

Enclosure 1

MFN 16-001, Revision 1

GEH Response to NRC's Request for Supplemental Information on ABWR COPS Redesign

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NRC Request for Supplemental Information:

In a public teleconference with the NRC on February 5th, the Staff's PRA team requested that:

- 1) GEH provide a listing of analysis that was reviewed for the Containment Overpressure Protection System (COPS) change in the sizes of the COPS discharge pipe and rupture disk.*
- 2) The staff's PRA team requested clarification on the MAAP inputs for the COPS pipe loss.*
- 3) The NRC's PRA staff also noted there were some legacy typographical errors in a few of the formulas in ABWR DCD subsection 19E.2.3.5.1.*

GEH Response to Supplemental Information Request:

- 1) GEH provide a listing of analysis that was reviewed for the Containment Overpressure Protection System (COPS) change in the sizes of the COPS discharge pipe and rupture disk.*

The following ABWR DCD analyses were reviewed to confirm that they were not impacted by the proposed change:

- Debris entrainment and direct containment heating 19E.2.1.5.3.1
- Core concrete interaction and debris coolability 19E.2.1.5.3.2
- Steam explosions 19E.2.3.1 and 19E.2.3.1.4
- Pool bypass 19E.2.3.3.3(4)
- Suppression pool bypass 19E.2.3.3 and 19E.2.7.3
- Critical time constant for blowdown response 19E.2.3.5.2
- RHR heat exchanger failure due to seismic event 19E.2.4.5
- In-vessel core melt scenarios 19E2.6.1
- Fission product release from core 19E2.6.2
- Ex-vessel core melt scenarios 19E2.6.6
- Fission product release flow area 19E.2.6.10
- Debris Coolability 19E.2.7.2
- Fission product release location 19E.2.8.1.1
- Accident sequences Table 19E.2-3
- Loss of all core cooling with vessel failure at low pressure (LCLP) 19E2.2.1
- Loss of all core cooling with vessel failure at high pressure (LCHP) 19E2.2.2
- Station Blackout with RCIC available (SBRC) 19E.2.2.3
- Loss of Containment Heat Removal (LHRC) 19E.2.2.4
- Large LOCA with Failure of All Core Cooling (LBLC) 19E.2.2.5

- Concurrent Loss of All Core Cooling and ATWS with Vessel Failure at Low Pressure (NSCL)
- Concurrent station blackout with ATWS (NSRC)
- Consequence Analysis 19E.3

As a result of this review, the following analyses were determined to be impacted by the change in the sizes of the COPS discharge pipe and rupture disk:

- Impact of suppression pool flashing 19E.2.3.5
- Response to suppression pool surface decompression wave 19E2.5.1
- Containment Overpressure Protection System 19E2.8.1

The markups to the affected sections of the ABWR DCD R5 are attached.

- 2) *The staff's PRA team requested clarification on the MAAP inputs for the COPS pipe loss.*

For the ABWR DCD the following was used: "MAAP-3.0B – Modular Accident Analysis Program for LWR Power Plants" (EPRI NP-7071-CCML, Nov 1990). The document is EPRI proprietary and is available at GEH for the NRC to Audit. In this program, there is a function, "KRESIS" that computes the flow path resistance based on first engineering principals (differential pressure (inlet to outlet), specific volume and flow).

This process of determining pipe loss was used in the ABWR DCD COPS evaluations since there were no piping isometric drawings available to determine an as-built pipe loss. The maximum mass rate flow (35 kg/s) was based on the calculated steam flow at an effective area of the 8 inch rupture disk with an opening pressure of 0.72 MPaA. The minimum acceptable COPS flow rate is 28 kg/s. These two flow rates were then used in the above formula to determine the pipe loss for the various COPS associated evaluations.

- 3) *The NRC's PRA staff also noted there were some legacy typographical errors in a few of the formulas in ABWR DCD subsection 19E.2.3.5.1.*

GEH has entered this issue into our Corrective Action Program. The design record file for the original calculation has been reviewed. The results of the COPS analysis in ABWR DCD R5 was determined to be correct and it was determined that the formulas in the DCD contained typographical errors. The formulas have been corrected in the attached ABWR DCD R5 markups.

Impact on DCD of COPS Redesign

The following ABWR DCD Revision 5 subsections, tables, and figures are revised as shown in the markups provided in Enclosure 2 as a result of the COPS redesign:

- Table 6.2-7
- Table 19.8-7
- Section 19E.2.3.5.1.1 through Section 19E.2.3.5.1.6
- Section 19E.2.3.5.2
- Section 19E.2.6.10
- Section 19E.2.8.1
- Section 19E.2.8.1.3
- Figure 19E.2-15
- Figure 6.2-39