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10CFR50.46
Gary J. Taylor
Vice President
Nuclear Operations

June 6,1997
RC-97-0120

Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Gentlemen:

Subject: VIRGIL C. SUMMER NUCLEAR STATION
DOCKET NO. 50/395
OPERATING LICENSE NO. NPF-12
ECCS EVALUATION MODEL REVISIONS REPORT (ANN 2300)

Attached is the annual (1996) Emergency Core Cooling System (ECCS) Evaluation Model Revisions Report for the Virgil C. Summer Nuclear Station (VCSNS). This report is being submitted pursuant to 10CFR50.46, which requires licensees to notify the NRC on at least an annual basis of corrections to or changes in the ECCS Evaluation Models.

I declare that the statements and matters set forth herein are true and correct to the best of my knowledge, information, and belief.

If you have any questions, please call Mr. Michael J. Zaccone at (803) 345-4328.

Very truly yours,

Gary J. Taylor

MJZ/GJT
Attachment

c: J. L. Skolds
R. R. Mahan (w/o att.)
J. B. Knotts, Jr.
R. J. White
L. A. Reyes
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NRC Resident Inspector
W. F. Conway
NSRC
DMS (RC-97-0120)
RTS (ANN 2300)
File (813.12-4, 818.02-17)

160081

NUCLEAR EXCELLENCE - A SUMMER TRADITION!

**STATE OF SOUTH CAROLINA** :
: **TO WIT** :
**COUNTY OF FAIRFIELD** :

I hereby certify that on the 6th day of June 1997, before me, the subscriber, a Notary Public of the State of South Carolina personally appeared Gary J. Taylor, being duly sworn, and states that he is Vice President, Nuclear Operations of the South Carolina Electric & Gas Company, a corporation of the State of South Carolina, that he provides the foregoing response for the purposes therein set forth, that the statements made are true and correct to the best of his knowledge, information, and belief, and that he was authorized to provide the response on behalf of said Corporation.

**WITNESS** my Hand and Notarial Seal

Michael J. Farrone
Notary Public

My Commission Expires

My Commission Expires July 13, 2005
Date

# CHANGES TO THE WESTINGHOUSE ECCS EVALUATION MODELS

## INTRODUCTION

Provisions in 10 CFR 50.46 require the annual reporting of corrections to or changes in the ECCS Evaluation Model (EM) approved for use in performing safety analyses for the Loss of Coolant Accident (LOCA). This report describes corrections and revisions to the Westinghouse ECCS EM which are applicable to the V. C. Summer Nuclear Station (VCSNS). The current approved Westinghouse ECCS EMs are listed in Table 1 and consist of several computer codes with specific functions.

Westinghouse has completed the evaluation of several items related to the Westinghouse ECCS EM listed in Table 1. Each of these items is discussed in Table 2, which includes a description of the item, the assessment which was performed, the resulting change to the EM, and the effect of the change on the Peak Clad Temperature (PCT).

Tables 3 and 4 summarize the changes or corrections in the ECCS Evaluation Model since the last notification and the associated change in the peak clad temperature (PCT). None of the model changes were considered significant under 10 CFR 50.46.

Table 5 summarizes the changes made to the ECCS Evaluation Model since the last notification under 10 CFR 50.59. There was no effect on PCT due to these evaluations.

TABLE 1
SUMMARY OF WESTINGHOUSE
ECCS EVALUATION MODELS
FOR VCSNS

**NAME: 1981 MODEL WITH BASH**

APPLICATION: Analysis of Large Break LOCA

| CODES USED: | PURPOSE: |
|---|---|
| SATAN-VI | Blowdown hydraulic transient |
| BASH | Reflood hydraulic transient |
| LOCBART | Hot assembly thermohydraulics and fuel rod thermal transient |
| WREFLOOD/COCO/LOTIC | Containment pressure transient |

**NAME: 1985 SBLOCA MODEL**

APPLICATION: Analysis of Small Break LOCA

| CODES USED: | PURPOSE: |
|---|---|
| NOTRUMP | System Hydraulic transient |
| SBLOCTA | Fuel rod thermal transient |

TABLE 2

CHANGES OR CORRECTIONS TO THE VIRGIL C. SUMMER

NUCLEAR STATION ECCS EVALUATION MODELS

NOT PREVIOUSLY REPORTED

**SBLOCTA Fuel Rod Initialization**

**Translation of Fluid Conditions from SATAN to LOCTA**

**SBLOCTA Fuel Rod Initialization**

Affected Evaluation Model

1985 Westinghouse Small Break LOCA Evaluation Model Using NOTRUMP

Background

An error was discovered in the SBLOCTA code related to adjustments which are made as part of the fuel rod initialization process which is used to obtain agreement between the SBLOCTA model and the fuel data supplied from the fuel thermal-hydraulic design calculations at full power, steady-state conditions. Specifically, an adjustment to the power, which is made to compensate for adjustments to the assumed pellet diameter was incorrect. Additionally, updates were made to the fuel rod creep and strain model to correct logic errors that could occur in certain transient conditions. These model revisions also had a small effect on the fuel rod initialization process, and can produce small effects during the transient. Due to the small magnitude of effects, and the interaction between the two items, they are being evaluated as a single, closely related effect.

This change is considered to be a Non-Discretionary Change as described in WCAP-13451.

Estimated Effect

Representative plant calculations with the corrected model demonstrated that these revisions result in a predicted peak clad temperature increase of +10°F.

