VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261
September 22, 2003

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

Serial No. 03-313D
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
SUPPLEMENTAL INFORMATION FOR REALISTIC LARGE BREAK LOSS OF COOLANT ACCIDENT (RLBLOCA) ANALYSIS RESULTS
PROPOSED TECHNICAL SPECIFICATIONS CHANGES AND EXEMPTION REQUEST FOR USE OF FRAMATOME ANP ADVANCED MARK-BW FUEL

In a May 6, 2003 letter (Serial No. 03-313), Dominion submitted the Realistic Large Break LOCA (RLBLOCA) 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. On August 20, 2003 (Serial No. 03-313A) Dominion provided a response to an August 6, 2003 NRC request for additional information regarding the RLBLOCA results. In an August 28, 2003 meeting to discuss the RLBLOCA analysis results, the NRC staff requested further clarification of Dominion's August 20, 2003 responses. Supplemental information for Questions 1, 5, 9, and 10b was provided on September 5, 2003 (Serial No. 03-313C). The attachment to this letter provides the requested clarification for Questions 6, 11a and additional questions provided in an August 29, 2003 facsimile. This information is applicable to both North Anna Units 1 and 2 even though the RAIs received were specific to Unit 2.

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 associated 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

Attachment

A001

cc: U.S. Nuclear Regulatory Commission
Region II
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW
Suite 23T85
Atlanta, Georgia 30303

Mr. J. E. Reasor, Jr.
Old Dominion Electric Cooperative
Innsbrook Corporate Center
4201 Dominion Blvd.
Suite 300
Glen Allen, Virginia 23060

Commissioner
Bureau of Radiological Health
1500 East Main Street
Suite 240
Richmond, VA 23218

Mr. S. R. Monarque
NRC Project Manager
U. S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Mail Stop 8-H12
Rockville, MD 20852

Mr. M. J. Morgan
NRC Senior Resident Inspector
North Anna Power Station

SN: 03-313D
Docket Nos.: 50-338/339
Subject: Supplemental Information – Proposed TS Change
RLBLOCA Analysis Results – Use of Framatome
ANP Advanced Mark-BW Fuel

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 22nd day of September, 2003.

My Commission Expires: March 31, 2004.

Maggie McClure
Notary Public

(SEAL)

Dominion Supplemental Responses to NRC Request for Additional Information
Questions 6 and 11a from Dominion's August 20, 2003 letter (Serial No. 03-313A) and questions posed in an August 29, 2003 NRC facsimile

In an August 28, 2003 meeting, the NRC staff requested additional information to supplement the responses provided in Dominion's August 20, 2003 letter (Reference 1). The original questions and supplemental responses requested by NRC staff are provided below. It is our understanding that Dominion's responses to Questions 7, 8, 10a, 11b, and 12 required no further clarification. Supplemental information for Questions 1, 5, 9, and 10b was provided in a September 5, 2003 letter (Serial No. 03-313A). The responses provided below are applicable to both North Anna Units 1 and 2, even though the RAIs received were specific to Unit 2.

A. APPLICABILITY OF ANALYTICAL MODELS

Many of the analytical models in the NAPS-2 best estimate LBLOCA methodology are supported by empirical data taken at temperatures less than 1700°F and by sensitivity studies performed at temperatures less than 1700°F.

The RLBLOCA peak cladding temperature spectrum calculated for NAPS-2 using this methodology extends above 2000°F. At temperatures above 1700°F many of the principal phenomena which influence peak cladding temperature (PCT) change or increase in their influence (e.g., cladding oxidation rate) such that the data and sensitivity studies identified for cladding temperatures lower than 1700°F may not apply.

Q6. The NAPS-2 LBLOCA calculations were ranged down to 0.1 ft^2 which is below the minimum range in the current NAPS-2 LBLOCA. This size for NAPS-2 falls in the current SBLOCA range. The supporting demonstration plant analyses for the Framatome ANP RLBLOCA were accepted to this small size because for the demonstration plant the phenomena that were predicted to occur were indicative of a LBLOCA rather than a SBLOCA. NAPS-2 must justify that the ranging of break size for application of the Framatome ANP RLBLOCA methodology does not result in phenomena occurring that are typical of a SBLOCA.

