

VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

June 21, 2002

United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Serial No. 02-361
NL&OS/GDM R0
Docket Nos. 50-280/281
50-338/339
License Nos. DPR-32/37
NPF-4/7

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY AND NORTH ANNA POWER STATIONS UNITS 1 AND 2
ANNUAL REPORT OF EMERGENCY CORE COOLING SYSTEM (ECCS)
EVALUATION MODEL CHANGES PURSUANT TO THE REQUIREMENTS OF
10CFR50.46

Pursuant to 10CFR50.46(a)(3)(ii), Virginia Electric and Power Company (Dominion) is providing information concerning changes to the ECCS Evaluation Models and their application in existing licensing analyses. Information is also provided that quantifies the effect of these changes upon reported results for North Anna and Surry Power Stations and demonstrates continued compliance with the acceptance criteria of 10CFR50.46.

Attachment 1 contains excerpted portions of Westinghouse reports describing the changes to the Westinghouse Large Break ECCS Evaluation Model that are applicable to North Anna and Surry and have been implemented during calendar year 2001.

Information regarding the effect of the ECCS Evaluation Model changes upon the reported LOCA analysis of record (AOR) results is provided for the North Anna and Surry Power Stations in Attachments 2 and 3, respectively. To summarize the information in Attachments 2 and 3, the calculated peak cladding temperature (PCT) for the small and large break LOCA analyses for North Anna and Surry are given below. These results do not represent significant changes based on the criterion established in 10CFR50.46(a)(3)(i).

North Anna Unit 1 - Small break:	1688°F
North Anna Unit 1 - Large break:	2125°F
North Anna Unit 2 - Small break:	1689°F
North Anna Unit 2 - Large break:	2145°F
Surry Units 1 and 2 - Small break:	1730°F
Surry Units 1 and 2 - Large break:	2117°F

Appl

Based upon our evaluation of this information and the associated changes in the applicable licensing basis PCT results, no further action is required to demonstrate compliance with 10CFR50.46 requirements. Reporting of this information is required per 10 CFR 50.46(a)(3)(ii), which obligates each licensee to report the effect upon calculated temperature of any change or error in evaluation models or their application on an annual basis. The changes in Attachment 1 associated with the annual report are not significant, as defined in 10 CFR 50.46(a)(3)(i).

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

Very truly yours,



L. N. Hartz
Vice President – Nuclear Engineering

Attachments:

- 1) Westinghouse Report of ECCS Evaluation Model Changes - North Anna Units 1 and 2 and Surry Units 1 and 2
- 2) Effect of ECCS Evaluation Model Changes - North Anna Units 1 and 2
- 3) Effect of ECCS Evaluation Model Changes - Surry Units 1 and 2

Commitments made in this letter: None

cc: U.S. Nuclear Regulatory Commission
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Mr. M. J. Morgan
NRC Senior Resident Inspector
North Anna Power Station

Mr. R. A. Musser
NRC Senior Resident Inspector
Surry Power Station

ATTACHMENT 1

**WESTINGHOUSE REPORT OF
ECCS EVALUATION MODEL CHANGES**

**NORTH ANNA UNITS 1 AND 2
AND
SURRY UNITS 1 AND 2**

REFILL HOT WALL DELAY MODEL GENERIC INPUT VALUES

Background

Various discrepancies were identified in the generic input values that are used with the REFILL hot wall delay model, which is presently incorporated as a module in BASH. This issue was resolved by replacing the use of generic values with expressions that were derived based on the input modification program (IMP) database and utilize appropriate plant-specific information. These changes were determined to be a closely related group of Non-Discretionary Changes in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Models

1981 Westinghouse Large Break LOCA Evaluation Model
1981 Westinghouse Large Break LOCA Evaluation Model with BART
1981 Westinghouse Large Break LOCA Evaluation Model with BASH

Estimated Effect

In a typical PWR calculation, the hot wall delay period represents a very minor portion of the large break LOCA transient. Replacing the use of generic values with IMP-based expressions was determined to have a negligible effect on results that will be treated as a 0°F PCT effect for 10 CFR 50.46 reporting purposes.

