VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

December 2, 2002

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Serial No.: 02-662
NL&OS/ETS RO
Docket Nos.: 50-338/339
50-280/281
License Nos.: NPF-4/7
DPR-32/37

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY (DOMINION)
NORTH ANNA POWER STATION UNITS 1 AND 2
SURRY POWER STATION UNITS 1 AND 2
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
DOMINION'S RELOAD NUCLEAR DESIGN METHODOLOGY TOPICAL REPORT

Dominion's Reload Nuclear Design Methodology Topical Report has been revised to support the transition to Framatome ANP Advanced Mark-BW fuel at North Anna. In a letter dated October 8, 2001 (Serial No. 01-623) Virginia Electric And Power Company (Dominion) submitted Revision 2 of VEP-FRD-42, "Reload Nuclear Design Methodology Topical Report," for NRC review and approval. During review of the topical report, the NRC staff identified additional information that is needed to complete their review. The additional information was requested in a letter from the NRC dated October 25, 2002. Attachment 1 to this letter provides the additional information including Dominion's process for the maintenance and modification of "NRC Approved" methodologies.

If you have any further questions or require additional information, please contact us.

Very truly yours,

Eugene S. Grecheck
Vice President - Nuclear Support Services

Attachment

Commitments made in this letter: None

A001

cc: U.S. Nuclear Regulatory Commission
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Attachment

REQUEST FOR ADDITIONAL INFORMATION
DOMINION'S RELOAD NUCLEAR DESIGN METHODOLOGY TOPICAL REPORT
VEP-FRD-42, Revision 2

North Anna Power Station Units 1 and 2
Surry Power Station Units 1 and 2
Virginia Electric and Power Company
(Dominion)

Background

In a letter dated October 8, 2001 (Serial No. 01-628) Virginia Electric and Power Company (Dominion) submitted Revision 2 of VEP-FRD-42, "Reload Nuclear Design Methodology Topical Report," for NRC review and approval. During review of the topical report, the NRC staff identified additional information that is needed to complete their review. The additional information was requested in a letter from the NRC dated October 25, 2002. The requested information is delineated below.

NRC Request for Additional Information:

"VEPCO is requested to confirm that the submittals listed below are the latest revisions for these codes that have not received NRC staff approval.

1. PDQ - The staff will review Topical Report VEP-NAF-1, July, 1990, submitted in a letter from VEPCO to NRC dated October 1, 1990.

2. NOMAD - The staff will review Topical Report VEP-NFE-1A, Supplement 1, September 1996, submitted in a letter from VEPCO to NRC dated November 11, 1996.

3. TIP/CECOR - The staff will review Topical Report VEP-NAF-2, November 1991, submitted in a letter from VEPCO to NRC dated December 20, 1991.

4. RETRAN - The staff will review the information submitted in a letter from VEPCO to NRC dated August 10, 1993. The information provided in this submittal was only applicable for North Anna, Units 1 and 2."

Dominion Response:

PDQ and NOMAD Codes & Models

For PDQ, the report submitted by letter Serial No. 90-562, dated October 1, 1990 is the latest revision that has not received NRC staff approval. Likewise, the NOMAD report submitted by letter Serial No. 96-319, dated November 13, 1996 (versus November 11, 1996 stated above) is the latest revision that has not received NRC staff approval. For both PDQ and NOMAD, the referenced reports are accurate representations of current codes and models with regard to methodology. That is, the theory, sources of input data, solution schemes, geometric mesh structure, energy group structure, and use of the models in the core modeling process have not changed. There have been subsequent code changes to correct minor errors and to accommodate new code edits and additional computing platforms. There have been changes in input to accommodate the evolution of core design features including increased fuel enrichments, changes in BP design, and use of vessel fluence suppression neutron absorber rods. Throughout this period, accuracy of the PDQ model (and by extension the NOMAD model, since PDQ is the source of data and normalization for NOMAD) has been verified each cycle during startup physics testing and during routine core follow. For each cycle, a Startup Physics Test Report and a Core Performance Report is issued to document the behavior of the core relative to the model predictions.

