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CP-201400565
Log # TXX-14059

Ref. # 10CFR50.46

May 7, 2014

ATTN: Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: COMANCHE PEAK NUCLEAR POWER PLANT (CPNPP)
DOCKET NOS. 50-445 AND 50-446
ANNUAL REPORT OF CHANGES IN PEAK CLADDING TEMPERATURE

REF: Letter logged TXX-14058, dated April 17, 2014, from Rafael Flores of Luminant Power to the NRC regarding "30-Day Report for Significant Change in Peak Clad Temperature"

Dear Sir or Madam:

Pursuant to 10CFR50.46(a)(3)(ii), Luminant Generation Company LLC (Luminant Power) hereby submits the attached peak cladding temperatures (PCT) for Comanche Peak Nuclear Power Plant (CPNPP), Units 1 and 2. The Large-Break Loss-of-Coolant-Accident and Small-Break Loss-of-Coolant Accident analysis for Units 1 and 2 were performed for Luminant Power with the approved Westinghouse methodologies listed in Technical Specification 5.6.5.

Luminant Power has reviewed the notification of 10CFR50.46 reporting information pertaining to the Emergency Core Cooling System (ECCS) Evaluation Model changes that were implemented by Westinghouse for 2013. Per the referenced letter, Luminant Power submitted information regarding an evaluation of revised Heat Transfer Multiplier Distributions, changes to Grid Blockage Ratio and Porosity, and application of a corrected Burst Strain in the Westinghouse Best Estimate Large Break Loss of Coolant Accident (LBLOCA) analysis methodology for CPNPP Unit 2 and its effect on PCT. The evaluation determined the change in PCT was determined to be significant and the referenced letter provided the required information. No other changes to, or errors in, the Evaluation Models on the limiting transient PCT were significant for 2013.

This report of the ECCS Evaluation Model changes provides an update on an annual basis. Attachment 1 provides an assessment of the specific changes and enhancements to the Westinghouse Evaluation Models for 2013.

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Attachment 2 provides the calculated LBLOCA and Small Break LOCA PCT margin allocations in effect for the 2013 Comanche Peak Units 1 and 2 Evaluation Models. There were no changes, error corrections, or enhancements to the 1985 Westinghouse Small Break LOCA Evaluation Model with NOTRUMP. The PCT values determined in the LBLOCA analysis of record, combined with all of the PCT allocations, remain well below the 10CFR50.46 regulatory limit of 2200 degrees Fahrenheit. Therefore, CPNPP Units 1 and 2 are in compliance with 10CFR50.46 requirements and no other action is required.

This communication contains no new licensing basis commitments regarding CPNPP Units 1 and 2.

Should you have any questions, please contact Mr. J. D. Seawright at (254) 897-0140.

Sincerely,

Luminant Generation Company LLC

Rafael Flores

By: Fred W. Madden
Fred W. Madden
Director, External Affairs

Attachments - 1. Assessment of Specific Changes and Enhancements to the Westinghouse Evaluation Models for 2013
2. CPNPP Units 1 and 2 Peak Cladding Temperatures

c - Marc L. Dapas, Region IV
Balwant K. Singal, NRR
Resident Inspectors, Comanche Peak

Assessment of Specific Changes and Enhancements to the Westinghouse Evaluation Models for 2013

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)

1996 Westinghouse Best Estimate Large Break LOCA Evaluation Model
2004 Westinghouse Realistic Large Break LOCA Evaluation Model Using ASTRUM

Estimated Effect

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

BURST ELEVATION SELECTION

Background

It is stated on page 11-20 of WCAP-16009-P-A that the burst option is applied at the elevation corresponding to the (WCOBRA/TRAC) burst elevation for the hot assembly rod. This approach was modified to apply the burst option at the HOTSPOT predicted burst elevation as described on page 19 of Attachment 1 to LTR-NRC-06-8. The HOTSPOT code has been updated to incorporate the following changes to the burst elevation selection logic if multiple nodes burst at the same time: (1) the node that has the highest cladding temperature at the time of burst is selected; (2) if multiple nodes have the same burst time and cladding temperature at the time of burst, the lowest ordered elevation of those nodes is selected. These changes represent a closely-related group of Discretionary Changes in accordance with Section 4.1.1 of WCAP-13451.

