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Project 717

MFN 03-140  
November 6, 2003

U.S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, D.C. 20852-2738

Attention: Chief, Information Management Branch  
Program Management  
Policy Development and Analysis Staff

Subject: **Response to Request for Additional Information (RAI) on Scaling Responses for ESBWR Pre-application Review – Additional Supplementary Information.**

In response to a request from the NRC (Reference 1), GE Nuclear Energy is submitting, in enclosures 1 and 2, additional supplementary information in support of our response (MFN 03-117) to Requests for Additional Information (RAI) numbers (15, 259, 286 and 292) and supplementary information in support of test scaling.

Enclosure 1 contains the supplementary information with GE proprietary information as defined by 10CFR2.790. GE customarily maintains this information in confidence and withholds it from public disclosure. A non-proprietary version of the information is provided in Enclosure 2.

The affidavit contained in Enclosure 3 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 2.790 and 9.17.

If you have any questions about the information provided here, please let me know.

Sincerely,

Sandra A. Delvin  
Manager, ESBWR  
Engineering & Technology

Reference:

1. Email from Amy Cabbage to Atam Rao (GE) and Robert Gamble (GE), October 30, 2003, SUBJECT: Scaling issues
2. MFN 03-117, Letter From Sandra Delvin (GE) to NRC, October 20, 2003, SUBJECT: Response to Request for Additional Information (RAI) numbers (15, 259, 286, and 292) for ESBWR Pre-application Review - Supplementary Information

Enclosures:

1. MFN 03-140 Response to NRC Request for Additional Information (RAI) Regarding Scaling Issues – Additional Supplementary Information - Proprietary Information (on CD)
2. MFN 03-140 Response to NRC Request for Additional Information (RAI) Regarding Scaling Issues – Additional Supplementary Information - Non-proprietary Information
3. Affidavit, George B. Stramback, dated November 6, 2003

cc: A. Cabbage USNRC (with enclosure)  
J. Lyons USNRC (w/o enclosure)  
G.B. Stramback GE (with enclosure)

# 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 the Enclosure 1 of GE letter MFN 03-140, Sandra Delvin to NRC, *Response to Request for Additional Information (RAI) on Scaling Responses for ESBWR Pre-application Review – Additional Supplementary Information*, dated November 6, 2003. The proprietary information is in Enclosure 1, *Response to NRC RAI Regarding Scaling Issues – Additional Supplementary Information*. For text and text contained in tables, GE proprietary information is identified by a double underline 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 2.790 (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 details for licensing application of TRACG to the ESBWR passive safety system design of the BWR. This TRACG code has been developed by GE for over fifteen years, at a total cost in excess of three million dollars. The reporting, evaluation and interpretations of the results, as they relate to the ESBWR, was achieved at a significant cost, to GE.

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.

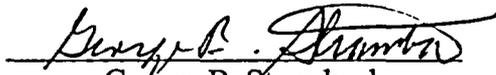
The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

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 6<sup>th</sup> day of November 2003

  
George B. Stramback  
General Electric Company

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Enclosure 2

ENCLOSURE 2

MFN 03-140

Response to NRC RAI Regarding Scaling Issues – Additional  
Supplementary Information

*Non-proprietary*

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Enclosure 2

(1) Please provide a justification of the distribution of non-condensable gases ([[ ]]) on Page 6 of enclosure 1 to MFN-117 dated October 20, 2003.

Response (1):  
[[

]]. Most of the noncondensibles are moved from the drywell to the wetwell during the early part of blowdown, prior to the start of the ESBWR tests.  
[[

]].

The ESBWR TRACG runs estimate that the noncondensable fraction at the start of the late blowdown period will be in the range of [[ ]]. The test initial conditions reflect this by starting with noncondensable fractions in the drywell in the range of [[

]]. However, it is easy to extrapolate this to other values by looking at the bars in Figure 8-6 and 8-7. For example the approximate impact of the noncondensable movement for PANDA test M7 ([[ ]]) would be approximately [[ ]] that shown in Figure 8-7.

