Attachment 4

Vermont Yankee Nuclear Power Station

Proposed Technical Specification Change No. 263 – Supplement No. 24

Extended Power Uprate

Response to RAI SRXB-A-6

REDACTED VERSION

Total number of pages in Attachment 4 (excluding this cover sheet) is 23.

Reactor Systems Branch (SRXB)

Boiling Water Reactors and Nuclear Performance Section (SRXB-A)

RAI SRXB-A-6

Table 1-1 in Attachment 6 of the application dated September 10, 2004 [*sic*], lists all the nuclear steam system codes used for the EPU request. Section 1.2.2 of Attachment 6, "Computer Codes," indicates that the VYNPS application of these codes complies with the limitations, restrictions, and conditions specified in the applicable NRC safety evaluation report (SER) that approved each code, with exceptions as noted in Table 1-1.

Similarly, review the fuel vendor's analytical methods and code systems used to perform the safety analyses supporting the VYNPS EPU application and provide the following information:

(a) Confirm that the steady state and transient neutronic and thermal-hydraulic analytical methods and code systems used to perform the safety analyses supporting the EPU conditions are being applied within the NRC-approved applicability ranges.

(b) Confirm that for the EPU conditions, the calculational and measurement uncertainties applied to the thermal limits analyses are valid for the predicted neutronic and thermal-hydraulic core and fuel conditions.

(c) Confirm that the assessment database and the assessed uncertainty of models used in all licensing codes that interface with and/or are used to simulate the response of VYNPS during steady state, transient or accident conditions remain valid and applicable for the EPU conditions.

Response to RAI SRXB-A-6

GE's NRC-approved neutronic and thermal-hydraulic methods and code systems were submitted originally with a database of performance demonstrations that spanned the plants and operations of the BWR fleet. The breadth of demonstration established the applicability ranges for the coupled sets of methods. The review and approval of these methods was, in whole or in part, based on the performance demonstration given in those submittals. Periodic updates of methods performance provided to NRC represent further evidence that methods continue to meet performance expectations. The current applicability of methods to VYNPS EPU conditions is based [[

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Finally, the conclusion that the methods are applicable to EPU at VYNPS, based on the results provided in Parts 6(a) and 6(b), is documented in Part 6(c).

Response to Part 6(a):

NRC-approved or industry-accepted computer codes and calculational techniques have been applied for the power uprate analyses for VYNPS: TGBLA, PANACEA, ISCOR, ODYN, TASC, TRACG, STEMP, SAFER, ODYSY, LAMB, and GESTR. The application of each of these codes complies with the limitations, restrictions, and conditions specified in the approving NRC SER where applicable for each code. Moreover, GE routinely updates the staff on how NRC approved methods perform. A demonstration of continued acceptable performance of these codes for the expected phenomenological conditions for the VYNPS power uprate is pertinent here, too.

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Safe BWR core operation is assured by operating within the Technical Specification limits for LHGR, MAPLHGR, MCPR, Hot Reactivity (Reactivity Anomaly), and Cold Reactivity (Shutdown Margin Demonstration). [[

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The numbered paragraphs below discuss [[

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These comparisons show that the [[

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are summarized in Table 6-2. Inspection of Tables 6-1, 6-3 and 6-4 and Figures 6-1 through 6-6, further demonstrates the fact that VYNPS EPU operation is consistent [[

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Applicability to transient methods

The transient, accident and stability analyses are classified into the three broad areas.

d. Transient events
e. LOCA
f. Stability

The transient area in this case involves the events affecting the core. [[

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The reactivity events are analyzed with the steady state tools and the results presented regarding steady-state methods in this response are directly applicable. There are some increases in power, which are significant but remain within the comparisons between the above plants for corresponding events.

