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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 302 Related to Design Control Document (DCD) Revision 5 – RAI Number 6.2-184 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. 302 (Reference 1). GEH response to RAI Number 6.2-184 S01 is addressed in Enclosure 1. ESBWR DCD markups associated with this response are provided in Enclosure 2.

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

Sincerely,

Richard E. Kingston

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Vice President, ESBWR Licensing

Reference:

1. MFN 09-150, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request for Additional Information Letter No. 302 Related to Design Control Document (DCD) Revision 5*, dated February 5, 2009.

Enclosures:

1. MFN 08-781 S02, Response to Portion of NRC Request for Additional Information Letter No. 302 Related to Design Control Document (DCD) Revision 5 – RAI Number 6.2-184 S01
2. MFN 08-781 S02, Response to Portion of NRC Request for Additional Information Letter No. 302 Related to Design Control Document (DCD) Revision 5 – RAI Number 6.2-184 S01 – DCD Markups

cc:	AE Cubbage	USNRC (with enclosures)
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Enclosure 1

MFN 08-781 S02

Response to Portion of NRC Request for

Additional Information Letter No. 302

Related to Design Control Document (DCD) Revision 5

RAI Number 6.2-184 S01

NRC RAI 6.2-184 S01

The GEH response to RAI 6.2-184 shows that providing only noncondensable gas pressure without void fraction is of little use in understanding the behavior of noncondensable gases, including the locations that retain noncondensable gas in the drywell. Provide plots of noncondensable gas mass and void fraction in the DCD.

GEH Response

Plots for the noncondensable gas mass and corresponding void fraction are provided for the containment limiting LOCA case. The locations that retain noncondensable gas and their corresponding time periods considered in this response are the same as the ones included in DCD Tier 2 for the noncondensable gas pressure. These new plots will be added in, Revision 6, as Figures 6.2-14n1 through 6.2-14o3. Also, a statement regarding these new figures will be included in DCD Tier 2, Subsection 6.2.1.1.3.5.

DCD Impact

DCD Tier 2, Figures 6.2-14n1 through 6.2-14o3 including a statement in Subsection 6.2.1.1.3.5 will be added as noted in the attached markups.

Enclosure 2

MFN 08-781 S02

Response to Portion of NRC Request for

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Related to Design Control Document (DCD) Revision 5

RAI Number 6.2-184 S01

DCD Markups

given for heat removal systems powered by these buses. Table 6.2-7h shows the sequence of events for the Main Steam Line Break with failure of one SRV and with offsite power available. Figures 6.2-14j1 through 6.2-14m3 show the pressure, temperature, DW and GDCS airspace pressure responses and PCCS heat removal for this analysis. The noncondensable mass and the void fraction in the DW and GDCS are presented in Figures 6.2-14n1 through 6.2-14o3. The cases analyzed without offsite power and water addition assume higher initial pressure, and result in higher pressure as shown in Table 6.2-5. The highest value of Maximum DW Pressure in Table 6.2-5 is the calculated peak containment internal pressure for the design basis loss of coolant accident.

6.2.1.1.3.5.1 Post-LOCA Containment Cooling and Recovery Analysis

For post-LOCA containment cooling and recovery, the Main Steam Line Break with failure of one DPV is selected. The analysis results are not sensitive to the event selection (failure of one DPV versus one SRV) due to the fact that these two cases are nearly the same in transient responses up to 72 hours and the containment pressure and temperature are rapidly reduced upon the activation of the nonsafety-related SSCs.

After the first 72 hours of the accident, the following nonsafety-related SSCs are utilized to keep the reactor at safe stable shutdown conditions, to rapidly reduce containment pressure and temperature to a level where there is acceptable margin, and then to maintain these conditions indefinitely:

(1) SSCs to refill the IC/PCC pools;

(2) PCCS Vent Fans;

(3) Passive Autocatalytic Recombiner System (PARS); and

(4) Power supplies to the PCCS Vent Fans and the IC/PCC pool refill pumps.