**Translation of Fluid Conditions from SATAN to LOCTA**

Affected Evaluation Model

1981 Westinghouse Large Break LOCA Evaluation Model Using BASH

Background

An error was discovered in the coding related to the translation of fluid conditions between the SATAN blowdown hydraulics code and the LOCTA code used for subchannel analysis of the fuel rods. In performing axial interpolations to translate the SATAN fluid conditions into the mesh nodalization used by the LOCTA code, the length of the lower core channel fluid connection to the lower plenum node was incorrectly calculated.

Estimated Effect

Representative plant calculations with the corrected model resulted in approximately a ±15°F effect on the BASH large break LOCA evaluation model. Therefore, a +15°F penalty has been assigned to the BASH large break LOCA evaluation model.

Table 3

Small Break Peak Clad Temperature Margin Utilization

Revision Date: 02/10/97

Plant Name: Virgil C. Summer
Utility Name: South Carolina Electric & Gas

Eval. Model: NOTRUMP FQ=2.45 FΔH=1.62

Fuel: Vantage + SGTP=10%

| | | Reference * | Clad Temperature | | Notes |
|---|---|---|---|---|---|
| A. | CURRENT ANALYSIS OF RECORD (2/94) | 2 | PCT= | 1823°F | 1 |
| B. | PRIOR PERMANENT ECCS MODEL ASSESSMENTS | 1 | ΔPCT= | 97°F | |
| C. | 10 CFR 50.59 SAFETY EVALUATIONS | Table 5-A | ΔPCT= | 0°F | |
| D. | 1996 10 CFR 50.46 MODEL ASSESSMENTS (Permanent Assessment of PCT Margin) | | | | |
| | 1. SBLOCTA Fuel Rod Initialization Error | 4 | ΔPCT= | 10°F | |
| E. | TEMPORARY ECCS MODEL ISSUES | | | | |
| | 1. None | | ΔPCT= | 0°F | |
| F. | OTHER MARGIN ALLOCATIONS | | | | |
| | 1. Burst and Blockage/Time in Life | | ΔPCT= | 86°F | 2 |
| | **LICENSING BASIS PCT + MARGIN ALLOCATIONS** | | **PCT=** | **2016°F** | |

* References for the Peak Clad Temperature Margin Utilization summary can be found in Table 5-B.

Notes:

1. AOR performed for core power = 2900 MWt and Δ75 steam generators.
2. This assessment is a function of base PCT plus permanent margin allocation and as such will increase/decrease with margin allocation changes.

TABLE 4

Large Break Peak Clad Temperature Margin Utilization

Revision Date: 02/10/97

Plant Name: Virgil C. Summer | Eval. Model: BASH | Fuel: Vantage +
Utility Name: South Carolina Electric & Gas | FQ=2.50 | FΔH=1.70 | SGTP=10%

| | | Reference * | Clad Temperature | | Notes |
|---|---|---|---|---|---|
| A. | CURRENT ANALYSIS OF RECORD (10/95) | 3 | PCT= | 2099°F | 1 |
| B. | PRIOR PERMANENT ECCS MODEL ASSESSMENTS | 1 | ΔPCT= | 0°F | |
| C. | 10 CFR 50.59 SAFETY EVALUATIONS | Table 5-A | ΔPCT= | 0°F | |
| D. | 1996 10 CFR 50.46 MODEL ASSESSMENTS (Permanent Assessment of PCT Margin) | | | | |
| | 1. Translation of Fluid Conditions from SATAN to LOCTA | | ΔPCT= | 15°F | |
| E. | TEMPORARY ECCS MODEL ISSUES | | | | |
| | 1. None | | ΔPCT= | 0°F | |
| F. | OTHER MARGIN ALLOCATIONS | | | | |
| | 1. None | | ΔPCT= | 0°F | |
| | **LICENSING BASIS PCT + MARGIN ALLOCATIONS** | | **PCT =** | **2114°F** | |

* References for the Peak Clad Temperature Margin Utilization summaries can be found in Table 5-B.

Notes:

1. AOR is for Δ75 steam generators and core power = 2900 MWt. 100 psig IFBA fuel is non-limiting compared to non-IFBA fuel for V. C. Summer.

TABLE 5

TABLE A - 10 CFR 50.59 Safety Evaluations

Revision Date: 02/10/97

Plant Name: Virgil C. Summer
Utility Name: South Carolina Electric & Gas

| | Reference | Clad Temperature | Notes |
|---|---|---|---|
| I. SMALL BREAK ECCS SAFETY EVALUATIONS | | | |
| A. None | | ΔPCT= 0°F | |
| **TOTAL 10 CFR 50.59 SMALL BREAK ASSESSMENTS** | | **PCT= 0°F** | |
| II. LARGE BREAK ECCS SAFETY EVALUATIONS | | | |
| A. Fuel Reconstitution | | ΔPCT= 0°F | |
| **TOTAL 10 CFR 50.59 LARGE BREAK ASSESSMENTS** | | **PCT= 0°F** | |

TABLE B - References


1. CGE-96-202, "10 CFR 50.46 Annual Notification and Reporting," February 9, 1996.
2. CGE-93-0054-SGUL, "SECL-93-036, Rev. 1," March 9, 1994.
3. CGE-95-0009-SGUL, "Revised Large Break LOCA Results for Uprating Submittal," October 24, 1995.
4. CGE-96-213, "South Carolina Electric and Gas Company, Virgil C. Summer Station, 10 CFR 50.46 Small Break LOCA Notification and Reporting," July 8, 1996.