



HITACHI

GE Hitachi Nuclear Energy

Richard Kingston
Vice President, ESBWR Licensing

Proprietary Notice

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

P.O. Box 780
3901 Castle Hayne Road, M/C J-70
Wilmington, NC 28402 USA

T 910.675.6192
F 910.362.6192
rick.kingston@ge.com

MFN 08-547
June 30, 2008

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

Subject: Transmittal of Response to NRC Request for Additional Information - NEDC-32906P, Supplement 3, "Migration to TRACG04/PANAC11 from TRACG02/PANAC10 for TRACG AOO and ATWS Overpressure Transients," (TAC No. MD2569)

In Reference 1, the NRC requested additional information (RAI) to support the review of NEDE-32906P, Supplement 3. The response to RAI 21 is enclosed.

Enclosure 1 contains proprietary information of the type that GEH maintains in confidence and withholds from public disclosure. The information has been handled and classified as proprietary to GEH as indicated in the affidavit. 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 in Enclosure 1 be withheld from public disclosure in accordance with the provisions of 10 CFR 2.390 and 9.17. Enclosure 2 is a non-proprietary version of Enclosure 1.

If you have any questions, please contact Mike Lalor at (408) 925-2443 or me.

Sincerely,

Richard E. Kingston

Richard E. Kingston
Vice President, ESBWR Licensing

Project No. 710

DO65
NRR

References:

1. Letter from M. Honcharik (NRC) to R.E. Brown (GEH), *Request for Additional Information RE: General Electric Nuclear Energy (GENE) Topical Report (TR) NEDE-32906P, Supplement 3, "Migration to TRACG04/PANAC11 from TRACG02/PANAC10 for TRACG AOO and ATWS Overpressure Transients,"* (MFN 07-144) March 5, 2007.

Enclosures:

1. GEH Response to NRC RAI 21 - NEDC-32906P - Proprietary
2. GEH Response to NRC RAI 21 - NEDC-32906P - Non-Proprietary
3. Affidavit – Richard E. Kingston – dated June 30, 2008

cc: M Honcharik, NRC
eDRF Section 0000-0059-4157

ENCLOSURE 2

MFN 08-547

GEH Response to NRC RAI 21 - NEDC-32906P

Non-proprietary Version

IMPORTANT NOTICE

This is a non-proprietary version of Enclosure 1 to MFN 08-547, from which the proprietary information has been removed. Portions of the enclosure that have been removed are indicated by an open and closed bracket as shown here [[]].

NRC RAI 21

Provide additional information demonstrating that the uncertainty in the Doppler coefficient and in scram reactivity (phenomena identification ranking table (PIRT) items C1BX and C1CX, respectively) cited in Table 5-5 in the TRACG AOO analysis for BWR/2-6 (Reference 3) is still applicable or bounding when applying the new PANAC11 physics methods.

GEH Response

The scram reactivity (C1CX) uncertainty is dominated by the uncertainty in determining the scram speed. The scram speed uncertainty is determined based on plant data obtained from scram speed tests at BWR plants and does not depend on the lattice or core physics methods.

The remainder of this response is concerned with the Doppler coefficient uncertainty (C1BX).

The basis for the [[]] value for the Doppler coefficient uncertainty (C1BX) that is cited in Reference 21-1 traces back to several RAI responses scattered in the different volumes of Reference 21-2. The [[]] value for C1BX can be traced to question 38 filed in Volume 1 of Reference 21-2. The response to that question indicates that the value is conservatively determined based on calculated responses for the SPERT tests.
[[

]]

To re-establish use of the [[]] value for TRACG04, test 43 in the SPERT-III series was evaluated using this value. Test 43 in the SPERT-III series is the most relevant test for this purpose because it is the cold test with the highest control blade worth. The cold tests are not complicated by early voiding in the fluid thus the power pulse is controlled by only two factors: (1) control blade reactivity insertion, and (2) Doppler negative feedback. The primary impact due to the blade worth was removed by adjusting the simulation to precisely match the stated value of \$1.21 from the test similar to what was done in creating Figure 3.8-2 of Reference 21-4. Two additional calculations were then performed on either side of this reference calculation by multiplying the Doppler coefficient for all nodes by factors of [[]] in one case and [[]] in the other case to account for the presumed one-sigma variation of [[]]. The calculated power responses are shown in Figure 21-1 superimposed on the results presented previously in Figure 3.8-2 of Reference 21-4. Note that the scales have been modified to allow the detail in the vicinity of the power peak to be seen. The results in Figure 21-1 show that the nominal measured peak power value is bracketed by a [[]] variation in Doppler coefficient that corresponds to a variation of about [[]] in the calculated peak power value.

