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Supplement 03

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**Subject: Response to Portion of NRC Request for Additional
Information Letter No. 199 Related to ESBWR Design
Certification Application ESBWR RAI Number 14.3-61 S02**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) response to the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) sent by NRC letter dated May 15, 2008 (Reference 1).

Verified DCD changes associated with this RAI response are identified in the enclosed DCD markups by enclosing the text within a black box. The marked-up pages may contain unverified changes in addition to the verified changes resulting from this RAI response. Other changes shown in the markup(s) may not be fully developed and approved for inclusion in the DCD.

Enclosure 1 contains the GEH response to each of the subject RAIs. Previous RAIs and responses were transmitted in References 2 through 5. The enclosed changes will be incorporated in an upcoming DCD Revision.

If you have any questions or require additional information, please contact me.

Sincerely,

Richard E. Kingston
Vice President, ESBWR Licensing

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NRO

References:

1. MFN 08-482, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, GEH, *Request For Additional Information Letter No. 199 Related To ESBWR Design Certification Application*, dated May 15, 2008.
2. MFN 06-382, Letter from U.S. Nuclear Regulatory Commission to David H. Hinds, GE, *Request For Additional Information Letter No. 70 Related To ESBWR Design Certification Application*, dated October 10, 2006.
3. MFN 07-032, *Response to Portion of NRC Request for Additional Information Letter No. 70 Related to ESBWR Design Certification Application – DCD Tier 1, RAI Numbers 14.3-27 through 14.3-66*, dated March 9, 2007.
4. MFN 07-032, Supplement 1 *Response to Portion of NRC Request for Additional Information Letter No. 70 Related to ESBWR Design Certification Application – Air conditioning, Heating, Cooling and Ventilation Systems, RAI Number 14.3-34 S01, 14.3-52 S01, 14.3-53 S01, 14.3-55 S01, and 14.3-61 S01*, dated December 14, 2007.
5. MFN 07-032, Supplement 1 *Response to Portion of NRC Request for Additional Information Letter No. 70 Related to ESBWR Design Certification Application – Air conditioning, Heating, Cooling and Ventilation Systems, RAI Number 14.3-34 S01, 14.3-52 S01, 14.3-53 S01, 14.3-55 S01, and 14.3-61 S01*, dated December 14, 2007.

Enclosure:

1. Response to Portion of NRC Request for Additional Information Letter No. 199 Related to ESBWR Design Certification Application TSCVS – Tech Support Center Ventilation System RAI Number 14.3-61 S02 199 Related to ESBWR Design Certification Application DCD Tier 1 DCD Tier 1 TSCVS – RAI Number 14.3-61 S02

Enclosure 1, Attachment 1 DCD Tier 1, Revision 5 Markups

cc: AE Cubbage USNRC (with enclosure)
RE Brown GEH/Wilmington (with enclosure)
eDRF Section 0000-0089-7040

Enclosure 1

MFN 07-032, Supplement 3

Response to Portion of NRC Request for

Additional Information Letter No. 199

Related to ESBWR Design Certification Application

DCD Tier 1 TSCVS – Tech Support Center Ventilation System

RAI Number 14.3-61 S02

For historical purposes, the original text of RAI 14.3-61 and RAI 14.3-61S01 with the corresponding GEH responses is included. The DCD mark-up provided with the original responses is not included.

NRC RAI 14.3-61

*DCD Tier 1, Revision 1, Section 2.16.2:
EBHVS ITAAC Table*

Provide ITAAC table consisting of "Design Commitments" and their associated "Inspection, Test, Analyses" and "Acceptance Criteria" columns as follows:

- A. - Provide the Design Commitment stating that the basic configuration of the EBHVS is as described in the Section (provide DCD Tier 1, Section Number). Also provide corresponding Inspection, test, Analyses column description stating that the inspections of the EBHVS configuration will be conducted. Also provide corresponding Acceptance Criteria column description stating that the as-built EBHVS conforms to the description in Section (provide DCD Tier 1, Section number).*
- B. Provide a Design Commitment for maintaining positive pressure inside TSC areas. Provide details such as: the TSC HVAC subsystem maintains TSC at a slightly positive pressure (provide specific pressure differential data in English as well as in Metric Units) with respect to the adjacent rooms and outside environment to minimize the infiltration of contaminated air. Also provide corresponding "Inspection, Test, Analyses" detail stating that testing will be conducted (such as differential pressure testing and tracer gas testing in accordance with ASTM E741). Also provide corresponding Acceptance Criteria column details such as the time average pressure differential in the TSC areas is positive as measured by each of the pressure differential indicators (provide DCD Tier 1 equipment table number).*
- C. Provide a concise description in the Design Commitment that describes the major areas served by the EER HVAC, TSC HVAC and DG HVAC subsystems to provide ventilation and/or cooling functions. Also provide corresponding details for the Inspection, Test, Analyses and Acceptance Criteria.*

