Enclosure 2

MFN 09-215

Licensing Topical Report
NEDO-33440, Revision 0
"ESBWR Safety Analyses – Additional Information
March 2009"

Public Version

GE Hitachi Nuclear Energy

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March 2009

Licensing Topical Report

ESBWR Safety Analysis – Additional Information

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1.0 INTRODUCTION

The purpose of this document is to compile the information requested and commitments made in miscellaneous RAIs resulted from the NRC review on the ESBWR design certification. Those RAIs and associated MFN letters are listed in Table 1.1 and details are presented in the following sections. Only the material included in the RAI submittal is presented in this document. There is no computer analysis or technical evaluation required to support this report. Therefore, there is no conclusions or recommendations included in this report.

Table 1.1

Miscellaneous RAIs.

RAI	MFN	Info requested/commitment
6.2-19	06-159	Sensitivity studies to justify time steps and nodalization.
6.2-20 Supplement 1	08-362	Justification on initial conditions assumed in the analysis.
6.2-22	06-159	Description of the piping system within a subcompartment that is assumed.
6.2-23	06-159	Provide the subcompartment nodalization information.
6.2-23 Supplement 1	06-159 Supplement 1	TRACG analysis related information
6.2-23 Supplement 2	08-270	Correct the velocity input errors and resubmit the corrected shield wall pressurization analyses.
6.2-23 Supplement 3	08-681	Provide the basis for selecting of inventory multiplier, updated results in graphical form and include responses to RAI 6.2-23 and associated supplements in a licensing document.
6.2-24	06-159	Provide graphs/results of the pressure responses.
6.2-25	06-159	Provide the mass and energy release data.
21.6-107	08-351	Provide the updated figures and associated description. This request is issued in RAI 21.6-107 S01.

2.0 NRC RAI 6.2-19

Provide a description of the computer program used to calculate the pressures, differential pressures and flow rates between subcompartment. Discuss the conservatism of the model with respect to the pressure response of the subcompartment. Include a discussion of sensitivity studies to justify time steps, nodalization, and any other criteria used by GE to justify the final model used for licensing evaluations. If the computer code being used has not been previously reviewed by the staff, provide a comparison of the results to those predicted by an accepted code as justification for its use. Provide this information in DCD Tier 2, Section 6.2.1.2.3, "Design Evaluation." This information is necessary to evaluate ESBWR subcomparment loads per SRP 6.2.1.2 and RG 1.70, Section 6.2.1.2.

2.1 GE RESPONSE

TRACG was used to calculate the pressures, differential pressures and flow rates between

subcompartment. TRACG was qualified for analysis SBWR and ESBWR reactor system and containment in references listed below, respectively. Four additional TRACG runs have been submitted to determine the effect of time step on the calculated pressure differentials, using timesteps of [[ ]]. All sampled peak maximum pressures are within [[ ]] of the value documented in the analysis of record.

As shown in the response to RAI 6.2-23, the smallest nodes are located around the postulated break. These small nodes have a height of [[ ]] and a width of [[ ]] These dimensions are comparable to the diameter of pipes that are postulated to break. Sensitivity studies have been performed to assess the effects of Annulus Volume, RSW Vent Flow Area and Annulus Hydraulic Diameters. The effects are found to be minor.

2.2 REFERENCES

2-1 "TRACG Qualification for SBWR." GE Nuclear Energy Report NEDC-32725P, September 1997.

2-2 "TRACG Application for ESBWR." GE Nuclear Energy Report NEDC-33083P, November 2002.

3.0 NRC RAI 6.2-20 SUPPLEMENT 1

The GENE response to RAI 6.2-20 provided in GENE letter MFN 06-159, dated June 5, 2006, states that "the reactor is operating at full power and the containment is filled with dry air at atmospheric pressure and 100°C when the postulated pipe break occurs." Confirm whether 2% measurement uncertainty for the reactor power was used and explain why the containment atmosphere was assumed to fill with air instead of nitrogen.

3.1 GEH RESPONSE

The energy of the break flow entering the annulus is the source for the annulus pressurization analysis. Break flow was determined with HEM model based on the pressure and temperature (enthalpy) at the break locations. The current analyses show that the limiting case is the reactor water cleanup (RWCU) line break. The break location is at the RWCU elevation in the downcomer.

