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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 120 - Related to ESBWR Design Certification Application – RAI Number 21.6-71, Supplement 1**

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) sent by the Reference 1 NRC letter. GEH response to RAI Number 21.6-71 Supplement 1 is addressed in Enclosure 1.

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

Sincerely,

James C. Kinsey
Vice President, ESBWR Licensing

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NRO

References:

1. MFN 07-717, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request for Additional Information Letter No. 120 Related to the ESBWR Design Certification Application*, dated December 19, 2007
2. MFN 07-382, *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,* dated July 11, 2007

Enclosure:

1. MFN 08-484 – Response to Portion of NRC Request for Additional Information Letter No. 120 - Related to ESBWR Design Certification Application – RAI Number 21.6-71 S01

cc: AE Cubbage USNRC (with enclosure)
GB Stramback GEH/San Jose (with enclosure)
RE Brown GEH/Wilmington (with enclosure)
DH Hinds GEH/Wilmington (with enclosure)
eDRF 0000-0083-3691

Enclosure 1

MFN 08-484

Response to Portion of NRC Request for

Additional Information Letter No. 120

Related to ESBWR Design Certification Application

RAI Number 21.6-71 S01

NRC RAI 21.6-71 S01

Address questions concerning nodalization to address noncondensible gases

According to the GEH's response to RAI 21.6-71, the TRACG model (DCD Tier 2, Revision 3, Section 6.2) included "finer nodalization for the lower drywell and two-pipe connection between the GOCS airspace and the DW", and "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 GOCS airspace." Please address the following:

A. *DCD Tier 2, Revision 4, Figure 6.2-13d1 shows a significant noncondensable (NC) gas pressure of about 40 kPa in the drywell head (level 35, Ring 1) at 72 hours, for the feedwater line break (FWLB) (when compared with the maximum DW pressure, 351.7 kPa, as reported in Table 6.2-5). Please describe why TRACG does not completely purge NC gases from the drywell (DW) to the wetwell (WW) at 72 hours, as described in DCD Tier 2, Revision 4, Table 6A-1, Item 6. What impact would this additional NC gas have on the WW pressure at 72 hours?*

B. *DCD Tier 2, Revision 4, Figure 6.2-7 shows the NC gas pressure plots for only a few DW and gravity driven cooling system (GDCS) levels (L30, L34, and L35). The staff is unable to find any plots in the DCD that would show that the NC gases are effectively purged from the lower DW (L21, L22). Please add the lower DW NC gas simulation plots to the DCD to demonstrate that the NC gases are effectively purged from the lower DW.*

C. *DCD Tier 2, Revision 4, Figure 6.2-13d1 also shows a GDCS NC gas pressure of about 10 kPa (Level 34, Ring 7) at 72 hours. Does this mean that the 2-pipe connection between the GDCS and the DW does not purge all the GDCS airspace for low GDCS pool levels such as in the FWLB? Moreover, in response to RAI6.2-98 (MFN 07-312 dated June 20, 2007), Figure 6.2-98-12 reveals that GDCS gas space Level 33 shows no effect of the two-pipe connect ion. There is over 700 kg of air in the GDCS at 72 hours. Please describe what impact the additional NC gas in the GDCS will have on the WW pressure at 72 hours.*

D. *DCD Tier 2, Revision 4, Figure 6.2-14d1 shows a sudden drop of various DW and GDCS NC gas pressures to zero around 18 hours, for the main steam line break (Bounding Case). What is the physical explanation behind the sudden drop of various DW and GDCS NC gas pressures?*

GEH Response

(A) The key containment responses to a postulated feedwater line break (FWLB case in DCD Tier 2, Revision 4, Section 6.2) with bounding conditions are discussed in the response to RAI 6.2-98 S01 (MFN 08-011, dated 1/09/2008), in paragraphs A2 through A2.8. The noncondensable (NC) gas responses (gas pressure and mass) are discussed in paragraph A2.4. At 72 hours, the total NC gas masses in the drywell (DW) head and GDCS gas spaces are 30 and 680 kg, respectively. These

amounts are about 0.2% and 5% of the total NC gas mass inside the containment (drywell and wetwell). The impact of this residue NC gas mass is an increase of 5% in the calculated DW pressure (paragraph A2.5, response to RAI 6.2-98 S01). The margin to the design pressure of 312 KPa(g) [45.3 psig] would reduce from 19.9% to 14.2%.

The response to RAI 6.2-98 S01 (MFN 08-011) also discusses the modeling of double pipe connection and the effect on the MSL and non-MSL breaks. For the non-MSL break cases, such as the FWL break case, the GDCS pool level drops to about 6 meters below the lower connection pipe. The pool level is situated at one 1 axial level (Level 33 in the TRACG nodalization) below the lower connection pipe. Under this situation, a small amount of NC gas is trapped in this level, due to lack of direct communication with the connection pipes.

(B) In the response to RAI 6.2-98 S01 (MFN 08-011), Figure 6.2-98 S01-9 shows the DW annulus NC gas pressures for the MSL bounding case. Similar plots will be presented in the DCD Rev. 5, Section 6.2 analyses.

(C) See discussion in Item (A) of this response.

(D) In the response to RAI 6.2-98 S01 (MFN 08-011), paragraph A1.3 discusses the physical reasons that initiate the sudden drop of various DW and GDCS NC gas pressures.

DCD Impact

A drywell NC gas pressure plot, similar to the one that is discussed in Item (B), will be presented in the DCD Rev. 5, Section 6.2 analyses.