VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

September 4, 2003

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

Serial No. 03-245A
NLOS/ETS
Docket Nos. 50-338/339
License Nos. NPF-4/7

VIRGINIA ELECTRIC AND POWER COMPANY (DOMINION)
NORTH ANNA POWER STATION UNITS 1 AND 2
PROPOSED TECHNICAL SPECIFICATIONS CHANGES AND EXEMPTION REQUEST FOR USE OF FRAMATOME ANP ADVANCED MARK-BW FUEL
SMALL BREAK LOSS OF COOLANT ACCIDENT (SBLOCA) ANALYSIS RESULTS
REQUEST FOR ADDITIONAL INFORMATION

In a May 27, 2003 letter (Serial No. 03-245), Dominion submitted the SBLOCA results for Advanced Mark-BW fuel in North Anna Unit 2 to support the NRC's review of a proposed amendment and exemptions that will permit North Anna Units 1 and 2 to use Framatome ANP Advanced Mark-BW fuel. The SBLOCA information was presented in the form of a supplement to the evaluation report provided in our March 28, 2002 letter (specifically, report Section 7.3). On August 19, 2003, the NRC requested additional information regarding the SBLOCA analysis results. Although the NRC request for additional information was only directed at Unit 2, this response addresses both Units 1 and 2. Attachment 1 to this letter provides the responses to the requested information.

To support the use of Framatome Advanced Mark-BW fuel in North Anna Unit 2, Cycle 17, we respectfully request the NRC to complete their review and approval of the license amendment and exemptions by September 30, 2003. We appreciate your consideration of our technical and schedular requests. If you have any questions or require additional information, please contact us.

Very truly yours,

Leslie N. Hartz
Vice President - Nuclear Engineering

Commitments made in this letter: None

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SN: 03-245A
Docket Nos.: 50-338/339
Subject: RAI – Proposed Tech Spec Change
Use of Framatome ANP Advanced Mark-BW Fuel
SBLOCA Analysis Results

COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by Leslie N. Hartz, who is Vice President - Nuclear Engineering, of Virginia Electric and Power Company. She has affirmed before me that she is duly authorized to execute and file the foregoing document in behalf of that Company, and that the statements in the document are true to the best of her knowledge and belief.

Acknowledged before me this 4th day of September, 2003.

My Commission Expires: March 31, 2004.

Maggie McClure
Notary Public

(SEAL)

Attachment

Request for Additional Information
Small Break LOCA Analysis Results
North Anna Power Station Units 1 and 2

Framatome Fuel Transition Program
Technical Specification Change

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

Request For Additional Information - North Anna Small Break LOCA Analysis

A. OVERALL APPLICABILITY TO NORTH ANNA, UNIT 2

The same questions asked regarding the overall applicability of the proposed large break LOCA (LBLOCA) methodology to North Anna Unit 2 (NA-2) also apply to the proposed small break LOCA (SBLOCA) methodology.

Question 1

To show that the referenced generically approved LOCA analysis methodologies apply specifically to the NA-2 plant, provide a statement that VEPCO and its vendor have ongoing processes which assure that the ranges and values of the input parameters for the NA-2 LOCA analysis bound the ranges and values of the as-operated plant parameters. Furthermore, if the NA-2 plant-specific analyses are based on the model and or analyses of any other plant (NA-1), then justify that the model or analyses apply to NA-2. (e.g. if the other design has a different vessel internals design the model wouldn't apply to NA-2.)

(Since these applicability questions have already been asked regarding the proposed LBLOCA methodology, these questions regarding the proposed SBLOCA methodology may be answered by referring to the responses to those LBLOCA questions, if they apply.)

Response:

Dominion and its fuel vendor have ongoing processes which assure that the ranges and values of input parameters for the North Anna Units 1 and 2 analyses bound the ranges and values of the as-operated plant values for those parameters. Dominion's reload core design process is an example of one such process.

The North Anna Unit 2 plant-specific SBLOCA analysis is based only on the model and/or analysis of North Anna Unit 2. The Unit 2 SBLOCA model was built based on Dominion-supplied Unit 2 plant-specific data.

B. APPLICABILITY OF THE SBLOCA MODEL AND ANALYSES RESULTS

The discussion of mixed cores in the submittal did address the effects of the mixed core on PCT and oxidation for M-5 fuel, but it does not seem to address the PCT and oxidation for the other fuel. In its Rulemaking Hearing dated December 28, 1983, the Nuclear Regulatory Commission stated, regarding the performance criteria of 10 CFR 50.46 (b): "In view of the lack of experience in this hypothetical situation, we think it prudent to apply our criteria to all of the core and not to exempt any part."

Question 2

Provide PCT and oxidation results for the other (non-FTI) fuel in the core.

(Note: In a letter to NEI dated November 8, 1999, Gary M. Holahan, reiterated the NRC position that "total oxidation" encompasses accident and pre-accident oxidation. This position continues to apply. Therefore, in response to Q2, provide total oxidation for the "other" (non-FTI) fuel, including pre-accident oxidation, plus LOCA cladding outside oxidation, plus cladding inside oxidation. This clarification also applies to LBLOCA Question 10.)