Once a state of safe, stable reactor shutdown is reached, ~~and~~ containment pressure and temperature are maintained with sufficient margin to containment design limits for a long period of time (Figure 6.2-14e1 through Figure 6.2-14e10) to allow the use of other non-safety related, non-RTNSS SSCs to be placed in service to~~at acceptably low values with no increasing trend, other nonsafety-related SSCs are relied upon to~~ bring the reactor to cold shutdown conditions and to further reduce the containment pressure and temperature. These SSCs include the FAPCS as the preferred method, and the RWCU/Shutdown Cooling (SDC) system in the unlikely event there is fuel damage (Subsections 9.1.3 and 5.4.8, respectively). In the unlikely event of fuel damage, where the RWCU/SDC system is used, the Reactor Building HVAC Accident Exhaust Filter Units are ~~system is~~ a required support system for limiting onsite and offsite dose. ~~The containment pressure and temperature response due to these nonsafety-related SSCs is shown in Figures 6.2-14e1 through 6.2-14e10.~~

Containment pressure and temperature responses which represent a postulated accident recovery evolution, with RWCU/SDC (fuel damage assumed) providing the cold shutdown function are shown in Figures 6.2-14e11 and 6.2-14e12. These response curves are based on the RWCU/SDC operating in suppression pool cooling mode for 24 hours, beginning seven days after a LOCA, followed by vessel injection via the normal RWCU/SDC midvessel suction line, with suction from the suppression pool. The heat removal for this mode of RWCU/SDC operation is provided by the non-regenerative heat exchanger (NRHX). A conservative heat

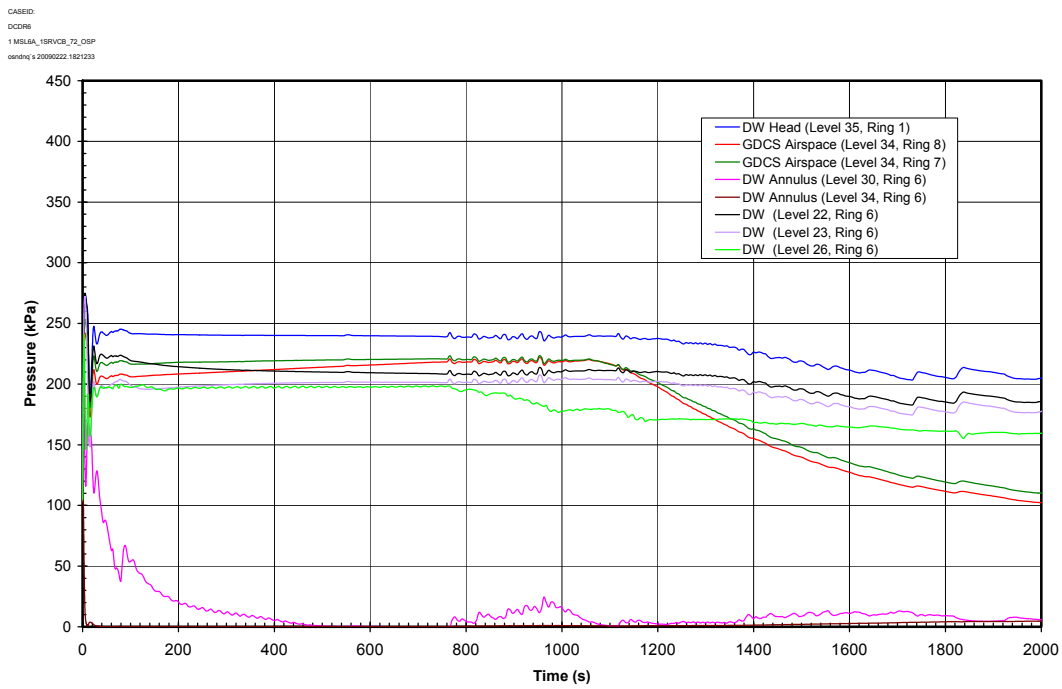

Figure 6.2-14m3. Main Steam Line Break, 1 SRV Failure (Bounding Case, with Offsite Power) – Drywell and GDCS Noncondensable Gas Pressures (2000 s)

