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Subject: **GEH Initiated Response to Portion of NRC Request for  
Additional Information Letter No. 62 Related to ESBWR Design  
Certification Application RAI Number 9.2-7 S01**

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 September 29, 2006. GEH initiated response to RAI Number 9.2-7 S01 is addressed in Enclosure 1.

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

Sincerely,

*Kathy Sedney for*

James C. Kinsey  
Vice President, ESBWR Licensing

*Doc 8*  
*NRO*

Reference:

1. MFN 06-380, Letter from U.S. Nuclear Regulatory Commission to David Hinds, Manager, ESBWR, *Request For Additional Information Letter No. 62 Related To ESBWR Design Certification Application*, dated September 29, 2006

Enclosure:

1. GEH Initiated Response to Portion of NRC Request for Additional Information Letter No. 62 Related to ESBWR Design Certification Application - Auxiliary Systems - RAI Number 9.2-7 S01

cc: AE Cubbage USNRC (with enclosure)  
GB Stramback GEH/San Jose (with enclosure)  
RE Brown GEH/Wilmington (with enclosure)  
eDRF 0000-0075-1774

**Enclosure 1**

**MFN 07-039, Supplement 2**

**GEH Initiated Response to Portion of NRC Request for**

**Additional Information Letter No. 62**

**Related to ESBWR Design Certification Application**

**Auxiliary Systems**

**RAI Number 9.2-7 S01**

**For historical purposes, the original text of RAI 9.2-7 and the GEH response is included, except for any attachments or DCD mark-ups.**

**NRC RAI 9.2-7**

*Table 1.9-9 of the DCD, Tier 2, Rev 1, indicates that General Design Criteria (GDC) 44 is not applicable to PSWS and RCCWS because they are non-safety-related. GDC 44 applies to cooling water systems that transfer heat to an ultimate heat sink under normal operating conditions as well as during cooldown, shutdown, and accident conditions. These two systems are important to safety even though they are not safety-related; therefore GDC 44 applies to them. And if GDC 44 applies, so does GDCs 45 and 46. Demonstrate how these systems satisfy GDCs 44, 45, and 46.*

**GE Response**

GDC 44, 45, and 46 are based on plants with active, safety-related heat removal systems that discharge to an ultimate heat sink (UHS), such as a large body of water or a cooling tower.

DCD Subsection 3.1.4.15 provides the ESBWR Standard Plant evaluation for GDC 44. The ESBWR ultimate heat sink is the IC/PCC pool. In the event of a design basis accident, heat is transferred to the IC/PCC pool(s) through the Passive Containment Cooling System (PCCS). The water in the IC/PCC pool(s) is allowed to boil and the resulting steam is vented to the environment. The PCCS has no active components and requires no electrical motive power or control and instrumentation functions to perform its safety-related function of transferring heat to the ultimate heat sink. Therefore, no credible single failure can prevent the PCCS from performing its safety-related function. The requirements of Criterion 44 for heat transfer to the ultimate heat sink are met.

DCD Subsection 3.1.4.16 provides the ESBWR Standard Plant evaluation for GDC 45. The IC/PCC pool is located outside containment and is accessible for periodic inspections. During outages, the IC/PCC pool compartments can be drained to permit inspection of the condensers. PCCS piping inside containment can be inspected during outages (see the evaluation of Criterion 39). The features of the PCCS meet the requirements of Criterion 45.

DCD Subsection 3.1.4.17 provides the ESBWR Standard Plant evaluation for GDC 46. Redundancy and isolation are provided to allow periodic pressure testing of the PCCS. As discussed in the evaluation of Criterion 44, the PCCS contains no active components; therefore, functional testing is not necessary. The periodic inspections described in the response to Criterion 45 verify system integrity. The design of the PCCS meets the requirements of Criterion 46.

10 CFR 50 Appendix A states that structures, systems and components (SSC) important to safety are those items "*that provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the public.*" Uncontrolled release of radioactive material into the environment or (at least) adversely affecting a safety-related function is the only type of event that could involve an "*undue risk to the health and safety of the public*". Therefore, for the ESBWR, there is no technical basis for the RCCWS or PSWS to be categorized as safety related.

### **Additional Discussion**

Historically, reactor component cooling and plant service water systems performed the safety-related functions of cooling safety-related equipment during normal, transient, and accident conditions.

