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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 321 Related to the ESBWR Design Certification – Containment Systems – RAI Number 6.2-193 S01**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) responses to the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) sent by NRC letter No. 321 (Reference 1). GEH response to RAI Number 6.2-193 S01 is addressed in Enclosure 1.

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

Sincerely,

Richard E. Kingston
Vice President, ESBWR Licensing

Reference:

1. MFN 09-196, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, GEH, *Request For Additional Information Letter No. 321 Related To ESBWR Design Certification Application*, dated March 18, 2009

Enclosure:

1. Response to Portion of NRC Request for Additional Information Letter No. 321 Related to ESBWR Design Certification Application – Containment Systems – RAI Number 6.2-193S01

cc: AE Cubbage USNRC (with enclosure)
JG Head GEH/Wilmington (with enclosure)
DH Hinds GEH/Wilmington (with enclosure)
eDRFs 0000-0100-5612

Enclosure 1

MFN 09-390

Response to Portion of NRC Request for Additional Information Letter No. 321 Related to ESBWR Design Certification Application

Containment Systems

RAI Number 6.2-193 S01

NRC RAI 6.2-193 S01:

GEH's response to RAI6.2-193 included results of containment-LOCA performance analyses for bounding steam line break inside containment and feedwater line break for 72 hours for feedwater operating domain point SP2 using a more realistic decay heat corresponding to 100% reactor power. The results show that the containment pressure at 72 hours increased by 1.5 kPa from the corresponding bounding case reported in the ESBWR DCD Revision 5. Based on these results GEH stated that "DCD Tier 2, Revision 5, Section 6.2 SPO Containment Bounding analyses bound the SP2 analyses."

However, the staff noted that for the SP2 analyses and DCD Tier 2, Revision 5, Section 6.2 SPO Containment Bounding analyses, GEH assumed a drywell-towetwell bypass leakage values of 1 cm2 (A/K) and 2 cm2 (A/K), respectively. Further, GEH has informed the staff that in response to RAI 21.6-103, GEH will no longer assume a loss of offisite power at the initiation ot a loss-of-coolant accident for the SPO Containment Bounding analyses since this was a non-conservative assumption for this scenario. This change will increase the amount of feedwater flowing into the containment during the accident from that accounted in DCD Tier 2, Revision 5, Sec ion 6.2 SPO Containment Bounding analyses.

Describe the effect of increased drywell-to-wetwell bypass leakage and increased amount of feedwater flowing into the containment on the SP2 analyses.

GEH Response:

The effect of increased drywell-to-wetwell bypass leakage is adequately described in ESBWR DCD Appendix 6I. The effect of an increased amount of feedwater flowing into containment is addressed in the response to RAI 21.6-103 in GEH letter MFN 09-224 dated April 24, 2009 and revised response via GEH letter MFN 09-224, Supplement 1 dated June 15, 2009. The SP0 Containment Bounding analysis, the SP1 Containment Bounding Analysis, and the SP2 Containment Bounding Analysis have been reanalyzed to account for the additional feedwater injection associated with the availability of offsite power; the results are included in ESBWR DCD Rev. 6 and NEDO-33338 Rev. 1 respectively. Presented in this response is an update to the analysis presented in the original response to RAI 6.2-193.

A TRACG analysis of the Main Steam Line Break (MSLB) with the failure of 1 Safety Relief Valve (1SRV) was performed for a period of 72 hrs. This analysis is consistent with current MSLB modeling assumptions, including the availability of offsite power and detailed modeling of the feedwater lines (FWL). Additionally, for the purposes of this response, the TRACG transient analysis is initialized at an increased feedwater temperature consistent with the SP2 operating state (T_{fw}=525.37 K). Furthermore, the decay heat assumed corresponds to 102% operating power before the accident.

The results of this calculation are compared to the bounding MSLB with 1SRV failure containment analysis case reported in Section 6.2, DCD Rev. 6. Table 6.2-193S01-1 gives pressure and temperature comparisons between the DCD Bounding case and the case presented in this response. The final results are consistent with the original

response. Figure 6.2-193S01-1 illustrates that the differences in containment pressure response between the two scenarios is similar to the difference reported in the original response. Furthermore, Figure 6.2-193S01-2 shows that the difference in Total Power and PCCS Power are not noticeable.

The results of this analysis support the original findings reported in the response to RAI 6.2-193; the elevated FW temperature associated with SP2 does not have an appreciable effect on long-term containment pressure.

