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Gary J. Taylor
Vice President
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June 11, 1996
RC-96-0146

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 (1995) 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.

Tables 2 through 4 in the attachment 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 10CFR50.46. Additionally, the PCT rack-up for the analysis of record (dated October 1995) is provided as Table 6. This analysis of record provides the results of the Large Break LOCA analysis performed at uprate power conditions and was found acceptable by the safety evaluation for Amendment 133.

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. Philip Rose at (803) 345-4052.

Very truly yours,

Gary J. Taylor

PAR/GJT/nkk
Attachment

c: J. L. Skolds
W. F. Conway
R. R. Mahan (w/o att.)
R. J. White
S. D. Ebneter
A. R. Johnson
General Managers

NRC Resident Inspector
J. B. Knotts, Jr.
NSRC
DMS (RC-96-0146)
RTS (ANN 2300)
File (813.12-4, 818.02-17)

170056

A001

STATE OF SOUTH CAROLINA :

: **TO WIT** :

COUNTY OF FAIRFIELD :

I hereby certify that on the 11th day of June 1996, 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

Notary Public

My Commission Expires

July 13, 2005
Date

CHANGES TO THE WESTINGHOUSE ECCS EVALUATION MODELS

INTRODUCTION

Provisions in 10CFR50.46 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 Cooling 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 include 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).

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

NOTRUMP Specific Enthalpy Error

SALIBRARY Double Precision Errors

NOTRUMP Specific Enthalpy Error

Affected Evaluation Model

1985 Westinghouse Small Break LOCA Evaluation Model Using NOTRUMP

Background

A typographical error was found in a line of coding in the NOTRUMP code. This line of coding was intended to model the calculation found in equation L-127 of WCAP-10079-P-A. Although the equation in the topical report is correct, the coding represented the last term as a partial derivative with respect to the fluid node mixture region total energy instead of the mixture region total mass. This correction is a Non-Discretionary Change in accordance with section 4.1.2 of WCAP-13451.

Estimated Effect

Representative plant calculations have led to an estimated effect of +20°F for this error correction.

SALIBRARY Double Precision Errors

Affected Evaluation Models

1981 Westinghouse Large Break LOCA Evaluation Model Using BASH
1985 Westinghouse Small Break LOCA Evaluation Model Using NOTRUMP

Background

During migration of the LOCA codes from the CRAY computer to UNIX-based platforms, programming errors were made in two library routines related to improper specification of double precision variables. These errors were found and fixed during later code maintenance.

Estimated Effect

Test cases with individual codes in the models demonstrated very small differences in only the SATAN and NOTRUMP code results, with correspondingly minor effects on the final peak clad temperature predictions. For the SBLOCA analysis performed on the UNIX platform, representative plant calculations resulted in an estimated effect of -15°F. For the LBLOCA calculations performed on the UNIX platform, negligable PCT effects were obtained.

Table 3

Small Break Peak Clad Temperature Margin Utilization

Revision Date: 01/31/96

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)		PCT =	1823°F	1
B.	PRIOR PERMANENT ECCS MODEL ASSESSMENTS		ΔPCT =	92°F	
C.	10 CFR 50.59 SAFETY EVALUATIONS	Table 5-A	ΔPCT =	1°F	
D.	1995 10 CFR 50.46 MODEL ASSESSMENTS (Permanent Assessment of PCT Margin)				
	1. NOTRUMP Specific Enthalpy Error		ΔPCT =	20°F	
	2. SALIBRARY Double Precision Errors		ΔPCT =	-15°F	
E.	TEMPORARY ECCS MODEL ISSUES				
	1. None		ΔPCT =	0°F	
F.	OTHER MARGIN ALLOCATIONS				
	1. Burst and Blockage/Time in Life		ΔPCT =	78°F	2
	LICENSING BASIS PCT + MARGIN ALLOCATIONS		**PCT =**	**1999°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: 01/31/96

Plant Name: Virgil C. Summer | Eval. Model: BASH | Fuel: Vantage +
Utility Name: South Carolina Electric & Gas | FQ = 2.45 | FΔH = 1.62 | SGTP = 10%

		Reference *	Clad Temperature		Notes
A.	CURRENT ANALYSIS OF RECORD (8/93)	2	PCT =	2007°F	1
B.	PRIOR PERMANENT ECCS MODEL ASSESSMENTS	1	ΔPCT =	-6°F	
C.	10 CFR 50.59 SAFETY EVALUATIONS	Table 5-A	ΔPCT =	1°F	
D.	1995 10 CFR 50.46 MODEL ASSESSMENTS (Permanent Assessment of PCT Margin)				
	1. None		ΔPCT =	0°F	
E.	TEMPORARY ECCS MODEL ISSUES				
	1. None		ΔPCT =	0°F	
F.	OTHER MARGIN ALLOCATIONS				
	1. Revised LOCBART Strain Model	3	ΔPCT =	-64°F	
	LICENSING BASIS PCT + MARGIN ALLOCATIONS		**PCT =**	**1938°F**	

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

Notes:
1. AOR is for Δ75 steam generators and core power = 2775 MWt.

TABLE 5

TABLE A - 10 CFR 50.59 Safety Evaluations

Revision Date: 01/31/96

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

		Reference	Clad Temperature	Notes
I.	SMALL BREAK ECCS SAFETY EVALUATIONS			
	A. Fuel Reconstitution		ΔPCT = 1°F	1
	TOTAL 10 CFR 50.59 SMALL BREAK ASSESSMENTS		**PCT = 1°F**	
II.	LARGE BREAK ECCS SAFETY EVALUATIONS			
	A. Fuel Reconstitution		ΔPCT = 1°F	1
	TOTAL 10 CFR 50.59 LARGE BREAK ASSESSMENTS		**PCT = 1°F**	

Notes:

1. This penalty is due to a fuel assembly reconstitution in assemblies K21 and K46 for Cycle 9. The penalty will be removed when assemblies K21 and K46 are removed from the core.

TABLE B - References

1. CGE-95-213, "South Carolina Electric and Gas Company Virgil C. Summer Station LOCA Axial Power Shape Sensitivity Model," August 14, 1995.

2. Steam Generator Replacement Technical Specification Change Request (TSP 930015) from J. L. Skolds to Document Control Desk, dated March 11, 1994.

3. CGE-95-004/MIP-CGE-1477, "Margin Broker Program - Safety Evaluation to Address Increase in FΔH Limit," February 2, 1995.

TABLE 6

Large Break Peak Clad Temperature Margin Utilization

Revision Date: 04/26/96

Plant Name: Virgil C. Summer
Utility Name: South Carolina Electric & Gas
Eval. Model: BASH FQ = 2.50 FΔH = 1.70
Fuel: Vantage + 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 7-A	ΔPCT =	0°F	
D.	1996 10 CFR 50.46 MODEL ASSESSMENTS (Permanent Assessment of PCT Margin)				
	1. None		ΔPCT =	0°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 =**	**2099°F**	

* References for the Peak Clad Temperature Margin Utilization summaries can be found in Table 7-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 7

TABLE A - 10 CFR 50.59 Safety Evaluations

Revision Date: 03/18/96

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. None		ΔPCT = 0°F	
TOTAL 10 CFR 50.59 LARGE BREAK ASSESSMENTS		**PCT = 0°F**	

TABLE B - References

1. CGE-96-202, "10CFR50.46 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.