Affected Evaluation Model(s)

2004 Westinghouse Realistic Large Break LOCA Evaluation Model Using ASTRUM

Estimated Effect

This improvement in burst elevation selection is a forward-fit change, leading to an estimated Peak Cladding Temperature (PCT) impact of 0°F.

ELEVATIONS FOR HEAT SLAB TEMPERATURE INITIALIZATION

Background

An error was discovered in WCOBRA/TRAC whereby an incorrect value would be used in the initial fuel rod temperature calculation for a fuel rod heat transfer node if that node elevation was specified outside of the bounds of the temperature initialization table. This problem has been evaluated for impact on existing analyses and its resolution represents a Discretionary Change in accordance with Section 4.1.1 of WCAP13451.

Affected Evaluation Model(s)

1996 Westinghouse Best Estimate Large Break LOCA Evaluation Model
2004 Westinghouse Realistic Large Break LOCA Evaluation Model Using ASTRUM

Estimated Effect

Based on inspection of plant analysis input, it was concluded that the input decks for existing analyses are not impacted by this error, leading to an estimated peak cladding temperature impact of 0°F.

HEAT TRANSFER LOGIC CORRECTION FOR ROD BURST CALCULATION

Background

A change was made to the WCOBRA/TRAC coding to correct an error which had disabled rod burst in separate effect test simulations. This change represents a Discretionary Change in accordance with Section 4.1.1 of WCAP-13451.

Affected Evaluation Model(s)

1996 Westinghouse Best Estimate Large Break LOCA Evaluation Model
2004 Westinghouse Realistic Large Break LOCA Evaluation Model Using ASTRUM

Estimated Effect

Based on the nature of the change and the evaluation model requirements for plant modeling in Westinghouse best estimate large break LOCA analyses with WCOBRA/TRAC, it is judged that existing analyses are not impacted by this change, leading to an estimated peak cladding temperature impact of 0°F.

WCOBRA/TRAC U19 FILE DIMENSION ERROR CORRECTION

Background

A problem was identified in the dimension of an array used to generate the u19 file in WCOBRA/TRAC. The u19 file is read during HSDRIVER execution and provides information needed to generate the HOTSPOT thermal-hydraulic history and user input files. The array used to write the desired information to the u19 file is dimensioned to 2000 in WCOBRA/TRAC. It is possible, however, for more than 2000 curves to be written to the u19 file. If that is the case, it is possible that the curves would not be stored correctly on the u19 file. A survey of current Best Estimate Large Break LOCA analyses indicated that the majority of plants had less than 2000 curves in their u19 files; therefore these plants are not affected by the change. For those plants with more than 2000 curves, plant-specific sensitivity calculations indicated that resolution of this issue does not impact the peak cladding temperature (PCT) calculation for prior analyses. This represents a Discretionary Change in accordance with Section 4.1.1 of WCAP-13451.

Affected Evaluation Model(s)

1996 Westinghouse Best Estimate Large Break LOCA Evaluation Model
2004 Westinghouse Realistic Large Break LOCA Evaluation Model Using ASTRUM

Estimated Effect

As discussed in the Background section, resolution of this issue does not impact the peak cladding temperature calculation for prior LBLOCA analyses, leading to an estimated peak cladding temperature impact of 0°F.

HEAT TRANSFER MODEL ERROR CORRECTIONS

Background

Several related changes were made to WCOBRA/TRAC to correct errors discovered which affected the heat transfer models. These errors included calculation of the entrained liquid fraction used in calculation of the drop wall heat flux, application of the grid enhancement factor for grid temperature calculation, calculation of the Reynold's number used in the Wong-Hochrieter correlation for the heat transfer coefficient from fuel rods to vapor, fuel rod initialization and calculation of cladding inner radius with creep, application of grid and two phase enhancement factors and radiation component in single phase vapor heat transfer, and reset of the critical heat flux temperature when J=2. These errors have been evaluated to estimate the impact on existing LBLOCA analysis results. Correction of these errors represents a closely-related group of Non-Discretionary Changes in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Model(s)

1996 Westinghouse Best Estimate Large Break LOCA Evaluation Model
2004 Westinghouse Realistic Large Break LOCA Evaluation Model Using ASTRUM

Estimated Effect

Based on the results of representative plant calculations, separate effects and integral effects test simulations, it is concluded that the error corrections have a negligible local effect on heat transfer, leading to an estimated peak cladding temperature impact of 0°F.

