



**HITACHI**

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**Proprietary Notice**

This letter forwards proprietary information in accordance with 10CFR2.390. Upon the removal of Enclosure 1, the balance of this letter may be considered non-proprietary.

MFN 09-023 Supplement 5

Docket No. 52-010

October 5, 2010

U.S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, D.C. 20555-0001

**Subject: Transmittal of Supplemental Information Regarding GEH Response to NRC Request for Additional Information (RAI) Number 6.2-140 S06**

The purpose of this letter is to submit supplemental information pertaining to apparent "chatter" in PCCS Vent Fan plots for fan flow and head plots as provided in Reference 1. The supplemental information is contained in Enclosure 1.

Enclosure 1 contains GEH proprietary information as defined by 10 CFR 2.390. GEH customarily maintains this information in confidence and withholds it from public disclosure. Enclosure 2 is the non-proprietary version, which does not contain proprietary information and is suitable for public disclosure.

The affidavit contained in Enclosure 3 identifies that the information contained in Enclosure 1 has been handled and classified as proprietary to GEH. GEH hereby requests that the information of Enclosure 1 be withheld from public disclosure in accordance with the provisions of 10 CFR 2.390 and 9.17.

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

Sincerely,

*Richard E. Kingston*  
Richard E. Kingston  
Vice President, ESBWR Licensing

*DOLB*  
*NRO*

Reference:

1. MFN 09-023 Supplement 4, Letter from Richard E. Kingston to U.S. Nuclear Regulatory Commission, Response to Portion of NRC Request for Additional Information Letter No. 405 Related to ESBWR Design Certification Application - Engineered Safety Systems - RAI Number 6.2-140 S06, February 27, 2010

Enclosures:

1. Transmittal of Supplemental Information Regarding GEH Response to NRC Request for Additional Information (RAI) Number 6.2-140 S06 – Discussion - GEH Proprietary Information
2. Transmittal of Supplemental Information Regarding GEH Response to NRC Request for Additional Information (RAI) Number 6.2-140 S06 – Discussion - Public Version
3. Transmittal of Supplemental Information Regarding GEH Response to NRC Request for Additional Information (RAI) Number 6.2-140 S06 - Affidavit

cc: AE Cabbage      USNRC (with enclosures)  
JG Head            GEH/Wilmington (with enclosures)  
DH Hinds           GEH/Wilmington (with enclosures)  
TL Enfinger        GEH/Wilmington (with enclosures)  
eDRF Section      0000-0123-5224

**Enclosure 2**

**MFN 09-023 Supplement 5**

**Transmittal of Supplemental Information Regarding GEH  
Response to NRC Request for Additional Information (RAI)  
Number 6.2-140 S06**

**Discussion**

**Public Version**

**Non-Proprietary Information Notice**

This is a non-proprietary version of Enclosure 1 to MFN 09-023 Supplement 5, which has the proprietary information removed. Portions of the document that have been removed are indicated as shown here [[ ]].

### **RAI 6.2-140 S06 - Fan Flow Chatter**

#### **Summary**

This type of chatter/oscillation in fan performance is not expected with the Drain Pan (Tray) in the GDCS pool into which the fan discharge will actually occur. The fluid in the tray is isolated from the GDCS pool water after GDCS drain down, and will remain full and overflow as the condensed liquid flows from the PCC to the drain pan via the drain line.

The chatter (oscillation) in vent fan performance in the TRACG analysis with 16-inch fan discharge submergence (6 inch bump in submergence) at about 269.4 hours in RAI 6.2-140 S06 response does not occur when the submergence is changed to 11 inches (1 inch bump), as indicated in Figures 1 and 2. Each of the figures include a polynomial fit trend line for the 16 inch submergence case that has chatter, to indicate the general trend with time for the fan flow and fan head.

Because the tray will limit the discharge submergence to 10", the chatter in the fan parameters is not expected in the DBA LOCA.

The containment pressure response provided in RAI 6.2-140 S06 remains bounding as shown in Figure 3. This is because with a larger submergence, the fan flow rate is lower, the PCC flow rate is lower, and the containment pressure is higher than that with a smaller, more realistic submergence.

#### **Reason for using 6-inch Submergence Bump**

The TRACG 30-day LOCA/Containment calculation requires [[  
]] to assure that the fan discharge submergence remained greater than ten inches even with GDCS pool level decreasing.

[[

]]

The containment pressure (figure of merit) resulting from this restart case with 6-inch bump (16 inch submergence) case was substantially below the containment design pressure (Figure 3). The fan discharge submergence remained greater than ten inches.