GE Response:

Consistent with other systems without safety design bases (i.e., no safety significance), an ITAAC will not be provided for EBVS. However, a concise description of major areas served by the EERVS, TSCVS, and DGVS have been added to new Tier 1, Subsection 2.16.2.7.

DCD Impact:

DCD Tier 1 has been revised as noted above and as reflected in DCD Revision 3.

NRC RAI 14.3-61S01

According to the guidance in NUREG-0696, the Technical support Center (TSC) should be habitable under accident conditions. Therefore, it is necessary to verify the ability of the Technical Support Center HVAC system to maintain the TSC at positive pressure with respect to the areas around it. It is also necessary to confirm that a filter system has been installed and that it meets appropriate test requirements.

Thus an ITAAC table for this Design Commitment is required. Please discuss the adequacy of flow and cooling design to meet normal and accident conditions both pre 72 hours and post 72 hours so that the staff can determine with reasonable assurance that sufficient system capability exists and include the design details in DCD Tier 2 Section 9.4.7. RTNSS systems should be identified.

Supplement 1 GEH Response

The Technical Support Center (TSC) HVAC Subsystem (TSCVS) is associated with the Electrical Building HVAC System (EBVS). The TSCVS is not a RTNSS system (Chapter 19, Appendix 19A) nor is the TSCVS specifically committed to providing a Safety-related environment in full compliance with GDC 19 (Chapter 9.4.7). Therefore, an ITAAC for the TSCVS is not required. ESBWR has committed to providing Radiological requirements for the building however without Safety-related equipment. TSCVS flow and cooling requirements are discussed in DCD Rev 4, Tier 2, and Subsection 9.4.7. The on-site diesel generators provide electrical power to the TSCVS in case of Loss of Preferred Power (LOPP), (Subsection 9.4.7.1). The EBVS filtration components are periodically tested in accordance with ASME AG-1, Code On Nuclear Air and Gas Treatment to meet the requirements of RG 1.140 (Subsection 9.4.7.4). Additionally, as stated in DCD Tier 1 Rev 4, Section 2.16.2.7 Electrical Building HVAC System, "The EBVS provides post 72-hour cooling for Diesel Generators and safety-related Electrical Distribution and support for electrical power to FAPCS."

As stated the GEH Response to RAI 9.4-39, Section B: The RTNSS qualified subsystems within the Electrical Building HVAC System (EBVS) are those subsystems that provide cooling for the standby diesel generators and their applicable electric and electronic equipment. These systems include the Electric and Electronic Rooms (EER) HVAC Subsystem (EERVS) and Diesel Generators (DG) HVAC Subsystem (DGVS). The Electrical Building HVAC System also supports the RTNSS function of maintaining electrical power to FAPCS. System components designated as RTNSS include the system fans, dampers, and ductwork necessary to perform this function. The post 72-hr period, ventilation subsystems are restarted to provide ventilation and cooling to the EBVS.

Supplement 1 DCD Impact

No DCD changes will be made in response to this RAI.

NRC RAI 14.3-61 S02

NRC Summary:

TSCVS RTNSS and ITAAC issues

NRC full Text:

In response to RAI 14.3-61 S01, GEH stated that the TSCVS is not a safety related system and therefore no ITAAC is required. In its response to RAI 14.3-150, GEH indicated that it would be impossible to develop generic emergency planning ITAAC due to site-specific differences. SRP Section 14.3 in Table 14.3.10-1 Item 8.1.3 and RG1.206, Appendix B Page C.II.1-B-5 Item 8.1.3 both establish acceptance criteria for an ITAAC for inspection of the TSC that requires comparable habitability with the control room. Comparable habitability with the control room is independent of site related differences.