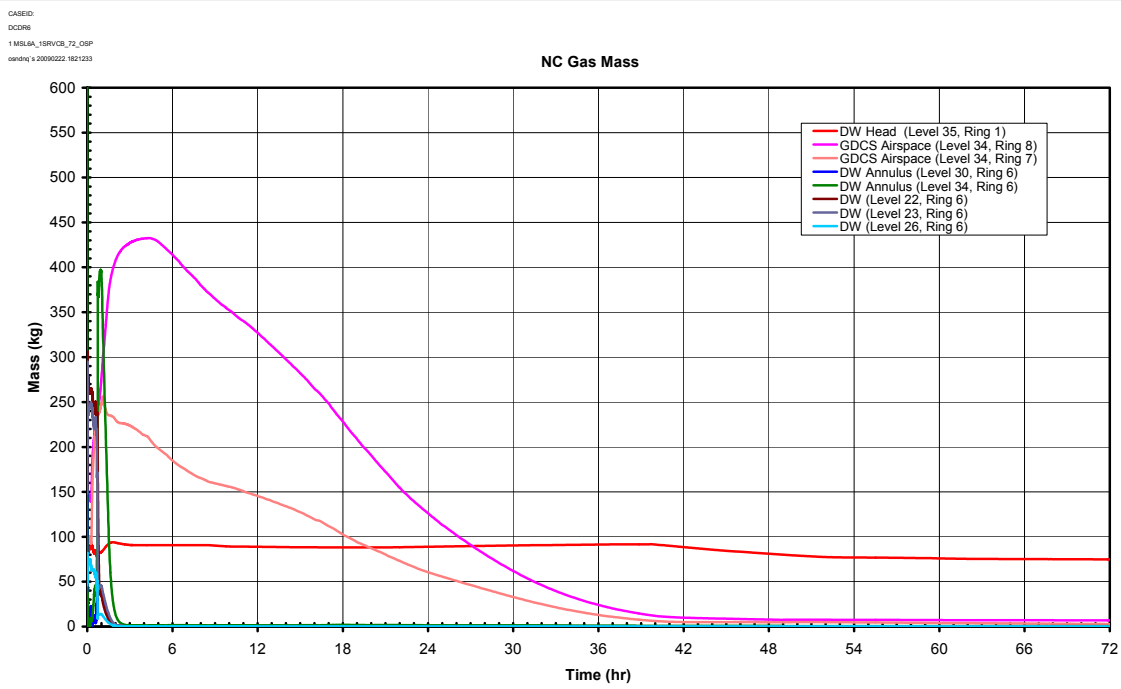

Figure 6.2-14n1. Main Steam Line Break, 1 SRV Failure (Bounding Case, with Offsite Power) –Drywell and GDCS Noncondensable Gas Mass (72 hrs)