An alternative to the 6-inch submergence increase would have been [[

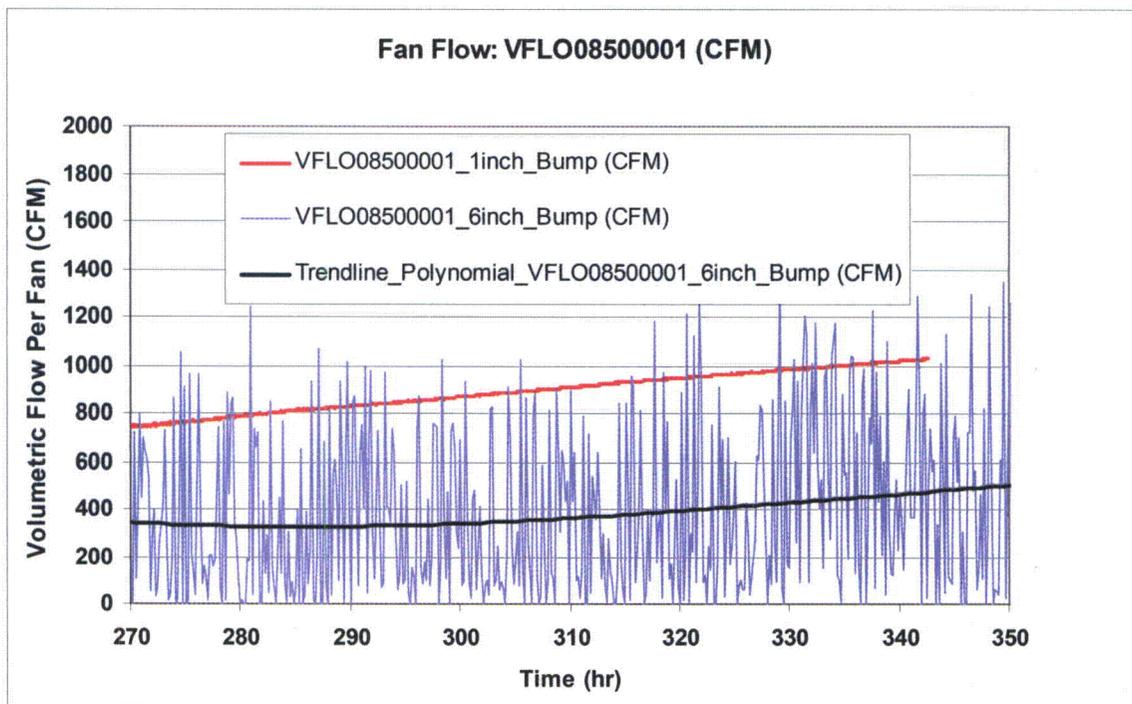
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**Background**

There is one Fan per PCCS Heat Exchanger Unit (6 total). Each fan takes suction on the PCCS Vent Line in order to remove non-condensable gases from PCCS tubes. The Vent Fans discharge into the GDCS Pool, but are only used after the GDCS Pools have drained to the RPV. To ensure that the PCCS will operate after the pools have drained (i.e. maintain the required delta-P across the PCCS system) a water seal is used via a Drain Pan (tray). The tray is continually filled by PCCS condensate. The vent fan discharge line is 24 cm (9.4 in) below the top of the drain pan lip with a tolerance of 1.4 cm (0.6 in).

Four out of the six vent fans are credited in the DCD Rev 7 limiting MSL Break LOCA (and also reported in RAI 6.2-140 S06). These four fans are modeled using one TRACG PUMP component 850 (see DCD Rev 7 ESBWR LOCA/Containment nodalization diagram Figure 6.2-7). The submergence of the fan exit is kept  $\geq 10$  inches. The tray is not modeled in the TRACG analysis; the fan flow exits to the GDCS pool.

Appendix A shows plots of GDCS pool water level, Vent Fan volumetric flow, and Vent Fan head respectively, excerpted from the RAI 6.2-140 S06 response. Appendix B shows the corresponding TRACG LOCA/Containment nodalization from the DCD.



