial accumulator tank inventory of compressed nitrogen is adequate to ensure full injection of the solution inventory at a reactor pressure of 1000 psia."

The calculated reactor pressure during ATWS is 1426.1 psig as shown in DCD Tier 2, Table 15.5-4b, and in DCD Tier 1, Table 2.2.4-1 reactor pressure is shown as 1250 psia.

Does the reactor pressure refer to the steam dome pressure? Which reactor pressure is correct?

Describe the capability of the accumulators to provide sufficient driving head to ensure boron injection for a reactor pressure greater than 1000 psia and explain how the capability is provided.

Status: *GEH responded on 7/19/2006, MFN-06-216.*
GEH response is under staff review. However, resolution of this RAI is dependent on the approval of TRAC-G for ESBWR anticipated transients without scram (ATWS) events.

RAI 9.3-15, Supplement No. 1, 03/11/07, ML072150059

a. Please add an ITAAC to DCD Tier 1, Table 2.2.4-2, for the approximate initial injection flow rate at the above reactor pressure. Develop a test or analysis that will confirm this parameter with an actual value that can be an acceptance criterion consistent with the assumptions in the safety analysis and add it to the ITAAC.

b. The "approximate average injection velocities" that appear in Table 2.2.4-1 are currently referenced as acceptance criteria by the ITAAC. However, an "approximate average" is not an actual value that can be an acceptance criterion consistent with the assumptions in the safety analysis. Revise the quantities in Table 2.2.4-1 and/or the corresponding reference that appears in the ITAAC table so that the injection velocities can be verified with a specific acceptance criterion.

Status: *GEH has not yet committed to a response date.*

RAI 9.3-25, 06/22/2006, ML061720019

The staff identified several phenomena that could challenge the capability of the core's natural circulation patterns to disperse boron uniformly. First, the SLCS injects into the core bypass region within the core shroud. It is expected that the presence of fuel channels and, in the instance of the middle of cycle, some control rods, will inhibit planar flow. Second, this core has an unconventionally large diameter, which not only poses another challenge to passive means of boron mixing, but means that the core is less neutronically coupled than conventional BWRs. Third, restrictions imposed by two-phase flow will inhibit core upflow, and thus further limit boron transport in the core. Additional challenges to axial mixing include the presence of chimneys on top of the core, which would prevent the boron from traveling upward through the bypass and downward into the core via density-driven flow mechanisms, and flow reversal in the event of a main steamline isolation valve (MSIV) closure.

Provide additional information about local boron concentration at various regions within the core and bypass during the evolution of the ATWS/MSIV closure scenario. Discuss the technical bases underlying the 25% (non-uniformity) and 15% (RWCU/SDC) numerical conservatisms used to calculate the boron concentration requirements.

Describe the flow path for the borated solution that develops during the ATWS/MSIV closure scenario and its impact on the distribution of boron in the core; additionally, describe how the resulting distribution affects shutdown time.

Status: GEH responded on 9/8/2006, MFN-06-282.
GEH response is under staff review. However, resolution of this RAI is dependent on the approval of TRAC-G for ESBWR anticipated transients without scram (ATWS) events.

<u>RAI 9.3-40, 05/30/07, ML071490166</u>

Provide discussion regarding:

a. whether or not the auxiliary boiler system (ABS) would interface directly with any nuclear process systems,

b. where the auxiliary boiler is located,

c. whether the ABS lines would pass through areas where safety-related equipment is located.

Address that failure of the ABS system as a result of a pipe break or malfunction of the system would not adversely affect safety-related systems or components.

Status: GEH responded on 10/17/2007, MFN-07-527.
GEH response is under staff review.

<u>RAI 9.4-5 Supplement No. 1, 10/15/07, ML072690278</u>

DCD Rev 3 Table 9.4-17, consistent with the response to RAI 9.4-5, provides a generic list of codes and standards that may or may not be used in the design of HVAC systems. It is referenced in each section of 9.4 as the codes and standards by which the HVAC system are designed. This list does not clarify which components are designed to which codes and standards. Please identify, using a codes and standards table for each section, which codes are specific to components or structures in each of the systems and eliminate codes that are not applicable to that system.

Status: GEH has not yet committed to a response date.

