VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

February 7, 1995

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

Serial No. 94-436A
NA&F/GLD-CGL R0'
Docket Nos. 50-338
50-339
License Nos. NPF-4
NPF-7

Gentlemen:

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

Pursuant to 10CFR50.46(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 Power Station and demonstrates continued compliance with the acceptance criteria of 10CFR50.46.

Attachment 1 contains excerpted portions of the Westinghouse report describing a closely related group of changes to the Westinghouse Small Break LOCA ECCS Evaluation Model which have been recently implemented. As indicated in Attachment 1, the plant-specific changes for the small break LOCA reanalysis are significant, based upon the criterion established in 10CFR50.46(a)(3)(i).

Attachment 2 provides information regarding the effect of the ECCS Evaluation Model changes upon the reported LOCA results for the North Anna Power Station analysis of record. To summarize the information in Attachment 2, the calculated peak clad temperature (PCT) for the small and large break LOCA analyses for North Anna are given below. Only the small break LOCA results reflect any changes discussed in Attachment 1. Results which include significant changes, as defined in 10CFR50.46(a)(3)(i), are designated with an asterisk.

North Anna Units 1 and 2 - Small break: 2080°F (*)
North Anna Unit 1 - Large break: 2041°F
North Anna Unit 2 - Large break: 2076°F

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We have evaluated these issues and the associated changes in the applicable licensing basis PCT results. These results demonstrate compliance with the requirements of 10CFR50.46(b). Although the North Anna small break LOCA changes described in Attachment 1 are significant, as defined in 10CFR50.46(a)(3)(i), the licensing basis PCT result has adequate margin to the limit.

10CFR50.46(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 10CFR50.46 requirements. A reanalysis of the small break LOCA accident for North Anna Units 1 and 2 is scheduled to be completed by the end of first quarter 1996. No further action is required to demonstrate compliance with 10CFR50.46 requirements.

The North Anna large break LOCA result is not changed by this 30-day report and remains the same as that previously documented in our July 25, 1994 report by letter Serial No. 94-436.

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

Very truly yours,

James P. O'Hanlon

James P. O'Hanlon
Senior Vice President - Nuclear

Attachments:

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

cc: U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, N. W.
Suite 2900
Atlanta, Georgia 30323

Mr. R. D. McWhorter
NRC Senior Resident Inspector
North Anna Power Station

ATTACHMENT 1

WESTINGHOUSE REPORT OF ECCS EVALUATION MODEL CHANGES
(Axial Nodalization, Rod Internal Pressure Model Revision - SBLOCTA Error Correction Analysis)

NORTH ANNA UNITS 1 AND 2

Background

10CFR50.46, Appendix K prescribes the acceptable features and required documentation for ECCS Evaluation Models. More specifically, Section II.3 requires that documentation be in place to verify that sensitivity studies have demonstrated the adequacy of nodalization schemes used in the analysis models. A study was recently undertaken with the Westinghouse small break LOCA Evaluation Model to examine the sensitivity of predicted results to the nodalization used for the hot rod model. The results of that study raised concerns regarding the adequacy of the standard axial nodalization prescribed for use in the SBLOCTA code for licensing basis analyses. As a result of this concern, Westinghouse investigated this as a Potential Issue per 10 CFR 21.

Issue Description

The standard rod model (developed in the 1970's) used in performing SBLOCTA calculations has 19 axial nodes with a finer distribution in the top elevations. However, sensitivity studies to justify the number and distribution of these nodes can not be documented. A series of calculations were performed using increasingly finer axial nodalizations than prescribed for the 19 node model and indicated that the standard SBLOCTA 19 node model was not conservative. Nearly all cases demonstrated a significantly non-conservative behavior with respect to PCT. The penalty is attributed to a net increase in single-phase steam enthalpy rise as these nodes uncover sooner and heat up more than coarser nodes partially covered by the mixture level. Thus, it was concluded that a revised model that included a much finer axial nodalization could potentially lead to less favorable results than those predicted in the current analyses, possibly challenging the 10 CFR 50.46 acceptance criteria.

As a result of further investigation into the SBLOCTA code, several additional related issues associated with nodalization and the overall solution of the fluid conservation equations were subsequently identified and corrected. As a separate, but related issue, Westinghouse has implemented a revised model for calculating transient fuel rod internal pressure in the SBLOCTA code. Fuel rod pressure is a governing factor in defining the clad creep, burst and blockage behavior for small break LOCA transients. The NRC was informed of this modeling change per Westinghouse letter NTD-NRC-94-4253, "Revision to the Rod Internal Pressure Model in the Westinghouse SBLOCTA Code (Proprietary)". The letter also informed the NRC that Westinghouse has validated and instituted the model as a methodology improvement to the small break LOCA model for standard implementation on a forward-fit basis in accordance with WCAP-13451, Westinghouse Methodology for Implementation of 10 CFR 50.46 Reporting, October, 1992.