**Figure 1 Main Steam Line Break (Bounding Case) PCC Vent Fan Volumetric Flow**

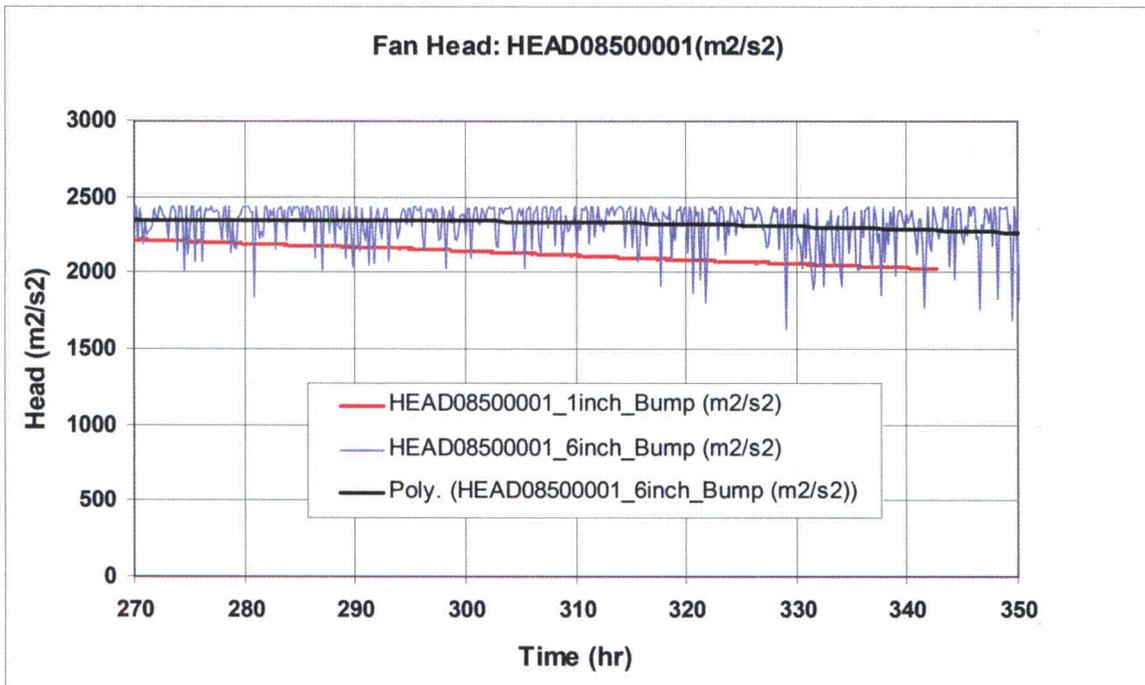


Figure 2 Main Steam Line Break (Bounding Case) PCC Vent Fan Head

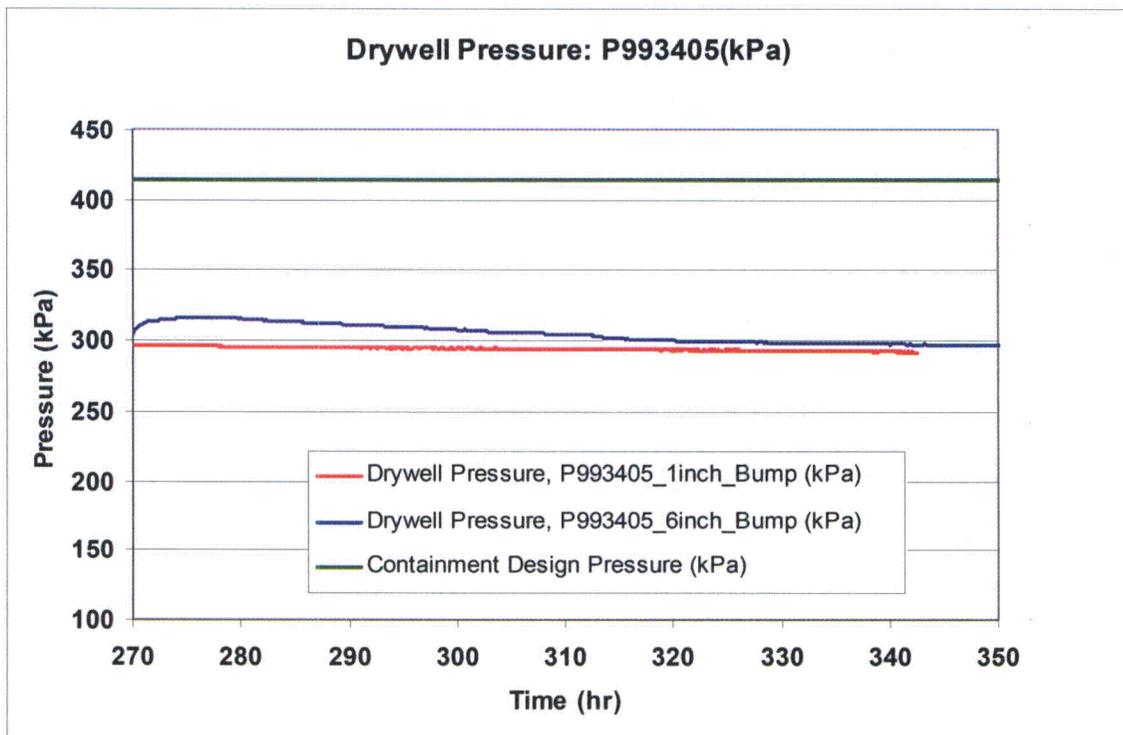


