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MFN 07-039
Supplement 1

Docket No. 52-010

August 28, 2007

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555-0001

Subject: **Response to Portion of NRC Request for Additional Information Letter No. 62 Related to ESBWR Design Certification Application – Auxiliary Systems – RAI Number 9.2-12 S01**

Enclosure 1 contains response to the subject RAI supplement which was initiated by GEH.. GEH's original response was provided in the Reference 1 letter.

If you have any questions or require additional information regarding the information provided here, please contact me.

Sincerely,

Kathy Sedney for

James C. Kinsey
Project Manager, ESBWR Licensing

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NRO

Reference:

1. MFN 07-039, Letter from James C. Kinsey to U.S. Nuclear Regulatory Commission, *Response to Portion of NRC Request for Additional Information Letter No. 62 – Auxiliary Systems – RAI Numbers 9.2-7, 9.2-10 and 9.2-12,* March 30, 2007

Enclosure:

1. MFN 07-039, Supplement 1 – Response to Portion of NRC Request for Additional Information Letter No. 62 Related to ESBWR Design Certification Application – Auxiliary Systems – RAI Number 9.2-12 S01

cc:

AE Cubbage	USNRC (with enclosures)
DH Hinds	GEH (with enclosures)
RE Brown	GEH (w/o enclosures)
eDRF	0000-0072-4037

Enclosure 1

MFN 07-039

Supplement 1

Response to Portion of NRC Request for

Additional Information Letter No. 62

Related to ESBWR Design Certification Application

Auxiliary Systems – RAI Number 9.2-12 S01

For historical purposes, the original text of RAI 9.2-12 and the GE response is included, except for any attachments or DCD mark-ups.

NRC RAI 9.2-12:

How do the PSWS, RCCWS, Makeup Water System (MWS), Condensate Storage and Transfer System (CS&TS), Chilled Water System (CWS), and Turbine Component Cooling Water System (TCCWS) satisfy GDC 2? Acceptance is based on meeting the guidance of Regulatory Position C.2 of Regulatory Guide 1.29 for non-safety-related portions.

GE Response:

The Regulatory Position C.2 of Reg. Guide 1.29 states if a system is not required to operate after a Safe Shutdown Earthquake (SSE), the failure of that system shall not reduce the functioning of any plant feature (items 1.a through 1.q) to an unacceptable safety level or result in incapacitating injury to occupants of the Control Room.

There is no Makeup Water System (MWS) and Condensate Storage and Transfer System (CS&TS) piping in the control room that would incapacitate control room personnel. MWS containment penetrations and isolation valves are designed as Seismic Category I, and those portions within Seismic Category I buildings are designed as Seismic Category II (see DCD Table 3.2-1 and Subsection 9.2.3.1). The CS&TS also has portions within Seismic Category I buildings that are designed as Seismic Category II (see attached markup of DCD Table 3.2-1 and Subsection 9.2.6.1). Failure of either MWS or CS&TS will not compromise any safety-related system or component nor does it prevent a safe shutdown (DCD Subsections 9.2.3.3 and 9.2.6.3 respectively). Therefore, the MWS and CS&TS satisfy the requirements of GDC 2 because the failure of the nonsafety-related portions of the system does not impact any safety-related structures and will not degrade a safety-related system to an unacceptable safety level.

The RCCWS, TCCWS, and PSWS do not have any piping in the control room, and it is not possible for them to result in an incapacitating injury to occupants of the control room. None of these cooling water systems perform any safety-related function or interface with any safety-related component (DCD Subsections 9.2.1.1, 9.2.2.1, and 9.2.8.1) and all piping is designated as Seismic Category NS (DCD Table 3.2-1).

However, RCCWS, TCCWS and PSWS will be categorized under the Regulatory Treatment of Non-Safety Systems (RTNSS) in order to provide cooling functions post-SSE. RCCWS will be required to provide cooling to the DG's and NI Chillers. TCCWS will be required to provide cooling to the BOP Chillers. While the PSWS will be required to provide heat removal to the RCCWS and TCCWS heat exchangers. These systems will be designed to seismic requirements to be specified in DCD Appendix 19A. Therefore, the RCCWS, TCCWS, and PSWS satisfy the requirements of GDC 2 because the failure of the nonsafety-related portions of the systems does not impact any safety-related structures and will not degrade a safety-related system to an unacceptable safety level. RCCWS, TCCWS and PSWS meet the intent of Position C.1 of Reg. Guide 1.29 by providing post-accident recovery cooling functions (Response to RAI 19.1.0-2).