Compliance with GDC 44 requires that a system be provided to transfer heat from safety-related SSCs, to an UHS, and that the system must be capable of operating under normal and accident conditions assuming a single failure and a loss of offsite power. The ESBWR RCCWS and PSWS provide cooling during normal conditions and are not required to perform safety functions to mitigate design basis accidents (refer to the response to RAI 3.2-45, MFN 06-308 dated September 8, 2006). RCCWS and PSWS are non-safety-related; however, within ESBWR, these systems are designed to perform accident recovery functions. The RCCWS is required to provide post 72-hour cooling for Chillers and DG's and the PSWS is required for cooling the RCCWS post 72-hour (Response to RAI 19.1.0-2). The RCCWS and PSWS are designed to be a robust and reliable system to maintain plant reliability for power operation by incorporating redundant cooling water trains, parallel arrangement of major equipment and system cross-connects to support plant reliability. The RCCWS and PSWS do not transfer heat from any safety-related SSC. They are designed to transfer heat to a plant heat sink under normal conditions assuming a single failure and a loss of offsite power. Furthermore, in order to perform accident recovery functions, these systems are designed to withstand the post-accident environment (Not in the scope of 10 CFR 50.49 or 10 CFR 50, App B) and function after a Safe Shutdown Earthquake (SSE) (Not Seismic I or II systems). Both RCCWS and PSWS will fall under the Regulatory Treatment of Non-Safety Systems (RTNSS) to provide cooling post 72-hour and post-SSE. These systems will meet the RTNSS requirements to be specified in DCD Appendix 19A.

Although RCCWS and PSWS are non-safety related systems, the RCCWS and PSWS meet GDC 44 by providing cooling water systems that are capable of rejecting heat to a plant heat sink under all normal conditions and part of accident recovery. These functions can be performed assuming a single failure concurrent with a loss of offsite power using nonsafety-related diesel power and the ability to isolate components or piping automatically or manually by use of parallel trains, cross-connected piping and redundant components. Additionally, these systems will withstand post-accident environments and remain functional after an SSE.

Compliance with GDC 45 requires that the cooling water system be designed to permit appropriate periodic inspection of important components (e.g., heat exchangers and piping) to ensure integrity and capability of the system. Both the PSWS and RCCWS are designed for periodic inspection of components to ensure the capability and integrity of the system per DCD Subsections 9.2.1.4 and 9.2.2.4 respectively. Therefore, both the PSWS and RCCWS meet the requirements for GDC 45.

Compliance with GDC 46 requires that the cooling water system be designed to permit appropriate periodic pressure and functional testing to ensure the leak-tight integrity and operability of components, as well as the operability of the system as a whole, at conditions as close to the design basis as practical. For the PSWS, testing of pumps and system is performed to simulate all normal modes of operation to the greatest extent practical and transfer between normal and standby power source is included in the periodic tests (DCD Subsection 9.2.1.4). Additionally, flow elements and transmitters are used in the PSWS return headers to monitor PSWS flow in the MCR and can be used to assist in leak detection (DCD Subsection 9.2.1.5). In DCD Chapter 9, Subsection 9.2.2.4, it is stated that the RCCWS contains provisions for inspection of major equipment as well as indicators for vital parameters required for testing and inspection. Also, the RCCWS will provide head tank level instrumentation to assist in leakage detection from the system (DCD Subsection 9.2.2.5). Therefore, both the PSWS and RCCWS meet GDC 45 requirements.

### **DCD Impact RAI 9.2-7**

Based on the above explanations, Table 1.9-9 of the DCD, Tier 2, will remain unchanged. The PSWS and RCCWS meet GDC 44, 45, and 46 as shown on the markup to DCD Subsection 9.2.1. Compliance of the ESBWR with GDC 44, 45 and 46 is discussed further in DCD Subsections 3.1.4.15 through 3.1.4.17.

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**The following is a GEH initiated supplement.**

### **NRC RAI 9.2-7 S01**

GEH originally submitted response to RAI 9.2-7 with the requirement that RCCWS and PSWS should meet the requirements of GDC's 44, 45, and 46 due to the expected RTNSS function. No discussion was included in that RAI response concerning TCCWS meeting these GDC's however, a DCD markup was provided to show that TCCWS meets the requirements of GDC's 44, 45, and 46. Based on review of DCD Tier 2, Revision 3 Chapter 19A and Table 19A-2, TCCWS is not required to meet NRC

regulations, safety goal guidelines, and containment performance goal objectives. Additionally, TCCWS, which is not RTNSS, is not used to transfer heat from structures, systems, and components as required by GDC's 44, 45, and 46. Therefore, the requirements of the above GDC's are no longer necessary or relevant to the design of the Turbine Component Cooling Water System.

**DCD Tier 2, Rev. 4 Impact – RAI 9.2-7 S01**

DCD Subsection 9.2.8.1 has been revised to DELETE the following in DCD Tier 2, Revision 4:

“The ESBWR TCCWS meets the acceptance criteria of GDC's 44, 45, and 46 by providing the following design considerations:

- Capable of transferring heat loads from SSC's to a heat sink under normal and accident conditions;
- Component redundancy so the system will remain functional assuming a single failure coincident with a loss of offsite power;
- Capability to isolate components or piping so system function will not be compromised; and
- Design provisions to permit inspection and operational testing of components and equipment.”

**DCD Impact**

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