Supplemental Response:

A set of 59 calculations was performed for NAPS Unit 2 using the RLBLOCA methodology to support the operation of the plant with FANP Advanced Mark-BW fuel. The smallest break size in this set was 0.44 ft^2 (with the total break area defined as the sum from both break junctions). From a review of the case results, it was found that during blowdown the core region completely voided, which is a large break characteristic. The liquid level in the core region began to increase after the initiation of accumulator injection that occurred at about 130 seconds. This result for the smallest break analyzed provides confirmation that SBLOCA phenomena did not occur in any of the 59 cases that were run using the RLBLOCA methodology.

Q11. Downcomer Boiling - The containment pressure in Figure 7.2-33 indicates that the containment pressure is at about 30 psia and continues to decline at 200 seconds into the limiting LBLOCA. Figures 7.2-23, 7.2-30, and 7.2-32 seem to indicate that downcomer boiling occurs at about 375 seconds into the transient. The containment plot ends at 200 seconds and it appears from Figures 7.2-23 and 7.2-32 that the calculation was terminated at ~460 seconds. At ~460 seconds, the PCT drops to ~450°F. At this time, the (extrapolated) containment pressure is 30 psia or less. The saturation temperature at 30 psia is ~250°F or less, but the drop in PCT stops at ~450°F. 10 CFR 50.46 requires that analyses to be run until the core is quenched.

a. Extend the analysis results tables and graphs, particularly Table 7.2-11 and Figure 7.2-33, to beyond the time that stable and sustained quench is established.

Supplemental Response:

The calculation of the limiting North Anna Unit 2 realistic large break LOCA transient was extended to 640 seconds. The elevation independent peak cladding temperature is shown in Figure 11-1. It can be seen from this figure that stable and sustained quench is established after about 450 seconds. The minor temperature spikes seen in the figure after 450 seconds are due to intermittent liquid carryover to the reactor vessel side of the break. Figure 11-2 shows that the reactor vessel liquid inventory remains reasonably constant, exhibiting a rising trend.