Additional support for a [[]] uncertainty in the Doppler coefficient is provided by the AOO transient analyses for cases where comparisons to plant data are possible. These evaluations were updated using TRACG04 and have been provided to the NRC staff in Chapter 7 of Reference 21-4. Selected results for the analyses of the Peach Bottom turbine trip tests obtained prior to completion of Reference 21-4 had been provided in Figures 7-1 through 7-6 of Reference 21-5, the LTR that is the focus of this RAI. For consistency with the final results in Reference 21-4, Figures 7-1 through 7-6 for the LTR under review (Ref. 21-5) are being updated to reflect input modifications [[]].

The replacement figures are provided separately and will be incorporated in the approved LTR containing a copy of the NRC Safety Evaluation Report.

Comparisons between calculated and measured power responses (some of which have been cited here) justify continued use of [[]] for AOO applications using our three-dimensional process. The uncertainty in Doppler coefficient for our three-dimensional neutronics models is relatively unimportant compared to the larger range of values already accounted for spatially across the core. For example, the section for C1BX in Chapter 5 of Reference 21-1 documented that a [[]] change in the Doppler coefficient applied to each node in the core simultaneously in the same direction would change the calculated $\Delta\text{CPR}/i\text{CPR}$ for the limiting turbine trip without bypass event by only about [[]].

The uncertainty in Doppler coefficient would have to increase by about an order of magnitude before the expected impact on the calculated $\Delta\text{CPR}/i\text{CPR}$ would start to become important relative to the overall transient uncertainty in $\Delta\text{CPR}/i\text{CPR}$ that is considered in the licensing basis for AOO events. To demonstrate this point, the PB2TT3 case for which the nominal results are shown in Figures 7.5 and 7.6 of Reference 21-5 was recalculated for $\pm 40\%$ core-wide perturbations in Doppler coefficient. The calculated nominal $\Delta\text{CPR}/i\text{CPR}$ result together with the results for the $\pm 40\%$ perturbations in Doppler coefficient are shown in Figure 21-2. Even at 10 times the expected uncertainty, the Doppler coefficient perturbations conservatively applied to each node in the core simultaneously produce a change in the calculated $\Delta\text{CPR}/i\text{CPR}$ that is only slightly greater than the [[]] threshold that is considered to be negligible.

The [[]] uncertainty for Doppler coefficient is adequate for AOO applications and its use in TRACG04 AOO calculations has been justified.

References

- 21-1 "TRACG Application for Anticipated Operational Occurrences Transient Analyses," NEDE-32906P-A, Revision 1, Class III, April 2003.

- 21-2 "Qualification of the One-Dimensional Core Transient Model for Boiling Water Reactors," NEDO-24154P-A (Volumes 1 and 2) and NEDE-24154-P-A (Volumes 3 and 4), August 1986 for Volumes 1-3, February 2000 for Revision 1 for Volume 4.
- 21-3 "Generation of Void and Doppler Reactivity Feedback for Application to BWR Design," NEDO-20964, Class I, December 1975.
- 21-4 "TRACG Qualification," NEDE-32177P, Revision 3, Class III, August 2007.
- 21-5 "Migration to TRACG04 / PANAC11 from TRACG02 / PANAC10 for TRACG AOO and ATWS Overpressure Transients," NEDE-32906P Supplement 3, Class III, May 2006.

[[

Figure 21-1: SPERT III Test 43 Power Responses

]]

[[

**Figure 21-2: PBTT3 Δ CPR/iCPR Sensitivity to $\pm 40\%$ Core-Wide Doppler
Coefficient Change**

]]

ENCLOSURE 3

MFN 08-547

Affidavit

GE-Hitachi Nuclear Energy Americas LLC

AFFIDAVIT

I, **Richard E Kingston**, state as follows:

- (1) I am Vice President, ESBWR Licensing, Regulatory Affairs, 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 sought to be withheld is contained in GEH letter, MFN 08-547, *Transmittal of Response to NRC Request for Additional Information - NEDE-32906P, Supplement 3, "Migration to TRACG04/PANAC11 from TRACG02/PANAC10 for TRACG AOO and ATWS Overpressure Transients,"* dated June 30, 2008. The proprietary information in Enclosure 1 entitled, "GEH Response to NRC RAI 21," is identified by a dotted underline inside double square brackets.. [[This sentence is an example.^{3}]] 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 detailed results including the process and methodology for application of TRACG to the performance of AOOs for GEH BWRs. This TRACG code has been developed by GEH for over sixteen years at a total cost in excess of three million dollars. The reporting evaluation and interpretations of the results, as they are applicable to the BWR, was achieved at a significant cost to GEH.

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 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.

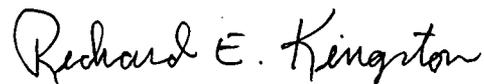
The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

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 30th day of June, 2008.



Richard E. Kingston
GE-Hitachi Nuclear Energy Americas LLC