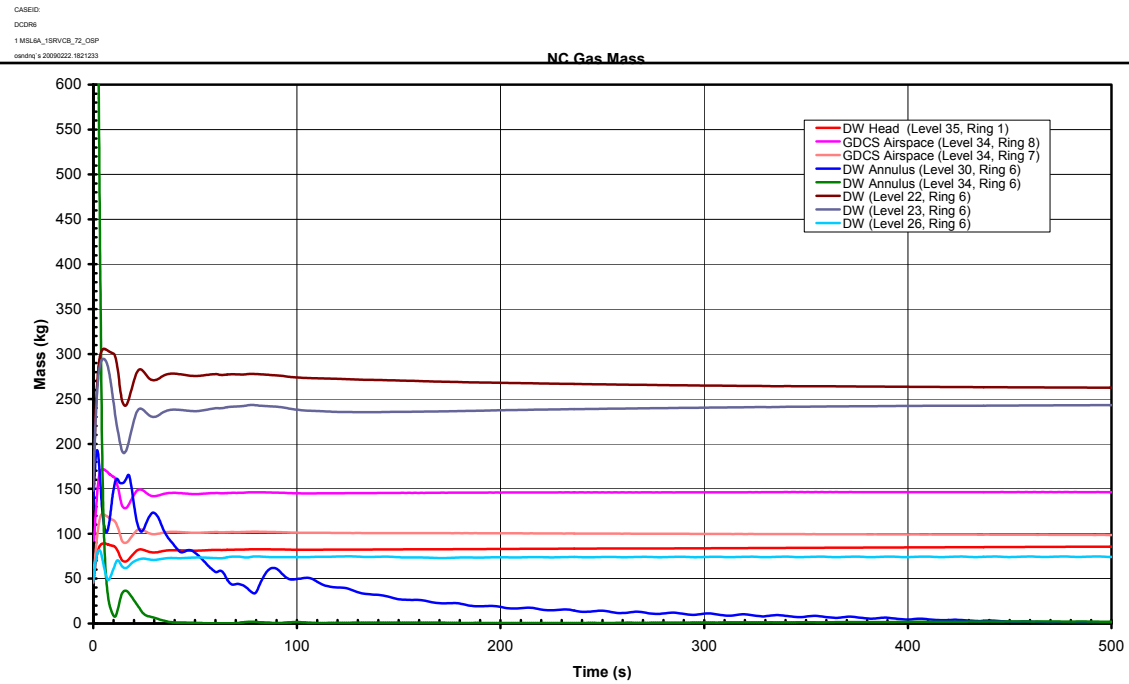

Figure 6.2-14n2. Main Steam Line Break, 1 SRV Failure (Bounding Case, with Offsite Power) –Drywell and GDCS Noncondensable Gas Mass (500 s)

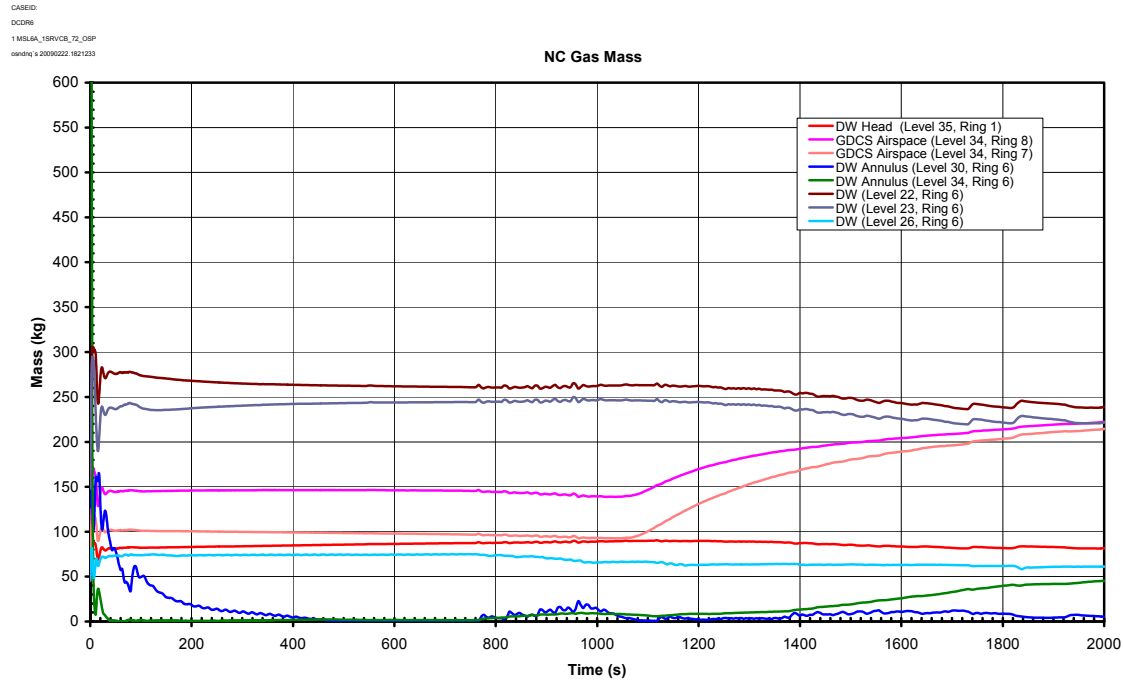

Figure 6.2-14n3. Main Steam Line Break, 1 SRV Failure (Bounding Case, with Offsite Power) –Drywell and GDCS Noncondensable Gas Mass (2000 s)