CORRECTION TO HEAT TRANSFER NODE INITIALIZATION

Background

An error was discovered in the heat transfer node initialization logic in WCOBRA/TRAC whereby the heat transfer node center locations could be inconsistent with the geometric node center elevations. The primary effects of this issue are on the interpolated fluid properties and grid turbulent mixing enhancement at the heat transfer node. This problem has been evaluated for impact on existing analyses and its resolution represents a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Model(s)

1996 Westinghouse Best Estimate Large Break LOCA Evaluation Model
2004 Westinghouse Realistic Large Break LOCA Evaluation Model Using ASTRUM

Estimated Effect

Based on engineering judgment and the results from a matrix of representative plant calculations, it is concluded that the effect of this error is within the code resolution, leading to an estimated peak cladding temperature impact of 0°F.

MASS CONSERVATION ERROR FIX

Background

It was identified that mass was not conserved in WCOBRA/TRAC one-dimensional component cells when void fraction values were calculated to be slightly out of the physical range (greater than 1.0 or smaller than 0.0). This was observed to result in artificial mass generation on the secondary side of steam generator components. Correction of this problem represents a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Model(s)

1996 Westinghouse Best Estimate Large Break LOCA Evaluation Model
2004 Westinghouse Realistic Large Break LOCA Evaluation Model Using ASTRUM

Estimated Effect

This error was observed to primarily affect the mass on the secondary side of the steam generator. This issue was judged to have a negligible impact on existing LBLOCA analysis results, leading to an estimated peak cladding temperature impact of 0°F.

CORRECTION TO SPLIT CHANNEL MOMENTUM EQUATION

Background

An error was discovered in the momentum equation calculations for split channels in WCOBRA/TRAC. This error impacts the (1) continuity area of the phantom/boundary bottom cell; (2) bottom and top continuity area correction factors for the channel inlet at the bottom of a section and for the channel outlet at the top of a section; and (3) drop entrainment mass rate per unit volume and drop de-entrainment mass rate per unit volume contributions to the momentum calculations for split channels. This problem has been evaluated for impact on existing analyses and its resolution represents a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Model(s)

1996 Westinghouse Best Estimate Large Break LOCA Evaluation Model
2004 Westinghouse Realistic Large Break LOCA Evaluation Model Using ASTRUM

Estimated Effect

Based on the results from a matrix of representative plant calculations, it is concluded that the effect of this error on the quantities directly impacted by the momentum equation calculations for split channels (velocities, flows, etc.) is negligible, leading to an estimated peak cladding temperature impact of 0°F.

CHANGES TO VESSEL SUPERHEATED STEAM PROPERTIES

Background

Several related changes were made to the WCOBRA/TRAC coding for the vessel super-heated water properties, including updating the HGAS subroutine coding to be consistent with WCAP-12945-P-A Equation 10-6, updating the approximation of the enthalpy in the TGAS subroutine to be consistent with the HGAS subroutine coding, and updating the temperature iteration method and convergence criteria in the TGAS subroutine. These changes represent a closely-related group of Non-Discretionary Changes in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Model(s)

1996 Westinghouse Best Estimate Large Break LOCA Evaluation Model
2004 Westinghouse Realistic Large Break LOCA Evaluation Model Using ASTRUM

Estimated Effect

The updates to the calculations of the superheated steam properties had generally less than 1°F impact on the resulting steam temperature values, leading to an estimated peak cladding temperature impact of 0°F.

UPDATE TO METAL DENSITY REFERENCE TEMPERATURES

Background

It was identified that for one-dimensional components in which heat transfer to stainless steel 304 or 316 is modeled, the reference temperature for the metal density calculation was allowed to vary; as a result the total metal mass was not preserved. Correction of this problem represents a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Model(s)

1996 Westinghouse Best Estimate Large Break LOCA Evaluation Model
2004 Westinghouse Realistic Large Break LOCA Evaluation Model Using ASTRUM

Estimated Effect

This change primarily impacts the reactor coolant system loop piping modeled in the large break loss-of coolant accident (LBLOCA) WCOBRA/TRAC models. It was judged that the effect of this change on the peak cladding temperature results was negligible, leading to an estimated peak cladding temperature impact of 0°F.