<u>RAI 9.4-25 Supplement No. 1, 10/15/07, ML072690278</u>

The RAI response states that ESBWR compliance with NUREG-0696 for the technical support center (TSC) design will be described in DCD Tier 2 Subsection 9.4.7, Revision 3. However, Revision 3 of the DCD is not clear on the extent that the TSC HVAC system will comply with the recommendations of NUREG-0696. Section 9.4.7 states in part, "NUREG-0696 requires the TSC to supply the same level of radiological protection as that supplied to the MCR under GDC 19; however, the TSC is not specifically committed to providing a safety-related environment in full compliance with GDC 19 that defines the Control Room habitability acceptance criteria." Of particular concern are the habitability requirements identified in NUREG-0696, Section 2.6, one of which states that the TSC shall have the same radiological habitability (less than 5 rem TEDE from GDC 19) as the control room under accident conditions. The operation of the TSC ventilation system (TSCVS) significantly affects the TSC meeting these requirements. Please clarify in DCD Section 9.4.7 whether the TSCVS system will comply with the recommendations of NUREG-0696 without exception. If GEH will take exception to NUREG-0696 for the TSC, please include justification for the exception.

Status: GEH has not yet committed to a response date.

<u>RAI 9.4-29, 07/23/07, ML071830286</u>

In DCD, Tier 2, Revision 3, Section 9.4.1, the Emergency Filter Unit (EFU) flow rate was established at 424 cfm. This was stated to be the minimum outdoor supply air required to maintain breathable air quality in the control room based on American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Standard 62.

Please provide the assumptions used in this determination. Show how the control room compares to the type of facility selected from the ASHRAE 62 tables in terms of use, equipment, and air circulation features. Are there monitors that would warn operators of oxygen or carbon dioxide levels? Is there a capability to increase filtered outdoor air flow if more fresh air is needed? Considering the control room as an isolated facility with very minimal air circulation, what is the maximum carbon dioxide level and how does it compare with the toxic limits for carbon dioxide in the 72 hours after an accident?

Status: GEH has committed to a response by 10/1/2007.
No response has been submitted as of the date of this letter.

<u>RAI 9.4-30, 07/23/07, ML071830286</u>

In DCD, Tier 2, Revision 3, Section 9.4.1, Figure 9.4-1 the EFU discharges its flow into the plenum above the false ceiling in the control room. For the first two hours an air handling unit (AHU) operates off the non-safety battery power to facilitate removal of non-safety heat loads. The inference is that after two hours the recirculation AHU would be shut down. As such, there would be no recirculation from the plenum above the false ceiling to the plenum below the false floor for distribution through the control room. Breathable air, especially if it is warm air from the outside, may not dissipate to the operator breathable zone and the operator could experience reduced oxygen. Please discuss the features which provide assurance that the air in the operator breathable zone would be adequately refreshed in the first 72 hours.

Status: GEH has committed to a response by 10/1/2007.
No response has been submitted as of the date of this letter.

<u>RAI 9.4-31, 07/23/07, ML071830286</u>

a. In DCD, Tier 2, Revision 3, Section 9.4.1 the applicant stated that the emergency filter unit (EFU) was operated from the safety-related battery supply for a 72 hour duration. In Section 19A.3.1.3, it is stated that “for longer term operation, the system can be powered by a small, portable AC power generator that is kept on the plant site.”

   Is this portable generator dedicated to the EFU system as a power source? Please clearly state how many portable generators are provided for this purpose. If there is only one, what actions would be needed to restore power to the EFU. What are the testing requirements and reliability goals for the portable generator system under the RTNSS program? Are there conveniently located isolation busses provided where the portable generator can be hooked up to provide power to the EFU? Does this portable generator also power the chiller and recirculation AHU that is necessary to restore temperature control in the control room habitability area (CRHA)?

b. In DCD, Tier 2 Revision 3, Section 19A.8.4.12, it is stated that the portable AC generator that recharges the batteries that power the Control Room Habitability Area (CRHA) ventilation is not risk significant. The EFU is operated from one of the four safety-related battery trains.

Would this portable AC generator be hooked up to recharge one or more of these trains after 72 hours? Explain how GDC19 is met if the loss of the portable AC generator results in the loss of the EFU.

Status: GEH has committed to a response by 10/1/2007.
No response has been submitted as of the date of this letter.