The initial pressure and liquid temperature for the 100% power and 102% power cases are compared at the downcomer location. The result shows that the pressure is about the same, and the liquid temperature for the 100% power case is about 1°K higher than that for the 102% case. For bounding break flow and energy entering into the annulus, the current analyses used the downcomer conditions at 100% power for the RWCU break.

The annulus pressurization is a very short term transient. The time duration of interest is completed within a few seconds after the break. The current analyses assumed that the annulus is initially filled with air, instead of nitrogen. This assumption is expected to have little or no impact on the calculated peak subcompartment pressure responses. This assumption is judged to be acceptable because a multiplier of 1.2 was applied to the peak pressures calculated for annulus pressurization before being applied to the structural analyses. This 1.2 multiplier ensures at least 15% margin above the analytical determined pressures (See response to RAI 6.2-18 S01, MFN 06-159 Supplement 1, dated September 12, 2007).

4.0 NRC RAI 6.2-22

Provide a description of the piping system within a subcompartment that is assumed to rupture, the location of the break within the subcompartment, and the break size. Give the inside diameter of the rupture of line and the location and size of any flow restrictions within the line postulated to fail. Provide this information in DCD Tier 2, Section 6.2.1.2.3, "Design Evaluation." This information is necessary to evaluate ESBWR subcompartment loads per SRP 6.2.1.2 and RG 1.70, Section 6.2.1.2.

4.1 GE RESPONSE

Feedwater and RWCU lines are postulated to break separately inside the Reactor Shield Annulus. An instantaneous guillotine break is assumed for each break type. The mass and energy releases from two ends of the break are lumped. [[

]] The feedwater break flow from RPV is restricted by the spargers inside the RPV.

The MSL and DPV pipe breaks are not analyzed in this analysis. The safe end of these pipes extends beyond the annulus region, such that a break would occur outside the RSW and thus not directly pressurize the annulus region. In addition, the IC return and GDCS line pipe breaks are not calculated because the these pipes are smaller than the RWCU and FW lines and will be bounded by breaks in the larger pipes.

5.0 NRC RAI 6.2-23

Provide the subcompartment nodalization information in accordance with the formats of Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants (LWR Edition) Rev. 3 (ADAMS ML011340072, ML011340108, and ML011340116), Section 6.2.1.2. Demonstrate that the selected nodalization maximizes the differential pressures as a basis for establishing the design pressures for the structures and component supports. Provide this information in DCD Tier 2, Section 6.2.1.2.3, "Design Evaluation." This information is necessary to evaluate ESBWR subcompartment loads per SRP 6.2.1.2 and RG 1.70, Section 6.2.1.2.

5.1 GE RESPONSE

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Sensitivity study of geometric input has been performed as described in the response to RAI 6.2-19.

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RAI 6.2-23, Figure 1 – Nodalization Scheme

RAI 6.2-23, Table 1 – Axial (z) Nodalization

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RAI 6.2-23, Table 2 – Azimuth (θ) Nodalization

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6.0 NRC RAI 6.2-23 SUPPLEMENT 1

In RAI 6.2-23 the staff requested for subcompartment nodalization information in accordance with the formats of Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants (LWR Edition) Rev. 3, Section 6.2.1.2. In GE's response, MFN 06-159, GE provided nodal data but stated without specifics that it calculated large pipe and vessel support structure volumes and hydraulic diameters and accounted for the additional obstructions by applying a 10% reduction factor in the annulus volume for cells where a specific obstruction is not modeled.

Please provide the following information needed to perform a confirmatory subcompartment analysis of the vessel/shield wall annular volume:

A. The TRACG input for the reactor shield wall subcompartment analysis.

B. The results of a sensitivity analysis on the number and size of the control volumes used in the shield wall subcompartment analysis. This information is needed to verify the appropriateness of the control volume nodalization used in the final reported analysis.

C. A copy of the calculation used to obtain the break mass and energy releases. This information is needed to confirm the appropriateness of the assumptions used in this calculation.

D. Detailed information and/or drawings describing the space between the reactor vessel and shield wall to include the following:

   1. The outer diameter of the reactor vessel.

   2. A description of the upper and lower heads of the reactor vessel.

   3. A description of the shield wall including inner diameter and the volumes surrounding the upper and lower vessel heads.