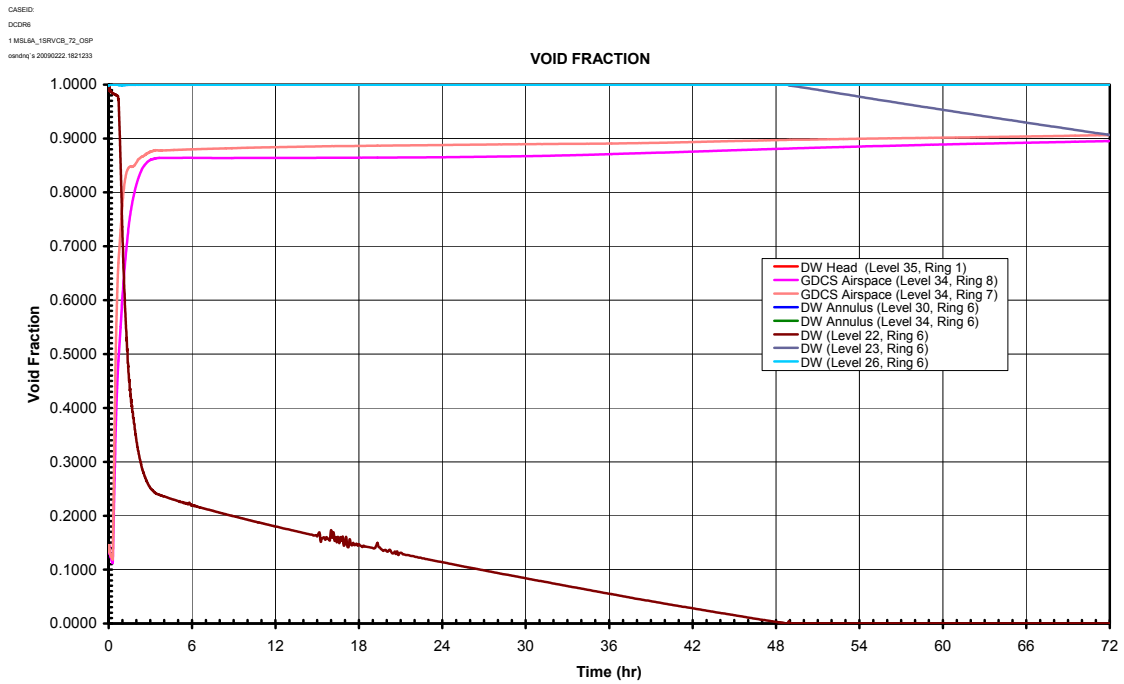

Figure 6.2-14o1. Main Steam Line Break, 1 SRV Failure (Bounding Case, with Offsite Power) –Drywell and GDCS Pool Void Fraction (72 hrs)