DECAY HEAT MODEL ERROR CORRECTIONS

Background

The decay heat model in the WCOBRA/TRAC code was updated to correct the erroneously coded value of the yield fraction directly from fission for Group 19 of Pu-239, and to include the term for uncertainty in the prompt energy per fission in the calculation of the decay heat power uncertainty. Correction of these errors represents a closely-related group of Non-Discretionary Changes in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Model(s)

1996 Westinghouse Best Estimate Large Break LOCA Evaluation Model
2004 Westinghouse Realistic Large Break LOCA Evaluation Model Using ASTRUM

Estimated Effect

These changes have a negligible impact on the calculated decay heat power, leading to an estimated peak cladding temperature impact of 0°F.

CORRECTION TO THE PIPE EXIT PRESSURE DROP ERROR

Background

An error was discovered in WCOBRA/TRAC whereby the frictional pressure drop at the split break TEE connection to the BREAK component was incorrectly calculated using the TEE hydraulic diameter instead of the BREAK component length input. This error has been evaluated for impact on existing analyses and its resolution represents a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Model(s)

1996 Westinghouse Best Estimate Large Break LOCA Evaluation Model
2004 Westinghouse Realistic Large Break LOCA Evaluation Model Using ASTRUM

Estimated Effect

Based on the results from a matrix of representative plant calculations, it is concluded that the effect of this error on the pressure at the break and the break flow is negligible, leading to an estimated peak cladding temperature impact of 0°F.

GRID HEAT TRANSFER ENHANCEMENT CALCULATION

Background

An issue was identified which could affect the calculation of the heat transfer at gridded elevations for Best-Estimate (BE) Large-Break Loss-of-Coolant Accident (LBLOCA) Evaluation Models (EMs). For a specific input condition, the grid heat transfer enhancement factor is calculated based on an erroneous core geometry, which can cause an over-prediction of the heat transfer coefficient at gridded elevations. This issue has been evaluated to estimate the impact on existing LBLOCA analysis results. The resolution of this issue represents a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Model(s)

1996 Westinghouse Best Estimate Large Break LOCA Evaluation Model
2004 Westinghouse Realistic Large Break LOCA Evaluation Model Using ASTRUM

Estimated Effect

The effect described above was judged to have a negligible effect on existing LBLOCA analysis results, leading to an estimated Peak Cladding Temperature (PCT) impact of 0°F.

REVISED HEAT TRANSFER MULTIPLIER DISTRIBUTIONS

Background

Several changes and error corrections were made to WCOBRA/TRAC and the impacts of these changes on the heat transfer multiplier uncertainty distributions were investigated. During this investigation, errors were discovered in the development of the original multiplier distributions, including errors in the grid locations specified in the WCOBRA/TRAC models for the G2 Refill and G2 Reflood tests, and errors in processing test data used to develop the reflood heat transfer multiplier distribution. Therefore, the blowdown heatup, blowdown cooling, refill, and reflood heat transfer multiplier distributions were redeveloped. For the reflood heat transfer multiplier development, the evaluation time windows for each set of test experimental data and each test simulation were separately defined based on the time at which the test or simulation exhibited dispersed flow film boiling heat transfer conditions characteristic of the reflood time period. The revised heat transfer multiplier distributions have been evaluated for impact on existing analyses. Resolution of these issues represents a closely related group of Non-Discretionary Changes in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Model(s)

1996 Westinghouse Best Estimate Large Break LOCA Evaluation Model
2004 Westinghouse Realistic Large Break LOCA Evaluation Model Using ASTRUM

Estimated Effect

A plant transient calculation representative of Comanche Peak Unit 1 and Unit 2 transient behavior was performed with the latest version of WCOBRA/TRAC. Using this transient, a matrix of HOTSPOT calculations was performed to estimate the effect of the heat transfer multiplier distribution changes. Using these results and considering the heat transfer multiplier uncertainty attributes from limiting cases for Comanche Peak Unit 1 and Unit 2, an estimated PCT effect of -6°F has been established for 10 CFR 50.46 reporting purposes for Comanche Peak Unit 1, and an estimated PCT effect of -17°F has been established for 10 CFR 50.46 reporting purposes for Comanche Peak Unit 2.