Technical Evaluation

At this time Westinghouse has completed the generic technical evaluation of the fuel rod axial nodalization methodology. A revised standard for rod nodalization has been established which insures an adequate solution to the hot channel calculation by specifying a fine nodalization of 0.25 ft nodes for all elevations that are predicted to uncover during the transient.

Since the improved axial nodalization methodology and revised fuel rod internal pressure model can have significant synergistic effects on the predicted peak clad temperature, the SBLOCTA calculation

from the limiting small break LOCA transient has been rerun with the revised code and methodology in order to obtain an accurate estimation of the net effect of these changes on the analysis of record. Several recent code revisions and error corrections of lesser magnitude have also been incorporated in the code version used to conduct this calculation. Normally these items would have been reported in the 10CFR50.46 year-end reporting summary along with estimates of effects. Since all of the issues relate to portions of the SBLOCTA code and/or its associated input methodology, they may be reported as a single closely-related group of changes.

Recommendation

For those plants for which Westinghouse performs the licensed SBLOCA analyses, Westinghouse has determined that this issue is not a substantial safety hazard pursuant to 10 CFR 21 because the PCT penalty does not result in a loss of safety function to the extent that there is a major reduction in the degree of protection provided to public health and safety. Plant licensees should review their reporting obligations under 10 CFR 50.46.

ATTACHMENT 2

EFFECT OF WESTINGHOUSE ECCS EVALUATION MODEL CHANGES

NORTH ANNA UNITS 1 AND 2

Effect of Westinghouse ECCS Evaluation Model Changes - North Anna

The information provided herein is applicable to North Anna 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. Section A presents the detailed assessment for small break LOCA. The large break LOCA details are given in Section B.

Section A - Small Break LOCA Margin Utilization - North Anna Units 1 and 2
(30-day report as required by 10CFR50.46(a)(3)(ii))

A.	PCT for Analysis of Record (AOR)	1880°F (1)
B.	Prior PCT Assessments Allocated to AOR (2)	81°F
1.	Safety Injection in the Broken Loop	0°F
2.	SBLOCA Limiting Time in Life-Zirc/Water Oxidation	+ 81°F
SBLOCA Augmented PCT for AOR		1961°F
C.	PCT Assessments for 10CFR50.46(a)(3)(i) Accumulation	**119°F**
1.	Axial Nodalization, Rod Internal Pressure Model Revision - SBLOCTA Error Correction Analysis {1}	+ 119°F
SBLOCA Licensing Basis PCT (AOR PCT + PCT Assessments)		2080°F

Section B - Large Break LOCA Margin Utilization - North Anna Units 1 and 2
(As previously reported in the July 25, 1994 report (letter Serial No. 94-436)

		Unit 1	Unit 2
A.	PCT for Analysis of Record (AOR) (3)	2066°F	2066°F
B.	Prior PCT Assessments Allocated to AOR (2)	0°F	0°F
1.	Structural Metal Heat Modeling	- 25°F	- 25°F
2.	LBLOCA/Seismic SG Tube Collapse	+ 6°F	+ 6°F
3.	N2C10 Extended SGTP Evaluation	n/a	+ 35°F
LBLOCA Augmented PCT for AOR		2047°F	2082°F
C.	PCT Assessments for 10CFR50.46(a)(3)(i) Accumulation	6°F	6°F
1.	Vessel & SG Calculation Errors in LUCIFER-6 °F	- 6°F	n/a
2.	LBLOCA Rod Internal Pressure Issues	0°F	0°F
LBLOCA Licensing Basis PCT (AOR PCT + PCT Assessments)		2041°F	2076°F

Notes { } and References ( ) on the following page

Effect of Westinghouse ECCS Evaluation Model Changes - North Anna

Notes:

(1) Refer to the Report of Westinghouse ECCS Evaluation Model Changes provided in Attachment 1. The sensitivity study result includes the effects of the following items reported in Reference (2):

- NOTRUMP Drift Flux Flow Regime Map Errors,
- Hot Assembly Average Rod Burst Effects, and
- Revised Burst Strain Limit Model.

References:

(1) "North Anna Power Station Units 1 and 2 - Safety Evaluation for Revised Large Break LOCA Analysis," 10CFR50.59 Safety Evaluation 94-082, March 28, 1994.

(2) Letter from James P. O'Hanlon (Virginia Electric & Power Co.) to NRC, "North Anna Power Station Units 1 and 2, Report of ECCS Evaluation Model Changes and 30-Day Report Pursuant to 10CFR50.46 Requirements," Serial No. 94-436, July 25, 1994.

(3) Letter from W. L. Stewart (Virginia Electric & Power Co.) to NRC, "North Anna Power Station Units 1 and 2, Proposed Technical Specifications Changes - Implementation of ZIRLO Cladding," Serial No. 93-614, October 4, 1993.