Figure 3 Main Steam Line Break (Bounding Case) Containment Pressure

**Appendix A – Plots from RAI 6.2-140 S06 Response**

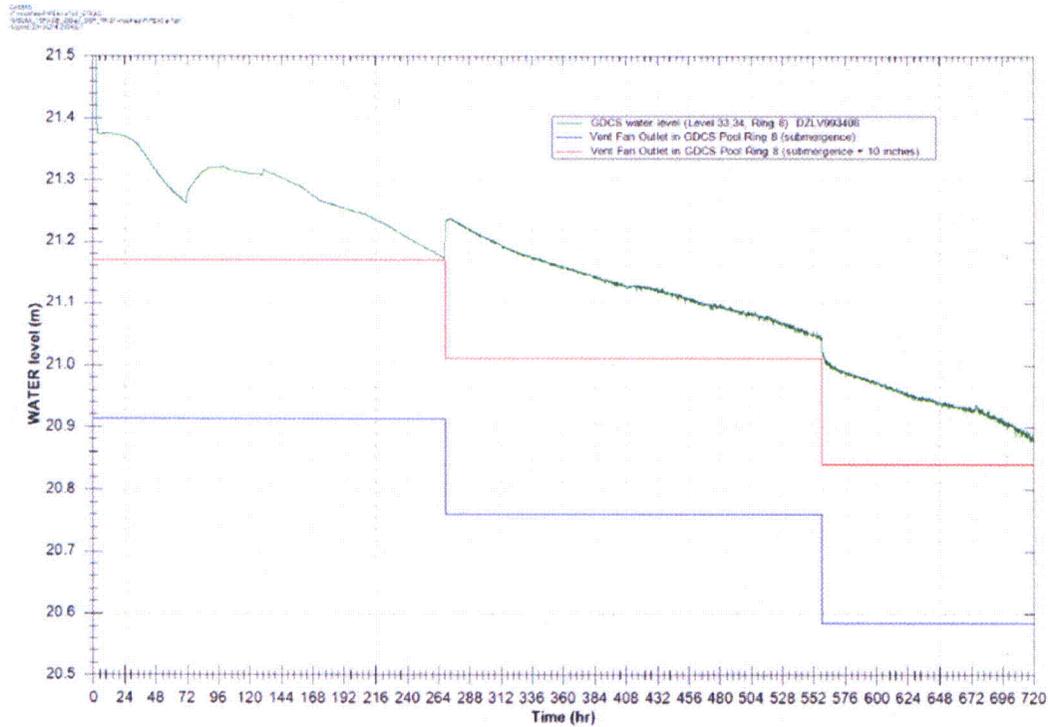


Figure 6.2-140 S06-C5 Main Steam Line Break, (Bounding Case) - GDCS Pool Water Level (30 days).