ERROR IN BURST STRAIN APPLICATION

Background

An error in the application of the burst strain was discovered in HOTSPOT. The equation for the application of the burst strain is given as Equation 7-69 in WCAP-16009-P-A and in WCAP-12945-P-A. The outer radius of the cladding after burst occurs should be calculated based on the burst strain, and the inner radius of the cladding should be calculated based on the outer radius. In HOTSPOT, the burst strain is applied to the calculation of the cladding inner radius. The cladding outer radius is then calculated based on the inner radius. As such, the burst strain is incorrectly applied to the inner radius rather than the outer radius, which impacts the resulting cladding geometry at the burst elevation after burst occurs. Correction of the erroneous calculation results in thinner cladding at the burst node and more fuel relocating into the burst node, leading to an increase in the Peak Cladding Temperature (PCT) at the burst node. This issue has been evaluated to estimate the impact on existing Best-Estimate (BE) Large-Break Loss-of-Coolant Accident (LBLOCA) analysis results. The resolution of this issue represents a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Model(s)

1996 Westinghouse Best Estimate Large Break LOCA Evaluation Model
2004 Westinghouse Realistic Large Break LOCA Evaluation Model Using ASTRUM

Estimated Effect

The issue described above was evaluated based on the results of executing the most limiting plant-specific HOTSPOT runs for similar plants with a HOTSPOT version that includes the correction of this error. This resulted in an estimated PCT impact of 21°F for Comanche Peak Units 1 and 2.

CHANGES TO GRID BLOCKAGE RATIO AND POROSITY

Background

A change in the methodology used to calculate grid blockage ratio and porosity for Westinghouse fuel resulted in a change to the grid inputs used in the Comanche Peak Unit 1 and Unit 2 large break loss-of-coolant accident (LBLOCA) analyses. Grid inputs affect heat transfer in the core during a LBLOCA. This change represents a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Model(s)

2004 Westinghouse Realistic Large Break LOCA Evaluation Model Using ASTRUM

Estimated Effect

The updates to the methodology to calculate grid blockage ratio and porosity used as input in Westinghouse LBLOCA models resulted in a negligible change to heat transfer in the core prior to the time of PCT, which occurs during blowdown in Comanche Peak Unit 1. The estimated penalty associated with the changes is 0°F for 10 CFR 50.46 reporting purposes for Comanche Peak Unit 1.

The updates to the methodology to calculate grid blockage ratio and porosity used as input in Westinghouse LBLOCA models resulted in degraded heat transfer in the core during reflood for the fuel type used in Comanche Peak Unit 2. The estimated penalty associated with the changes is 24°F for 10 CFR 50.46 reporting purposes for Comanche Peak Unit 2.

INITIAL FUEL PELLET AVERAGE TEMPERATURE UNCERTAINTY CALCULATION

Background

In the Automated Statistical Treatment of Uncertainty Method (ASTRUM) Best-Estimate (BE) Large-Break Loss-of-Coolant Accident (LBLOCA) Evaluation Model (EM), uncertainties are applied to the gap heat transfer coefficient and pellet thermal conductivity to capture the uncertainty in the initial fuel pellet average temperature. This approach was compared to the initial fuel pellet average temperature uncertainties predicted by the PAD code at beginning-of-life conditions and found to be conservative in Section 25-4-2-4 of WCAP-12945-P-A. However, the initial fuel pellet average temperature uncertainty range analyzed at higher burnups in the ASTRUM EM is much wider than the uncertainty range predicted by the PAD code, which may result in excessively low or high analyzed initial fuel pellet average temperatures. This issue has been evaluated to estimate the impact on existing ASTRUM LBLOCA analysis results. The resolution of this issue represents a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Model(s)

2004 Westinghouse Realistic Large Break LOCA Evaluation Model Using ASTRUM

Estimated Effect

The issue described above is judged to have either no effect or a negligible effect on existing LBLOCA analysis results, leading to an estimated Peak Cladding Temperature (PCT) impact of 0°F.

SBLOCTA CLADDING STRAIN REQUIREMENT FOR FUEL ROD BURST

Background

An error was discovered in the minimum local strain required for burst for **ZIRLO**[®1] cladding in the SBLOCTA code. The coding does not enforce reaching the minimum percent local strain threshold prior to calculating fuel rod burst. However, a review of licensing basis analyses revealed no instances of this error impacting calculated results. Resolution of this issue represents a Non-Discretionary Change 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

Based on a review of current licensing basis analyses, and the phenomena and physics of a small break LOCA transient, it is 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.