<u>RAI 9.4-32, 07/23/07, ML071830286</u>

DCD, Tier 2, Revision 3, Section 9.4.1 states that the CRHAVS maintains a habitable control room under accident conditions by providing adequate radiation protection and breathing air. When power is available, the Air Handling Units (AHU) maintains the space temperature. Upon loss of power the remaining non safety-related heat loads are dissipated for 2 hours using battery power, and the remaining safety related heat loads are passively dissipated by the walls, floor ceiling, and interior walls.

a. Please provide additional information justifying the use of a non-safety power source to provide cooling to non-safety heat loads in the first two hours of accident mitigation. Please include in the information the source and magnitude of these heat loads and the impact on control room temperatures and accident mitigation if cooling is not available and/or these non-safety heat loads are isolated.

b. Please identify any operator actions that may be required to isolate these heat loads during the first two hours of an accident.

Status: GEH has committed to a response by 10/1/2007.
No response has been submitted as of the date of this letter.

<u>RAI 9.4-33, 07/23/07, ML071830286</u>

In DCD, Tier 2, Revision 3, Section 9.4.1 it is stated that after the first two hours up to 72 hours, the temperature is controlled by the absorption of heat by the control room habitability area (CRHA) heat sink which is essentially the building walls, floors, ceilings and other structural components. The staff understands that a recirculation AHU would not be operating and that movement of air in the control room would be by natural convection with a small contribution of the EFU outside air flow being delivered to the space above the false ceiling.

Provide additional information on how the temperature in the control room changes with time during the 72-hour period following accident initiation. The information should be based on a detailed thermal heat transfer study that considers the temperature of outside air entering the control room, the heat loads in the control room, the rate of heat transfer from the heat producing equipment to control room air, the rate of heat transfer from the control room air to building structures and components that make up the heat sink, the impact of other barriers to heat transfer such as carpets, vinyl layers, false ceilings and floors, and the impact of heat sources on exterior CRHA surfaces, outside air conditions and other environmental factors on the building heat sink.

The staff is concerned that although there is some potential to remove the heat through the heat sink, the rate of removal would be much slower than the heat released to the room and the temperatures might exceed limits for personnel and equipment operation.

Status: GEH has committed to a response by 10/1/2007.
No response has been submitted as of the date of this letter.

<u>RAI 9.4-34, 07/23/07, ML071830286</u>

In DCD, Tier 2, Revision 3,Section 9.4.1, it is stated that the temperature rise in the control room would be limited to 15 degrees Fahrenheit.

Is the temperature rise based on the highest temperature that could exist in the room at the time of the accident? Although room air temperature is important, the temperature of the air inside electrical cabinets is also important because it affects the proper functioning and potential failure of components important to safety. Is the air flow through electrical cabinets reduced during the 72-hour post accident period? Are temperatures inside the cabinets higher since the room air used to cool the cabinets is higher? Is there any potential for component design temperatures to be exceeded with adverse effects on component performance or failure? Is there any adverse impact on control room temperatures or component operating temperatures if the winter design temperatures exist at the time of the accident?

Status: GEH has committed to a response by 10/1/2007.
No response has been submitted as of the date of this letter.

RAI 9.4-36, 07/23/07, ML071830286

The staff noted that in DCD, Tier 2, Revision 3, Section 5.5.13.c that the laboratory test of the charcoal absorber shows a penetration value of less than 1 percent. In Section 9.4.1, the credit given the carbon adsorption filter in the emergency filter unit (EFU) is 99 percent credited efficiency (equivalent to 1 percent penetration). Regulatory Guide (RG) 1.52 requires a safety factor of two (2) for the laboratory test criteria with respect to the efficiency credited for filter operation. This would lead to a laboratory test criteria of less than 0.5 percent penetration.

Explain the basis for the laboratory test criteria used to support the 99 percent credited efficiency and provide the thickness of the charcoal bed in the DCD.

Status: GEH has committed to a response by 10/1/2007.
No response has been submitted as of the date of this letter.

RAI 9.4-37, 07/23/07, ML071830286

In DCD, Tier 2, Revision 3, Section 9.4.1, it was stated in the control room habitability HVAC system (CRHAVS) description that "The portions of the CRHAVS which penetrate the control room habitability area (CRHA) envelope are non-safety-related and designed as Seismic Category I to provide isolation of the CRHA envelope from the outside and surrounding areas in the event of a design basis accident (DBA)."

Please clarify if the items should be classified as safety-related since they provide isolation of the CRHA envelope from the outside and surrounding areas in the event of a DBA and make the appropriate change to the DCD.

Status: GEH has committed to a response by 10/1/2007.
No response has been submitted as of the date of this letter.

