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MFN 06-305, Supplement 2

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Subject: **Response to Portion of NRC Request for Additional Information Letter Nos. 54 and 150 Related to the ESBWR Design Certification – Radiation Protection – RAI Number 12.2-15S02**

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) 54 sent by NRC letter dated August 23, 2006 (Reference 1), and later supplemented by NRC RAI letter 150 dated February 7, 2008 (Reference 2). GEH response to RAI Number 12.2-15S02 is addressed in Enclosure 1.

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

Sincerely,

James C. Kinsey

James C. Kinsey
Vice President, ESBWR Licensing

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NRO

References:

1. MFN 06-302, Letter from U.S. Nuclear Regulatory Commission to David H. Hinds, GEH, *Request For Additional Information Letter No. 54 Related To ESBWR Design Certification Application*, dated August 23, 2006.
2. MFN 08-117, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, GEH, *Request For Additional Information Letter No. 150 Related To ESBWR Design Certification Application*, dated February 7, 2008.

Enclosure:

1. Response to Portion of NRC Request for Additional Information Letter Nos. 54 and 150 Related to ESBWR Design Certification Application – Radiation Protection – RAI Number 12.2-15S02

cc: AE Cubbage USNRC (with enclosure)
GB Stramback GEH/San Jose (with enclosure)
RE Brown GEH/Wilmington (with enclosure)
eDRF 0000-0083-7859

Enclosure 1

MFN 06-305, Supplement 2

Response to Portion of NRC Request for Additional Information Letter Nos. 54 and 150 Related to ESBWR Design Certification Application

Radiation Protection

RAI Number 12.2-15 S02

NRC RAI 12.2-15 S02:

An evaluation of the response to NRC RAI 12.2-15 S01, contained in MFN 06-0305 Supp. 1 (Dec. 11, 2007), indicates that the staff could not independently confirm the estimated annual amounts of radioactivity released in liquid effluents. In its evaluation, the staff used the 1986 version of the BWR-GALE code (aka GALE86), given that GE had used that version of the code in its analysis in estimating yearly releases of radioactivity in liquid effluents. In comparing both sets of results, please note the following:

1. The staff's analysis used the input described in DCD Table 12.2-19a and plant design capacity factor (0.92) listed in DCD Table 12.2-15.

2. The results from the GALE86 code analysis were adjusted (1.15) to address the difference in plant capacity factors: 0.92 as the stated design capacity factor vs the default value of 0.80 hardwired in the GALE86 code.

3. For the analysis ran with no adjustment factor for the difference in capacity factors, the staff's results matches that presented in DCD Table 12.2-19b.

4. For the analysis ran with an adjustment factor of 1.15 (0.92/0.8) for the difference in capacity factors, the staff's results do not match that presented in DCD Table 12.2-19b.

5. It is concluded that the results presented in DCD Table 12.2-19b do not account for the DCD stated plant capacity factor of 0.92. Note that the corresponding analyses used in estimating gaseous effluent source terms did make adjustments for the stated design capacity factor of 0.92.

Confirm whether the staff interpretation's of the analytical approach presented in GE MFN 06-305 Supp. 1 and liquid effluent source term results listed in DCD Table 12.2-19b is correct, revise the liquid effluent source terms listed in DCD Table 12.2-19b, revise the estimated liquid effluent concentrations listed in Table 12.2-19b, and revise the associated dose results shown in Table 12.2-20b.

GEH Response:

There is no input card for the capacity factor in the GALE-86 code. A capacity factor of 0.8 is an internal default value.

In the liquid effluent releases in the BWR GALE-86 code, a capacity factor of 0.8 is only used for the tritium calculations; specifically, to calculate the tritium discharges via the "processed liquid regenerant wastes" stream. It is not used for other streams. If a capacity factor of 0.92 is applied using the GALE-86 Code instructions, the tritium discharges would change from 14.47 Ci/yr to 14.65 Ci/yr (note: the GALE-86 Code presents the results rounded to the whole number). This change would mean an increase in a negligible dose for a maximum increase of 1.1% for infant, total body and 1.2% for infant, lung organ. Considering that all the Tier 2, Table 12.2-20b doses are well under the 3.0E-02 mSv (3 mrem) total body and 1.0E-01 mSv (10 mrem) maximum organ dose criteria established in 10 CFR 50 Appendix I, Section II.A, this slight increase still maintains the doses due to liquid effluents well below the dose limits.

The capacity factor applies to the GALE-86 gaseous releases code module, where the default capacity factor of 0.8 is applied. Due to the fact that the use of a higher capacity factor is more conservative in calculating gaseous release (Offgas operation is one

leading contribution to gaseous releases), a capacity factor of 0.92 has been used in the ESBWR gaseous release calculations.

DCD Impact:

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