



South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

June 9, 2015
NOC-AE-15003249
10 CFR 50.46(a)(3)(i)
10 CFR 50.46(a)(3)(ii)

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

South Texas Project
Units 1 & 2
Docket Nos. STN 50-498, STN 50-499
10 CFR 50.46 Thirty-Day Report of Significant ECCS Model Changes and Annual Report

References:

1. Letter from R.F. Dunn to NRC Document Control Desk, "10 CFR 50.46 ECCS Evaluation Model Significant Change/Error Report," October 17, 2012, NOC-AE-12002912 (ML12310A383)
2. Letter from R.F. Dunn to NRC Document Control Desk, "10CFR50.46 Thirty-Day Report of Significant ECCS Model Changes," July 7, 2014, NOC-AE-14003157 (ML14205A014)

In accordance with the requirements of 10 CFR 50.46(a)(3)(i), STP Nuclear Operating Company (STPNOC) is submitting a 30-day report for a significant change in the South Texas Project Unit 2 Emergency Core Cooling Model. In addition, the annual report for South Texas Project Units 1 and 2 is also provided in accordance with 10 CFR 50.46(a)(3)(ii).

The annual report for Unit 1 shows an estimated change in Large Break LOCA Peak Clad Temperature (PCT) from 2117°F to 2120°F reflecting the value for the hot assembly average rod Gamma Energy Deposition Model (GEDM) for Unit 1 Cycle 19, increased 0.0041 above the 0.984 value used in the analysis. This change was previously reported in Reference 2. There is no change to PCT for Small Break LOCA.

The value for the hot assembly average rod GEDM for Unit 2 Cycle 18, increased 0.00321 above the LOCA RSAC limit of 0.984. In addition, the hot rod calculated value is 0.00272 above the current limit of 0.947. This resulted in an estimated increase in PCT of 8°F to the value of 2117°F reported in the Reference 1 for the large Break LOCA. The new PCT value for Unit 2 Cycle 18 is 2125°F. Since the absolute value of PCT changes to the Analysis of Record exceeds 50°F, the change is considered significant in accordance with 10 CFR 50.46(a)(3)(i). The PCT value for the Small Break LOCA is not changed.

No schedule for reanalysis is proposed since the Unit 2 Cycle 18 PCT remains below the 10 CFR 50.46(b)(1) limit of 2200°F.

There are no commitments in this letter. If there are any questions please contact Charlie Albury at (361) 972-8901.

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A002
NRC

Attachment: PCT Assessment

STI: 34109607

cc:

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EVALUATION OF THE SOUTH TEXAS PROJECT UNIT 1 CYCLE 19 LOCA RSAC GEDM EXCEPTION

Background

The South Texas Project Unit 1 Cycle 19 reload core design resulted in an exception to the gamma energy deposition model (GEDM) loss-of-coolant accident (LOCA) reload safety analysis checklist (RSAC)

limit used in the large-break LOCA analysis – the value for the hot assembly average rod GEDM increased 0.0041 above the LOCA RSAC limit of 0.984.

This exception was evaluated for South Texas Project Unit 1 Cycle 19 and represents a change in a plant configuration or associated set point, distinguished from an evaluation model change in Section 4 of WCAP-13451.

Affected Evaluation Models(s)

1981 Westinghouse Large Break LOCA Evaluation Model with BASH

Estimated Effect

The impact of the Cycle 19 GEDM exception was estimated to result in a 3°F increase to the calculated large break LOCA peak cladding temperature (PCT) for South Texas Project Unit 1.

EVALUATION OF THE SOUTH TEXAS PROJECT UNIT 2 CYCLE 18 LOCA RSAC GEDM EXCEPTION

Background

The South Texas Project Unit 2 Cycle 18 reload core design resulted in an exception to the GEDM LOCA RSAC limit used in the large-break LOCA analysis – the value for the hot assembly average rod GEDM increased 0.00321 above the LOCA RSAC limit of 0.984. In addition, the hot rod calculated value is 0.00272 above the current limit of 0.947.

This exception was evaluated for South Texas Project Unit 2 Cycle 18 and represents a change in a plant configuration or associated set point, distinguished from an evaluation model change in Section 4 of WCAP-13451.

Affected Evaluation Models(s)

1981 Westinghouse Large Break LOCA Evaluation Model with BASH

Estimated Effect

The impact of the Cycle 18 GEDM exception was estimated to result in a 8°F increase to the calculated large break LOCA peak cladding temperature (PCT) for South Texas Project Unit 2.