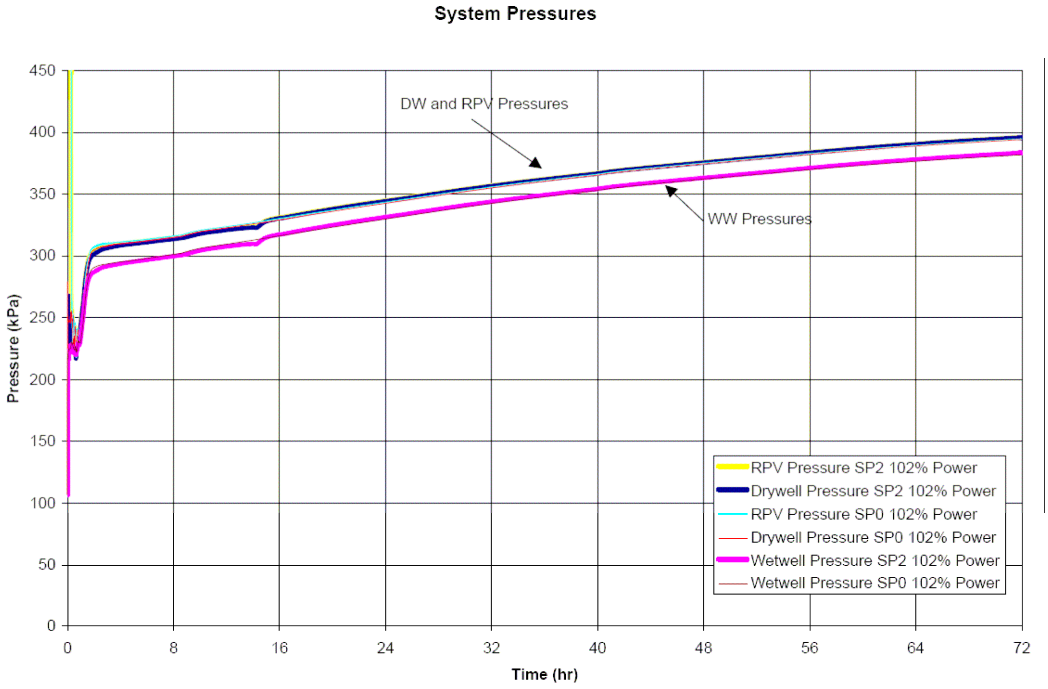

Figure RAI 6.2-193S01- 1 Comparison of System Pressures for DCD Rev. 5 Appendix 6I Limiting Case and Current Analysis.

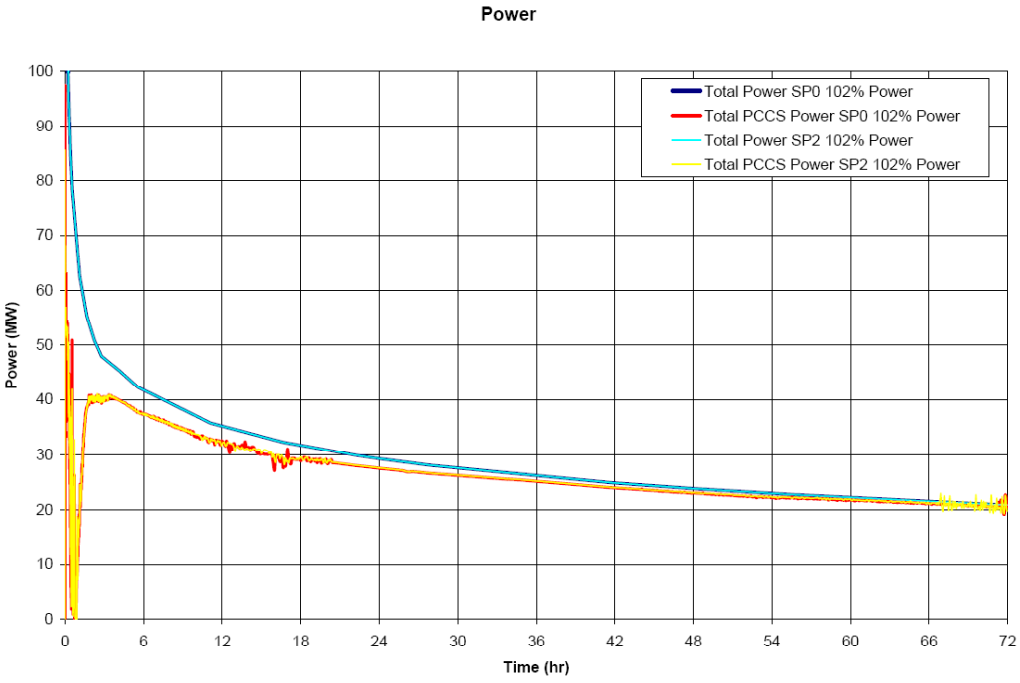

Figure RAI 6.2-193S01- 2. Comparison of Total Power and PCCS Power for DCD Rev. 5 Appendix 6I Limiting Case and Current Analysis.

Table RAI 6.2-193S0-1

Parameter	Break Size+ m^2 (ft^2)	Single Failure	Maximum DW Pressure kPa,a (psia)	Maximum DW Pressure++ kPa,gauge (psig)	Margin to Design Pressure of 45 psig+++ (%)	Short-term Bulk DW Temperature ºC (ºF)	Long-term Bulk DW Temperature ºC (ºF)	Long-term WW Temperature ºC (ºF)	Long term Suppression Pool Temperature ºC (ºF)
MSL6A_1SRV_72									
Steam Line Inside Containment++++ (DCD Rev. 6 Section 6.2)	0.09832 (1.0583)+	1 SRV	394.12 (57.16)	292.76 (42.46)	6%	174.97 (346.95)	143.17 (289.71)	128.39 (263.10)	74.33 (165.79)
Steam Line Inside Containment+++++ (RAI Response)	0.09832 (1.0583)+	1 SRV	395.76 (57.40)	294.41 (42.70)	5%	173.12 (343.61)	143.28 (289.90)	128.44 (263.19)	75.18 (167.32)

+ The break area is from the RPV side of the break.

++ Maximum DW pressure calculated during the 72 hours following a LOCA

+++ Minimum DW pressure margin calculated during the 72 hours following a LOCA

++++Limiting ESBWR Section 6.2 Case as taken from Table 6.2-5

+++++Main Steam Line Break, at Level 34, 2 GDCS vent paths. The break area from the RPV side of the break is limited by the MSL nozzle, which has a flow area of 0.09832 m^2 (1.05831 ft^2)

DCD Impact:

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