   4. The type and thickness of the reactor vessel insulation, and information on how the insulation is treated in the subcompartment analysis (i.e., whether the insulation is assumed to stay in place or blown away and its affect on the calculated volume and nodalization of the annular volume).

   5. A description of the flow obstructions in the reactor vessel/shield wall annular volume: flow area, flow resistance, and flow obstructions providing boundaries for the control volume nodalization.

   6. A description of the flow connections (i.e., flow area and flow resistance) between the reactor vessel/shield wall annulus and the upper part of the drywell.

6.1 GEH RESPONSE

A. Two TRACG input decks are included as Attachments 1 and 2.

FW_r2.bdk for FWL break.

RWCU_r2.bdk for RWCU Line break.

B. The GE experience with annulus pressurization of previous BWRs has indicated that smaller node sizes around the break location resulted in higher pressures. Based on this, smaller node sizes are applied near the break location. The nodalization of ESBWR annulus pressurization was supplied with the response to RAI 6.2-23. The nodes around the postulated breaks, (i.e., Levels 7 through 14) have a dimension of 0.34 m, the smallest size without encroaching the inside diameter of Feedwater or RWCU line.

A sensitivity study was performed to show the impact of the annulus volume. Annulus volumes where no specific obstructions are present were increased by 10%, and the cell volume where the peak pressure occurs was not changed due to presence of obstruction. For a RWCU line break, the peak pressure of the sensitivity cases is reduced to 1.228 MPa, compared to 1.267 Mpa of the base case.

C. Pages showing calculations of mass and energy releases are included as Attachment 3.

D. Following are item-by-item responses.

1. The outer diameter of reactor vessel is 7.476 meters.
2. Descriptions of reactor vessel, including upper and lower RPV heads, are provided in DCD Tier 2, sub-section 5.3.3.2.1.
3. The geometry of Reactor Shield Wall (RSW) is shown in the attached figure (Figure 2 Upper Drywell). The inner diameter of RSW is 9.292 meters. The thickness is 0.016 meter.
4. A description of RPV insulation is provided in DCD, Tier 2, sub-section 5.3.3.2.2, under the heading "Reactor Vessel Insulation." The insulation is designed to remain in place and resist damage during a safe shutdown earthquake. The reactor insulation is not modeled in the annulus pressurization analysis.

   The effect of blown-away insulation is addressed in a sensitivity study of reduced vent area between the annulus and drywell. A decrease in the RSW to drywell vent flow area (50% reduction) results in practically no change in the peak annulus pressure. Decreasing drywell venting does show a moderate increase in the annulus pressures as the transient progresses, however, since the peak pressure occurs so soon (3 ms) into the transient, the drywell venting does not affect the peak annulus pressures.
5. The annulus contains various piping and support structures that presents a reduction in volume from the ideal cylinder. Large Piping and vessel support structure volumes and hydraulic diameters are calculated to model the obstruction in the annulus nodal volumes. Volumes are minimized for conservatism and simplicity where necessary. For this analysis, the main steam line, feedwater, DPV, and RWCU piping is specifically incorporated. Also, the RPV stabilizer and vessel support structure are incorporated. All other smaller geometries are assumed to be distributed about the annulus. These

additional obstructions are accounted for by applying a 10% reduction in the annulus volume for cells where a specific obstruction is not modeled.

6. The geometry of upper drywell head is shown in DCD Tier 2, Figure 3G.1-51. The flow paths between the drywell head and RSW are shown in the attached figure. The upper drywell head volume is not credited in the annulus pressurization calculation to maximize the annulus pressure.

RAI 6.2-23 Supplement 1, Attachment 1 - FW_r2.bdk for FWL break

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RAI 6.2-23 Supplement 1, Attachment 2 - RWCU_r2.bdk for RWCU Line break

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RAI 6.2-23 Supplement 1, Attachment 3

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RAI 6.2-23 Supplement 1, Figure 2 Upper Drywell.