To demonstrate the Tic's comparable habitability with the control room, the ITAAC must include specific design certification criteria, if applicable, or otherwise identify specific capabilities. This would confirm that the TSC ventilation system -- including HEPA and carbon filters, and radiation monitors -- are installed in accordance with the DCD, and that the functional requirements for flow rates, pressurization, and temperature control are satisfied.

Supplement 2 GEH Response

GEH concurs that additional ITAAC are appropriate to confirm the requirements for the TSC ventilation system habitability as suggested by SRP 14.3.10, Emergency Planning-Inspections, Tests, Analyses, and Acceptance Criteria.

SRP Section 14.3.10 (dated March 2007) includes Table 14.3.10-1 Item 8.1.3 that establishes acceptance criteria for inspection of the TSC that requires comparable habitability with the control room. DCD Tier 2 subsection 13.3, Emergency Planning, states, "The TSC is environmentally controlled to provide room air temperature, humidity and cleanliness appropriate for personnel and equipment. The room is provided with radiological protection and monitoring equipment necessary to ensure that radiation exposure to any person working in the TSC would not exceed 0.05 Sv. (5 rem) Total Effective Dose Equivalent (TEDE) as defined in 10 CFR 50.2 for the duration of the accident. The level of protection is comparable to the Main Control Room (MCR)."

As described in DCD, Tier 2 subsection 9.4.7.2, the TSCVS Air Filtration Units (AFU) with supply fans, high efficiency particulate air (HEPA) filters and charcoal filters remove radioactive materials when required to operate during radiological mode upon detection of radioactivity at the outside air intakes.

DCD Tier 1, Revision 5, Section 2.3, Process Radiation Monitoring System, contains ITAAC for TSC HVAC Air Intake Process Radiation Monitor in subsection 2.3.1 and Table 2.3.1-1.

DCD Tier 1, Revision 5, subsection 2.16.2.7, Electrical Building HVAC System, addresses the TSC cooling function under Table 2.16.2.10 Item 1; "The functional arrangement of the Electrical Building Ventilation System (EBVS) is as described in the Design Description of this Subsection 2.16.2.7 and is as shown in Figure 2.16.2-9".

DCD Tier 1, Revision 5, subsection 2.16.2.7, Electrical Building HVAC System, is revised to include the TSC ventilation subsystem (TSCVS) ITAAC required to confirm that the TSC ventilation subsystem provides habitability comparable to the ESBWR Main Control Room. Design Description 2.16.2.7, items (3), (4) and (5) and ITAAC Table 2.16.2-10 items (3), (4) and (5) confirm that the TSCVS Air Filtration Unit (AFU) HEPA filters, charcoal adsorbers and associated ventilation fans are installed in accordance with the DCD, and that the functional requirements for flow rates, pressurization, and temperature control are satisfied.

DCD Impact

DCD Tier 1, Revision 6, subsection 2.16.2.7, Electrical Building HVAC System, is revised to include the TSC ventilation subsystem (TSCVS) ITAAC required to confirm that the TSC provides habitability comparable to the ESBWR Main Control Room.

Design Description 2.16.2.7, items (3), (4) and (5) and ITAAC Table 2.16.2-10 items (3), (4) and (5) confirm that the TSCVS Air Filtration Unit (AFU) HEPA filters, charcoal adsorbers and associated ventilation fans are installed in accordance with the DCD, and that the functional requirements for flow rates, pressurization, and temperature control are satisfied.

2.16.2.5 Fuel Building HVAC System**Design Description**

The Fuel Building HVAC system (FBVS) does not perform any safety-related functions, except for automatic isolation of the Fuel Building ventilation systems to mitigate the consequences of fuel handling accidents with significant radiological releases. The Fuel Building HVAC subsystems include the Fuel Building General Area HVAC Subsystem (FBGAVS) shown in Figure 2.16.2-7 and the Fuel Building Fuel Pool HVAC Subsystem (FBFPVS) shown in Figure 2.16.2-8.