Response:

The Framatome ANP analysis documented in Section 7.3 of Dominion's submittal (Reference 1) modeled a mixed core configuration that directly included mixed core effects on the Advanced Mark-BW fuel. The PCT results for the mixed core assessment (Tables 7.3-13, 7.3-19) confirm that mixed core effects are small. This is consistent with existing evaluations noted in UFSAR Section 15.3.1.4, which concludes that mixed core hydraulic mismatches are not a significant factor for small break analyses. The existing results for the NAIF fuel, which were calculated from analysis of a full core of NAIF, remain conservative for NAIF in a mixed core with Advanced Mark-BW.

This assessment concludes that the existing analysis of the Westinghouse fuel remains valid. The PCT and oxidation values from the analysis of record for the co-resident Westinghouse NAIF may be found in Section 15.3.1 of the current NAPS UFSAR. These results were calculated using the Westinghouse NOTRUMP SBLOCA ECCS Evaluation Model. These values have been modified to account for changes and errors in the Westinghouse SBLOCA ECCS Evaluation Model, per the requirements of 10 CFR 50.46(a)(3)(ii). The most recent report of these changes was provided to the NRC in a letter dated May 21, 2003 (Reference 2). This report documented licensing basis PCTs for NA-1 and NA-2 SBLOCA of 1689°F (one analysis accommodates both units). This report did not provide cladding oxidation results. The hot rod maximum oxidation value of 2.0% reported in UFSAR Table 15.3-3 remains conservative for the Westinghouse fuel in NAPS-1 and NAPS-2 for mixed cores with Advanced Mark-BW fuel. This total oxidation value includes both inside and outside cladding oxidation, as calculated by the NOTRUMP Evaluation Model. These results were determined consistent with the NOTRUMP Evaluation Model process for accommodating the potential effects of burned assemblies. Therefore, the results are bounding for Westinghouse fuel in transition cores.

The pre-existing cladding oxidation is accommodated in the following fashion. For each North Anna reload cycle, Westinghouse performs cycle specific fuel rod design calculations that confirm all Westinghouse fuel rod design criteria are satisfied. To verify compliance with the 17% cladding oxidation limit, these cycle specific calculations ensure the amount of fuel cladding oxidation (i.e., the pre-LOCA local oxidation) does not exceed a predetermined limit. The assessment also evaluates the potential for pellet-clad gap reopening. For the transition cores that contain both Framatome and Westinghouse fuel, Dominion will continue to provide Westinghouse with information

regarding specific Westinghouse fuel assemblies that are scheduled for reuse as well as the planned operating conditions. Westinghouse will perform cycle specific reload evaluations for their fuel in North Anna Units 1 and 2 to confirm compliance with the Westinghouse fuel rod design criteria, including the limits on oxidation and rod internal pressure / gap reopening. The limit on upper bound oxide thickness is set to ensure that the sum of the pre-transient and post-LOCA oxidation will not exceed 17%.

Question 3

The loop seal elevation and core level figures in the May 27, 2003 submittal, do not have a common indicated reference value such that the relative elevation of the top of the core, the bottom of the core, the top of the loop seal, and the bottom of the loop seal can be cross referenced versus each other. Only by indirect means can a reader estimate the level of the top and bottom of the core, and the top and bottom of the loop seal, on their respective graphs. There is no way to correlate the core graph elevations versus the loop seal elevations. Provide graphs that are consistently labeled.

Response:

The following data are provided for use in comparing the subject plots from Section 7.3 of Dominion's submittal. Key elevations on the small break LOCA intact and broken loop seal level plots are as follows: 1) the zero elevation is the centerline of the reactor vessel nozzle; 2) the top of the active core is –4.8 feet; 3) the bottom of the active core is –16.8 feet; 4) the top of the loop seal pipe is –9.0 ft; 5) the bottom of the loop seal pipe is –11.6 ft. Key elevations on the core level plots are as follows: 1) the zero elevation is the bottom of the active core; 2) the top of the active core is 12.00 feet; 3) the top of the loop seal pipe is 7.8 ft; 4) the bottom of the loop seal pipe is 5.2 ft. The bottom of the active core is thus 16.8 feet below the centerline of the reactor vessel nozzle. This provides the necessary information to compare the small break LOCA core level and loop seal level plots.

References:

1. Letter, Leslie N. Hartz (Dominion) to USNRC, "Virginia Electric and Power Company, North Anna Power Station Units 1 and 2, Surry Power Station Units 1 and 2, Reporting of ECCS Model Changes Pursuant to 10 CFR 50.46," Serial No. 03-350, May 21, 2003.

2. Letter, Leslie N. Hartz (Dominion) to USNRC, "Virginia Electric and Power Company, North Anna Power Station Units 1 and 2, Small Break Loss of Coolant (SBLOCA) Analysis Results for the Proposed Technical Specifications Changes and Exemption Request for Use of Framatome ANP Advanced Mark-BW Fuel," Serial No. 03-245, May 27, 2003.