LOCBART ROD-AVERAGE OXIDATION ERROR

Background

An error was discovered in LOCBART whereby the calculation of the rod-average oxidation incorrectly includes elevations below the bottom of the active fuel. As discussed below, it was determined that correcting this error would either have a negligible effect on, or would result in a reduction in, the rod-average oxidation, so LOCBART updates will be deferred to a future code release. When corrected, this error correction will represent a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Models

1981 Westinghouse Large Break LOCA Evaluation Model with BART
1981 Westinghouse Large Break LOCA Evaluation Model with BASH

Estimated Effect

For typical near beginning-of-life (BOL) calculations, correcting this error would have a negligible effect on the rod-average oxidation. For calculations beyond BOL, correcting this error would result in a reduction in the rod-average oxidation. In either case, existing analysis results remain conservative.

ATTACHMENT 2

EFFECT OF ECCS EVALUATION MODEL CHANGES

NORTH ANNA UNITS 1 AND 2

Effect of ECCS Evaluation Model Changes - North Anna Unit 1

The information provided herein is applicable to North Anna Power Station, Unit 1. It is based upon reports from Westinghouse Electric Corporation for issues involving the ECCS evaluation models and plant-specific application of the models in the existing analyses. Peak cladding temperature (PCT) values and margin allocations represent issues for which permanent resolutions have been implemented. The assessments for small break and large break LOCA are presented in Sections A and B, respectively.

Section A - Small Break LOCA Margin Utilization - North Anna Unit 1

A. PCT for Analysis of Record	1704°F (1)
B. Prior PCT Assessments Allocated to AOR	-29°F
1. NOTRUMP Specific Enthalpy Error	+20°F (2)
2. SALIBRARY Double Precision Errors	-15°F (2)
3. Fuel Rod Initialization Error	+10°F (3)
4. Loop Seal Elevation Error	-44°F (3)
SBLOCA Augmented PCT for AOR	1675°F
C. PCT Assessments for 10CFR50.46(a)(3)(i) Accumulation {1}	13°F
1. NOTRUMP – Mixture Level Tracking Errors	+13°F (7)
SBLOCA Licensing Basis PCT (AOR PCT + PCT Assessments)	1688°F

Section B - Large Break LOCA Margin Utilization - North Anna Unit 1

A. PCT for Analysis of Record	2013°F (1)
B. Prior PCT Assessments Allocated to AOR	109°F
1. LBLOCA/Seismic SG Tube Collapse	+30°F (1)
2. BASH Accumulator Empty Flag	+10°F (1)
3. Translation of Fluid Conditions from SATAN to LOCTA	+15°F (4)
4. LOCBART Spacer Grid Single-Phase Heat Transfer	+15°F (6)
5. LOCBART Zirc-Water Oxidation Error	+39°F (6)
LBLOCA Augmented PCT for AOR	2122°F
C. PCT Assessments for 10CFR50.46(a)(3)(i) Accumulation {1}	27°F
1. LOCBART Cladding Emissivity Errors	+6°F (7)
2. LOCBART Vapor Film Flow Regime Heat Transfer Error	+9°F (7)
3. LOCBART Dispersed Flow Regime Wall Emissivity Error	-12°F (7)
LBLOCA Licensing Basis PCT (AOR PCT + PCT Assessments)	2125°F

Notes { } and References () on the page following the next page

Effect of ECCS Evaluation Model Changes - North Anna Unit 2

The information provided herein is applicable to North Anna Power Station, Unit 2. It is based upon reports from Westinghouse Electric Corporation for issues involving the ECCS evaluation models and plant-specific application of the models in the existing analyses. Peak cladding temperature (PCT) values and margin allocations represent issues for which permanent resolutions have been implemented. The assessments for small break and large break LOCA are presented in Sections A and B, respectively.