[1] *ZIRLO is a registered trademark of Westinghouse Electric Company LLC, its affiliates and/or its subsidiaries in the United States of America and may be registered in other countries throughout the world. All rights reserved. Unauthorized use is strictly prohibited. Other names may be trademarks of their respective owners.*

CPNPP Units 1 and 2 Peak Cladding Temperatures

Westinghouse LOCA Peak Clad Temperature Summary for ASTRUM Best Estimate Large Break

Plant Name: Comanche Peak Unit 1
Utility Name: Luminant
Revision Date: 2/27/2014

Analysis Information

EM:	ASTRUM	**Analysis Date:**	7/27/2007	**Limiting Break Size:**	Guillotine
FQ:	2.5	**FdH:**	1.6		
Fuel:	OFA	**SGTP (%):**	10		
Notes:					

	Clad Temp (^{O}F)	Ref.	Notes
LICENSIS BASIS			
Analysis-Of-Record PCT	**1492**	**1**	
PCT Assessments (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1. Evaluation of Fuel Pellet Thermal Conductivity Degradation and Peaking Factor Burndown	122	2	(a)
B. PLANNED PLANT MODIFICATION EVALUATIONS			
1. None	0		
C. 2013 ECCS MODEL ASSESSMENTS			
1. Revised Heat Transfer Multiplier Distributions	-6	3	
2. Error in Burst Strain Application	21	4	
D. OTHER			
1. None	0		
LICENSING BASIS PCT + PCT ASSESSMENTS	**PCT =** 1629		

References:

1. WCAP-16762-P, Revision 1, "Best-Estimate Analysis of the Large-Break Loss-of-Coolant Accident for the Comanche Peak Nuclear Power Plant Unit 1 Using the ASTRUM Methodology," March 2009.
2. LTR-LIS-12-410, "Comanche Peak Units 1 and 2, 10 CFR 50.46 Notification and Reporting for Fuel Pellet Thermal Conductivity Degradation and Peaking Factor Burndown," September 20, 2012.
3. LTR-LIS-13-359,"Comanche Peak Units 1 and 2 10CFR50.46 Report for Revised Heat Transfer Multiplier Distributions," July 2013.
4. LTR-LIS-14-43,"Comanche Peak Units 1 and 2 10CFR50.46 Report for the HOTSPOT Burst Strain Error Correction," January 2014.

Notes:

(a) *This evaluation credits peaking factor burndown, see Reference 2.*

CPNPP Units 1 and 2 Peak Cladding Temperatures

Westinghouse LOCA Peak Clad Temperature Summary for ASTRUM Best Estimate Large Break

Plant Name: Comanche Peak Unit 1
Utility Name: Luminant
Revision Date: 2/27/2014

Cycle 17

Analysis Information

EM:	ASTRUM	**Analysis Date:**	7/27/2007	**Limiting Break Size:**	Guillotine
FQ:	2.5	**FdH:**	1.6		
Fuel:	OFA	**SGTP (%):**	10		
Notes:					

	Clad Temp (^{O}F)	Ref.	Notes
LICENSIS BASIS			
Analysis-Of-Record PCT	**1492**	**1**	
PCT Assessments (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1. Evaluation of Fuel Pellet Thermal Conductivity Degradation and Peaking Factor Burndown	122	3	(a)
B. PLANNED PLANT MODIFICATION EVALUATIONS			
1. PBOT/PMID Violation	0	2	
C. 2013 ECCS MODEL ASSESSMENTS			
1. Revised Heat Transfer Multiplier Distributions	-6	4	
2. Error in Burst Strain Application	21	5	
D. OTHER			
1. None	0		
LICENSING BASIS PCT + PCT ASSESSMENTS	**PCT =** 1629		

References:

1. WCAP-16762-P, Revision 1, "Best-Estimate Analysis of the Large-Break Loss-of-Coolant Accident for the Comanche Peak Nuclear Power Plant Unit 1 Using the ASTRUM Methodology," March 2009.
2. LTR-LIS-13-160, "LBLOCA PCT Rackup Sheet Update for the Evaluation of the Comanche Peak Unit 1 Cycle 17 PBOT/PMID Violations," March 2013.
3. LTR-LIS-12-410, "Comanche Peak Units 1 and 2, 10 CFR 50.46 Notification and Reporting for Fuel Pellet Thermal Conductivity Degradation and Peaking Factor Burndown," September 20, 2012.
4. LTR-LIS-13-359,"Comanche Peak Units 1 and 2 10CFR50.46 Report for Revised Heat Transfer Multiplier Distributions," July 2013.
5. LTR-LIS-14-43,"Comanche Peak Units 1 and 2 10CFR50.46 Report for the HOTSPOT Burst Strain Error Correction," January 2014.

