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MFN 06-417
Supplement 3

Docket No. 52-010

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

Subject: **Response to Portion of NRC Request for Additional Information Letter No. 62 –Auxiliary Systems– RAI Number 9.2-11 S01**

Enclosure 1 contains GHNEA'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

NRO

Reference:

1. E-mail from L. Quinones (NRC) to F. White (GE) dated February 2, 2007.
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 – Auxiliary Systems - RAI Number 9.2-11,* December 1, 2006.

Enclosure:

1. MFN 06-417 Supplement 3– Response to Portion of NRC Request for Additional Information Letter No. 62 – RAI Number 9.2-11 Supplement 1

cc:	AE Cubbage	USNRC (with enclosure)
	BE Brown	GHNEA/Wilmington (with enclosure)
	LE Fennern	GHNEA/San Jose (with enclosure)
	GB Stramback	GHNEA/San Jose (with enclosure)
	eDRF: 0000-0069-0419	

Enclosure 1

MFN 06-417
Supplement 3

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

Auxiliary Systems

RAI Number 9.2-11 S01

For historical purposes, the original text of RAI 9.2-11 and the GE response is included. This original response did not include any attachments or DCD mark-ups.

NRC RAI 9.2-11:

Discuss the potential for water hammer as well as operating and maintenance procedures for avoidance of water hammer in the PSWS and RCCWS.

GE Response:

The system is designed to minimize the potential for water hammer with features to mitigate water hammer should it occur. Specifically, water hammer is mitigated through the use of various system design and layout features, including:

- Minimize high points in the system
- Provide for venting at all high points
- Procedural requirements ensuring proper line filling prior to system operation and following maintenance operations will be addressed by the COL applicant.
- Valve actuation times that are slow enough to prevent water hammer.
- Use of check valves at pump discharge to prevent backflow into the pump.

DCD Subsections 9.2.1 and 9.2.2 will be revised in the next revision to state PSWS and RCCWS meets GDC 4 with respect to water hammer.

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

NRC RAI 9.2-11 S01:

The response is acceptable, but cannot be considered "resolved" until the staff sees the DCD revision (a DCD markup was not provided with the RAI response).

GHNEA Response:

DCD Tier 2, Revision 3, Subsections 9.2.1.1, 9.2.1.2, and 9.2.2.1 provide a discussion of the design features to minimize water hammer events for the PSWS and RCCWS. Please note that because of the design differences between the RCCWS and PSWS, the DCD write-ups are different for the following reasons.

Design features to minimize water hammer differ between open and closed-loop water systems. For the ESBWR conceptual design, the PSWS is an open-loop system, while the RCCWS is a closed-loop system. The use of Air Release/Vacuum valves is common in open-loop systems such as Service Water (or Circulating Water) systems with cooling towers or once-through design. Service Water systems are typically filled by starting their pumps. The Air Release/Vacuum valves are automatic and function to vent the system when these service water pumps are started.

Unlike open-loop systems, closed-loop systems, such as the RCCWS, are filled in a slower manner with makeup water systems. High point vents are controlled manually to allow filling and venting.

Additionally, "proper valve actuation times" and "check valves at the pump discharge" are applied to Service Water systems which have cooling components at high elevations and provide long legs (risers) of drain down back to the basin or cooling pond at lower elevations.

Because the RCCWS is a closed-loop system, the mechanism and flow path for drain down of risers is not available for a properly filled and vented system. Proper system engineering design of closed-loop systems precludes system pressure from falling below vapor pressure of the fluid being transported. Surge tanks are also used per DCD Tier 2, Revision 3, Subsection 9.2.2.2 within the RCCWS, which provide NPSH to the RCCWS pumps and maintain system above vapor pressure to mitigate voiding.

DCD Impact

DCD Tier 2, Revision 3, Subsections 9.2.1.1, 9.2.1.2, and 9.2.2.1 provide a discussion of the design features to minimize water hammer events for the PSWS and RCCWS.