

VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

November 18, 1999

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

Serial No. 99-558
NLOS-GDM/CGL 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
30-DAY REPORT - EMERGENCY CORE COOLING SYSTEM (ECCS) EVALUATION
MODEL CHANGES PURSUANT TO THE REQUIREMENTS OF 10 CFR 50.46

Pursuant to 10 CFR 50.46(a)(3)(ii), Virginia Electric and Power Company is providing information concerning changes to the ECCS Evaluation Models and their application in existing licensing analyses. Information is also provided which 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 10 CFR 50.46.

Attachment 1 contains excerpted portions of Westinghouse reports describing the changes to the Westinghouse Large Break ECCS Evaluation Model, which are applicable to North Anna and Surry.

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 large break LOCA analyses for North Anna and Surry are given below. These results represent significant changes, based on the criterion established in 10 CFR 50.46(a)(3)(i).

North Anna Unit 1 - Large break: 2122°F
North Anna Unit 2 - Large break: 2142°F
Surry Units 1 and 2 - Large break: 2089°F

We have evaluated these issues and the associated changes in the applicable licensing basis PCT results. These results demonstrate compliance with the requirements of 10 CFR 50.46(b). Although the North Anna and Surry large break LOCA changes described in Attachments 2 and 3 are significant, as defined in 10 CFR 50.46(a)(3)(i), the licensing basis PCT results have adequate margin.

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10 CFR 50.46(a)(3)(ii) specifically requests that the 30-day report include a proposed schedule for providing a reanalysis or taking other action as may be needed to show compliance with 10 CFR 50.46 requirements. Re-analyses of the large break LOCA accident for Surry and North Anna are scheduled to be completed by April 30, 2001 and August 31, 2001, respectively. No further action is required to demonstrate compliance with 10 CFR 50.46 requirements.

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

Very truly yours,



Leslie N. Hartz
Vice President - Nuclear Engineering and Services

Commitments made in this letter:

1. Complete re-analysis of the Large Break LOCA for Surry by April 30, 2001.
2. Complete re-analysis of the Large Break LOCA for North Anna by August 31, 2001.

Attachments:

1. Westinghouse Report on ECCS Evaluation Model Changes for 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

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

**EXCERPTS FROM WESTINGHOUSE REPORT OF
ECCS EVALUATION MODEL CHANGES**

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

LOCBART SPACER GRID SINGLE-PHASE HEAT TRANSFER ERROR

Background

As discussed in Reference 1, the Yao-Hochreiter-Leech correlation is used in the LOCBART code to compute the single-phase heat transfer enhancement for axial elevations located downstream of spacer grids. The Safety Evaluation Report to Reference 1 requires that a length-averaged value be used to specify the heat transfer coefficient for a given fluid cell, since use of a local value corresponding to the forward edge or the rear edge of the cell could be non-conservative. It was determined that the length-averaging in LOCBART was not being done correctly in all cases. This error correction was determined to be a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Model

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

Estimated Effect

The effect of this error on existing results was determined on a plant specific basis for North Anna by Westinghouse [2]. A PCT effect (penalty) of +15°F has been quantified for North Anna Units 1 and 2.

The effect of this error on existing results was determined on a plant specific basis for Surry by Westinghouse [2]. A PCT effect (penalty) of +15°F has been quantified for Surry Units 1 and 2.

Reference

1. WCAP-10484-P-A, "Spacer Grid Heat Transfer Effects During Reflood," M. Y. Young, et. al., March 1991.
2. Letter from M. P. Osborne (Westinghouse) to D. A. Christian (Virginia Power), "Virginia Power, North Anna and Surry Stations, 1999 Mid Year 10 CFR 50.46 BART/BASH Report," VRA-99-046, October 22, 1999.

LOCBART ZIRC-WATER OXIDATION ERROR

Background

As discussed in Reference 1, a logic error in the LOCBART code caused the Baker-Just metal-water reaction calculations to be performed three times per timestep. Correcting the error was found to reduce the total cladding oxidation while increasing the heat deposition in the cladding. This error correction was determined to be a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Model

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

Estimated Effect

The effect of this error on existing results was determined on a plant specific basis for North Anna by Westinghouse [2]. PCT effects (penalties) of +39°F and +41°F have been quantified for North Anna Units 1 and 2, respectively.

The effect of this error on existing results was determined on a plant specific basis for Surry by Westinghouse [2]. A PCT effect (penalty) of +201°F has been quantified for Surry Units 1 and 2.

The plant specific assessment for Surry also quantified a compensatory impact (benefit) of -240°F for a reduction in the FQ limit from 2.32 to 2.20.