Section A - Small Break LOCA Margin Utilization - North Anna Unit 2

A. PCT for Analysis of Record	1704°F (1)
B. Prior PCT Assessments Allocated to AOR	-29°F
1. NOTRUMP Specific Enthalpy Error	+20°F (2)
2. SALIBRARY Double Precision Errors	-15°F (2)
3. Fuel Rod Initialization Error	+10°F (3)
4. Loop Seal Elevation Error	-44°F (3)
SBLOCA Augmented PCT for AOR	1675°F
C. PCT Assessments for 10CFR50.46(a)(3)(i) Accumulation {1}	14°F
1. Removal of Part-Length CRDMs	+1°F (5)
2. NOTRUMP – Mixture Level Tracking Errors	+13°F (7)
SBLOCA Licensing Basis PCT (AOR PCT + PCT Assessments)	1689°F

Section B - Large Break LOCA Margin Utilization - North Anna Unit 2

A. PCT for Analysis of Record	2013°F (1)
B. Prior PCT Assessments Allocated to AOR	129°F
1. LBLOCA/Seismic SG Tube Collapse	+30°F (1)
2. BASH Accumulator Empty Flag	+10°F (1)
3. Translation of Fluid Conditions from SATAN to LOCTA	+15°F (4)
4. Removal of Part-Length CRDMs	+18°F (5)
5. LOCBART Spacer Grid Single-Phase Heat Transfer	+15°F (6)
6. LOCBART Zirc-Water Oxidation Error	+41°F (6)
LBLOCA Augmented PCT for AOR	2142°F
C. PCT Assessments for 10CFR50.46(a)(3)(i) Accumulation {1}	27°F
1. LOCBART Cladding Emissivity Errors	+6°F (7)
2. LOCBART Vapor Film Flow Regime Heat Transfer Error	+9°F (7)
3. LOCBART Dispersed Flow Regime Wall Emissivity Error	-12°F (7)
LBLOCA Licensing Basis PCT (AOR PCT + PCT Assessments)	2145°F

Notes { } and References () on the following page

Effect of ECCS Evaluation Model Changes - North Anna

Notes:

- {1} The accumulation of changes (sum of absolute magnitudes) is less than 50°F and is not significant, as defined in 10CFR50.46(a)(3)(i).

References:

- (1) Letter from J. P. O'Hanlon (VEPCO) to Document Control Desk (USNRC), "Virginia Electric and Power Company, North Anna Power Station Units 1 and 2, 30-Day Report of ECCS Evaluation Model Changes Per Requirements of 10CFR50.46," Serial No. 95-608, November 29, 1995.
- (2) Letter from J. P. O'Hanlon (Va. Electric & Power Co.) to USNRC, "Virginia Electric and Power Company, North Anna and Surry Power Station Units 1 and 2, Report of ECCS Evaluation Model Changes and 30-Day Report of ECCS Evaluation Model Changes Per Requirements of 10CFR50.46," Serial No. 96-111, March 14, 1996.
- (3) Letter from J. P. O'Hanlon (Va. Electric & Power Co.) to USNRC, "Virginia Electric and Power Company, North Anna Power and Surry Power Station Units 1 and 2, Report of ECCS Evaluation Model Changes and 30-Day Report of ECCS Evaluation Model Changes Per Requirements of 10CFR50.46," Serial No. 96-390, August 1, 1996.
- (4) Letter from J. P. O'Hanlon (Va. Electric & Power Co.) to USNRC, "Virginia Electric and Power Company, Surry and North Anna Power Stations Units 1 and 2, Report of Emergency Core Cooling System (ECCS) Evaluation Changes Pursuant to the Requirements of 10CFR50.46," Serial No. 97-174, March 27, 1997.
- (5) Letter from J. P. O'Hanlon (Va. Electric & Power Co.) to USNRC, "Virginia Electric and Power Company, Surry and North Anna Power Stations Units 1 and 2, Report of Emergency Core Cooling System (ECCS) Evaluation Changes Pursuant to the Requirements of 10CFR50.46," Serial No. 98-303, May 28, 1998.
- (6) Letter from L. N. Hartz (Va. Electric & Power Co.) to USNRC, "Virginia Electric and Power Company, Surry and North Anna Power Station Units 1 and 2, 30-Day Report – Emergency Core Cooling System (ECCS) Evaluation Model Changes Pursuant to the Requirements of 10CFR50.46," Serial No. 99-558, November 18, 1999.
- (7) Letter from L. N. Hartz (Va. Electric & Power Co.) to USNRC, "Virginia Electric and Power Company, Surry and North Anna Power Station Units 1 and 2, Annual Report and 30-Day Report of Emergency Core Cooling System (ECCS) Evaluation Model Changes Pursuant to the Requirements of 10CFR50.46," Serial No. 01-232, April 24, 2001.

