



GE Energy

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.*

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MFN 06-098

Docket No. 52-010

March 31, 2006

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

Subject: **GE Response to Stability RAI Number 17 – ESBWR Chimney Nodalization**

By the referenced email the NRC requested that GE supplement information presented during the recent ACRS meeting (March 14, 2006), regarding chimney nodalization. Enclosed is the requested ESBWR information.

Enclosure 1 contains GE proprietary information as defined by 10 CFR 2.390. GE customarily maintains this information in confidence and withholds it from public disclosure. A non-proprietary version of Enclosure 1 is contained in Enclosure 2.

The Enclosure 3 affidavit identifies that the information contained in Enclosure 1 has been handled and classified as proprietary to GE. GE 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 about the information provided here, please let me know.

Sincerely,

David H. Hinds  
Manager, ESBWR

References:

1. Email from Amy Cubbage (NRC) to David Hinds (GE), *Stability RAI Number 17*, March 15, 2006

Enclosures:

1. GE Response to Stability RAI Number 17 –GE Proprietary Information
2. GE Response to Stability RAI Number 17– Non-Proprietary Version
3. Affidavit, George B. Stramback, March 31, 2006

cc: WD Beckner USNRC (w/o encl)  
AE Cubbage USNRC (w/ encl)  
LA Dudes USNRC (w/o enclosures)  
GB Stramback GE/San Jose (w/ encl)  
eDRF 0000-0052-1685

# **ENCLOSURE 1**

**MFN 06-098**

## **GE Response to Stability RAI Number 17**

### **IMPORTANT NOTICE**

#### **GE Proprietary Information**

#### **PROPRIETARY INFORMATION NOTICE**

This enclosure contains proprietary information of the General Electric Company (GE) and is furnished in confidence solely for the purpose(s) stated in the transmittal letter. No other use, direct or indirect, of the document or the information it contains is authorized. Furnishing this enclosure does not convey any license, express or implied, to use any patented invention or, except as specified above, any proprietary information of GE disclosed herein or any right to publish or make copies of the enclosure without prior written permission of GE. The header of each page in this enclosure carries the notation "GE Proprietary Information."

GE proprietary information is identified by a double underline inside double square brackets. In each case, the superscript notation<sup>(3)</sup> refers to Paragraph (3) of the affidavit provided in Enclosure 4, which documents the basis for the proprietary determination. [[This sentence is an example.<sup>(3)</sup>]] Specific information that is not so marked is not GE proprietary.

**ENCLOSURE 2**

**MFN 06-098**

**GE Response to Stability RAI Number 17**

**Non-Proprietary Version**

**IMPORTANT NOTICE**

This is a non-proprietary version of Enclosure 1, which has the proprietary information removed. Portions of the enclosure that have been removed are indicated by an open and closed bracket as shown here [[ ]]

**NRC RAI 17 - Stability**

*Provide calculations demonstrating that the chimney does not affect the density wave stability of ESBWR. To perform these calculations, re-nodalize the chimney with a finer nodalization and use the explicit integration scheme.*

**GE Response:**

The reference nodalization of the ESBWR for stability analysis is shown in Figure 5.2-1 of NEDE-33083P, Supplement 1. The chimney region is represented by Levels 10 through 16. The height of Level 10 is [[ ]], and the height of Levels 11 through 16 is [[ ]]. For the nodalization study, Level 10 was subdivided into [[ ]] levels and Levels 11 through 16 were subdivided into [[ ]] levels each, resulting in [[ ]] levels in the chimney region of approximately [[ ]] each. The chimney node height then becomes similar to the channel node size of [[ ]]. The total number of levels in the vessel increased from [[ ]].

A steady state calculation was performed with the new nodalization. Stability analysis for the MOC conditions was then performed with the new nodalization. [[ ]]

]].

Figure 1 shows the propagation of voids from the boiling boundary up the channel. The exit void fraction perturbation is out of phase with the void fraction perturbation in the boiling boundary node. The magnitude of the void perturbation is largest in the lower part of the bundle and decreases at the channel exit. Figure 2 shows the propagation of the void fraction through the chimney. The magnitude of the perturbation is reduced relative to that in the core, and it propagates through the chimney with minimal damping. Figure 3 shows the magnitude of the pressure drop perturbations in the core and chimney. The pressure drop perturbations are dominated by the core. The core power response to the perturbation is shown in Figure 4. Also shown is the core power response for the original nodalization of the chimney. There is virtually no difference in the power response traces, and consequently in the decay ratio. This confirms that the original nodalization of the chimney was adequate and there is no effect of the finer nodalization. This can be attributed to the fact that the perturbations in the chimney pressure drop are much smaller than those in the core. Hence, the propagation of voids through the chimney plays only a minor role in determining the decay ratio and resonant frequency.

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**Figure 1: Void propagation through Core (Detailed Chimney Nodalization)**

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**Figure 2: Void propagation through Chimney (Detailed Chimney Nodalization)**

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**Figure 3: Core and Chimney Pressure Drop Perturbations (Detailed Chimney Nodalization)**



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**Figure 4: Core Power Response (Standard and Detailed Chimney Nodalizations)**

**ENCLOSURE 3**

**MFN 06-098**

**Affidavit**

# General Electric Company

## AFFIDAVIT

I, **George B. Stramback**, state as follows:

- (1) I am Manager, Regulatory Services, General Electric Company ("GE") 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 GE letter MFN 06-098, David H. Hinds to U.S. Nuclear Regulatory Commission, *GE Response to Stability RAI Number 17 – ESBWR Chimney Nodalization*, dated March 31, 2006. The proprietary information in Enclosure 1, *GE Response to Stability RAI Number 17*, is identified by a dark red font with double underlines inside double square brackets. 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, GE 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 2.790(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 General Electric's competitors without license from General Electric 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 General Electric customer-funded development plans and programs, resulting in potential products to General Electric;
- 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 GE, 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 GE, 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. Access to such documents within GE 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, by the manager of the cognizant marketing function (or his delegate), and by the Legal Operation, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GE 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 the results of analytical models, methods and processes, including computer codes, which GE has developed, and applied to perform stability evaluations using the TRACG code for the ESBWR. GE has developed this TRACG code for over fifteen years, at a total cost in excess of three million dollars.

The development of the evaluation process along with the interpretation and application of the analytical results is derived from the extensive experience database that constitutes a major GE asset.

- (9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GE's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GE'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 GE.

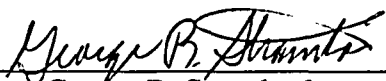
The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GE's competitive advantage will be lost if its competitors are able to use the results of the GE 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 GE 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 GE of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing 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 31<sup>st</sup> day of March 2006

  
George B. Stramback  
General Electric Company