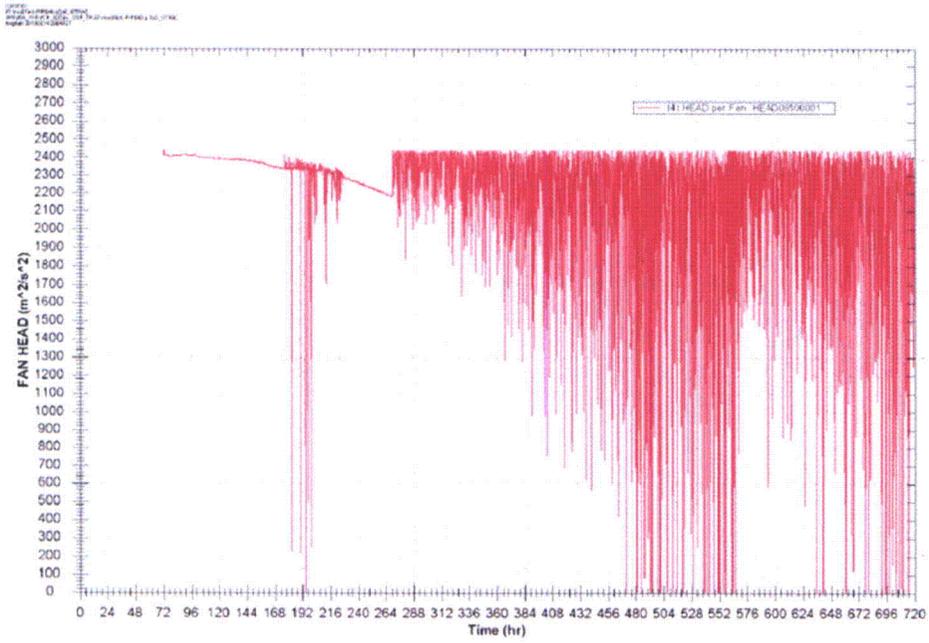


Figure 6.2-140 S06-D5 Main Steam Line Break, (Bounding Case), PCCS Vent Fan Head (30 Days).