Figure 11-1 PCT Independent of Elevation

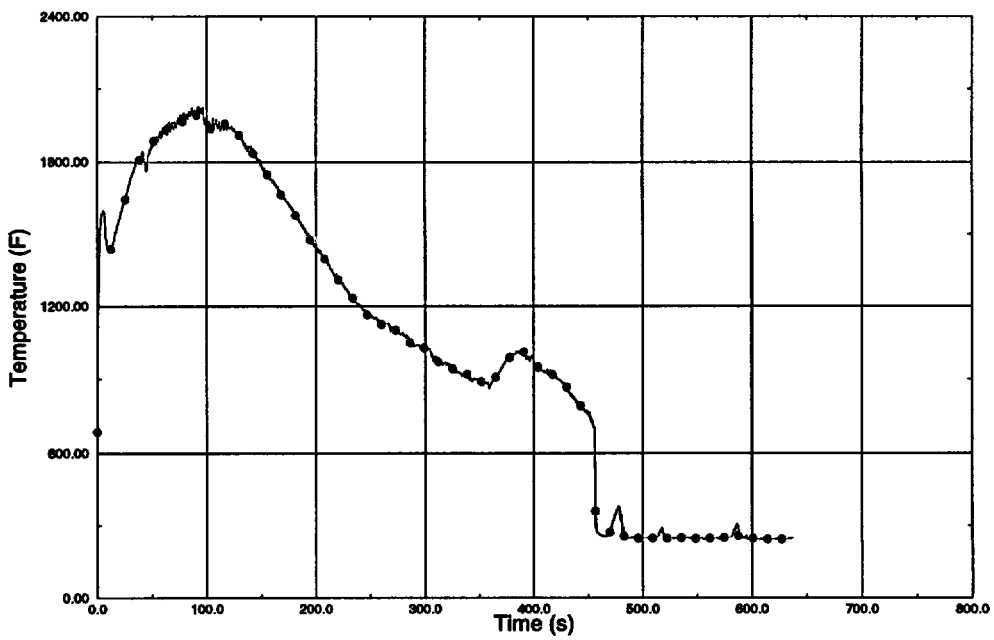
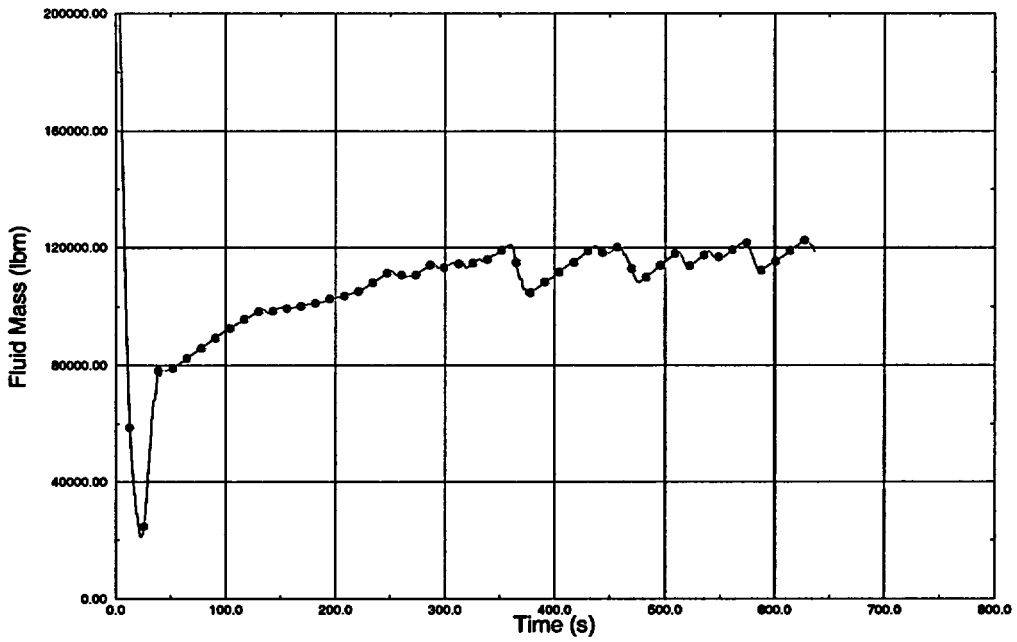


Figure 11-2 Reactor Vessel Mass



Questions from August 29, 2003 facsimile:

Additionally VEPCO is requested to provide the following information:

If the built-in S-RELAP5 pump performance curves were used, then verify that they apply to the North Anna plant's pump curves for conditions during the LBLOCA.

Response:

The North Anna realistic large break LOCA analyses used the S-RELAP5 built-in Westinghouse pump performance curves. The S-RELAP5 pump performance curves were validated for North Anna use by comparison with pump performance curve data provided by Dominion for North Anna (i.e., pump data used in the existing LBLOCA analysis). The comparison showed agreement with the data with the exception of differences in the neighborhood of the zero flow/zero speed point (the locked rotor point). These points are of little consequence since RLBLOCA analyses do not make use of the locked rotor assumption as do deterministic calculations. Framatome ANP concluded that the S-RELAP5 pump was appropriate for North Anna use.

Verify that hot leg to downcomer nozzle gaps were not modeled in the LBLOCA Analysis.

Response:

In compliance with the Safety Evaluation use conditions on FANP's RLBLOCA evaluation model (topical report EMF-2103) hot leg nozzle gaps were not modeled in the North Anna large break LOCA analyses.

REFERENCES

1. Letter, Leslie N. Hartz (Dominion) to USNRC, "Virginia Electric and Power Company, North Anna Power Station Units 1 and 2, Request For Additional Information Regarding Realistic Large Break Loss Of Coolant Accident (RLBLOCA) Analysis Results For The Proposed Technical Specifications Changes And Exemption Request For Use Of Framatome Anp Advanced Mark-Bw Fuel," Serial No. 03-313A, August 20, 2003.

2. Letter, Leslie N. Hartz (Dominion) to USNRC, "Virginia Electric and Power Company, North Anna Power Station Units 1 and 2, Realistic Large Break Loss of Coolant Accident (RLBLOCA) Analysis Results for the Proposed Technical Specifications Changes and Exemption Request for Use of Framatome ANP Advanced Mark-BW Fuel," Serial No. 03-313, May 6, 2003.