Notes:

(a) This evaluation credits peaking factor burndown, see Reference 3.

CPNPP Units 1 and 2 Peak Cladding Temperatures

Westinghouse LOCA Peak Clad Temperature Summary for Appendix K Small Break

Plant Name: Comanche Peak Unit 1
Utility Name: Luminant
Revision Date: 2/27/2014

Analysis Information

EM:	NOTRUMP	**Analysis Date:**	6/8/2007	**Limiting Break Size:**	4 inch
FQ:	2.5	**FdH:**	1.6		
Fuel:	OFA	**SGTP (%):**	10		
Notes:					

	Clad Temp (^{O}F)	Ref.	Notes
LICENSIS BASIS			
Analysis-Of-Record PCT	**1013**	**1**	
PCT Assessments (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1. None	0		
B. PLANNED PLANT MODIFICATION EVALUATIONS			
1. None	0		
C. 2013 ECCS MODEL ASSESSMENTS			
1. None	0		
D. OTHER			
1. None	0		
LICENSING BASIS PCT + PCT ASSESSMENTS	**PCT =** 1013		

References:

1. WCAP-16840-P, "Comanche Peak Nuclear Power Plant Stretch Power Uprate Licensing Report," August 2007. (Results are included in TXX-07107, "Comanche Peak Steam Electric Station (CPSES), Docket Nos. 50-445 and 50-446, Submittal of the CPSES Units 1 and 2 Large and Small Break LOCA Analyses," July 31, 2007.)

Notes:
None

CPNPP Units 1 and 2 Peak Cladding Temperatures

Westinghouse LOCA Peak Clad Temperature Summary for ASTRUM Best Estimate Large Break

Plant Name: Comanche Peak Unit 2
Utility Name: Luminant
Revision Date: 2/27/2014

Analysis Information

EM:	ASTRUM	**Analysis Date:**	7/27/2007	**Limiting Break Size:**	Guillotine
FQ:	2.5	**FdH:**	1.6		
Fuel:	OFA	**SGTP (%):**	10		
Notes:					

	Clad Temp (^{O}F)	Ref.	Notes
LICENSIS BASIS			
Analysis-Of-Record PCT	**1632**	**1**	
PCT Assessments (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1. Evaluation of Fuel Pellet Thermal Conductivity Degradation and Peaking Factor Burndown	190	2	(a)
B. PLANNED PLANT MODIFICATION EVALUATIONS			
1. None	0		
C. 2013 ECCS MODEL ASSESSMENTS			
1. Revised Heat Transfer Multiplier Distributions	-17	3	
2. Changes to Grid Blockage Ratio and Porosity	24	4	
3. Error in Burst Strain Application	21	5	
D. OTHER			
1. None	0		
LICENSING BASIS PCT + PCT ASSESSMENTS	**PCT =** 1850		

References:

1. WCAP-16763-P, Revision 1, "Best-Estimate Analysis of the Large-Break Loss-of-Coolant Accident for the Comanche Peak Nuclear Power Plant Unit 2 Using the ASTRUM Methodology," March 2009.
2. LTR-LIS-12-410, "Comanche Peak Units 1 and 2, 10 CFR 50.46 Notification and Reporting for Fuel Pellet Thermal Conductivity Degradation and Peaking Factor Burndown," September 20, 2012.
3. LTR-LIS-13-359,"Comanche Peak Units 1 and 2 10CFR50.46 Report for Revised Heat Transfer Multiplier Distributions," July 2013.
4. LTR-LIS-13-472,"Comanche Peak Units 1 and 2 10CFR50.46 Report for Changes to Grid Blockage Ratio and Porosity," October 2013.
5. LTR-LIS-14-43,"Comanche Peak Units 1 and 2 10CFR50.46 Report for the HOTSPOT Burst Strain Error Correction," January 2014.