RAI 9.4-38, 07/23/07, ML071830286

Spent fuel pool cooling relies on pool boiling as an emergency cooling method. Is there any impact on the fuel building ventilation system as a result of pool boiling? Would releases during pool boiling mandate routing the fuel building ventilation system to the Reactor Building HVAC Purge Exhaust Filter Unit for clean up?

Status: GEH has committed to a response by 10/1/2007.
No response has been submitted as of the date of this letter.

RAI 9.4-39, 07/23/07, ML071830286

DCD Section 19A.8.4.10, Tier 2, states that component cooling will be performed by the HVAC systems in the Reactor Building, Electrical Building, Fuel Building, Control Building, and parts of the Turbine Building.

a. Please identify which components in the Reactor Building HVAC System (RBVS) are RTNSS qualified. Please discuss how the RBVS or its sub-system would be used in the post 72-hour period and identify areas of the Reactor Building or equipment which require ventilation or cooling. Is there any impact on the control of the release of radioactivity by using the RBVS in the post 72-hour period that could be caused by opening building isolation dampers, discharging to the stack, or discharging to the Contaminated Air Ventilation System (CONAVS).

b. Please identify which components in the Electrical Building HVAC System (EBVS) are RTNSS qualified. Please discuss how the EBVS or its sub-system would be used in the post 72-hour period and identify areas of the Electrical Building or equipment which require ventilation or cooling.

c. Please identify which components in the Fuel Building HVAC System (FBVS) are RTNSS qualified. Please discuss how the FBVS or its sub-system would be used in the post 72-hour period and identify areas of the Fuel Building or equipment which require ventilation or cooling. Is there any impact on the control of the release of radioactivity by using the FBVS in the post 72-hour period that could be caused by opening building isolation dampers, discharging to the stack, or discharging to the Contaminated Air Ventilation System (CONAVS).

d. Please identify which components in the Control Building HVAC System (CBVS) are RTNSS qualified. Please discuss how the CBVS or its sub-system would be used in the post 72-hour period and identify areas of the Control Building or equipment which require ventilation or cooling. Is there any impact on the control of the release of radioactivity by using the CBVS in the post 72-hour period that could be caused by opening building isolation dampers, discharging to the stack, or discharging to the Contaminated Air Ventilation System (CONAVS).

e. Please identify which components in the Turbine Building HVAC System (TBVS) are RTNSS qualified. Please discuss how the TBVS or its sub-system would be used in the post 72-hour period and identify areas of the Turbine Building or equipment which require ventilation or cooling.

Status: GEH has committed to a response by 10/1/2007.
No response has been submitted as of the date of this letter.

RAI 9.4-40, 07/23/07, ML071830286

DCD, Tier 2, Revision 3, Figure 9.4-8 shows two (2) filter units for the Turbine Building Exhaust (TBE) system whereas Table 9.4-15 states there are five (5) filter units.
Please show all five filter units on the figure or show one filter unit with a note saying that it is typical of 5 units. Please verify that the nomenclature between the figure, table, and text are consistent.

Status: GEH has committed to a response by 10/1/2007.
No response has been submitted as of the date of this letter.

RAI 9.4-41, 07/23/07, ML071830286

DCD Tier 2, Revision 3, Table 9.4-10 states there are four (4) safety-related isolation dampers for the Reactor Building Refueling and Pool Area HVAC Subsystem (REPAVS). Figure 9.4-11 (a simplified diagram) only shows two (2) building isolation dampers.

Please show all four of the safety-related dampers on the figure and mark them as safety-related.

Status: GEH has committed to a response by 10/1/2007.
No response has been submitted as of the date of this letter.

RAI 9.4-42, 07/23/07, ML071830286

DCD, Tier 2, Revision 3, Table 9.4-9 does not list safety-related isolation dampers. Please add this item to the table with appropriate information. Figure 9.4-9 has a variety of dampers. Please identify the isolation dampers that are safety-related and coordinate with Table 9.4-9.

Status: GEH has committed to a response by 10/1/2007.
No response has been submitted as of the date of this letter.

RAI 9.4-43, 07/23/07, ML071830286

DCD, Tier 2, Revision 3, Table 9.4-9 shows two battery room exhaust fans. How many battery rooms are exhausted by these fans? Are there both safety-related and non-safety-related battery rooms exhausted by these fans. Are there monitors in each of the battery rooms that indicate that the rooms are being properly exhausted and that there is no build up of hydrogen? Is the operation of these fans required to keep the battery rooms cool during periods of battery discharge? Are there recirculation fans in each of the rooms to prevent thermal gradients?