7.0 NRC RAI 6.2-23 SUPPLEMENT 2

In GEH's response to RAI 6.2-23, Supplement No. 1, Attachment 3, provided detailed calculations of the break boundary conditions for the feedwater line and RWCU/SDC line breaks. For the feedwater line break, page 2 of this attachment indicates that the calculated break velocity is 55.207 m/s for the feedwater line break. Similarly, page 3 of this attachment indicates that the calculated break velocity for the RWCU/SDC line break is 31.764 m/s. The velocity calculations used half the break flow to accommodate the 180° model of the shield wall annulus; however, the full break area, instead of half the break area, was used in the velocity calculations. Consequently, the calculated break velocities were in error by a factor of 2. The correct feedwater break velocity is 110.414 m/s and the correct RWCU/SDC break velocity is 63.528 m/s. These break velocities were directly used in the inputs for the shield wall pressurization analyses provided in Attachments 1 and 2. Please correct the velocity input errors and resubmit the corrected shield wall pressurization analyses for the feedwater and RWCU line breaks.

7.1 GEH RESPONSE:

In the revised annulus pressurization analysis using TRACG computer program, a control block to model the break flow was added to replace the velocity input in the FILL component. In addition, the PIPE component between the VSSL and FILL was removed since this artificially added component was not necessary in the current TRACG version. Only the final cases were rerun and updated since the conclusions from the sensitivity study were not affected.

The reactor water cleanup (RWCU) and feedwater (FW) line pipe break critical mass flow rates are calculated in the updated Attachment 3 below. The total blowdown break flow into the annulus consists of two components, one from the reactor pressure vessel (RPV) side of the break and the other from the pipe side of the break. A critical flow inventory multiplier of 0.5 (Reference 7-1) was applied in the blowdown break flow on the pipe side of the break. There is no change on the RPV side. The break is modeled in TRACG as a FILL component with a control block providing constant break flow rate. Modifications to the input files for the final RWCU and FW cases are presented in Attachments 1 and 2 below.

Results show the RWCU line break to be limiting, with a peak annulus pressure of 1.2124 MPa reached at 1.5 msec after the break, compared to 1.521 MPa at 3 msec from the previous analysis. For FW line break, the peak pressure is 0.8852 MPa and occurs at 13 msec into the transient, compared to 0.877 MPa at 3 msec from the previous analysis.

7.2 REFERENCES

7-1 NEDO-20533-1, "The General Electric Mark III Pressure Suppression Containment System Analytical Model Supplement 1," Appendix B, September 1975.

RAI 6.2-23 Supplement 2, Attachment 1

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RAI 6.2-23 Supplement 2, Attachment 2

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RAI 6.2-23 Supplement 2, Attachment 3

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8.0 NRC RAI 6.2-23 SUPPLEMENT 3

(A) In response to RAI 6.2-23 Supplement 2, GEH changed the critical flow inventory multiplier in the blowdown break flow on the pipe side of the break from the previously used value of 1.0 to 0.5. Please provide the basis for selecting this value.

(B) In response to RAI 6.2-23 Supplement 2, GEH states the following:

"Results show the RWCU line break to be limiting, with a peak annulus pressure of 1.2124 MPa reached at 1.5 msec after the break, compared to 1.521 MPa at 3 msec from the previous analysis. For FW line break, the peak pressure is 0.8852 MPa and occurs at 13 msec into the transient, compared to 0.877 MPa at 3 msec from the previous analysis."

GEH provided previous results in graphical form in letter MFN 06-159, dated June 5, 2006. Please provide the updated results in graphical form.

(C) GEH should include responses to RAI 6.2-23 and associated supplements in a licensing document (such as the proprietary licensing topical report as described in GEH's response to RAI 6.2.-23 in MFN-06-159 dated June 5, 2006).

8.1 GEH RESPONSE

(A) The selection of the multiplier in the blowdown break flow on the pipe side of the break is based on the modeling assumption provided on Page B-12 of the following reference:

NEDO-20533-1, "The General Electric Mark III Pressure Suppression Containment System Analytical Model Supplement 1," Appendix B, September 1975.

The pipe inventory blowdown study documented in NEDO-20533-1 is for the Mark III containment and also applicable to the ESBWR design since the phenomena of the inventory effect is independent of the containment type. The modeling change on the inventory multiplier assumption in the annulus pressurization reanalysis is consistent with the recommendation provided in NEDO-20533-1 and relaxed the overly conservative assumption adopted in the previous analysis.

