GE Energy

James C. Kinsey
Project Manager, ESBWR Licensing

PO Box 780 M/C J-70
Wilmington, NC 28402-0780
USA

T 910 675 5057
F 910 362 5057
jim.kinsey@ge.com

MFN 06-417
Supplement 2

Docket No. 52-010

May 9, 2007

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

Subject: **Response to Portions of NRC Request for Additional Information Letter No. 62 – Auxiliary Systems – RAI Numbers 9.2-8 S01 and 9.2-13 S01 - Supplement 2**

Enclosure 1 contains GE's response to the subject NRC RAIs transmitted via Reference 1 which is a supplemental request to the RAIs transmitted via Reference 2. The original RAI responses were submitted to the NRC in Reference 3.

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

D068

Reference:

1. E-mail request from L. Quinones (NRC) to F. White (GE) dated February 2, 2007. Subject: Supplement request for sections 9.2, 9.5, and 10.3. (ACN: ML 070670449)
2. MFN 06-380, Letter from U.S. Nuclear Regulatory Commission to David Hinds, *Request for Additional Information Letter No. 62 Related to the ESBWR Design Certification Application*, September 29, 2006.
3. MFN 06-417, Letter from David Hinds to the U.S. Nuclear Regulatory Commission, *Partial Response to NRC Request for Additional Information Letter No. 62 Related to ESBWR Design Certification Application – Reactor Component Cooling Water and Plant Service Water Systems - RAI Numbers 9.2-6, -8, -9, -11 and 9.2-13, December 1, 2006.*

Enclosure:

1. MFN 06-417 Supplement 2– Response to Portion of NRC Request for Additional Information Letter No. 62 – RAI Numbers 9.2-8 S01 and 9.2-13 S01 Supplement 2

cc: AE Cubbage USNRC (with enclosure)
BE Brown GE/Wilmington (with enclosure)
LE Fennern GE/Wilmington (with enclosure)
GB Stramback GE/San Jose (with enclosure)
eDRF: 0000-0064-7041

Enclosure 1

MFN 06-417
Supplement 2

Response to Portion of NRC Request for Additional Information Letter No. 62 Related to ESBWR Design Certification Application

Primary Service Water System
Reactor Component Cooling Water System

RAI Numbers 9.2-8 S01 and 9.2-13 S01
Supplement 2

For historical purposes, the original text of RAIs 9.2-8 and 9.2-13 and the GE response is included. The original attachments and DCD mark-ups are not included to prevent confusion.

RAI 9.2-8

Demonstrate the capability for detection, control, and isolation of PSWS leakage, including radioactive leakage into and out of the system and prevention of accidental releases to the environment. Describe allowable operational degradation (e.g., pump leakage) and the procedures to detect and correct these conditions when they become excessive.

GE Response

The PSWS is designed to detect, control, and isolate non-radioactive leakage by monitoring system flow rate through the piping. Flow rate reductions would indicate possible system water losses or pump degradation. If any such losses adversely impact operation, then the flow loss portion of PSWS could be isolated, identified and repairs without immediately impacting plant operations.

Radioactive leakage into PSWS can only occur following three consecutive failures:

1. RCCWS can only become contaminated by the interface with either RWCU/SDC or FAPCS, which could occur only by cross-contamination through the heat exchangers associated with those systems;
2. The RCCWS is equipped with radiation detectors (Reference DCD Tier 2, Rev. 2, Subsection 11.5.3.2.8 and Table 11.5-5). If these detectors alarm, the applicable train and/or equipment is isolated. If these alarms fail, a third failure is required to contaminate PSWS; and
3. After these two foregoing failures have occurred, a leak from the RCCWS process water into the PSWS cooling water in the RCCWS heat exchangers would then have to occur.

This type of consecutive failure scenario is highly unlikely. However, the PSWS design includes provisions for obtaining a grab sample in the unlikely event that there is leakage. The COL holder will also provide provisions for sampling the cooling tower blowdown (Reference Table 11.5-5).

No additional DCD Tier 2 changes will be made in response to this RAI.

Received by e-mail from L. Quinones (NRC) to F. White (GE) dated February 2, 2007 (ACN: ML070670449).

The staff has determined that supplementary information is required to complete its review of ESBWR design control document (DCD) Tier 2, Section 9.2, 9.5 and 10.3. Please provide supplementary RAI responses for the following RAIs:

RAI 9.2-8 S01:

The radiation monitoring and sampling provisions provided in DCD Tier 2, Table 11.5-5 for the PSWS are not consistent with Table 2 of SRP Section 11.5, Revision 3, which indicates provisions of continuous radiation monitoring/sampling for the service water system. In addition, the response states that the COL holder will also provide provisions for sampling the cooling tower blowdown. Please, provide reference the specific COL Action Item.

GE Response:

The PSWS is consistent with Table 2 of SRP Section 11.5, Revision 4 in regards to grab sampling. GE recognizes the inconsistency between DCD Tier 2, Table 11.5-5 for the PSWS and Table 2 of SRP Section 11.5, Revision 4 in regards to continuous effluent sampling. This difference is that the SRP refers to continuous radiation monitoring on PSWS effluent. The DCD requires continuous effluent monitoring, but it can be either directly on the effluent of PSWS or another downstream process effluent (i.e.; one detector could monitor the combined effluent of PSWS and Circulating Water).

