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AEP-NRC-2015-79  
10 CFR 50.46

Docket Nos.: 50-315  
50-316

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

Donald C. Cook Nuclear Plant Units 1 and 2  
ANNUAL REPORT OF LOSS-OF-COOLANT ACCIDENT  
EVALUATION MODEL CHANGES

Pursuant to 10 CFR 50.46, Indiana Michigan Power Company (I&M), the licensee for Donald C. Cook Nuclear Plant (CNP), is transmitting an annual report of loss-of-coolant accident (LOCA) evaluation model changes affecting the peak cladding temperature (PCT) for CNP Unit 1 and Unit 2. I&M is providing, as an enclosure to this letter, the Unit 1 and Unit 2 Large Break and Small Break LOCA Analyses-of-Record PCT values and error assessments for calendar year 2014.

There are no new or revised commitments in this letter. Should you have any questions, please contact Mr. Michael K. Scarpello, Regulatory Affairs Manager, at (269) 466-2649.

Sincerely,

Quinton S. Lies  
Engineering Vice President

JMT/ams

Enclosure: Donald C. Cook Nuclear Plant Units 1 and 2, Large and Small Break Loss-of-Coolant Accident Peak Clad Temperature Summary

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A002  
NRR

## ENCLOSURE TO AEP-NRC-2015-79

### DONALD C. COOK NUCLEAR PLANT UNITS 1 AND 2 LARGE AND SMALL BREAK LOSS-OF-COOLANT ACCIDENT PEAK CLAD TEMPERATURE SUMMARY

#### Abbreviations:

ADAMS	Agencywide Document Access and Management System
CNP	Donald C. Cook Nuclear Plant
°F	degrees Fahrenheit
ECCS	emergency core cooling system
EM	evaluation methodology
FdH	nuclear enthalpy rise hot channel factor
F <sub>Q</sub>	heat flux hot channel factor
I&M	Indiana Michigan Power Company
LBLOCA	large break loss of coolant accident
LOCA	loss of coolant accident
MWt	megawatts – thermal
NRC	U. S. Nuclear Regulatory Commission
PBOT	power limit at bottom part of reactor
PCT	peak cladding temperature
%	percent
PMID	power limit at middle part of reactor
SGTP	steam generator tube plugging
TCD	thermal conductivity degradation

#### Summary:

By letter dated March 19, 2012, (ADAMS Accession No. ML12088A104), and supplemented by letter dated June 11, 2012 (ADAMS Accession No. ML12173A025), I&M, the licensee for CNP Units 1 and 2, submitted a report describing the impact of fuel pellet TCD on the LBLOCA ECCS evaluation model, and an estimate of the effect on the predicted PCT for CNP Units 1 and 2. This report was submitted pursuant to 10 CFR 50.46(a)(3), and referred to a letter from Westinghouse Electric Company dated March 7, 2012 (ADAMS Accession No. ML12072A035). The report was subsequently found to be acceptable by NRC letter dated March 7, 2013 (ADAMS Accession No. ML13077A137).

By letter dated August 30, 2013 (ADAMS Accession No. ML13247A174), I&M submitted a report describing the impact of Revised Heat Transfer Multiplier Distributions on the predicted PCT for CNP Unit 1. This report was submitted pursuant to 10 CFR 50.46(a)(3). By Westinghouse letter LTR-LIS-13-360, "D. C. Cook Units 1 and 2 10 CFR 50.46 Report for Revised Heat Transfer Multiplier Distributions," dated July 31, 2013, Westinghouse Electric Company notified I&M of significant errors in the EM for the LBLOCA analysis of record for CNP Unit 1. By Westinghouse letter LTR-LIS-13-406, "Additional Information on the Evaluation of Revised Heat Transfer Multiplier Distributions," dated August 14, 2013, Westinghouse Electric Company provided I&M additional detail on the nature of the errors and the corrections made.

As documented in the subsequent rack-up sheets, the error results in a benefit to the calculated PCT.

By letter dated February 27, 2014 (ADAMS Accession No. ML14063A043), I&M submitted a report describing the impact of an Error in Burst Strain Application on the predicted PCT for CNP Unit 1. This report was submitted pursuant to 10 CFR 50.46(a)(3). By Westinghouse letter LTR-LIS-14-44, "D. C. Cook Units 1 and 2 10 CFR 50.46 Report for the HOTSPOT Burst Strain Error Correction," dated January 29, 2014, Westinghouse Electric Company notified I&M of significant errors in the EM for the LBLOCA analysis of record for CNP Unit 1.

The following pages summarize the impact of TCD, peaking factor burndown, heat transfer multiplier distribution revisions, error in burst strain application, decay group uncertainty factors errors, changes to grid blockage ratio and porosity, and plant modification evaluations on the CNP Units 1 and 2 LBLOCA analyses of record. In addition, pages are included that summarize the small break LOCA PCT analyses of record for CNP Units 1 and 2.