Status: GEH has committed to a response by 10/1/2007.
No response has been submitted as of the date of this letter.

RAI 9.4-44, 07/23/07, ML071830286

DCD, Tier 2, Revision 3, Table 9.4-11 states there are four (4) safety-related isolation dampers for the Reactor Building Contaminated Area HVAC Subsystem (CONAVS). Figure 9.4-10 (a simplified diagram) only shows two (2) building isolation dampers. Please show all four of the safety-related dampers on the figure and mark them as safety-related.

Status: GEH has committed to a response by 10/1/2007.
No response has been submitted as of the date of this letter.

RAI 9.4-45, 07/23/07, ML071830286

DCD, Tier 2, Revision 3, Table 9.4-11 lists a Main Steam Tunnel AHU, Recirculation AHU and a Refueling Machine Control Room Recirculation AHU as part of the CONAVS equipment.

a. Please identify these items on the Figure 9.4-10 with respect to other CONAVS equipment.

b. The Main Steam Tunnel AHU's are located in the Turbine Building. Are there safety-related dampers for isolation at the Reactor Building interface? Include them on the appropriate diagrams and equipment list.

The CONAVS AHU's are located in the Fuel Handling Building. Are there safety-related dampers at the building interface? Include them on the appropriate diagrams and equipment list.

Status: GEH has committed to a response by 10/1/2007.
No response has been submitted as of the date of this letter.

RAI 9.4-46, 07/23/07, ML071830286

DCD, Tier 2, Revision 3, Figure 9.4-9 indicates that the smoke purge is exhausted directly to the environment.

Include the building isolation dampers and note if they are safety-related in Figure 8.4-9. Since the smoke exhaust could be from contaminated areas, is there any provision to monitor for radioactive release?

Status: GEH has committed to a response by 10/1/2007.
No response has been submitted as of the date of this letter.

RAI 9.4-47, 07/23/07, ML071830286

DCD, Tier 2, Revision 3, Figure 9.4-9 shows that the reactor building clean air sub system exhaust air directly outdoors.

How is the release monitored for radiation? What assurance is there that this release is clean and does not have to be monitored? Are there barriers that separate the clean area from the contaminated areas of the reactor building other than air pressure differential?

Status: GEH has committed to a response by 10/1/2007.
No response has been submitted as of the date of this letter.

RAI 9.4-48, 07/23/07, ML071830286

DCD, Tier 2, Revision 3, Section 9.4.7.1 states that the Electrical Building Electric and Electronic Rooms (EER) sub system provides fresh filtered air.

Identify the outside air intake and flow rate on Figure 9.4-12 for the EER or the Electrical Building Technical Support Center HVAC Subsystem (TSCVS) systems and discuss its adequacy in the DCD Tier 2 text. Has the potential effect of hot air being introduced from the outside been taken into consideration with the sizing of cooling coil capacity? Provide a table that shows the major components of the electrical building HVAC System (EBVS) including sub systems and basic design features including flow rates.

Status: GEH has committed to a response by 10/1/2007.
No response has been submitted as of the date of this letter.

RAI 9.4-49, 07/23/07, ML071830286

In DCD, Revision 3, Tier 2, Section 9.4.1 and as shown on Figure 9.4.1, the normal outdoor air supply for the control room habitability area HVAC system (CRHAVS) is 424 cfm. With the leak tight structure, the CR is essentially a confined entry vessel and is significantly different from the structures evaluated in ASHRAE 62. The CR operates at a positive pressure and depends on cracks, crevices, and door seals leakage to remove most of the surplus air that develops as a result of the normal outside air supply. The staff is concerned that the air which leaves the ESBWR control room might not carry with it the contaminants, odors, fumes, etc., that would be carried out by a direct exhaust equivalent to the outside air being added.

Provide additional information on the applicability of the ASHRAE Standard 62 on a tightly closed facility such as the ESBWR control room and determine if there are long term indoor air quality effects on habitability that need to be addressed.

Status: GEH has committed to a response by 10/1/2007.
No response has been submitted as of the date of this letter.

RAI 9.4-50, 07/23/07, ML071830286

The AHU's listed in DCD, Tier 2, Revision 3, Table 9.4.2 should be labeled Recirculation AHU's to avoid confusion and the terminology should be consistent in the text, tables and figures of the DCD.