Reference

1. NSD-NRC-99-5845, "Closure of Westinghouse Interim Report No. 98-029," H. A. Sepp, August 27, 1999.
2. Letter from M. P. Osborne (Westinghouse) to D. A. Christian (Virginia Power), "Virginia Power, North Anna and Surry Stations, 1999 Mid Year 10 CFR 50.46 BART/BASH Report," VRA-99-046, October 22, 1999.

ATTACHMENT 2

**10 CFR 50.46
EFFECT OF ECCS EVALUATION MODEL CHANGES**

**VIRGINIA ELECTRIC AND POWER COMPANY
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 assessment for the large break LOCA is presented in Section A.

Section A - 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	40°F
1. LBLOCA/Seismic SG Tube Collapse	+30°F (1)
2. BASH Accumulator Empty Flag	+10°F (1)
LBLOCA Augmented PCT for AOR	2053°F
C. PCT Assessments for 10 CFR 50.46(a)(3)(i) Accumulation {1}	69°F
1. Translation of Fluid Conditions from SATAN to LOCTA	+15°F (2)
2. LOCBART Spacer Grid Single-Phase Heat Transfer {2} {3}	+15°F
3. LOCBART Zirc-Water Oxidation Error {2} {3}	+39°F
LBLOCA Licensing Basis PCT (AOR PCT + PCT Assessments)	2122°F

Notes { } and References () on the following 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 assessment for the large break LOCA is presented in Section A.

Section A - 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	40°F
1. LBLOCA/Seismic SG Tube Collapse	+30°F (1)
2. BASH Accumulator Empty Flag	+10°F (1)
LBLOCA Augmented PCT for AOR	2053°F
C. PCT Assessments for 10 CFR 50.46(a)(3)(i) Accumulation {1}	89°F
1. Translation of Fluid Conditions from SATAN to LOCTA	+15°F (2)
2. Removal of Part-Length CRDMs	+18°F (3)
3. LOCBART Spacer Grid Single-Phase Heat Transfer {2} {3}	+15°F
4. LOCBART Zirc-Water Oxidation Error {2} {3}	+41°F
LBLOCA Licensing Basis PCT (AOR PCT + PCT Assessments)	2142°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 greater than 50°F and is significant, as defined in 10 CFR 50.46(a)(3)(i).
- {2} The current report is the initial quantification of effects for this issue.
- {3} Refer to the Westinghouse Report of ECCS Evaluation Model Changes provided in Attachment 1.

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 10 CFR 50.46," Serial No. 95-608, November 29, 1995.
- (2) Letter from J. P. O'Hanlon (VEPCO) 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 10 CFR 50.46," Serial No. 97-174, March 27, 1997.
- (3) Letter from J. P. O'Hanlon (VEPCO.) 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 10 CFR 50.46," Serial No. 98-303, May 28, 1998.

ATTACHMENT 3

**10 CFR 50.46
EFFECT OF ECCS EVALUATION MODEL CHANGES**

**VIRGINIA ELECTRIC AND POWER COMPANY
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 assessment for the large break LOCA is presented in Section A.

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

A. PCT for Analysis of Record (AOR)	2120°F (1)
B. Prior PCT Assessments Allocated to AOR	-16°F
1. ZIRLO™ Cladding	-16°F
LBLOCA Augmented PCT for AOR	2104°F
C. PCT Assessments for 10 CFR 50.46(a)(3)(i) Accumulation {1}	477°F
1. Vessel & SG Calculation Errors in LUCIFER	-6°F (1)
2. LBLOCA Rod Internal Pressure Issues	0°F (1)
3. Translation of Fluid Conditions from SATAN to LOCTA	+15°F (2)
4. LOCBART Spacer Grid Single-Phase Heat Transfer {2} {3}	+15°F
5. LOCBART Zirc-Water Oxidation Error {2} {3}	+201°F
6. Reduction in FQ {2} {3}	-240°F
LBLOCA Licensing Basis PCT (AOR PCT + PCT Assessments)	2089°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 greater than 50°F and is significant, as defined in 10 CFR 50.46(a)(3)(i).
- {2} The current report is the initial quantification of effects for this issue.
- {3} Refer to the Westinghouse Report of ECCS Evaluation Model Changes provided in Attachment.

References:

- (1) Letter from W. L. Stewart (VEPCO) to Document Control Desk (USNRC), "Virginia Electric and Power Company, Surry Power Station Units 1 and 2, 30-Day Report of ECCS Evaluation Model Changes Per Requirements of 10 CFR 50.46," Serial No. 94-254, April 27, 1994.
- (2) Letter from J. P. O'Hanlon (VEPCO) 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 10 CFR 50.46," Serial No. 97-174, March 27, 1997.