February 27, 2003

Mr. David A Christian
Senior Vice President - Nuclear
Virginia Electric and Power Company
5000 Dominion Blvd.
Glen Allen, Virginia 23060-6711

SUBJECT: NORTH ANNA POWER STATION, UNITS 1 AND 2, AND SURRY POWER STATION, UNITS 1 AND 2 - REQUEST FOR ADDITIONAL INFORMATION ON TOPICAL REPORT VEP-FRD-42, REVISION 2, "RELOAD DESIGN METHODOLOGY" (TAC NOS. MA3141, MA3142, MA3151, AND MA3152)

Dear Mr. Christian:

We have reviewed your submittal dated October 8, 2001, as supplemented by letters dated May 13, and December 2, 2002, that requested review and approval of Topical Report VEP-FRD-42, Revision 2, "Reload Design Methodology." You had requested approval of this topical report to allow North Anna and Surry Power Stations, Units 1 and 2, to utilize either Westinghouse or Framatome ANP fuel. The NRC staff's safety evaluation dated July 29, 1986, had restricted the applicability of VEP-FRD-42, Revision 1-A, to only Westinghouse-supplied reloads. Your response to the enclosed request for additional information (RAI) is required in order for the staff to complete this review.

Our questions are provided in the Enclosure. The NRC staff requests a response to the RAI by March 31, 2003. This response date was discussed with Mr. Kerry Basehore of your staff on January 31, 2003, who indicated that Virginia Electric and Power Company will be able to meet this date.

Sincerely,

/RA/

Stephen R. Monarque, Project Manager, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-280, 50-281, 50-338, and 50-339

Enclosure: As stated

cc w/encl: See next page

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REQUEST FOR ADDITIONAL INFORMATION

NORTH ANNA AND SURRY POWER STATIONS, UNITS 1 AND 2

VEP-FRD-42, REVISION 2, "RELOAD DESIGN METHODOLOGY"

The following information is required in order for the NRC staff to complete its review of Topical Report VEP-FRD-42, Revision 2, "Reload Design Methodology." Virginia Electric and Power Company (VEPCO) is requested to respond to the following questions discussed in the paragraphs below.

RETRAN Code and Model Review - VEPCO Letter dated August 10, 1993

1. In the generic RETRAN Safety Evaluation Report (SER) dated September 4, 1984 (Reference 1), the NRC staff approved the use of RETRAN-01/MOD003 and RETRAN-02/MOD002 subject to the limitations and restrictions outlined in the SER. By letter dated April 11, 1985, the NRC staff approved the use of RETRAN-01/MOD003 for VEPCO, although the staff stated in this SER that VEPCO had not provided an input deck to the staff nor had it provided the information needed to address the restrictions listed in the staff SER dated September 4, 1984. The NRC staff's SER dated September 4, 1984, had requested this input deck submittal as a condition of approval to use the RETRAN Code.

    a. VEPCO is currently using RETRAN02/MOD005.2. Please provide information describing how each of the limitations, restrictions, and items identified as requiring additional user justification in the generic staff SERs for RETRAN-02/MOD002 through RETRAN02/MOD005.0 (References 1 - 3) are satisfied for the North Anna and Surry RETRAN models.

    b. As required by the staff SERs (References 1 - 3), please submit RETRAN input decks that represent the current models and code options used for both North Anna and Surry. For each station, please provide input decks initialized to hot full power and hot zero power conditions in electronic format.

2. Doppler Reactivity Feedback (page 8 of the submittal dated August 10, 1993)

    a. The Doppler reactivity feedback is calculated by VEPCO's correlation of Doppler reactivity as a function of core average fuel temperature and core burnup. Please provide a technical description of how this correlation is derived, including the codes and methods used. Discuss any limitations or restrictions regarding the use of this correlation.

    b. Discuss the method of calculation and application of suitable weighting factors used to acquire a target Doppler temperature coefficient or Doppler power defect. Indicate the Updated Final Safety Analysis Report (UFSAR) transients that use this method.

Enclosure

3. By letter dated August 10, 1993, VEPCO discussed the expansion of the North Anna RETRAN model from two geometric configurations to four geometric configurations. The model options increased from a one-loop and two-loop reactor coolant system (RCS) geometry with a single-node steam generator secondary side, to one-loop and three-loop RCS geometry with either single- or multi-node steam generator secondary side. Please discuss the process used for choosing which of the four configurations to use for a particular transient, and identify the specific model used for each of the North Anna and Surry UFSAR, Chapter 15, transients that were evaluated using RETRAN.