Notes:

(a) This evaluation credits peaking factor burndown, see Reference 2.

CPNPP Units 1 and 2 Peak Cladding Temperatures

Westinghouse LOCA Peak Clad Temperature Summary for ASTRUM Best Estimate Large Break

Plant Name: Comanche Peak Unit 2
Utility Name: Luminant
Revision Date: 2/27/2014

Cycle 14

Analysis Information

EM:	ASTRUM	**Analysis Date:**	7/27/2007	**Limiting Break Size:**	Guillotine
FQ:	2.5	**FdH:**	1.6		
Fuel:	OFA	**SGTP (%):**	10		
Notes:					

	Clad Temp (^{O}F)	Ref.	Notes
LICENSIS BASIS			
Analysis-Of-Record PCT	**1632**	**1**	
PCT Assessments (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1. Evaluation of Fuel Pellet Thermal Conductivity Degradation and Peaking Factor Burndown	190	3	(a)
B. PLANNED PLANT MODIFICATION EVALUATIONS			
1. PBOT/PMID Evaluation	0	2	
C. 2013 ECCS MODEL ASSESSMENTS			
1. Revised Heat Transfer Multiplier Distributions	-17	4	
2. Changes to Grid Blockage Ratio and Porosity	24	5	
3. Error in Burst Strain Application	21	6	
D. OTHER			
1. None	0		
LICENSING BASIS PCT + PCT ASSESSMENTS	**PCT =** 1850		

References:

1. WCAP-16763-P, Revision 1, "Best-Estimate Analysis of the Large-Break Loss-of-Coolant Accident for the Comanche Peak Nuclear Power Plant Unit 2 Using the ASTRUM Methodology," March 2009.
2. LTR-LIS-12-498, "LBLOCA PCT Rackup Sheet Update for the Evaluation of the Comanche Peak Unit 2 Cycle 14 PBOT/PMID Violations" September 2012.
3. LTR-LIS-12-410, "Comanche Peak Units 1 and 2, 10 CFR 50.46 Notification and Reporting for Fuel Pellet Thermal Conductivity Degradation and Peaking Factor Burndown," September 20, 2012.
4. LTR-LIS-13-359,"Comanche Peak Units 1 and 2 10CFR50.46 Report for Revised Heat Transfer Multiplier Distributions," July 2013.
5. LTR-LIS-13-472,"Comanche Peak Units 1 and 2 10CFR50.46 Report for Changes to Grid Blockage Ratio and Porosity," September, 2013.
6. LTR-LIS-14-43,"Comanche Peak Units 1 and 2 10CFR50.46 Report for the HOTSPOT Burst Strain Error Correction," January 2014.

Notes:

(a) This evaluation credits peaking factor burndown, see Reference 3.

CPNPP Units 1 and 2 Peak Cladding Temperatures

Westinghouse LOCA Peak Clad Temperature Summary for Appendix K Small Break

Plant Name: Comanche Peak Unit 2
Utility Name: Luminant
Revision Date: 2/27/2014

Analysis Information

EM:	NOTRUMP	**Analysis Date:**	6/8/2007	**Limiting Break Size:**	4 inch
FQ:	2.5	**FdH:**	1.6		
Fuel:	OFA	**SGTP (%):**	10		
Notes:					

	Clad Temp (^{O}F)	Ref.	Notes
LICENSIS BASIS			
Analysis-Of-Record PCT	**1210**	**1**	
PCT Assessments (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1. None	0		
B. PLANNED PLANT MODIFICATION EVALUATIONS			
1. None	0		
C. 2013 ECCS MODEL ASSESSMENTS			
1. None	0		
D. OTHER			
1. None	0		
LICENSING BASIS PCT + PCT ASSESSMENTS	**PCT =** 1210		

References:

1. WCAP-16840-P, "Comanche Peak Nuclear Power Plant Stretch Power Uprate Licensing Report," August 2007. (Results are included in TXX-07107, "Comanche Peak Steam Electric Station (CPSES), Docket Nos. 50-445 and 50-446, Submittal of the CPSES Units 1 and 2 Large and Small Break LOCA Analyses," July 31, 2007.)

Notes:
None