CWS containment penetrations and isolation valves are designed as Seismic Category I, CWS portions within Seismic Category I buildings are designed as Seismic Category II, and the rest of the system is designed as non-seismic category according to RG 1.29 (see Table 3.2-1 and Subsection 9.2.7.1). The CWS does have piping in the control room, but it is not possible for these components to result in an incapacitating injury to occupants of the control room because the CWS components are designed to remain functional during and following a SSE.

Additionally, nonsafety-related portions of the CWS will be categorized under the Regulatory Treatment of Non-Safety Systems (RTNSS) in order to provide cooling functions post-SSE (Response to RAI 19.1.0-2). CWS will be required to provide cooling to remove heat from HVAC loads in the Reactor, Fuel Handling, Electrical, Control and Turbine Buildings. The Chilled Water System will be designed to the seismic requirements to be specified in DCD Appendix 19A. Therefore, the CWS satisfies the requirements of GDC 2 because the failure of the nonsafety-related portions of the system does not impact any safety-related structures and will not degrade a safety-related system to an unacceptable safety level. These systems are robust and meet the seismic requirements to be specified in DCD Appendix 19A to provide post-accident recovery cooling functions.

DCD Impact RAI 9.2-12:

DCD Table 3.2-1 Item P25, P30 and Subsection 9.2.6.1 will be revised as noted in the attached markup.

Based on the above explanations, the RCCWS, TCCWS, and PSWS satisfy the requirements of GDC 2 as it pertains to Position C.2 of Reg. Guide 1.29. The RCCWS, TCCWS, and PSWS also meet the intent of GDC 2 as it pertains to Position C.1 of Reg. Guide 1.29. See attached markups of DCD Subsections 9.2.1, 9.2.2, and 9.2.8 for PSWS, RCCWS and TCCWS respectively.

Also, the CS&TS and CWS meet GDC 2 and compliance to Regulatory Guide (RG) 1.29. The applicable sections of RG 1.29 include Position C.1 for safety-related portions and Position C.2 for nonsafety-related portions. Revision 3 to DCD Subsections 9.2.6 and 9.2.7 for CS&TS and CWS will reflect the attached markup.

The following is a GEH initiated supplement.

RAI 9.2-12 S01:

Response to RAI 9.2-12, submitted in MFN 07-039 dated 3/30/07, identified the Turbine Component Cooling Water System (TCCWS) as subject to Regulatory Treatment of Nonsafety Systems (RTNSS). Subsequent to that RAI submittal, Chapter 19A, Revision 3, was issued which declassified TCCWS from RTNSS status. This RAI supplement is to clarify, in DCD Revision 4, that TCCWS is no longer considered RTNSS based on risk assessment.

GEH Response

Based on review of DCD Tier 2, Revision 3 Chapter 19A and Table 19A-2, TCCWS is not required to meet safety goal guidelines of containment performance objectives. TCCWS does supply the BOP Chillers as stated in the original response. However, the BOP Chillers are not RTNSS classified per DCD Chapter 19A.

Because TCCWS is no longer RTNSS, TCCWS does not require the augmented seismic considerations imposed by RTNSS. All TCCWS piping and components are located in the Turbine Building (TB), which is a nonsafety-related structure (Ref. DCD Tier 2, Table 3.2-1). Therefore, since the TB is classified as seismic category II, the TCCWS satisfies the requirements of GDC 2 as it pertains to Position C.2 of Regulatory Guide 1.29.

DCD Impact

DCD Subsection 9.2.8.1 will be revised as noted in the attached markup and DELETE the following:

"The TCCWS also meets the intent of GDC 2 as it pertains to Position C.1 of Reg. Guide 1.29."

"The TCCWS has Regulatory Treatment of Non-Safety Systems (RTNSS) functions to provide post 72-hour cooling to the TB HVAC. Performance of RTNSS functions is assured by applying requirements for redundant trains, physical and electrical separation of trains, seismic requirements, and ability to withstand Category 5 hurricane missiles and flood protection. Appendix 19A provides the level of oversight and additional requirements to meet the RTNSS functions."

9.2.8 Turbine Component Cooling Water System

9.2.8.1 Design Bases

Safety (10 CFR 50.2) Design Bases

The Turbine Component Cooling Water System (TCCWS) performs or ensures no safety-related function, and thus, has no safety design basis.

There are no connections between the TCCWS and any safety-related systems.

~~The TCCWS has Regulatory Treatment of Non-Safety Systems (RTNSS) functions to provide post 72-hour cooling to the TB HVAC. Performance of RTNSS functions is assured by applying requirements for redundant trains, physical and electrical separation of trains, seismic requirements, and ability to withstand Category 5 hurricane missiles and flood protection. Appendix 19A provides the level of oversight and additional requirements to meet the RTNSS functions.~~

The TCCWS meets the requirements of GDC 2 as it pertains to Position C.2 of Reg. Guide 1.29. ~~The TCCWS also meets the intent of GDC 2 as it pertains to Position C.1 of Reg. Guide 1.29.~~

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.