(B) The updated results in graphical form are presented in the following attachments:

Enclosure 2: RWCU Line Break Result

Enclosure 3: FW Line Break Result

(C) The responses to RAI 6.2-23 and associated supplements will be provided in a new Licensing Topical Report (LTR) entitled: "NEDE-33440P, "ESBWR Safety Analysis – Additional Information," October 2008.

6.2-23 Supplement 3, Enclosure 2 - RWCU Line Break Result

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ESBWR Annulus Pressurization
RWCU Line Break

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RAI 6.2-23 Supplement 3, Enclosure 3 - FW Line Break Result

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FW Line Break

Annulus Pressurization - Level 17

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9.0 NRC RAI 6.2-24

Provide graphs of the pressure responses of all subnodes within a subcompartment as functions of time to permit evaluations of the effect on structures and component supports. Provide this information in DCD Tier 2, Section 6.2.1.2.3, "Design Evaluation." This information is necessary to evaluate ESBWR subcompartment loads per SRP 6.2.1.2 and RG 1.70, Section 6.2.1.2.

9.1 GE RESPONSE

The pressure responses of all subnodes (see response to 6.2-23) within the reactor shield annulus as consequence of RWCU and FWL pipe breaks are presented in the attached files. The data cover 0.2 second following the pipe break. Since peak pressures occur at around [[ ]] second, nodal pressures are steady at 0.2 second.

- Final RWCU Line Break
- Final FW Line Break

Each attachment contains nodal pressure charts for different elevations, with curves for different azimuths in each chart. There is also a tabular presentation of the pressures. The plot and column labels follow the TRAC/GRIT labeling convention (Ref TRACG04 User Manual, Table 4.1-1). See also the nodalization diagram provided in RAI 6.2-23.

RAI 6.2-24, Attachment 1 – Final RWCU Line Break

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ESBWR Annulus Pressurization
RWCU Line Break

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RAI 6.2-24, Attachment 2 – Final FW Line Break

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10.0 NRC RAI 6.2-25

Provide the mass and energy release data for the postulated pipe breaks in tabular form, with time in seconds, mass release rate in kg/sec, enthalpy of mass released in kJ/kg, and energy release rate in W/sec. A minimum of 20 data points should be used from time zero to the time of peak pressure. The mass and energy release data should be given for at least the first three seconds. Provide this information in DCD Tier 2, Section 6.2.1.2.3, "Design Evaluation." This information is necessary to evaluate ESBWR subcompartment loads per SRP 6.2.1.2 and RG 1.70, Section 6.2.1.2.

10.1 GE RESPONSE

Steady mass and energy releases, based on the initial operating condition, are assumed for each analysis. The mass release rate is determined with the Moody critical mass flux model.

Feedwater and RWCU lines are postulated to break separately inside the Reactor Shield Annulus. The RWCU line break, from both ends of a guillotine break, is represented by a break area of [[..]] at an elevation of [[ ]] above the vessel zero. Since only a half annulus is analyzed, the break area for TRACG analysis is [[ ]] The RWCU line assumed upstream coolant temperature and pressure are [[ ]] respectively, representative of the downcomer hydraulic conditions. The discharge velocity is [[...]]

The FW line break is represented by a break area of [[ ]] at an elevation of [[ ]] above the vessel zero. Since only a half annulus is analyzed, the break area for TRACG analysis is [[ ]] The assumed FW line upstream coolant temperature and pressure are [[ ]] respectively, representative of the FW line hydraulic conditions. The discharge velocity is [[ ]]

11.0 NRC RAI 21.6-107

Justify the removal of the figures, or include the updated figures and associated description back into the report.