PDQ Code and Model Review, Topical Report VEP-NAF-1, "PDQ Two Zone Mode," VEPCO submittal dated October 1, 1990

1. By letter dated December 2, 2002, VEPCO stated that the accuracy of the PDQ model is verified each cycle during startup physics testing and during routine core follow. Please provide representative results from a recent refueling outage (comparisons between the startup physics test data and the PDQ predictions) that demonstrate the accuracy of this model.

2. There do not appear to be any limitations or restrictions associated with the use of PDQ Two Zone as described in VEP-NAF-1. Please justify that PDQ Two Zone is applicable over all ranges of operation expected for North Anna and Surry.

3. PDQ Two Zone cross section representation has been improved through the addition of multiple G-factor capability. Please discuss the methodologies used to determine these factors and discuss when and how they are applied. Include a discussion of the "fictitious crod isotope" mentioned on page 2-23 of your dated October 1, 1990.

4. Table 3.2 of this submittal lists the existing nuclear reliability factors and the PDQ Two Zone nuclear uncertainty factors (NUF). Please discuss the methodology used to calculate each of the PDQ NUF values, and indicate when NRC approval was obtained.

5. Please discuss how the measured data used for statistical comparison to the PDQ Two Zone predicted values were obtained. How were uncertainties in the measured data addressed in the statistical analyses?

NOMAD Code and Model Review, Topical Report VEP-NFE-1-A, Supplement 1, "VEPCO NOMAD Code and Model," VEPCO Submittal dated November 13, 1996

1. By letter dated December 2, 2002, VEPCO stated that the accuracy of the NOMAD model is verified each cycle during startup physics testing and during routine core follow. Please provide representative results from a recent refueling outage (comparisons between the startup physics test data and the NOMAD predictions) that demonstrate the accuracy of this model.

2. There do not appear to be any limitations or restrictions associated with the use of NOMAD as described in this submittal. Please justify that NOMAD is applicable over all ranges of operation expected for North Anna and Surry.

3. Please discuss the user-defined tolerances used in the Radial Buckling Coefficient model, including how they are calculated and used in the model. Also discuss the process in place that ensures that correct values are calculated and entered into the model by the user.

4. The Xenon model in NOMAD allows a user-supplied multiplier to be applied to the xenon or iodine production terms. Please discuss the purpose of this multiplier and how the value is determined. Also discuss the process in place that ensures that correct values are calculated and entered into the model by the user.

5. The Control Rod Model requires several user input constants or multipliers. Please discuss the purpose of these user inputs, and the methods used to determine their values. Also discuss the process in place that ensures that correct values are calculated and entered into the model by the user.

6. In the $F_Q(z)$ x relative power calculations, a correction factor for grids is applied. Please discuss the method used to calculate these correction factors. Discuss how the correction factors change as the location of interest moves away from a grid location and provide typical values for these correction factors as a function of axial location.

7. Regarding the method of qualifying the NOMAD model, please address why data from only a few select operating cycles for North Anna, Unit 1, and Surry, Unit 2, were chosen for benchmarking purposes. Are the number of data points used for the various verifications adequate for a statistically significant decision?

8. Please discuss the methodology used to calculate each of the NOMAD NUF and indicate when NRC approval was obtained.

9. Please discuss how the measured data used for statistical comparison to the NOMAD predicted values were obtained. How were uncertainties in the measured data addressed in the statistical analyses?

REFERENCES:

1. Letter from C. O. Thomas (USNRC) to T. W. Schnatz (UGRA), “Acceptance for Referencing of Licensing Topical Reports EPRI CCM-5, RETRAN - A Program for One Dimensional Transient Thermal Hydraulic Analysis of Complex Fluid Flow Systems, and EPRI NP-1850-CCM, RETRAN-02 - A Program for Transient Thermal-Hydraulic Analysis of Complex Fluid Flow Systems,” dated September 4, 1984.

2. Letter from A. C. Thadani (USNRC) to R. Furia (GPU), “Acceptance for Referencing Topical Report EPRI-NP-1850 CCM-A, Revisions 2 and 3 Regarding RETRAN02/MOD003 and MOD004,” dated October 19, 1988.

3. Letter from A. C. Thadani (USNRC) to W. J. Boatwright (RETRAN02 Maintenance Group), “Acceptance for Use of RETRAN02/MOD005.0,” dated November 1, 1991.

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