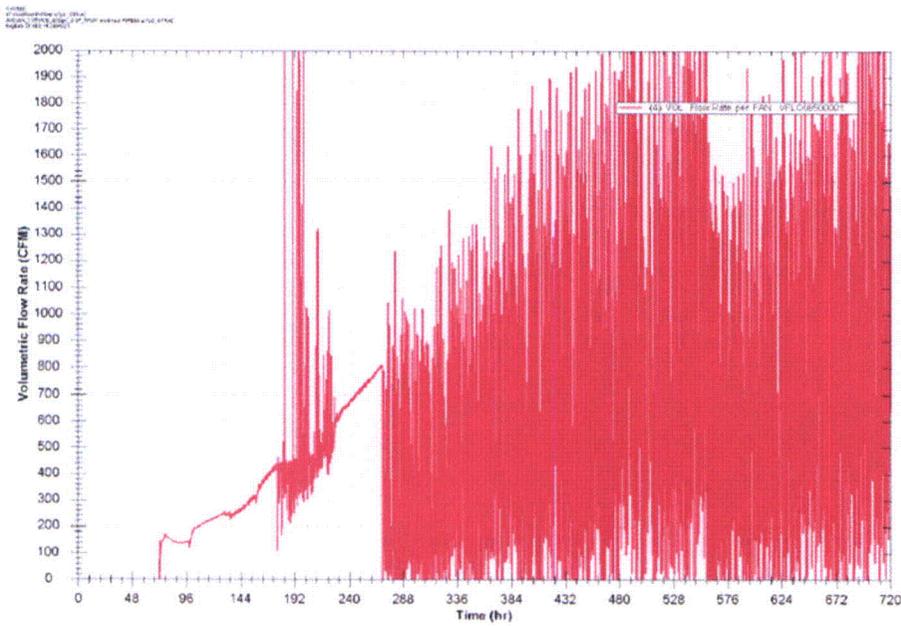


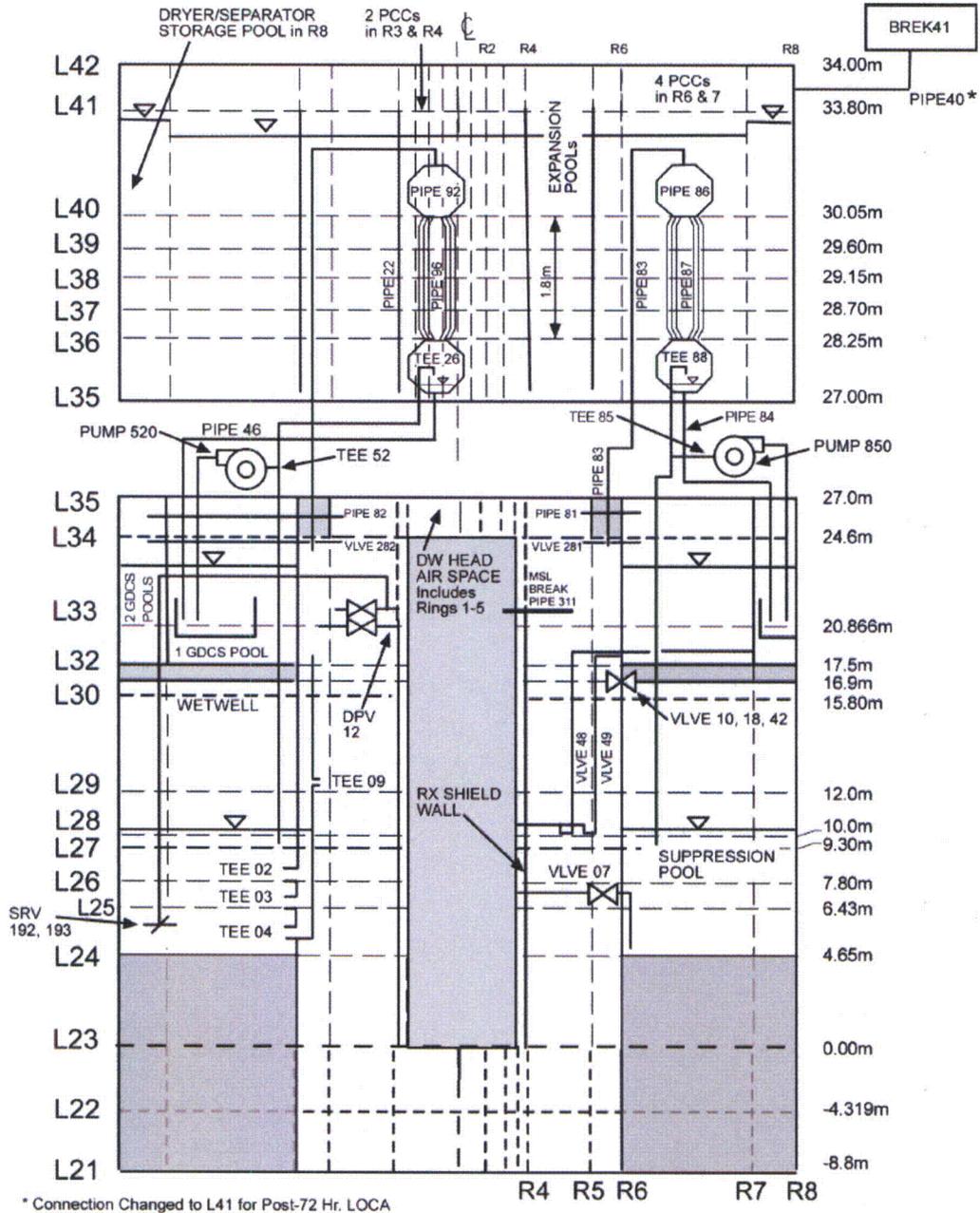
Figure 6.2-140 S06-D2 Main Steam Line Break, (Bounding Case), PCCS Recirculation Volumetric flow Rate (30 Days).

**Appendix B Nodalization Diagram from DCD Rev 7**

26A6642AT Rev. 07

ESBWR

Design Control Document/Tier 2



**Figure 6.2-7. TRACG Nodalization of the ESBWR Containment**

**Enclosure 3**

**MFN 09-023 Supplement 5**

**Transmittal of Supplemental Information Regarding GEH  
Response to NRC Request for Additional Information (RAI)  
Number 6.2-140 S06**

**Affidavit**

## GE-Hitachi Nuclear Energy Americas LLC

### AFFIDAVIT

I, **Mark J. Colby**, state as follows:

- (1) I am the Manager, New Plants Engineering, GE Hitachi Nuclear Energy (“GEH”), and 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 sought to be withheld is contained in enclosure 1 of GEH’s letter, MFN 09-023 Supplement 5, Mr. Richard E. Kingston to U.S. Nuclear Regulatory Commission, entitled “Transmittal of Supplemental Information Regarding GEH Response to NRC Request for Additional Information (RAI) Number 6.2-140 S06” dated October 5, 2010. The proprietary information in enclosure 1, entitled “*Transmittal of Supplemental Information Regarding GEH Response to NRC Request for Additional Information (RAI) Number 6.2-140 S06 – Discussion - GEH Proprietary Information*,” is delineated by a [[dotted underline inside double square brackets<sup>(3)</sup>]]. Figures and large equation objects are identified with double square brackets before and after the object. In each case, the superscript notation <sup>(3)</sup> 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) is classified as proprietary because it contains details of GEH's design and licensing methodology. The development of the methods used in these analyses, along with the testing, development and approval of the supporting methodology was achieved at a significant cost to GEH.
- (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.

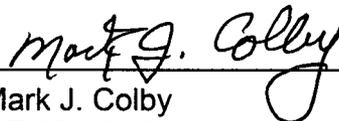
The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

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 5<sup>th</sup> day of October 2010.



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Mark J. Colby  
GE-Hitachi Nuclear Energy Americas LLC