TIP/CECOR Code & Model

The topical VEP-NAF-2, submitted by letter Serial No. 91-746, dated December 20, 1991, is the latest revision of TIP/CECOR that has not received NRC staff approval. However, Dominion does not consider review of TIP/CECOR necessary for review of VEP-FRD-42 Rev. 2 (the Reload Topical) for several reasons. First, the focus of the Reload Topical is on core design and safety analysis methodology, not core surveillance. TIP/CECOR is not directly discussed in VEP-FRD-42 Rev. 2 because it is not part of the reload methodology. TIP/CECOR uses data provided by the PDQ model (Reload Topical Section 2.1.1, paragraph 2) to perform core power distribution surveillance. Second, TIP/CECOR is not new methodology for measurement of core power distributions. USNRC review and approval for use of CECOR in the synthesis of core power distributions using fixed in-core detector data is documented in a 1980 Combustion Engineering Topical Report (Reference 5 of VEP-NAF-2). TIP/CECOR, the Dominion version of the model, uses the same solution schemes and techniques but employs data at 61 axial points rather than just a few. Finally, although the current interpretation of "essentially the same" had not yet been applied to 10CFR50.59 evaluations in 1992, the TIP/CECOR Topical Report and the 10CFR50.59 evaluation performed prior to use of the code clearly demonstrate that TIP/CECOR results are essentially the same as those of the previous measurement code (INCORE). The reason for replacing INCORE with CECOR was not to gain analytical margin, but to be able to accept input representing physically different regions of newer, axially non-homogenous cores.

RETRAN Code & Model

Consistent with approaches employed by NSSS vendors, Dominion's RETRAN model is qualified on the basis of the plant class for which it will be used. There is not a separate Surry-specific RETRAN model document that parallels the content of the report submitted in Reference 1. However, as discussed further below, the material in Reference 1 is equally applicable to the Surry and North Anna models. The Surry 3-loop model, which was completed after the submittal of Reference 1, uses the same noding, modeling philosophy and code options as the North Anna model. The following description provides some background discussion relating to the RETRAN models in use for North Anna and Surry.

Dominion's reload methodology incorporates the RETRAN-02 code, which was generically approved by the NRC via Reference 2. Dominion is currently using RETRAN-02, Mod 5.2. The NRC issued a generic approval, transmitted in Reference 3, for RETRAN-02 Mod 5.0. Discussions between the utilities and the NRC led to the conclusion that Mods 5.1 and 5.2, which were essentially maintenance upgrades, did not require additional NRC review for utility implementation (References 4 and 5).

Dominion's RETRAN models and capability were approved in Reference 6. As noted in the SER, the Virginia Electric and Power Company (Dominion) Topical Report was supplemented in three subsequent submittals (References 7, 8, 9) prepared in response to NRC Requests for Additional Information.

The RETRAN Topical SER (Reference 6) recognized that model maintenance activities would be performed under the utility 10 CFR 50 Appendix B QA program:

> "The staff requires that all future modifications of VEPCO RETRAN model and the error reporting and change control models should be placed under full quality assurance procedures."

Dominion has followed the requirements specified in the SER for VEP-FRD-41 in updating our RETRAN models. Updated models and the qualification results were documented per our 10 CFR 50 Appendix B QA program and provided to the USNRC for information in Reference 1. The qualification, documentation and implementation of these new models was done in a manner that meets the programmatic elements of Generic Letter 83-11, Supplement 1.

Reference 1 presented the 3-loop RETRAN model and qualification results using the North Anna version of the model. The Surry 3-loop model is the same with regard to noding, options and system and component modeling techniques. The Surry and North Anna models differ in order to appropriately reflect plant specific design features such as RCS geometry, system and pump characteristics and setpoint values. Dominion concludes that the model description in Reference 1 accurately describes the key features of the models in use for both Surry and North Anna power stations.

