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MFN 08-928, Supplement 1

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Subject: **Supplemental Response to Portion of NRC Request for Additional Information Letter No. 295 Related to the ESBWR Design Certification – Containment Systems – RAI Number 6.2-195 S01**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) supplemental response to the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) sent by NRC letter No. 295 (Reference 1). GEH response to RAI Number 6.2-195 S01 is addressed in Enclosure 1. DCD markups associated with this response are provided in Enclosure 2.

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

Sincerely,

Richard E. Kingston

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Vice President, ESBWR Licensing

Reference:

1. MFN 09-033, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, GEH, *Request For Additional Information Letter No. 295 Related To ESBWR Design Certification Application*, dated January 13, 2009

Enclosures:

1. Supplemental Response to Portion of NRC Request for Additional Information Letter No. 295 Related to ESBWR Design Certification Application – Containment Systems – RAI Number 6.2-195 S01

2. MFN 08-928, Supplement 1 – RAI Number 6.2-195 S01 – DCD Appendix 6B Markups

cc:	AE Cubbage	USNRC (with enclosures)
	RE Brown	GEH/Wilmington (with enclosures)
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	eDRFs	0000-0096-5071

Enclosure 1

MFN 08-928, Supplement 1

Response to Portion of NRC Request for Additional Information Letter No. 295 Related to ESBWR Design Certification Application

Containment Systems

RAI Number 6.2-195 S01

NRC RAI 6.2-195 S01:

In RAI 6.2-195, the staff requested clarification on the differences between Figure 6.2-7 and Figures 6B-2, 6B-3 and 6B-4, respectively. A response was provided that was not planned to be incorporated into the DCD. The response to RAI 6.2-195 should be included in Appendix 6B to provide clarity and understanding of the relationship of Figures 6B-2, 6B-3, and 6B-4 to that of Figure 6.2-7, which is the TRACG nodalization used for the licensing analysis.

The staff has selected the following text from the GEH response to RAI 6.2-195 for input to ES8WR DCD Tier 2 Chapter 6, Appendix B (text bracketed).

GEH Response:

The nodalization figures found in DCD Tier 2, Revision 5, Appendix 6B (Figures 6B-2, 6B-3, and 6B-4) are provided as tieback illustrations to the approved Licensing Topical Report (LTR) NEDC-33083P-A, March 2005 (Reference 1). [During the development and evolution of the ESBWR design, changes have been made to the original nodalization presented in that LTR. In order to accurately analyze the ES8WR for reactor pressure vessel level and containment pressure responses after a loss-of-coolant accident (LOCA), the TRACG model must be updated to reflect the most current design. Due to this fact, the nodalization diagrams produced for Reference 1 will not remain representative of the ES8WR during the certification process.]1

DCD Tier 2, Figures 6B-3 and 6B-4 show, respectively, the first and second combined nodalization of the Emergency Core Cooling Systems (ECCS)/LOCA nodalization (Figure 6B-1) and the coarse long-term containment nodalization (Figure 6B-2). [Figures 6B-3 and 6B-4 represent a departure from the nodalization presented in Reference 1.]2

DCD Tier 2, Appendix 6B presents the tieback calculations conducted to compare the combined nodalization to the original nodalizations presented in Reference 1.

All subsequent design changes have been incorporated into these combined nodalization schemes and the results of analyses using the updated model are presented in the DCD and supporting LTRs.

Letter MFN 08-545 (Reference 2) provides a list of design changes, since the approval of TRACG for ESBWR LOCA analysis (Reference 1), that impact LOCA analysis. DCD Tier 2, Table 6.2-6a also provides a list of TRACG model changes which account for differences in the figures found in Appendix 6B and Figure 6.2-7. Table 6.2-195-1 provides a brief answer to each of the questions presented in this RAI and a cross reference to the items found in DCD Table 6.2-6a, Reference 2, or both. If the noted change in the Figure is not found in these references, an appropriate note is given.

GEH Response:

GEH agrees with the proposed changes to the DCD; however, minor changes have been made to preserve the language of the DCD.

ESBWR DCD Appendix 6B will be updated to include the abovementioned information. Please refer to attached markup.

DCD Impact:

DCD Tier 2, Appendix 6B will be revised as noted on the attached markup.

Enclosure 2

MFN 08-928, Supplement 1

RAI Number 6.2-195 S01

DCD Appendix 6B Markups

6B. EVALUATION OF THE TRACG NODALIZATION FOR THE ESBWR LICENSING ANALYSIS

The analysis for the ESBWR containment evaluation follows the application methodology outlined in Reference 6B.1-1. The TRACG nodalization approach in the licensing analysis is similar to that used in Reference 6B.1-1. However, this licensing nodalization includes some additional features and details. Some of these features are implemented to address the confirmatory items listed in the Safety Evaluation Report of Reference 6B.1-1. Other features are implemented due to design changes. Table 6.2-6a summarizes the list of these changes in the TRACG nodalization.

This appendix provides the justification for the use of the DCD nodalization (DCD Tier 2, Figures 6.2-6 and 6.2-7), including the results of the tie-back calculations using the DCD nodalization and the nodalizations presented in Reference 6B.1-1.

Tie-back calculations were performed with the combined TRACG nodalization similar to that presented in the DCD Tier 2, Figures 6.2-6 and 6.2-7. The results for these calculations were compared with those using the TRACG nodalizations presented in Reference 6B.1-1. These tie-back calculations include a total of three cases used in Reference 6B.1-1, two for the ECCS analysis (short-term calculation) and one for the containment analysis (long-term calculation). Results of this comparison show that the calculations using the combined TRACG nodalization compared well with those from the base cases in Reference 6B.1-1, and the impacts due to nodalization changes on the minimum chimney static head level (+0.1 to -0.16 m (+4 to -6.3 in)) and on the long-term DW pressure (< 2 kPa (0.3 psia)) are judged to be small by comparing to the margins.

At the time of this evaluation and in the process of running parametric cases for the feedwater line break, it was discovered that the early peak in DW pressure for the FWLB was sensitive to the time step size. Also, three other input errors were identified. Sensitivity studies were performed and the impact of these input errors on the key output parameters was identified to be small. In addition, two model enhancements were implemented into the input deck.

During the development and evolution of the ESBWR design, changes have been made to the original nodalization presented in Reference 6B.1-1. In order to accurately analyze the ESBWR for reactor pressure vessel level and containment pressure responses after a LOCA, the TRACG model is maintained up to date, reflecting the final design. Due to this fact, the nodalization diagrams in Reference 6B.1-1 are intended to document previous models, and the changes are needed to maintain the final nodalization representative of the ESBWR. The final nodalization used in certification analyses is discussed in DCD Tier 2, Sections 6.2 and 6.3. Figures 6B-3 and 6B-4 represent a departure from the nodalization presented in Reference 6B.1-1.

The following paragraphs discuss the results of these tie-back calculations, including the effect on the noncondensable gases holdup, mixing and stratification. Also included in the following discussions are the descriptions and impact of the input errors and two model enhancements.

Combined Nodalization

In the TRACG Application Report (Reference 6B.1-1), two nodalizations are used for the calculations, Figure 6B-1 (from Figure 2.7-1 in Reference 6B.1-1) for the ECCS analyses