Status: GEH has committed to a response by 10/1/2007.
No response has been submitted as of the date of this letter.

RAI 9.4-51, 10/15/07, ML072690278

In DCD, Tier 2, Section 9.4.2, the applicant states the safety-related Fuel Building boundary isolation dampers automatically close in the event of a fuel handling accident or other radiological accident. Identify whether the fuel handling building is isolated during the movement of irradiated fuel or can it be open for maintenance or other refueling activities such that closure of these valves would be ineffective at containing radioactive release? If so clarify the purpose of the isolation dampers.

Status: GEH has not yet committed to a response date.

RAI 9.4-52, 10/15/07, ML072690278

In DCD, Tier 2, Section 9.4.2, the applicant states that the Fuel Building HVAC System (FBVS) is not required to operate during an SBO. Are there any components in the FB that could be affected by increases in temperature? Are there any provisions to providing cooling to areas of the FB when the FBVS is isolated? Has the impact of over heating and failure of any component been evaluated for the SBO condition?

Status: GEH has not yet committed to a response date.

RAI 9.5-44, Supplement No. 1, 10/15/07, ML072690278

The GEH response to RAI 15.5-3 states that "The ESBWR post-fire, safe shutdown circuit analyses have not been developed at this time. These analyses will be developed later in the project life cycle as part of the plant specific fire protection program." Consequently, the DCD should be revised to state that the post-fire, safe shutdown circuit analyses will be developed by the licensee as part of the plant specific fire protection program.

Status: GEH has not yet committed to a response date.

RAI 9.5-45, Supplement No. 2 & RAI 9.5-46, Supplement No. 2, 10/15/07, ML072690278

Contrary to GEH's response that the fire hazard analysis provided in the ESBWR design certification document provides all of the information needed for a fire hazards analysis in accordance with NFPA 804 and Regulatory Guide 1.189, the following information listed in these two guides has not been provided to the extent described:

RG 1.189

1. Amounts, types, configurations and locations of flammable and combustible materials – in situ and transient.

2. Layout and configuration of structures, systems and components important to safety.

3. Accessibility of plant areas for manual fire fighting, location and type of manual fire fighting equipment

4. Lack of adequate access or smoke removal facilities that impede plant operations or fire extinguishment in plant areas important to safety.

NFPA 804

1. All in situ combustibles and flammable materials and their configurations should be identified. Where in situ combustibles present an exposure to nuclear safety-related systems and components, they should be uniquely identified.

2. Physical construction and layout of the buildings and equipment.

3. Description and location of any equipment necessary to ensure a safe shutdown, including cabling.

4. Analysis of smoke control system and the impact smoke can have on nuclear safety and operation for each area.

5. Analysis of the emergency planning and coordination requirements necessary for effective loss control, including any necessary compensatory measures to compensate for the failure or inoperability of any active or passive fire protection system or feature.

As noted in the GEH response to RAI 9.5-46, RG 1.206 does acknowledge that this information may not be available even at the COL stage, but the RG also stipulates that if the information is not available, the applicant should justify the inability to provide the unavailable information in the COL application, and furnish details describing implementation plans, milestones and sequences and/or ITAAC or commitments for developing, completing, and submitting this information during the construction period, prior to fuel receipt at site. This should be identified in the DCD as a COL action item.

While this level of information may not be important in areas that provide complete three-hour fire barrier separation between redundant post-fire safe-shutdown trains, as a minimum, the information should be developed and documented by the applicant for areas where full compliance with the criteria for enhanced fire protection is not feasible. In particular, the level of information described above should be provided for the main control room and adjacent rooms where exceptions have been taken to the regulatory guidance for fire protection, as well as for the other “Special Cases” described in DCD Section 9A.

Status: GEH has not yet committed to a response date.

<u>RAI 9.5-61, Supplement No. 1 & RAI 9.5-63, Supplement No. 1, 08/16/07, ML072150479</u>

In response to RAI 9.5-63, GEH stated that "The MCR emergency lighting system including the switches, associated cables and lighting fixtures are safety-related." Additionally, GEH stated that the safety-related UPS and the MCR emergency lighting circuitry are isolated by a series of circuit breakers that is coordinated for isolation. This statement was made in response to RAI 9.5-61. If MCR emergency lighting system (power supply, cables, switches, fixtures, etc.) is safety-related and classified as Class 1E, why isolation device is needed?

Status: GEH has not yet committed to a response date cc:

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