



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

May 7, 2018
NOC-AE-18003572
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 and STN 50-499
10 CFR 50.46 Thirty-Day Report of Significant ECCS Model Changes and Annual Report

References:

1. Letter from R. Dunn to NRC Document Control Desk, "Units 1 & 2 10 CFR 50.46 Thirty-Day Report of Significant ECCS Model Changes and Annual Report," dated November 22, 2016, NOC-AE-16003422 (ML16336A637)
2. Letter from R. Dunn to NRC Document Control Desk, "Unit 1 10 CFR 50.46 Thirty-Day Report of Significant ECCS Model Changes," dated May 10, 2017, NOC-AE-17003468 (ML17139D354)

In accordance with the requirements of 10 CFR 50.46 (a)(3)(ii), STP Nuclear Operating Company (STPNOC) is submitting a 30-day report for a significant change in the South Texas Unit 2 Emergency Core Cooling System (ECCS) model for Unit 2 Cycle 20. In addition, the Annual Report for South Texas Units 1 and 2 is also provided in the attachment in accordance with 10 CFR 50.46 (a)(3)(ii).

It was recently discovered that STP did not issue a 10 CFR 50.46 report within 30 days of receiving the model changes report from Westinghouse dated March 8, 2016. The change resulted in an increase of the fuel peak cladding temperature (PCT) by 6°F for Units 1 and 2 due to the effect of containment purge on the containment pressure response model as discussed below. Condition Report 18-5944 has been written to address this issue.

The following summarizes the penalties and impact on the calculated PCT for the limiting ECCS analysis for large break LOCA (LBLOCA) and small break LOCA (SBLOCA) analyses of record (AOR) as a result of the unreported changes in the 2016 model and changes in Unit 2 Cycle 20 LBLOCA PCT.

The method used to account for the effect of containment purge on the containment pressure response modeled in the Units 1 and 2 LBLOCA AOR was determined to be unsuitable. An evaluation was performed to estimate the impact on PCT. The results showed an estimated 6°F increase in PCT, resulting in an increase in the total LBLOCA PCT for both Units 1 and 2 to 2123°F.

In addition, for Unit 2 Cycle 20, there is a LBLOCA PCT penalty of 2°F due to gamma energy deposition model. Therefore, the total PCT for Unit 2 LBLOCA is 2125°F.

Although the PCT changed only 6°F for Unit 1 and 8°F for Unit 2, the absolute values of the PCT changes still remain above 50°F from the Analysis of Record. Therefore, this is considered significant in accordance with 10 CFR 50.46 (a)(3)(i), and is being reported by this letter.

The limiting small break LOCA (SBLOCA) PCT has not changed since the submittal of the last reports (References 1 and 2).

No schedule for reanalysis is proposed since the PCT for both Units 1 and 2 remain below the 10 CFR 50.46 (b)(1) limit of 2200°F.

There are no commitments in this letter.

If there are any questions regarding this information please contact Safdar Hafeez at 361-972-8906.



Roland Dunn
Manager
Nuclear Fuel and Analysis Department

rds

Attachment: Unit 1 & Unit 2 Annual Report (PCT Assessment)

cc:
(Paper Copy)

Regional Administrator, Region IV
U. S. Nuclear Regulatory Commission
1600 East Lamar Boulevard
Arlington, TX 76011-4511

Lisa M. Regner
Senior Project Manager
U.S. Nuclear Regulatory Commission
One White Flint North (O8H04)
11555 Rockville Pike
Rockville, MD 20852

NRC Resident Inspector
U. S. Nuclear Regulatory Commission
P. O. Box 289, Mail Code: MN116
Wadsworth, TX 77483

GENERAL CODE MAINTENANCE

Background

Various changes have been made to enhance the usability of codes and to streamline future analyses. Examples of these changes include 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)

1981 Westinghouse Large Break LOCA Evaluation Model with BASH
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.

ERROR IN THE UPPER PLENUM FLUID VOLUME CALCULATION

Background

An error was found in the fluid volume calculation in the upper plenum where the support column outer diameter was being used instead of the inner diameter. The correction of this error lead to a reduction in the upper plenum fluid volume used in the Appendix K Large Break LOCA and Small Break LOCA analyses. The corrected values represent a less than 1% change in the total RCS fluid volume and will be incorporated on a forward-fit basis, based on the evaluated impact on the current licensing basis analysis results. These changes represent a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Model(s)

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

Estimated Effect

The differences in the upper plenum fluid volume are relatively minor and have been evaluated to have a negligible effect on large and small break LOCA analysis results, leading to an estimated PCT impact of 0°F.

EVALUATION OF THE EFFECT OF CONTAINMENT PURGE ON CONTAINMENT PRESSURE RESPONSE

Background

The method used to account for the effect of containment purge on the containment pressure response modeled in the South Texas Units 1 and 2 large break loss-of-coolant accident (LBLOCA) analysis of record (AOR) was determined to be unsuitable. An evaluation has been completed to estimate the effect of containment purge on the containment pressure response using an acceptable method. This change represents a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Model(s)

1981 Westinghouse Large Break LOCA Evaluation Model with BASH.

Estimated Effect

The maximum change in containment pressure due to containment purge was calculated for the South Texas Units 1 and 2 AOR. A representative BASH Evaluation Model sensitivity for a change peak cladding temperature (PCT) versus a change in containment pressure was used, leading to an estimated PCT effect of 6°F due to containment purge.

EVALUATION OF UNIT 2 CYCLE 20 LOCA RSAC GEDM VIOLATION

Background

The South Texas Project Unit 2 Cycle 20 reload core design resulted in a violation of the gamma energy deposition model (GEDM) loss-of-coolant accident (LOCA) reload safety analysis checklist (RSAC) limit used in the large-break LOCA analysis. This violation was evaluated for Unit 2 Cycle 20 and represents a change in a plant configuration or associated set point(s), 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 Unit 2 Cycle 20 GEDM violation was estimated to result in a 2°F increase to the calculated large-break LOCA peak cladding temperature (PCT).

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, Hi Tav, 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
6. Effect of Containment Purge	6
B. PLANNED PLANT MODIFICATION EVALUATIONS	
1. None	0
C. 2017 ECCS MODEL ASSESSMENTS	
1. None	0
D. OTHER	
1. Rebaseline of AOR	46
LICENSING BASIS PCT + PCT ASSESSMENTS PCT	2123

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 Hi Tav, Hi TMFW, 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
C. 2017 ECCS MODEL ASSESSMENTS	
1. None	0
D. OTHER	
1. Burst and Blockage/Time in Life	0
LICENSING BASIS PCT + PCT ASSESSMENTS PCT	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, Hi Tav, 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
6. Effect of Containment Purge	6
B. PLANNED PLANT MODIFICATION EVALUATIONS	
1. GEDM Violation Evaluation	2 (a)
C. 2017 ECCS MODEL ASSESSMENTS	
1. None	0
D. OTHER	
1. Rebaseline of AOR	46
 LICENSING BASIS PCT + PCT ASSESSMENTS PCT	 2125

(a) This evaluation is applicable to, and may be removed following completion of, Unit 2 Cycle 20.

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:** 10/1/2000 **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 Hi Tav, Hi TMFW, 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
C. 2017 ECCS MODEL ASSESSMENTS	
1. None	0
D. OTHER	
1. Burst and Blockage/Time in Life	0
LICENSING BASIS PCT + PCT ASSESSMENTS PCT	1612