

January 24, 2003

TO: Virginia Electric and Power Company

FROM: Stephen Raul Monarque, Project Manager */RA/*  
Section 1  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

SUBJECT: NRC STAFF'S REQUEST FOR ADDITIONAL INFORMATION;  
VEP-FRD-42, RELOAD DESIGN METHODOLOGY, NORTH  
ANNA AND SURRY POWER STATIONS, UNITS 1 AND 2 (TAC  
MB3141, MB3142, MB3151, AND MB3152)

The NRC staff is providing Virginia Electric and Power Company (VEPCO) a list of questions that will be sent as a request for additional information. VEPCO is requested to review these following questions and provide a response date to the NRC staff.

RETRAN Review - VEPCO Letters dated 11/19/85 (Conversion from RETRAN01 to RETRAN02) and 8/10/93 (updated model)

1. In the generic RETRAN Safety Evaluation Report (SER), dated September 4, 1984 (Reference 1), the NRC staff generically approved the use of RETRAN-01/MOD003 and RETRAN-02/MOD002, subject to the limitations and restrictions outlined in the SER and its enclosed Technical Evaluation Reports (TER). The NRC staff approved the use of RETRAN-01/MOD003 for VEPCO in a letter dated April 11, 1985. In that SER, the staff stated that VEPCO has not provided information to address the restrictions stated in the staff SER for the generic RETRAN computer code and that VEPCO has not provided an input deck to the staff as was required by the staff SER for the generic RETRAN code. The input deck submittal was required from VEPCO as a condition of the approval to use RETRAN.
  - a. VEPCO is currently using RETRAN02/MOD005.2. Please provide information which describes 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 in the North Anna and Surry RETRAN models. If VEPCO has previously submitted any of this information, then please provide a reference to this submittal.
  - b. As required by the Staff SERs, please submit RETRAN input decks which 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. Please provide these input decks in electronic text file format.
2. Regarding Doppler reactivity feedback (discussed on pg. 8 of the 8/10/93 submittal):
  - a. The Doppler reactivity feedback is calculated by a Virginia Power derived 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. For which FSAR transients is this method applied?
3. The 8/10/93 submittal discussed how VEPCO expanded the North Anna RETRAN model from two geometric configurations to four geometric configurations. The model options increased from a one-loop and two-loop 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 which model is used for each of the North Anna and Surry FSAR Chapter 15 transients evaluated using RETRAN.

PDQ Two Zone Model (VEP-NAF-1, July 1990 - Transmitted via VEPCO letter dated 10/1/90)

1. VEPCO's December 2, 2002 RAI response stated that the accuracy of the PDQ and NOMAD models is verified each cycle during startup physics testing and during routine core follow. Please provide representative results from a recent refueling (comparisons between the startup physics test data and the PDQ predictions) which demonstrate the accuracy of these models.
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 methodology used to determine these factors and discuss when and how they are applied. Include in this a discussion of the "fictitious rod isotope" mentioned on page 2-23 of the submittal.
4. Table 3.2 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. Provide a reference to NRC approved methodology, if applicable.
5. Please discuss how the measured data used for statistical comparison to the PDQ Two Zone predicted values was obtained. How was uncertainty in the measured data addressed in the statistical analyses?

NOMAD Code and Model (VEP-NFE-1A, Supplement 1 - Transmitted via VEPCO letter dated 11/13/96)

1. VEPCO's December 2, 2002 RAI response stated that the accuracy of the PDQ and NOMAD models is verified each cycle during startup physics testing and during routine core follow. Please provide representative results from a recent refueling (comparisons

between the startup physics test data and the NOMAD predictions) which demonstrate the accuracy of these models.

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 which ensures that correct values are calculated and input to 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 which ensures that correct values are calculated and input to 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 which ensures that correct values are calculated and input to 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 Nuclear Uncertainty Factors. Provide a reference to NRC approved methodology, if applicable.
9. Please discuss how the measured data used for statistical comparison to the NOMAD predicted values was obtained. How was uncertainty 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.

**ADAMS: ML030270165**