Dominion continues to perform model maintenance activities in accordance with the provisions of the SER and 10 CFR 50 Appendix B. Dominion has made model changes in the past to refine treatment of certain features, to address industry issues or to reflect changes to the plants. These changes were evaluated under the provisions of 10CFR50.59, which will continue to be employed to assess future changes. The following list summarizes several enhancements which are illustrative of the changes that have been made to the models:

- The current models use the 1979 ANS Decay Heat model option.
- More detailed main steam safety valve (MSSV) modeling was added to ensure that the concerns raised in NRC Information Notice 97-09, "Inadequate Main Steam Safety Valve (MSSV) Setpoints and Performance Issues Associated with Long MSSV Inlet Piping" are adequately addressed.
- Hydraulic characteristics in the core regions have been adjusted to reflect current fuel assembly designs.
- More detailed, mechanistic models for the pressurizer and steam generator level instrumentation were added.
- A detailed rod control system model was added.

Dominion's Process for the Maintenance and Modification of "NRC Approved" Methodologies

Section 2.3 of VEP-FRD-42, Rev. 2, entitled "Analytical Model and Method Approval Processes," indicates several acceptable means by which either analytical models or methods can achieve approved status for use in Dominion's reload methodology. The following discussion describes Dominion's approach in performing maintenance and modifications of NRC Approved methodologies. This approach is applied to all models and methodologies that are employed in Dominion's reload design methodology, and which may be cited either by reference within VEP-FRD-42 or in the COLR.

The determination of the requirement to submit methodology changes to NRC for approval prior to application is based on published NRC guidance, i.e.:

- Generic Letter 88-16, "Removal Of Cycle-Specific Parameter Limits From Technical Specifications"
- 10 CFR 50.59, and in particular 10 CFR 50.59c(2)(viii): "*(2) A licensee shall obtain a license amendment pursuant to Sec. 50.90 prior to implementing a proposed change, test, or experiment if the change, test, or experiment would (viii) Result in a departure from a method of evaluation described in the FSAR (as updated) used in establishing the design bases or in the safety analyses.*"
- NEI 96-07, Revision 1, "Guidelines for 10 CFR 50.59 Evaluations"
- Regulatory Guide 1.187, "Guidance for Implementation of 10 CFR 50.59, Changes, Tests, and Experiments" (endorses NEI 96-07 Rev. 1)
- Generic Letter 83-11, Supplement 1, "Licensee Qualifications for Performing Safety Analyses"

Relevant sections of these documents upon which we base our determination process are as follows:

1. Generic Letter 88-16 establishes the concept of reload cycle dependent operating limits in the Technical Specifications.

   "Generally, the methodology for determining cycle-specific parameter limits is documented in an NRC-approved Topical Report or in a plant-specific submittal. As a consequence, the NRC review of proposed changes to TS for these limits is primarily limited to confirmation that the updated limits are calculated using an NRC-approved methodology and consistent with all applicable limits of the safety analysis. These changes also allow the NRC staff to trend the values of these limits relative to past experience. This alternative allows continued trending of these limits without the necessity of prior NRC review and approval."

2. NEI 96-07, Rev. 1, as endorsed by Reg. Guide 1.187, provides guidance for evaluating changes to methods under the provisions of 10CFR50.59. For example, Paragraph 4.3.8.1, states:

4.3.8.1, Guidance for Changing One or More Elements of a Method of Evaluation

"The definition of "departure ..." provides licensees with the flexibility to make changes under 10 CFR 50.59 to methods of evaluation whose results are "conservative" or that are not important with respect to the demonstrations of performance that the analyses provide. Changes to elements of analysis methods that yield conservative results, or results that are essentially the same, would not be departures from approved methods."

