

VIRGINIA ELECTRIC AND POWER COMPANY  
RICHMOND, VIRGINIA 23261

July 31, 2007

10 CFR 50.90

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

Serial No. 06-936B  
NLOS/GDM R0  
Docket Nos. 50-280/281  
License Nos. DPR-32/37

**VIRGINIA ELECTRIC AND POWER COMPANY**  
**SURRY POWER STATION UNITS 1 AND 2**  
**PROPOSED TECHNICAL SPECIFICATIONS CHANGE**  
**ADDITION OF ASTRUM METHODOLOGY TO CORE OPERATING LIMITS REPORT**  
**REFERENCES AND REVISED LARGE BREAK LOCA ANALYSIS**  
**SUPPLEMENTAL INFORMATION**

In a letter dated November 16, 2006 (Serial No. 06-936), Virginia Electric and Power Company (Dominion) requested amendments in the form of changes to the Technical Specifications (TS) to Facility Operating License Numbers DPR-32 and DPR-37 for Surry Power Station Units 1 and 2, respectively. The proposed change would add a reference in Technical Specification 6.2.C, "Core Operating Limits Report (COLR)," to permit the use of the Westinghouse Best-Estimate Large Break Loss of Coolant Accident (BE-LBLOCA) analysis methodology using the Automated Statistical Treatment of Uncertainty Method (ASTRUM) for the analysis of LBLOCA. Dominion provided additional information in support of the license amendment request in a letter dated March 29, 2007 (Serial No. 06-936A).

On May 23, 2007, Dominion was informed by Westinghouse that the BE-LBLOCA analysis discussed in the license amendment request contained a computer code error associated with the determination of the limiting peak clad temperature (PCT). Although the error does not affect the conclusions of the analysis, we informed the NRC of this code error during a conference call on May 24, 2007. Dominion's plans to address the error were discussed with the NRC during subsequent conference calls, and it was agreed that Dominion would provide supplemental information that: 1) summarizes the code error issue and its effects on the key results of the BE-LBLOCA analysis, 2) describes the interim re-analysis effort that has been performed to address the error, and 3) details the additional analysis that would be performed to further substantiate acceptable PCT results for Surry Power Station Units 1 and 2. This information is provided in the attachment and the commitment described in this letter. The additional information provided herein does not affect the significant hazards consideration determination or environmental assessment that was previously provided in support of the proposed license amendment request.

In the discussions with the NRC regarding this error, it was concluded that the interim re-analysis effort would need to be supplemented by additional analysis to fully account for effects of the error on detailed results inherent in the ASTRUM BE-LBLOCA calculation. On this basis, Dominion commits to perform a full BE-LBLOCA reanalysis for Surry Power

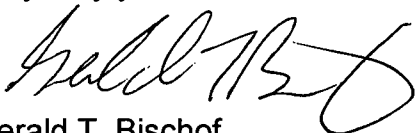
ADD  
NRR

Station Units 1 and 2 and to submit the reanalysis results to the NRC by December 31, 2008.

Finally, as discussed in Dominion's initial submittal dated November 16, 2006, previously approved Surry TS Amendments 250/249 revise the method for starting the inside and outside recirculation spray (RS) pumps as part of the resolution to GSI-191, *Assessment of Debris Accumulation on PWR Sump Performance*. This change was implemented for Surry Unit 2 during the fall 2006 refueling outage and will be implemented for Surry Unit 1 during the fall 2007 refueling outage. The supporting analyses for the implementation of the Westinghouse BE-LBLOCA analysis methodology using ASTRUM credits these changes to the Engineered Safety Features setpoints. Thus, coordinated implementation of the BE-LBLOCA analysis with the GSI-191 pump start change is planned prior to power operation during startup from the Surry Unit 1 fall 2007 refueling outage. To support this planned implementation, approval of this TS change and the interim Surry BE-LBLOCA analysis is requested by September 28, 2007.

If you have any questions or require additional information, please contact Mr. Gary D. Miller at (804) 273-2771.

Very truly yours,



Gerald T. Bischof  
Vice President – Nuclear Engineering

Attachment:

- Supplemental Information, Surry BE-LBLOCA ASTRUM Analysis

Commitment made in this letter:

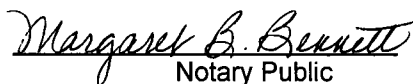
- Dominion commits to perform a full BE-LBLOCA reanalysis for Surry Power Station Units 1 and 2 and to submit the reanalysis results to the NRC by December 31, 2008.

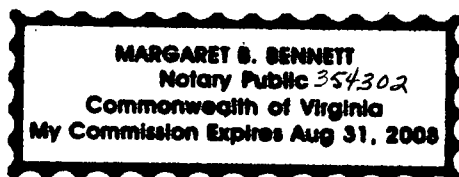
COMMONWEALTH OF VIRGINIA     )  
  )  
COUNTY OF HENRICO            )

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by Gerald T. Bischof, who is Vice President – Nuclear Engineering, of Virginia Electric and Power Company. He has affirmed before me that he 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 his knowledge and belief.

Acknowledged before me the 31<sup>ST</sup> day of July, 2007.