Power Generation Design Bases

The TCCWS provides cooling water to all turbine island auxiliary equipment listed in Table 9.2-12.

During power operation, the TCCWS operates to provide a continuous supply of cooling water to the turbine island auxiliary equipment.

The TCCWS is designed to permit the maintenance of any single active component without interruption of the cooling function.

Makeup to the TCCWS is designed to permit continuous system operation with design failure leakage and to permit expeditious post-maintenance system refill.

The TCCWS includes an atmospheric surge tank located such that the water level in the tank is above any other component in the system.

The TCCWS utilizes plate and frame type heat exchangers. This design mitigates cross-contamination of either RCCWS or PSWS.

9.2.8.2 System Description

Summary Description

The TCCWS is a single loop system and consists of one surge tank, one chemical addition tank, pumps, heat exchangers connected in parallel, associated coolers, piping, valves, controls and instrumentation. System parameters are shown in Table 9.2-12 and the system configuration is shown in the Figure 9.2-4. Heat is removed from the TCCWS and transferred to the Nonsafety-Related Plant Service Water System (PSWS) (Subsection 9.2.1).

A TCCWS sample is periodically taken for analysis to assure that the water quality meets chemical specifications.

Detailed Description

The system is designed in accordance with Quality Group D specifications.

The chemical addition tank is located in the turbine building in close proximity to the TCCWS pumps.

The TCCWS pumps are constant speed electric motor driven, horizontal centrifugal pumps. The pumps are connected in parallel with common suction and discharge lines.

The TCCWS heat exchanger capacity is based on the normal heat loads.

The surge tank is an atmospheric carbon steel tank located at the highest point in the TCCWS. The surge tank is provided with level transmitters and a level control valve to control makeup water addition. The surge tank is located at the highest point in the system and connected to the TCCWS pumps suction header.

System Operation

During normal power operation, the TCCWS pumps circulate water through one side of the TCCWS heat exchangers in service. The heat from the TCCWS is rejected to the PSWS that circulates water on the other side of the parallel plate TCCWS heat exchangers.

The standby TCCWS pump is automatically started on detection of low TCCWS pump discharge pressure. The standby TCCWS heat exchangers are placed in service manually.

Flow control valves regulate the cooling water flow to the turbine lube oil coolers and the generator hydrogen cooler. Control valves in the cooling water side of these components are throttled in response to temperature signals from the fluid being cooled.

TCCWS flow through heat exchangers and coolers are provided with fixed orifice plates, control valves, and/or manual valves for system balancing. Major heat exchangers and coolers have motor-operated isolation valves for operator convenience.

The surge tank provides a reservoir for leakage from the system and for the expansion and contraction of the cooling fluid with changes in the system temperature. The surge tank is connected to the system in the pump suction lines to ensure that adequate net positive suction head for the TCCWS pumps is available.

A control valve that is actuated by level transmitters sensing the surge tank level automatically controls demineralized makeup water to the TCCWS. A corrosion inhibitor is manually added to the system by means of the chemical addition tank.

9.2.8.3 Safety Evaluation

The TCCWS has no safety design basis and does not perform any safety-related function. Failure of the TCCWS does not affect any safety-related systems or components.

9.2.8.4 Tests and Inspections

All major components are tested and inspected as separate components prior to installation and as an integrated system after installation to ensure design performance.

The components of the TCCWS and associated instrumentation are accessible during plant operation for visual examination. Periodic inspections during normal operation are made to ensure operability and integrity of the system. Inspections include measurements of cooling water flows, temperatures, pressures, water quality, corrosion-erosion rate, control positions, and setpoints to verify the system condition.

Additional testing details of TCCWS are described in Subsection 14.2.8.1.52.

9.2.8.5 Instrumentation Requirements

Pressure and temperature transmitters are provided as required for testing and balancing the system. Flow indicator taps are provided at strategic points in the system for initial balancing of the flows and verifying flows during plant operation.

Surge tank high and low level and TCCWS discharge pressure alarms are transmitted to the MCR.

Makeup flow to the TCCWS surge tank is initiated automatically on low surge tank level and is continued until the normal level is reestablished.

Provisions for taking TCCWS water samples are included.

The TCCWS instrumentation conforms to GDC 13. Refer to Subsection 3.1.2 for a general discussion of the GDC.

9.2.8.6 COL Unit-Specific Information

None

9.2.8.7 References

None