3. USNRC Generic Letter 83-11 Supplement 1 provides a method for utility qualification of analysis methodologies, including those used to establish core operating limits, without formal NRC review and approval:

   "The U.S. Nuclear Regulatory Commission (NRC) is issuing this supplement to Generic Letter (GL) 83-11 to notify licensees and applicants of modifications to the Office of Nuclear Reactor Regulation (NRR) practice regarding licensee qualification for performing their own safety analyses. This includes the analytical areas of reload physics design, core thermal-hydraulic analysis, fuel mechanical analysis, transient analysis (non-LOCA), dose analysis, setpoint analysis, containment response analysis, criticality analysis, statistical analysis, and Core Operating Limit Report (COLR) parameter generation. It is expected that recipients will review the information for applicability to their facilities. However, suggestions contained in this supplement to the generic letter are not NRC requirements; therefore, no specific action or written response is required."

   "To help shorten the lengthy review and approval process, the NRC has adopted a generic set of guidelines which, if met, would eliminate the need to submit detailed topical reports for NRC review before a licensee could use approved codes and methods. These guidelines are presented in the Attachment to this Generic Letter. Using this approach, which is consistent with the regulatory basis provided by Criteria II and III of Appendix B to Part 50 of Title 10 of the Code of Federal Regulations (10 CFR Part 50), the licensee would institute a program (such as training, procedures, and benchmarking) that follows the guidelines, and would notify NRC by letter that it has done this and that the documentation is available for NRC audit."

Reflecting this NRC and industry guidance, Dominion's process for maintaining and modifying approved methodologies encompasses these elements:

- Dominion can change, under the provisions of 10 CFR 50.59(c)(2)(viii), NRC approved codes and methodologies used to establish core operating limits, via the processes outlined in NEI 96-07, Rev. 1, without additional NRC review and approval of these changes.

- Dominion can implement or substitute, under 10 CFR 50.59(c)(2)(viii), NRC approved codes and methodologies for use in establishing core operating limits via the processes outlined in Generic Letter 83-11 Supplement 1, without additional NRC review and approval of these methods.

- Dominion concludes that, in updating the list of approved methodologies for establishing core operating limits in the Technical Specifications, utility affirmation that the changes to the methodologies have been done as described by either of the above is adequate to retain the "approved" status for these methods.

References:

1. Letter from M. L. Bowling (Virginia Electric and Power Company) to USNRC, "Virginia Electric and Power Company, North Anna Power Station Units 1&2, Supplemental Information on the RETRAN NSSS Model," Serial No. 93-505, August 10, 1993.

2. Letter from C. O. Thomas (NRC) 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," September 4, 1984.

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

4. Letter from M. J. Virgilio (NRC) to C. R. Lehmann (RETRAN Maintenance Group), Acceptance for Referencing of the RETRAN-02 MOD005.1 Code, April 12, 1994.

5. Letter from G. L. Swindlehurst (RETRAN Maintenance Group) to T. E. Collins (NRC/RSB), RETRAN-02 MOD005.2 Code Version, Notification of Code Release, November 24, 1997.

6. Letter from C. O. Thomas (NRC) to W. L. Stewart (Virginia Power), Acceptance for Referencing of Licensing Topical Report VEP-FRD-41, "Virginia Power Reactor System Transient Analyses Using the RETRAN Computer Code," April 11, 1985.

7. Letter from W. L. Stewart (Vepco) to H. R. Denton (USNRC), "Vepco Reactor System Transient Analyses, Supplemental Information," Serial No. 060, February 27, 1984.

8. Letter from W. L. Stewart (Vepco) to H. R. Denton (USNRC), "Vepco Reactor System Transient Analyses," Serial No. 376, July 12, 1984.

9. Letter from W. L. Stewart (Vepco) to H. R. Denton (USNRC), "Vepco Reactor System Transient Analyses," Serial No. 376A, August 24, 1984.