- (1) The functional arrangement of the FBVS is as described in the Design Description of this Subsection 2.16.2.5 and as shown in Figures 2.16.2-7 and 2.16.2-8.
- (2) The Fuel Building HVAC isolation dampers automatically close upon receipt of a high radiation signal.
- (3) The safety-related components identified in Table 2.16.2-8 can withstand Seismic Category I loads without loss of safety-related function.
- (4) The FBVS maintains the fuel building at a slightly negative pressure relative to surrounding areas.
- (5) The FBVS provides post 72-hour cooling for FAPCS pump motors and N-DCIS.
- (6) Indications and controls for the safety-related components of the FBVS as indicated in Table 2.16.2-8 are available in the MCR.

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.16.2-9 provides the design commitments, inspections, tests, analyses and acceptance criteria for the Fuel Building HVAC.

2.16.2.6 Radwaste Building HVAC System

No ITAAC are required for this system.

2.16.2.7 Electrical Building HVAC System**Design Description**

The Electrical Building Ventilation System (EBVS) is nonsafety-related and includes three subsystems. The Electric and Electronic Rooms HVAC Subsystem (EERVS), the Technical Support Center HVAC Subsystem (TSCVS), and the Diesel Generators HVAC Subsystem (DGVS).

- (1) The functional arrangement of the Electrical Building Ventilation System (EBVS) is as described in the Design Description of this Subsection 2.16.2.7 and is as shown in Figure 2.16.2-9.
- (2) The EBVS provides post 72-hour cooling for Diesel Generators and safety-related Electrical Distribution and support for electrical power to FAPCS.
- (3) The TSCVS air filtration units (AFU) include HEPA filters to provide a habitable work environment for personnel when nonsafety-related power is available.

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| <ul style="list-style-type: none">(4) <u>The TSCVS air filtration units (AFU) include charcoal adsorbers to provide a habitable work environment for personnel when nonsafety-related power is available.</u>(5) <u>The TSCVS air filtration units (AFU) maintain the TSC at a slight positive pressure with respect to the surrounding adjacent areas.</u> |
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Inspections, Tests, Analyses and Acceptance Criteria

Table 2.16.2-10 provides the design commitments, inspections, tests, analyses and acceptance criteria for the Electrical Building HVAC System.

Table 2.16.2-10

ITAAC For Electrical Building Ventilation System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The functional arrangement of the Electrical Building Ventilation System (EBVS) is as described in the Design Description of this Subsection 2.16.2.7 and shown in Figure 2.16.2-9.	Inspections of the EBVS configuration will be conducted.	Inspection report(s) document exist and <u>conclude</u> that the as-built EBVS system conforms with the description in Subsection 2.16.2.7 and shown in Figure 2.16.2-9.
2. The EBVS provides post 72-hour cooling for Diesel Generators and Safety-Related Electrical Distribution, and support for electrical power to FAPCS.	System testing will be performed and cooling air flow to the specified cubicles will be verified.	Test report(s) documents exist and <u>conclude</u> that the cooling air flow capability meets the requirements to support post 72-hour cooling for Diesel Generators and safety-related Electrical Distribution, and support for electrical power to FAPCS.
3. <u>The TSCVS air filtration units (AFU) include HEPA filters to provide a habitable work environment for personnel when nonsafety-related power is available.</u>	<u>An inspection of the as-built TSCVS HEPA filters procurement documentation will be performed.</u>	<u>Inspection report(s) conclude that the initially installed HEPA filters have been designed, constructed and tested in accordance with Section FC of ASME AG-1.</u>
4. <u>The TSCVS air filtration units (AFU) include charcoal adsorbers to provide a habitable work environment for personnel when nonsafety-related power is available.</u>	<u>An inspection of the as-built TSCVS charcoal adsorber procurement documentation will be performed.</u>	<u>Inspection report(s) conclude that the initially installed charcoal adsorbers have been designed, constructed and tested in accordance with Section FD of ASME AG-1.</u>

Table 2.16.2-10

ITAAC For Electrical Building Ventilation System

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5. <u>The TSCVS air filtration units (AFU) maintain the TSC at a slight positive pressure with respect to the surrounding adjacent areas.</u>	<u>Testing will be performed to measure the differential pressure between the TSC and surrounding adjacent areas.</u>	<u>Test report(s) conclude that the as-built TSCVS filtration units maintain the TSC at a positive pressure of > 31 Pa (0.125 inch water gauge) with respect to the surrounding adjacent areas at the required air addition flow rate.</u>