Additional details are as follows:

The PSWS, as part of the ESBWR Standard Plant design, provides component cooling to RCCWS and TCCWS heat exchangers. The RCCWS interfaces with many systems through heat exchangers and cooling coils and cannot become contaminated unless there is a passive failure. Therefore, the RCCWS acts as a barrier for the PSWS to protect against cross-contamination.

Radioactive leakage into PSWS from the RCCWS can only occur following these three independent failures:

1. RCCWS can only become contaminated by the interface with either RWCU/SDC, Post Accident Sampling program coolers and Process Sampling system (PSS) coolers or FAPCS, which could occur only by failure through the heat exchangers associated with those systems.

2. The RCCWS is equipped with continuous radiation monitors (Reference DCD Tier 2, Rev. 3, Subsection 11.5.3.2.7 and Table 11.5-5). If these detectors alarm, the applicable train and/or equipment will be isolated. If these alarms fail and isolation of the affected RCCWS loop is not performed, a third failure is required to contaminate PSWS.

3. In addition to these two failures, a leak from the RCCWS process water into the PSWS cooling water in the RCCWS heat exchangers would have to occur. RCCWS is designed using plate heat exchangers and leakage through holes or cracks in the plates is not considered credible based on industry experience with plate type heat exchangers. These heat exchangers are also designed such that any gasket leakage from either RCCWS or PSWS drains to the Equipment and Floor Drain System (Reference DCD Tier 2 Rev. 3, Subsection 9.2.2.2). Consequently, there is essentially no potential for plate failure and cross contamination.

This consecutive failure scenario is highly unlikely. However, the PSWS design includes provisions for obtaining a grab sample in the event that there is a RCCWS radiation monitor alarm. The COL holder will also provide provisions for monitoring, sampling, or analyzing the cooling tower blowdown (Reference Table 11.5-5) to ensure monitoring prior to release to the environment.

In regards to the COL holder item, the COL Action Item will be provided in DCD Tier 2, Revision 4, Subsections 11.5.7.3 and Subsection 9.2.4 as shown in attached markup.

DCD Impact

Revision 4 to DCD Tier 2 is to provide the COL Action Item in Subsections 11.5.7.3 and 9.2.4 as shown in attached markup.

RAI 9.2-13

Describe the measures provided for precluding long-term corrosion and organic fouling that would degrade PSWS performance.

GE Response

The type of water (e.g., fresh or sea water) and the results of a water quality analysis for a future plant referencing the design certification will determine the material selection for all piping and pump parts wetted by raw PSWS water.

Revision 2 to DCD Tier 2, Subsection 9.2.1.2, has been clarified by deleting the following: "Provisions for anti-fouling treatment of the PSWS is provided," and replacing with: "Provisions to preclude long-term corrosion and fouling of PSWS are provided."

Received by e-mail from L. Quinones (NRC) to F. White (GE) dated February 2, 2007 (ACN: ML070670449).

The staff has determined that supplementary information is required to complete its review of ESBWR design control document (DCD) Tier 2, Section 9.2, 9.5 and 10.3. Please provide supplementary RAI responses for the following RAIs:

RAI 9.2-13 S01

The response states that intersystem leakage into RCCWS is monitored through four methods. Clarify the third and forth method. It is not clear whether the third method, using the chemical contamination, is adopted or not for the ESBWR design. It is not clear which one is the forth method and whether it is used by the ESBWR design.

GE Response

The chemical contamination method is not adopted for the ESBWR design. The minimal benefit from adding conductivity monitors is not warranted to detect intersystem leakage into RCCWS in the ESBWR design. The previous response should have stated there were three methods. The previous response is clarified as follows:

Intersystem leakage into RCCWS is monitored through three methods.

1. If the system intrusion is radioactive, the RCCWS monitors detect the increase in radioactivity. The RCCWS has radiation monitoring in each cooling water train to detect intersystem radiation leakage into the respective RCCWS loop. (Reference DCD Tier 2, Rev 3 Subsections 9.2.2.5 and mark-up of Subsection 11.5.3.2.7).
2. The flow rate of RCCWS water is constantly monitored throughout the system to provide detection of leakage to or from the RCCWS. In addition, other monitored system parameters can be used to detect intersystem leakage. Low pump discharge header pressure, high or low head tank level and excessive makeup valve opening time are alarmed/annunciated in the MCR.
3. Using chemical contamination monitoring to detect intersystem leakage would not be an effective method for systems cooled by RCCWS because the water quality of these systems is equal to or better than that of RCCWS. Therefore, even if there were an intrusion from one of these systems, it would not adversely affect the water quality of RCCWS. A conductivity monitor could detect PSWS in-leakage, but any leakage into RCCWS would result in the surge tank level increasing and subsequent high head tank level alarm (reference Subsection 9.2.2.5). A high level alarm would indicate corrective actions are required. Provisions for obtaining grab samples to monitor for any potential chemical or radiological contamination are provided. The locations of the grab samples are determined based on actual plant system routing. Therefore, the minimal benefit from adding conductivity monitors is not warranted to detect intersystem leakage into RCCWS.

The original response to this RAI provided a mark-up of Chapter 11 to clarify the location of the RCCWS radiation monitor. The intent is to isolate the contaminated train and prevent contamination of both trains. The mark-up did not convey this intent, and the DCD is to be revised to delete the descriptive location.

DCD Impact

Revision 4 to DCD Tier 2 Subsection 11.5.3.2.7 is to delete the descriptive location of the radiation monitor as noted on the attached markup.