This RAI is concerning Confirmatory Item No. 4 in NEDC-33083P-A, "TRACG Application for ESBWR," March 2005:

GEH had taken the entire Section 7.1 1 (Containment Components) out of the "Component Model" section in Licensing Topical Report, TRACG Model Description (NEDE-32176P), Rev. 1. As a result, the information on Drywell, Wetwell Air Space, Suppression Pool, and Main Vents, such as included in Table 6.5-3 in Rev. 1, was not present in Rev. 2. Though, GEH has put back Section 7.1 1 in Rev. 3, the Rev. 1 sub-section "Model Assessment" has been significantly shortened to "7.1 1.7.7 Model Applicability" in Rev. 3, by removing three figures (Figure 7.1 1-5 Pressure Suppression Test Facility; Figure 7.1 1-6 Drywell Pressure Response; and Figure 7.1 1-7 Vent Flow Transient), and the related description. The staff considers these figures to be important as they showed the facility schematics and dimensions; and compared the TRACG predictions with the measured drywell pressure and vent flow rate data.

Please justify the removal of these figures, or include the updated figures and associated description back into the report.

11.1 GEH RESPONSE

The Figures 7.11-5, 7.11-6, and 7.11-7 [[

]] This rationale provides justification for not including these Figures in the TRACG model description report.

Items a) and b) below provide suitable alternative locations for these Figures.

a) Figure 7.11-5 of Reference [11-1] is [[
]]

b) The TRACG vs. PSTF data comparisons previously reported in Figures 7.11-6 (Drywell pressure) and 7.11-7 (Vent flow rate) of Reference [11-1] have been [[

]]

11.2 REFERENCES

11-1 TRACG Model Description, NEDE-32176P, Revision 1, Class 3, February 1996.

11-2 TRACG Qualification for SBWR, NEDC-32725P, Class 3, September 1997.

11-3 MFN 02-053, Enclosure 1, TRACG Qualification for SBWR , NEDC-32725P, Revision 1, August 2002

[[ ]]

RAI 21.6-107, Figure 21.6-107-1 Drywell Pressure Response (PSTF Test 5703-1)

[[ ]]

RAI 21.6-107, Figure 21.6-107-2 Vent Flow Transient (PSTF Test 5703-1)

MFN 09-215

Affidavit

Larry J. Tucker

March 31, 2009

GE-Hitachi Nuclear Energy Americas LLC

AFFIDAVIT

I, Larry J. Tucker, state as follows:

(1) I am Manager, ESBWR Engineering, GE-Hitachi Nuclear Energy Americas LLC ("GEH"), have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information to be discussed and sought to be withheld is delineated in the letter from Mr. Richard E. Kingston to U.S. Nuclear Regulatory Commission, entitled "*MFN 09-215 Transmittal of Licensing Topical Reports (LTR) NEDE-33440P and NEDO-33440, Revision 0 "ESBWR Safety Analysis – Additional Information March 2009"* dated March 31, 2009. The information in Enclosure 1, which is entitled *"MFN 09-215 Licensing Topical Report NEDE-33440P, Revision 0 "ESBWR Safety Analysis – Additional Information March 2009" – GEH Proprietary Information* contains proprietary information, and is identified by [[dotted underline inside double square brackets{3}]]. Figures and other large objects are identified with double square brackets before and after the object. In each case, the superscript notation {3} refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner or licensee, GEH relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.390(a)(4) for "trade secrets" (Exemption 4). The material for which exemption from disclosure is here sought also qualify under the narrower definition of "trade secret", within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).

(4) Some examples of categories of information which fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by GEH's competitors without license from GEH constitutes a competitive economic advantage over other companies;

b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;

c. Information which reveals aspects of past, present, or future GEH customer-funded development plans and programs, resulting in potential products to GEH;

d. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a. and (4)b. above.

(5) To address 10 CFR 2.390(b)(4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GEH, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GEH, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties, including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or subject to the terms under which it was licensed to GEH. Access to such documents within GEH is limited on a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist, or other equivalent authority for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GEH are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.

(8) The information identified in paragraph (2) above is classified as proprietary because it contains computer code analysis inputs and assumptions used by GEH for analyzed transients using the TRACG computer model. Development of these inputs and assumptions and the TRACG computer code was achieved at a significant cost to GEH, and is considered a major GEH asset.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GEH's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GEH's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and

includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical and NRC review costs comprise a substantial investment of time and money by GEH.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GEH's competitive advantage will be lost if its competitors are able to use the results of the GEH experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GEH would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GEH of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing and obtaining these very valuable analytical tools.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed on this 31st day of March 2009.

Larry J. Tucker
GE-Hitachi Nuclear Energy Americas LLC