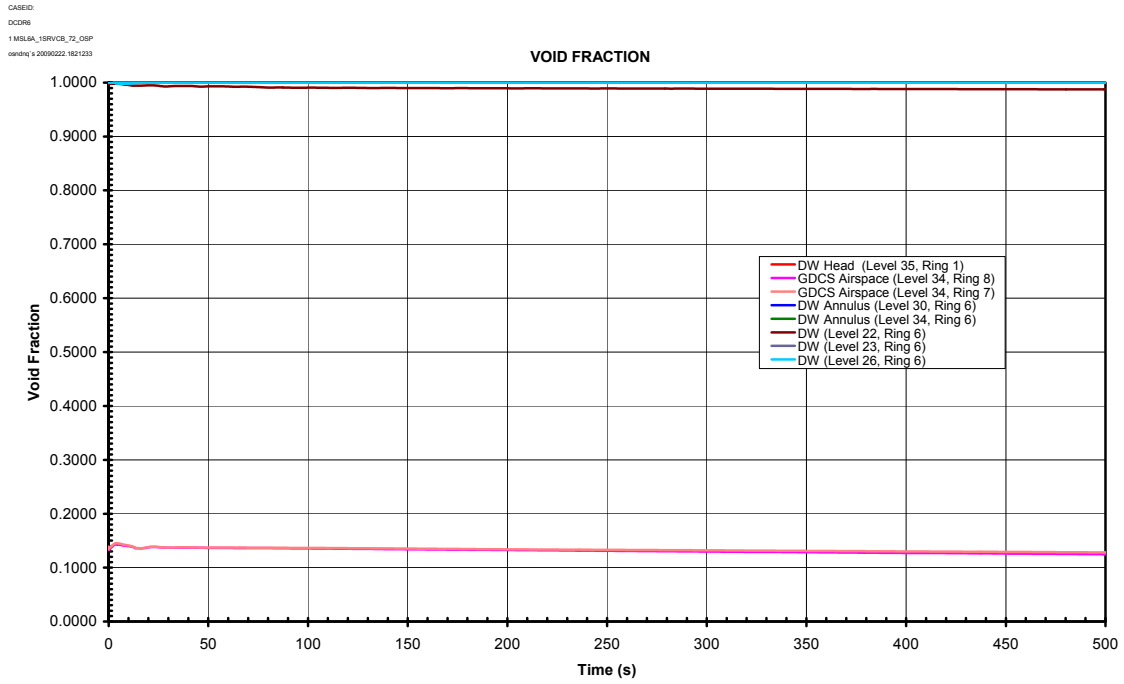

Figure 6.2-14o2. Main Steam Line Break, 1 SRV Failure (Bounding Case, with Offsite Power) –Drywell and GDCS Pool Void Fraction (500 s)

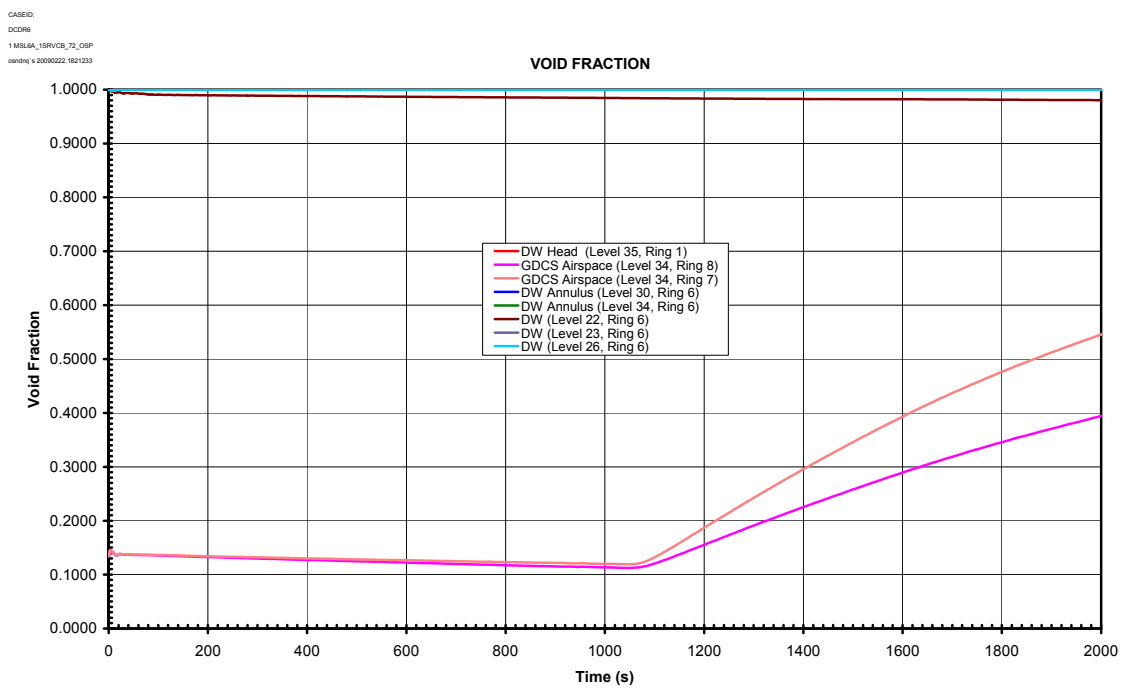

Figure 6.2-14o3. Main Steam Line Break, 1 SRV Failure (Bounding Case, with Offsite Power) –Drywell and GDCS Pool Void Fraction (2000 s)