GENERAL CODE MAINTENANCE

Background

Various changes have been made to enhance the usability of the codes and to help preclude errors in analyses. This includes items such as modifying input variable definitions, units, and defaults; improving the input diagnostic checks; enhancing the code output; optimizing active coding; and, eliminating inactive coding. These changes represent Discretionary Changes that will be implemented on a forward-fit basis in accordance with Section 4.1.1 of WCAP-13451.

Affected Evaluation Model(s)

1985 Westinghouse Small Break LOCA Evaluation Model with NOTRUMP

Estimated Effect

The nature of these changes leads to an estimated Peak Cladding Temperature (PCT) impact of 0°F.

FUEL ROD GAP CONDUCTANCE ERROR

Background

An error was identified in the fuel rod gap conductance model in the NOTRUMP computer code (reactor coolant system response model). The error is associated with the use of an incorrect temperature in the calculation of the cladding emissivity term. This error corresponds to a Non-Discretionary Change as described in Section 4.1.2 of WCAP-13451.

Affected Evaluation Model(s)

1985 Westinghouse Small Break LOCA Evaluation Model with NOTRUMP

Estimated Effect

The estimated effect was determined based on a combination of engineering judgment of the phenomena and physics of a small break LOCA and sensitivity calculations performed with the advanced plant version of NOTRUMP. It was concluded that this error has a negligible effect on small break LOCA analysis results, leading to an estimated Peak Cladding Temperature (PCT) impact of 0°F.

RADIATION HEAT TRANSFER MODEL ERROR

Background

Two errors were discovered in the calculation of the radiation heat transfer coefficient within the fuel rod model of the NOTRUMP computer code (reactor coolant system response model). First, existing logic did not preclude non-physical negative or large (negative or positive) radiation heat transfer coefficients from being calculated. These erroneous calculations occurred when the vapor temperature exceeded the cladding surface temperature or when the predicted temperature difference was less than 1°F. Second, a temperature term incorrectly used degrees Fahrenheit instead of Rankine. These errors represent a closely related group of Non-Discretionary problems in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Model(s)

1985 Westinghouse Small Break LOCA Evaluation Model with NOTRUMP

Estimated Effect

The estimated effect was determined based on a combination of engineering judgment of the phenomena and physics of a small break LOCA and sensitivity calculations performed with the advanced plant version of NOTRUMP. It was concluded that this error has a negligible effect on small break LOCA analysis results, leading to an estimated Peak Cladding Temperature (PCT) impact of 0°F.

SBLOCTA PRE-DNB CLADDING SURFACE HEAT TRANSFER COEFFICIENT CALCULATION

Background

Two errors were discovered in the pre-departure from nucleate boiling (pre-DNB) cladding surface heat transfer coefficient calculation in the SBLOCTA code (cladding heat-up calculations). The first error is a result of inconsistent time units (hours vs. seconds) in the parameters used for the calculation of the Reynolds and Prandtl numbers, and the second error relates to an incorrect diameter used to develop the area term in the cladding surface heat flux calculation. Both of these issues impact the calculation of the pre-DNB convective heat transfer coefficient, representing a closely related group of Non-Discretionary Changes to the Evaluation Model as described in Section 4.1.2 of WCAP-13451.

Affected Evaluation Model(s)

1985 Westinghouse Small Break LOCA Evaluation Model with NOTRUMP

Estimated Effect

These errors have been corrected in the SBLOCTA code. Because this condition occurred prior to DNB, it was judged that these errors had no direct impact on the cladding heat-up related to the core uncover period. A series of validation tests were performed and confirmed that these errors have a negligible effect on SBLOCA analysis results, leading to an estimated Peak Cladding Temperature (PCT) impact of 0°F.

Westinghouse LOCA Peak Clad Temperature Summary for Appendix K Large Break

Plant Name: South Texas Unit 1
Utility Name: STPNOC

Analysis Information

EM:	BASH	Analysis Date:	7/1/1998	Limiting Break Size:	Cd=0.8
FQ:	2.55	FdH:	1.62		
Fuel:	RFA / Vantage 5H	SGTP (%):	10		
Notes:	1. RFA Re-analysis - FdH = 1.55 for Once Burned Standard Fuel 2. Limiting Break run was performed with Min SI, HiTav, and IFBA				

Clad Temp (°F)

LICENSING BASIS

Analysis-Of-Record PCT

2090

PCT Assessments (Delta PCT)

A. PRIOR ECCS MODEL ASSESSMENTS

1 . IMP Database Error Corrections	0
2 . PAD Version 4.0 Implementation	-30
3 . LOCBART Pellet Volumetric Heat Generation Rate	6
4 . PWROG TCD Evaluation - Rebaseline of AOR	5
5 . PWROG TCD Evaluation - Effect of TCD and Assembly Power/Peaking Factor Burndown	0