The pressurization events result in higher pressures and a momentary increase in core flow for VYNPS, which reduces the void fractions and increases the power generation. The Peach Bottom tests are used as a basis for the transient model validation for the limiting pressurization events. The model bias and uncertainties have been defined for these events and are applied for the transient analysis. The core conditions are bounded by the GEXL and void-quality correlations for these events. Further, the GEXL correlation has been qualified through full scale thermal-hydraulic testing for transient conditions by simulation of the limiting pressurization events. These response conditions keep the core within the bounding range of the other plants indicated in the examples for their transient conditions.

The depressurization and flow reduction events are not the limiting events and result in a reduction of power, which is the reason they are not limiting. The reduction in power results in a decrease in void fraction. When flow decreases occur such as a pump trip, there is still a reduction in power and no challenge to the thermal limits due to the reduction in power. [[

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LOCA events start from the outset with a sharp drop in reactor power (reactor trip occurs almost immediately), core flow and pressure. The post-LOCA thermal hydraulic conditions are within the qualification basis of the SAFER-GESTR code models. These models have been qualified against data obtained in numerous small and full-scale experiments and tests. The GEXL and void-quality correlation are applied in the TASC code to determine dryout times. The post-LOCA thermal hydraulic conditions are within the qualification basis for these models. There is no significant dependence upon the steady-state correlations of the void-quality correlation for

the limiting calculations. The GEXL and void-quality correlation applications are within the range of application.

The pump trip transients lead to flow reductions that impact stability. [[

]]. The development of the void-quality correlation (NEDE-21565, J.A. Findlay & G.E. Dix, "BWR Void Fraction and Data", 1977) established a maximum range of [[ ]] voids. [[

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Response to Part 6(b):

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BWRs are designed so that they can be shut down in the cold condition (68°F) with the single strongest control blade completely withdrawn. In order to qualify the 3D simulator to accurately predict the cold shutdown margin, cold critical startup configurations are analyzed. In all cases, enough control blades were withdrawn at a given water temperature for the reactor to be critical or on a large positive period. [[

]] The RMS difference between predicted nuclear design basis based on past experience and the actual measured [[

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Response to Part 6(c):

The response to Part 6(a) has shown that the expected performance of VYNPS with EPU does not exceed [[ ]] Thus, VYNPS with EPU is not expected to operate with any of these [[ ]] exceeding the values [[ ]]

The results presented in Part 6(b) demonstrate that for several cycles of the [[ ]] the GE methods provide the same level of fidelity [[ ]] The uncertainties in the methods predictions are consistent with those previously developed and reported in the approved licensing topical reports for these methods.

Therefore, since the methods continue to be valid [[

]] it is concluded that the models themselves continue to remain "valid and applicable" for EPU at VYNPS.

Attachment 5

Vermont Yankee Nuclear Power Station

Proposed Technical Specification Change No. 263 – Supplement No. 24

Extended Power Uprate

General Electric Affidavit

Total number of pages in Attachment 5 (excluding this cover sheet) is 3.

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 Attachment 2 to GE letter, Michael Dick (GE) to Craig Nichols (ENOI), *VY RAIs SRXB 6,* dated March 3, 2005. The Attachment 2 proprietary information, *GE Responses to NRC RAIs (SRXB-6),* is delineated by a double underline inside double square brackets. 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, 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 contains detailed information in support of NEDC-33090P, *Safety Analysis Report for Vermont Yankee Nuclear Power Station Constant Pressure Power Uprate,* Class III (GE Proprietary Information), Revision 0, dated September 2003, which was submitted to the NRC. This power uprate report contains detailed results and conclusions from evaluations of the safety-significant changes necessary to demonstrate the regulatory acceptability for the power uprate of a GE BWR, utilizing analytical models, methods and processes, including computer codes, which GE has developed, obtained NRC approval of and applied to perform evaluations of the transient and accident events in the GE Boiling Water Reactor ("BWR"). The development and approval of these system, component, and thermal hydraulic models and computer codes was achieved at a significant cost to GE, on the order of several 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 3rd day of March 2005.

George B. Stramback
General Electric Company