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(2) On page 7, same reference, the equations feature the variables  $f_3$  and  $f_4$ . Please provide the units of these properties

Response (2):

The terms  $f_3$  and  $f_4$  are described on page 6-2 of the ESBWR Scaling Report, NEDC-33082P, Rev 0. The definitions and units for these variables are:

$$f_3 = 1 - \rho_g h'_g; \text{ dimensionless}$$

$$f_4 = \frac{\rho_g}{\rho_l} h'_g - h'_l; \text{ units} = \text{m}^3/\text{kg}$$

where,

$h_l$  is the saturated liquid enthalpy,

$h_g$  is the saturated vapor enthalpy,

$\rho_l$  is the saturated liquid density,

$\rho_g$  is the saturated vapor density, and

primes denote derivatives with respect to pressure.

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(3) On page 25, same reference, you provided a graph with a comparison of ESBWR and test analytical results. Please update this figure to include the GIST and GIRAFFE test data. You may also consider revising this plot to remove time by plotting delta inventory vs. delta pressure.

Response (3):

The Figure below provides the requested information. The inventory and pressure data have been added for the tests and the data has been replotted as RPV Pressure vs. Inventory. As before the plots show a very similar trend for the ESBWR and tests. Although there are distortions present in the magnitudes as previously identified by the scaling groups, the behavior of inventory relative to pressure is similar for all facilities.

[[

]].

[[

Figure 1. RPV Inventory vs. Pressure Comparison for Simple Model and Test Data for ESBWR and Test Facilities ]]

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Enclosure 2

The following two comments are related to GIRAFFE/SIT test scaling:

(4) The SBWR scaling report [Ref. 7, Table 4.1-20] shows that the GIRAFFE/SIT test is scaled well, [[  
]]. Comparison of the same dimensionless parameter ratio for GIRAFFE/SIT and ESBWR is needed to establish that the test data are applicable for ESBWR.

Reference 7 is NEDC-32288P "Scaling of the SBWR Related Tests". The requested information may be shown graphically in Figure 8-5 of NEDC-33082P. If that is correct then the test data [[

]] for this important parameter. It isn't then clear that interactions XL3 and XL4 are the same for the test and ESBWR. The value of the PI group needs to be provided and the consequences of any differences on these interactions need to be explained.

Response (4):

[[

]]. Values for these parameters are shown graphically in Figure 8-2 and 8-5 of NEDC-33082P, Rev 0, "ESBWR Scaling Report", respectively. Numerical values are given in Table A-4 and A-10 of the same reference, respectively. The numerical values given in the report are:

[[

]]

[[

]]. A better measure of the true impact of the differences in the PI groups is given by the supplemental response to RAI 292 given in pages 17 to 25 of enclosure 1 to MFN-117. The graph shown on page 25 of the reference shows that

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the timing of pressurization rate, GDCS initiation timing, and minimum water level is reasonably well represented in tests. Therefore the distortions present had a minimal impact on the interactions represented by PIRT parameters XL3 and XL4.

(5) The GIRAFFE/SIT data exhibit phenomenon E3 (Cold Water Injection Below >Two-Phase Level) and phenomenon E7 (cold water injection above two-phase level). Please justify your conclusion that these phenomena are not important.

Sections 3.5.3 and 3.5.4 of NEDC-32606P state that based on the results of GIRAFFE/SIT test run GS2: "the issues raised by this phenomenon are not a concern". Test case GS2 exhibited GDCS injection for some periods of time both above and below the two-phase level in the downcomer. The test provides data that may be useful for qualifying the TRACG code to predict these phenomena. However, the conclusion that appears to be reached is that these phenomena are not a concern because the core did not uncover in this run or any other runs. This implies that GE sees no need to have models that accurately predict these phenomena. However, it is not clear why the core not uncovering shows that these phenomena did not play a role in the response. Also, the TRACG code will be used to simulate many events, and it is not apparent from the arguments presented that these phenomena are of no concern. These phenomena were ranked high and therefore, better justification needs to be provided for not qualifying the code to predict these phenomena.

Response (5):

[[

]].

Moreover, the test findings did not affect the TRACG qualification plan. The effects of these phenomena were present in the test results that were compared against TRACG calculations. The qualification report (NEDE-32725P) shows that the depressurization rate of the RPV, the downcomer level and chimney were all calculated well in the GIRAFFE/SIT tests. [[

]].