My Commission Expires: August 31, 2008

  
Notary Public



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

Mr. E. Riggs  
NRC Senior Resident Inspector  
Surry Power Station

State Health Commissioner  
Virginia Department of Health  
James Madison Building - 7th floor, Room 730  
109 Governor Street  
Richmond, Virginia 23219

Mr. S. P. Lingam  
NRC Project Manager - Surry  
U. S. Nuclear Regulatory Commission  
One White Flint North  
11555 Rockville Pike  
Mail Stop 8G9A  
Rockville, Maryland 20852

Mr. R. A. Jervey  
NRC Project Manager – North Anna  
U. S. Nuclear Regulatory Commission  
One White Flint North  
11555 Rockville Pike  
Mail Stop 8G9A  
Rockville, Maryland 20852

**ATTACHMENT**

**SUPPLEMENTAL INFORMATION**  
**SURRY BE-LBLOCA ASTRUM ANALYSIS**

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

**SUPPLEMENTAL INFORMATION**  
**ASTRUM BE-LBLOCA ANALYSIS**

**SURRY POWER STATION UNITS 1 AND 2**

**BACKGROUND**

The Large Break Loss of Coolant Accident (LBLOCA) was analyzed for Surry Units 1 and 2 using the Westinghouse ASTRUM methodology (Reference 1). The resulting Peak Cladding Temperature (PCT), Local Maximum Oxidation (LMO), and Core-wide Oxidation (CWO) values from this analysis were 2,044°F, 5.3%, and 0.32%, respectively. A License Amendment Request for Operating License Numbers DPR-32 (Surry Unit 1) and DPR-37 (Surry Unit 2) was submitted to the United States Nuclear Regulatory Commission requesting approval to apply the Westinghouse ASTRUM methodology to Surry Units 1 and 2 (Reference 2) based on these analysis results.

After completion of the Surry Units 1 and 2 ASTRUM analysis, Westinghouse discovered an error in the HOTSPOT code. In the axial node where burst is predicted to occur, a fuel relocation model is used to account for the likelihood that additional fuel pellet fragments may settle into the burst region. It was discovered that the effect of fuel relocation on local linear heat rate was being calculated, but then cancelled out later in the calculation. The impact of the fuel relocation error correction on the Surry Units 1 and 2 ASTRUM analysis has been assessed and is described herein.

The minimum containment pressure transient used in the original Surry ASTRUM submittal (Figure 18 in Reference 2) was a conservative estimate, intended to bound GSI-191 modifications at both units. Final containment design inputs were provided after the ASTRUM analysis completion, which included revised sump screen wall data, a delay in containment spray actuation, and an increase in the minimum initial containment pressure. These changes improve the containment pressure response for the LBLOCA accident, and have been assessed to partially offset the impact of correcting the HOTSPOT fuel relocation error.

The evaluation of the HOTSPOT fuel relocation error and revised containment pressure transient are described in the following section.

**SUPPLEMENTAL ASSESSMENTS**

The impact of the HOTSPOT fuel relocation error was assessed for the Surry Units 1 and 2 ASTRUM analysis through the re-analysis of all the burst cases with a corrected code version. The two most limiting cases (Runs 097 and 100) resulted in a PCT greater than the original ASTRUM analysis value. These cases were then re-analyzed using the revised containment pressure transient reflecting the changes described in the Background Section. The resulting PCT and LMO after the assessments are 2,095°F and 10.8%, respectively.

The HOTSPOT fuel relocation error had a negligible impact on the core-wide oxidation, since this error only impacts local behavior at the hot rod burst elevation. While the improved containment pressure response would tend to benefit the core-wide oxidation calculation, this benefit was not quantified. As such, the 0.32% core-wide oxidation reported in the original submittal (Reference 2) remains conservative with respect to these supplemental assessments.

For the BELOCA ASTRUM analysis, limiting calculated transient oxidation is obtained for fresh fuel (first cycle of irradiation). The maximum expected total of the normal operation (pre-transient) and LOCA transient oxidation, for any time in life, was considered for Surry Units 1 and 2. The pre-transient oxidation tends to increase from a minimum value at beginning-of-life to a maximum value at end-of-life, while the transient oxidation tends to decrease with increasing fuel burnup. The sum of the pre-transient and transient oxidation was confirmed to remain below 17% for all times in life. This confirmation credited a modest reduction in achievable rod power and maximum steady-state-depletion (baseload)  $F_Q$  for fuel beyond the first cycle of irradiation. These reductions will be implemented as design limits in the core reload design process, and confirmed for each reload on a pin-wise basis.

## CONCLUSIONS

The results of the supplemental assessments for Surry Units 1 and 2 are a PCT of 2,095°F, LMO of 10.8%, and CWO of 0.32%. These results confirm that Surry Units 1 and 2 maintain compliance with the 10 CFR 50.46 acceptance criteria of PCT < 2,200°F, LMO < 17%, and CWO < 1%.

## REFERENCES

1. WCAP-16009-P-A, "Realistic Large-Break LOCA Evaluation Methodology Using the Automated Statistical Treatment of Uncertainty Method (ASTRUM)," January 2005.
2. Dominion letter No. 06-936, "Virginia Electric and Power Company, Surry Power Station Units 1 and 2, Proposed Technical Specifications Change, Addition of ASTRUM Methodology to Core Operating Limits Report References and Revised Large Break LOCA Analysis," November 16, 2006.