**CNP UNIT 1**  
**LOCA Peak Clad Temperature Summary for ASTRUM Best Estimate Large Break**

Evaluation Model: ASTRUM (2004)			
$F_Q = 2.15$	$FdH = 1.55$	$SGTP = 10\%^{(a.)}$	Break Size: Split
Analysis Date: November 20, 2007			

**LICENSING BASIS**

Analysis-of-Record

PCT = 2128°F

**MARGIN ALLOCATIONS (Delta PCT)**

<b>A. PREVIOUS 10 CFR 50.46 ASSESSMENTS</b>		
1. Evaluation of TCD and Peaking Factor Burndown		384°F(a)
2. Revised Heat Transfer Multiplier Distributions		-55°F
<b>B. PLANNED PLANT MODIFICATION EVALUATIONS</b>		
1. Plant Evaluations associated with TCD		-381°F(a)
2. PBOT/PMID Evaluation for Cycle 25		14°F(b)
<b>C. NEW 10 CFR 50.46 ASSESSMENTS</b>		
1. Error in Burst Strain Application		85°F
2. Decay Group Uncertainty Factors Errors		-29°F
<b>D. OTHER</b>		
		0°F

**LICENSING BASIS PCT + MARGIN ALLOCATIONS**

PCT = 2146°F

**Notes:**

- a. These assessments are coupled via an evaluation of burnup effects which include thermal conductivity degradation, peaking factor burndown and design input changes (e.g., reduction in the maximum allowed steam generator tube plugging from 10% to 2.5% and maximum FdH reduced to 1.545).
- b. The 14°F penalty for a PBOT/PMID evaluation is specific to Unit 1 Cycle 25 which ended on September 24, 2014. The Unit 1 Cycle 26 Licensing basis PCT + margin allocations equals 2132°F.

## CNP UNIT 1

## LOCA Peak Clad Temperature Summary for Appendix K Small Break

Evaluation Model: NOTRUMP			
$F_Q=2.32$	$F_dH=1.55$	SGTP=10%	3.25 inch cold leg break
Analysis Date: January 6, 2012			

Notes: 3304 MWt (plus 0.34% calorimetric uncertainty)

## LICENSING BASIS

Analysis-of-Record

PCT = 1725°F

## MARGIN ALLOCATIONS (Delta PCT)

A.	PREVIOUS 10 CFR 50.46 ASSESSMENTS	
1.	None	0°F
B.	PLANNED PLANT MODIFICATION EVALUATIONS	0°F
C.	NEW 10 CFR 50.46 ASSESSMENTS	0°F
D.	OTHER	0°F

LICENSING BASIS PCT + MARGIN ALLOCATIONS

PCT = 1725°F

## CNP UNIT 2

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

Evaluation Model: ASTRUM (2004)			
$F_Q = 2.335$	$FdH = 1.644$	$SGTP = 10\%^{(a)}$	Break Size: Split
Analysis Date: February 9, 2009			

## LICENSING BASIS

Analysis-of-Record

PCT = 2107°F

## MARGIN ALLOCATIONS (Delta PCT)

A. PREVIOUS 10 CFR 50.46 ASSESSMENTS		
1. Evaluation of TCD and Peaking Factor Burndown		73°F(a)
2. Changes to Grid Blockage Ratio and Porosity		16°F
3. Revised Heat Transfer Multiplier Distributions		-3°F
B. PLANNED PLANT MODIFICATION EVALUATIONS		
1. Plant Evaluations associated with TCD		-239°F(a)
C. NEW 10 CFR 50.46 ASSESSMENTS		
1. Error in Burst Strain Application		13°F
D. OTHER		
		0°F

## LICENSING BASIS PCT + MARGIN ALLOCATIONS

PCT = 1967°F

## Notes:

- a. These assessments are coupled via an evaluation of burnup effects which include thermal conductivity degradation, peaking factor burndown and design input changes (e.g., reduction in the maximum allowed steam generator tube plugging from 10% to 1% and maximum FdH reduced to 1.61).

## CNP UNIT 2

## LOCA Peak Clad Temperature Summary for Appendix K Small Break

Evaluation Model: NOTRUMP			
$F_Q = 2.32$	$F_dH = 1.62$	SGTP = 10% 4 inch cold leg break	
Analysis Date: April 25, 2011			

Notes: 3600 MWt

## LICENSING BASIS

Analysis-of-Record

PCT = 1274°F (a)

## MARGIN ALLOCATIONS (Delta PCT)

A.	PREVIOUS 10 CFR 50.46 ASSESSMENTS	
1.	None	0°F
B.	PLANNED PLANT MODIFICATION EVALUATIONS	0°F
C.	NEW 10 CFR 50.46 ASSESSMENTS	0°F
D.	OTHER	0°F

## LICENSING BASIS PCT + MARGIN ALLOCATIONS

PCT = 1274°F

Notes:

- a. The 3600 MWt power level used in this analysis bounds the Unit 2 3468 MWt steady state power limit in the operating license.