HITACHI

GE Hitachi Nuclear Energy

Richard E. Kingston
Vice President, ESBWR Licensing

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

T 910 819 6192
F 910 362 6192
rick.kingston@ge.com

MFN 08-788

Docket No. 52-010

October 13, 2008

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. 224 - Related to ESBWR Design Certification Application – RAI Number 21.6-71 Supplement 2**

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 2 is addressed in Enclosure 1.

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

Sincerely,

Richard E. Kingston

Richard E. Kingston
Vice President, ESBWR Licensing

DO88
NRO

Reference:

1. MFN 08-576, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, Request For Additional Information Letter No. 208 Related to ESBWR Design Certification Application, dated July 10, 2008.

Enclosure:

1. MFN 08-788 – Response to Portion of NRC Request for Additional Information Letter No. 224 - Related to ESBWR Design Certification Application – RAI Number 21.6-71 S02

cc: AE Cubbage USNRC (with enclosure)
RE Brown GEH/Wilmington (with enclosure)
DH Hinds GEH/Wilmington (with enclosure)
eDRF 0000-0083-3703

Enclosure 1

MFN 08-788

Response to Portion of NRC Request for

Additional Information Letter No. 224

Related to ESBWR Design Certification Application

RAI Number 21.6-71 S02

NRC RAI 21.6-71 S02

(A) The MSLB and FWLB bounding cases summarized in DCD Tier 2, Revision 5, Table 6.2-5 show that the single failure criterion of Safety Relief Valve (1-SRV) is more conservative than the single failure criterion of Depressurization Valve (1-DPV). The predicted maximum drywell (DW) pressures are higher for the 1-SRV case than the 1-DPV case, for both MSLB (57.65 psia vs. 57.47 psia) and FWLB (53.61 psia vs. 53.36 psia) cases. This is contrary to DCD Tier 2, Revision 5, Section 6.2.1.1.3 (Design Evaluation) and the GEH response to RAI 6.2-98 S01 that document the failure of one Depressurization Valve (DPV) to be the limiting single failure criterion for the containment pressure evaluation.

Please explain if 1-DPV would still be considered the limiting single failure criterion.

Considering the scarcity of the margin, please include in Table 6.2-5, the results of "Steam Line With Noncondensable Adjustment" with 1-SRV single failure criterion.

(B) DCD Tier 2, Revision 4, Figure 6.2-14d1 showed a sudden drop of various DW and GDCS Noncondensable (NC) gas pressures to zero around 18 hours, for the main steam line break (Bounding Case). In the response to RAI 21.6-71 S01, GEH cited RAI 6.2-98 S01 (MFN 08-011), paragraph A1.3 explaining the physical reasons behind the sudden drop of various DW and GDCS NC gas pressures. Essentially, the addition of subcooled downcomer water would condense extra steam in the DW annulus that would lower pressure in the DW annulus region and lead to clearing of the NC gases to the DW annulus. However, Figure 6.2-14d1 in DCD Tier 2, Revision 5 does not show the same or similar NC gas pressure drop. Please explain why the earlier GE response does not appear to be applicable to the new Figure 6.2-14d1.

GEH Response

(A1) The following paragraph explains the selection of the limiting single failure criterion. Paragraph (B) of the response to RAI 6.2-189 (MFN 08-781) discusses the responses from MSLB cases with single failure of one DPV and single failure of one SRV. The transient responses are nearly identical. The difference in DW pressure margins between these two cases is acceptably small (0.3%), considering that the margins for both cases are greater than 1.5%. Both cases can be considered as the limiting event. For consistency with the results presented in Table 6.2-5, the limiting event will be revised as the MSLB with failure of one SRV in DCD Revision 6.

(A2) Table 6.2-5 will be revised in DCD Revision 6 to include the results of MLSB-1SRV case.

(B) The differences in responses are results of code modifications summarized below.

The Program Library version of TRACG04 PC Version 53 (29-Sept-2005) has been used to perform the LOCA and containment analyses supporting the ESBWR DCD

Revisions 3 and 4, including the results presented in DCD Revision 4, Figure 6.2-14d1. The PC Version 5704 (14-Apr-2008) has been used to perform the LOCA and containment analyses supporting the ESBWR DCD Revision 5, including the results presented in DCD Revision 5, Figure 6.2-14d1. Both the PC Version 53 and PC Version 5704 have been confirmed to be acceptable through software testing and various code qualifications.

The large drop of DW head and GDCS NC gas pressures in the Revision 4 results has been attributed to the interactions between the level swell in the downcomer, the surge of subcooled water flow into the DW, and the steam condensation in the DW annulus regions (including the vertical main vents connecting the DW to the suppression).

Since the PC Version 53, a list of code improvements has been implemented into TRACG. Table 21.6-109 in MFN # 08-710 (Response to RAI 21.6-109) summarizes all the changes implemented into TRACG. Among these modifications, there are several changes that could affect the responses discussed in the above paragraph. These are:

(1) 2007.08.22 Enhance treatment of the discontinuous void profile,

(2) 2008.01.30 Refine shear implementation,

(3) 2008.02.05 Provide better tracking of void discontinuities in 1D components,

(4) 2008.03.09 Match interfacial shear entrainment with interfacial heat transfer.

The GDCS NC gas pressures in the DCD Revision 5 results (Figure 6.2-14d1, DCD Revision 5) also show a decrease in pressure at around 13.5 hours. These pressure decreases are smaller in magnitude and milder than the DCD Revision 4 results. The differences in responses are results of above code modifications.

DCD Impact

Subsections 6.2.1.1.3.5, 6.2.1.1.3.5.1 and Table 6.2-5 will be revised in DCD Revision 6, as shown in the Response to RAI 6.2-189.