GE-Hitachi Nuclear Energy Americas LLC

James C. Kinsey
Project Manager, ESBWR Licensing

PO Box 780 M/C A-55
Wilmington, NC 28402-0780
USA

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

MFN 07-382

Docket No. 52-010

July 11, 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. 66 – Related to ESBWR Design Certification Application – RAI Number 21.6-69, 21.6-71, and 21.6-72**

Enclosure 1 contains GHNEA's response to the subject NRC RAIs transmitted via 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

D068

LRO

Reference:

1. MFN 06-377, Letter from U.S. Nuclear Regulatory Commission to David Hinds, *Request for Additional Information Letter No. 66 Related to the ESBWR Design Certification Application*, October 10, 2006

Enclosures:

1. MFN 07-382 – Response to Portion of NRC Request for Additional Information Letter No. 66 – Related to ESBWR Design Certification Application – RAI Numbers 21.6-69, 21.6-71 and 21.6-72

cc:

AE Cubbage	USNRC (with enclosures)
DH Hinds	GHNEA Wilmington (with enclosures)
BE Brown	GHNEA Wilmington (with enclosures)
eDRF	0000-0069-5934

Enclosure 1

MFN 07-382

Response to Portion of NRC Request for

Additional Information Letter No. 66

Related to ESBWR Design Certification Application

RAI Numbers 21.6-69, 21.6-71 and 21.6-72

NRC RAI 21.6-69

On page 6-142 of NEDE-32176P, Rev. 3, the sensitivity to steam condensation in containment makes reference to studies performed for a main steam line break (MSLB) where the peak pressures and temperatures in containment occur very late in the accident.

(a) Does this conclusion hold true for cases, such as the feedwater line break (FWLB), when the peaks occur early in the accident?

(b) How is the phenomena identification and ranking table (PIRT) multiplier determined for use in a licensing analysis - is the value event specific?

GE Response

(a) This conclusion holds true for all line break cases. The long-term containment responses following the opening of the Depressurization Valves (DPVs) are very similar among all line break cases, that is, the peak pressures and temperatures in containment occur very late in the accident (DCD Tier 2, Revision 3, Section 6.2).

The early pressure peak calculated in the FWLB case, presented in DCD Tier 2, Revision 1, was later identified as the result of a numerical problem commonly known as "water packing" (See response to RAI 6.2-59). Results of parametric cases show that this "water packing" can be avoided by specifying smaller time step size during the blowdown period of the LOCA event.

(b) The PIRT multiplier is determined on the basis of comparisons between separate effects test data and TRACG calculations performed. The value is not event specific.

The biases and uncertainties indicated by the data comparisons are used to establish probability density functions (PDFs) for TRACG parameters and correlations. These are implemented into TRACG through special input parameters designated as "PIRT multipliers". Biases are compensated by appropriate choice of the mean value of the PIRT multiplier and uncertainties are accommodated by choosing PDFs to represent the standard deviation of the data comparisons. The upper bound or lower bound value of a PIRT multiplier that would generate the larger negative impact on the calculated safety parameter (e.g., the minimum static head inside the chimney) is selected for use in the licensing calculation.

DCD Impact

DCD Tier 2, Subsection 6.3.3.7.9 will be revised in the next revision to document the "PIRT multipliers" used for the LOCA calculations.

No changes to the subject LTR will be made in response to this RAI

NRC RAI 21.6-71

In Section 7.11.1.2 of NEDE-32176P, Rev. 3, reference is made to the bounding model used to address uncertainties in the amount and location of noncondensable gases in containment. The model as shown in Figure 7-43 does not include the features referenced to for the MSLB case. How does the current model address these uncertainties for each type of accident (MSLB, FWLB, etc.)

GE Response

The long-term containment pressure depends on the distribution of noncondensable gases, and clearing all noncondensable gases from the drywell into the wetwell can maximize the peak pressure. The current model (DCD Tier 2, Revision 3, Section 6.2) includes the features discussed in the Referenced report. These features are finer nodalization for the lower drywell and two-pipe connection between the GDCS airspace and the DW (DCD Tier 2, Revision 3, Appendix 6A, Table 6A-1, Item 1 and Item 6). The new nodalization results in quicker and more complete clearing of noncondensable gases from the lower drywell, and complete purging of residual noncondensable gases in the GDCS airspace.

The long-term containment responses following the opening of the Depressurization Valves (DPVs) are very similar among all break cases, that is, the peak pressures in containment occur very late in the transient when all noncondensable gases are cleared from the drywell into the wetwell.

DCD Impact

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

No changes to the subject LTR will be made in response to this RAI.

NRC RAI 21.6-72

In Section 7.11.2.1 of NEDE-32176P, Rev. 3, the text describes two axial levels while the reference figure shows three. How does the selection of the number of axial levels effect the natural circulation in this region, the amount of mixing which influence the wetwell gas temperature and pressure?

GE Response

Results of sensitivity studies show that the natural circulation and the amount of mixing affect the wetwell gas temperature and pressure, and restricting the circulation can maximize the wetwell (and containment) pressures. The current model (DCD Tier 2, Revision 3, Appendix 6A, Table 6A-1, Item 5) includes a bounding feature that restricts the gas circulation between the top (ceiling) level and the next level in the wetwell. The top level models the airspace between the ceiling and approximately the bottom of the structural members (I-Beams). The top level receives the drywell-to-wetwell leakage flow with hotter gas mixture through the vacuum breakers. The I-Beams enhances stratification of the hotter gas mixture and restricts the mixing with the gases in the lower part of the wetwell. The current model uses three axial levels (instead of two axial levels used in the sensitivity studies and earlier calculations) because it can better represent the physical and hardware locations.

DCD Impact

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

No changes to the subject LTR will be made in response to this RAI.