ATTACHMENT 3

EFFECT OF ECCS EVALUATION MODEL CHANGES

SURRY UNITS 1 AND 2

Effect of Westinghouse ECCS Evaluation Model Changes - Surry

The information provided herein is applicable to Surry Power Station, Units 1 and 2. It is based upon reports from Westinghouse Electric Corporation for issues involving the ECCS evaluation models and plant-specific application of the models in the existing analyses. Peak cladding temperature (PCT) values and margin allocations represent issues for which permanent resolutions have been implemented. The assessments for small break and large break LOCA are presented in Sections A and B, respectively.

Section A - Small Break LOCA Margin Utilization - Surry Units 1 and 2

A. PCT for Analysis of Record (AOR)	1717°F (1)
B. Prior PCT Assessments Allocated to AOR	0°F
SBLOCA Augmented PCT for AOR	1717°F
C. PCT Assessments for 10CFR50.46(a)(3)(i) Accumulation {1}	13°F
1. NOTRUMP – Mixture Level Tracking Errors	+13°F (2)
SBLOCA Licensing Basis PCT (AOR PCT + PCT Assessments)	1730°F

Section B - Large Break LOCA Margin Utilization - Surry Units 1 and 2

A. PCT for Analysis of Record (AOR)	2117°F (2)
B. Prior PCT Assessments Allocated to AOR	0°F
1. LBLOCA/Seismic SG Tube Collapse {2}	0°F (2)
LBLOCA Augmented PCT for AOR	2117°F
C. PCT Assessments for 10CFR50.46(a)(3)(i) Accumulation {1}	0°F
LBLOCA Licensing Basis PCT (AOR PCT + PCT Assessments)	2117°F

Notes { } and References () on the following page

Effect of Westinghouse ECCS Evaluation Model Changes - Surry

Notes:

- {1} The accumulation of changes (sum of absolute magnitudes) is less than 50°F and is not significant, as defined in 10CFR50.46(a)(3)(i).
- {2} A generic steam generator LOCA/seismic load evaluation was performed by Westinghouse to quantify the potential steam generator tube collapse which may occur at the time of the LOCA due to combined LOCA and seismic loads. Based on this analysis, a total steam generator tube reduction equivalent to 5% tube plugging was allocated as a permanent assessment for those plants that do not have a detailed analysis. The 5% steam generator tube plugging reduction will be used to account for the effects of a combined LOCA/seismic event at Surry.

References:

- (1) Letter from J. P. O'Hanlon (Va. Electric & Power Co.) to USNRC, "Virginia Electric and Power Company, Surry Power Station Units 1 and 2, 30-Day Report of ECCS Evaluation Changes Pursuant to the Requirements of 10CFR50.46," Serial No. 96-635, January 9, 1997.
- (2) Letter from L. N. Hartz (Va. Electric & Power Co.) to USNRC, "Virginia Electric and Power Company, Surry and North Anna Power Station Units 1 and 2, Annual Report and 30-Day Report of Emergency Core Cooling System (ECCS) Evaluation Model Changes Pursuant to the Requirements of 10CFR50.46," Serial No. 01-232, April 24, 2001.