B. PLANNED PLANT MODIFICATION EVALUATIONS

1 . GEDM Exception Evaluation	3
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C. 2014 ECCS MODEL ASSESSMENTS

1 . None	0
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D. OTHER

1 . Rebaseline of AOR	46
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LICENSING BASIS PCT + PCT ASSESSMENTS

2120

Westinghouse LOCA Peak Clad Temperature Summary for Appendix K Small Break

Plant Name: South Texas Unit 1
Utility Name: STPNOC

Analysis Information

EM:	NOTRUMP	Analysis Date:	6/1/2000	Limiting Break Size:	2 inch
FQ:	2.7	FdH:	1.62		
Fuel:	RFA / Vantage 5H	SGTP (%):	10		
Notes:	1. Delta 94 Replacement Steam Generator 2. Limiting Break run was performed with HiTavg, HiTmfw, and S2				

Clad Temp (°F)

LICENSING BASIS

Analysis-Of-Record PCT

1578

PCT Assessments (Delta PCT)

A. PRIOR ECCS MODEL ASSESSMENTS

1	IMP Database Error Corrections	0
2	NOTRUMP Version 38.0 Namelist Error Correction	0
3	NOTRUMP Bubble Rise / Drift Flux Model Inconsistency Corrections	34

B. PLANNED PLANT MODIFICATION EVALUATIONS

1	None	0
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C. 2014 ECCS MODEL ASSESSMENTS

1	None	0
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D. OTHER

1	Burst and Blockage/Time in Life	0
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LICENSING BASIS PCT + PCT ASSESSMENTS

1612

Westinghouse LOCA Peak Clad Temperature Summary for Appendix K Large Break

Plant Name: South Texas Unit 2
Utility Name: STPNOC

Analysis Information

EM:	BASH	Analysis Date:	7/1/1998	Limiting Break Size:	Cd=0.8
FQ:	2.55	FdH:	1.62		
Fuel:	RFA / Vantage 5H	SGTP (%):	10		
Notes:	1. RFA Re-analysis - FdH = 1.55 for Once Burned Standard Fuel 2. Limiting Break run was performed with Min SI, HiTav, and IFBA				

Clad Temp (°F)

LICENSING BASIS

Analysis-Of-Record PCT

2090

PCT Assessments (Delta PCT)

A. PRIOR ECCS MODEL ASSESSMENTS

- | | |
|-------------------------------------------------------------------------------------|-----|
| 1 . IMP Database Error Corrections | 0 |
| 2 . PAD Version 4.0 Implementation | -30 |
| 3 . LOCBART Pellet Volumetric Heat Generation Rate | 6 |
| 4 . PWROG TCD Evaluation - Rebaseline of AOR | 5 |
| 5 . PWROG TCD Evaluation - Effect of TCD and Assembly Power/Peaking Factor Burndown | 0 |

B. PLANNED PLANT MODIFICATION EVALUATIONS

- | | |
|-----------------------------------------|---|
| 1 . GEDM & Hot Rod Exception Evaluation | 8 |
|-----------------------------------------|---|

C. 2014 ECCS MODEL ASSESSMENTS

- | | |
|----------|---|
| 1 . None | 0 |
|----------|---|

D. OTHER

- | | |
|-----------------------|----|
| 1 . Rebaseline of AOR | 46 |
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LICENSING BASIS PCT + PCT ASSESSMENTS

2125

Westinghouse LOCA Peak Clad Temperature Summary for Appendix K Small Break

Plant Name: South Texas Unit 2
Utility Name: STPNOC

Analysis Information

EM:	NOTRUMP	Analysis Date:	6/1/2000	Limiting Break Size:	2 inch
FQ:	2.7	FdH:	1.62		
Fuel:	RFA / Vantage 5H	SGTP (%):	10		
Notes:	1. Delta 94 Replacement Steam Generator 2. Limiting Break run was performed with HiTavg, HiTmfw, and S2				

Clad Temp (°F)

LICENSING BASIS

Analysis-Of-Record PCT

1578

PCT Assessments (Delta PCT)

A. PRIOR ECCS MODEL ASSESSMENTS

1	IMP Database Error Corrections	0
2	NOTRUMP Version 38.0 Namelist Error Correction	0
3	NOTRUMP Bubble Rise / Drift Flux Model Inconsistency Corrections	34

B. PLANNED PLANT MODIFICATION EVALUATIONS

1	None	0
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C. 2014 ECCS MODEL ASSESSMENTS

1	None	0
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D. OTHER

1	Burst and Blockage/Time in Life	0
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LICENSING BASIS PCT + PCT ASSESSMENTS

1612