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August 27, 2010

AEP-NRC-2010-65  
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

- References:
1. Letter from R. A. Hruby, Indiana Michigan Power Company (I&M), to U. S. Nuclear Regulatory Commission (NRC) Document Control Desk, "Donald C. Cook Nuclear Plant Units 1 and 2, Annual Report Of Loss-Of-Coolant Accident Evaluation Model Changes," AEP-NRC-2009-54, dated August 28, 2009 (ADAMS Accession No. ML092520238).
  2. Letter from R. A. Hruby, I&M, to NRC Document Control Desk, "Donald C. Cook Nuclear Plant Unit 1 and Unit 2, Docket Nos. 50-315 and 50-316, Schedule for Submittal of Revised Unit 1 and Unit 2 Small Break Loss of Coolant Accident Analyses Addressing Residual Heat Removal System Spray Issue," AEP-NRC-2010-30, dated March 29, 2010 (ADAMS Accession No. ML100960423).
  3. Letter from J. N. Jensen, I&M, to NRC Document Control Desk, "Donald C. Cook Nuclear Plant Unit 1 and Unit 2, Annual Report and Thirty-Day Report of Loss of Coolant Accident Evaluation Model Changes," AEP:NRC:6046, dated August 11, 2006 (ADAMS Accession Number ML062340193).

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) model changes affecting the peak cladding temperature (PCT) for CNP Units 1 and 2. The enclosure to this letter provides the Unit 1 and Unit 2 large break and small break LOCA analyses of record PCT values and error assessments.

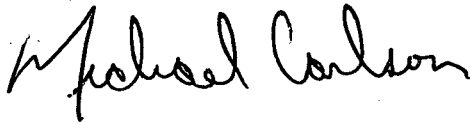
Note that the Unit 1 and Unit 2 small break LOCA analyses-of-record identified in the enclosure to this letter differ from those identified in the previous 10 CFR 50.46 annual report (Reference 1). In March 2010, I&M informed the NRC (Reference 2) that, until revised small break analyses were completed and incorporated into the Updated Final Safety Analysis Report, I&M would consider the

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Unit 1 and Unit 2 small break LOCA analyses-of-record to be those identified in Reference 3. Accordingly, the Unit 1 and Unit 2 small break LOCA analyses-of-record identified in the enclosure to this letter are those identified in Reference 3.

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,



Michael H. Carlson  
Vice President - Site Support Services

JRW/jmr

Enclosure · Donald C. Cook Nuclear Plant (CNP) Units 1 and 2 Large and Small Break Loss-of-Coolant Accident Peak Clad Temperature Summary

- c: J. T. King, MPSC  
S. M. Krawec, AEP Ft. Wayne, w/o enclosure  
MDEQ – WHMD/RPS  
NRC Resident Inspector  
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ENCLOSURE TO AEP-NRC-2010-65

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

CNP UNIT 1

LARGE BREAK LOCA

Evaluation Model: ASTRUM (2004)			
$F_Q = 2.15$	$F_{\Delta H} = 1.55$	SGTP = 10%	Break Size: Split
Operational Parameters: 3304 MWt Reactor Power			

LICENSING BASIS

Analysis-of-Record, October 2008

PCT = 2128°F

MARGIN ALLOCATIONS (Delta PCT)

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

LICENSING BASIS PCT + MARGIN ALLOCATIONS

PCT = 2128°F

## CNP UNIT 1

## SMALL BREAK LOCA

Evaluation Model: NOTRUMP	
$F_Q=2.32$	$F_{\Delta H}=1.55$ SGTP=30%      3" cold leg break
Operational Parameters: SI System Cross-Tie Valves Closed, 3250 MWt Reactor Power <sup>1</sup>	
Notes: ZIRLO clad, IFM grids	

## LICENSING BASIS

Analysis-of-Record, December 2000

PCT= 1720°F

## MARGIN ALLOCATIONS (Delta PCT)

A.	PREVIOUS 10 CFR 50.46 ASSESSMENTS	
1.	Asymmetric HHSI Delivery	+50°F
2.	Reduction in Turbine Driven Auxiliary Feedwater Flow	+109°F
3.	Burst and Blockage / Time in Life	+111°F
B.	NEW 10 CFR 50.46 ASSESSMENTS	0°F
C.	OTHER	0°F

## LICENSING BASIS PCT+ MARGIN ALLOCATIONS

PCT= 1990°F

<sup>1</sup> The 3250 MWt power level used in the reanalysis is acceptable because it bounds the Unit 1 3304 MWt steady state power limit in the operating license after adjusting for recapture of feedwater flow measurement and power calorimetric uncertainty.

CNP UNIT 2  
LARGE BREAK LOCA  
Scenario 1

Evaluation Model: BASH			
$F_Q = 2.335$	$F_{\Delta H} = 1.644$	SGTP = 15%	Break Size: $C_d = 0.6$
Operational Parameters: RHR System Cross-Tie Valves Closed, 3413 MWt Reactor Power <sup>1</sup>			

## LICENSING BASIS

Analysis-of-Record, December 1995

PCT = 2051°F

## MARGIN ALLOCATIONS (Delta PCT)

## A. PREVIOUS 10 CFR 50.46 ASSESSMENTS

- |   |       |
|---|-------|
| 1. ECCS double disk valve leakage   | +8°F  |
| 2. BASH current limiting break size reanalysis to incorporate LOCBART spacer grid single phase heat transfer and LOCBART zirc-water oxidation error | +58°F |
| 3. LOCBART Pellet Volumetric Heat Generation Rate Error <sup>2</sup>  | +25°F |

## B. PLANNED 50.59 PLANT CHANGE EVALUATIONS

- |  |       |
|--|-------|
| 1. Cycle 13 ZIRLO Fuel Evaluation        | -50°F |
| 2. Reduced Containment Spray Temperature | +47°F |

## C. NEW 10 CFR 50.46 ASSESSMENTS

0°F

## D. OTHER

0°F

## LICENSING BASIS PCT + MARGIN ALLOCATIONS

PCT = 2139°F

- 
1. Power level used as basis for PCT acceptance is 3413 MWt due to the reanalysis (see Item A.2) to provide an integrated error effect on the limiting case. This reanalysis (Item A.2) is not considered the analysis-of-record due to the spectrum of break sizes not being reanalyzed to ensure that the limiting break size at 3413 MWt with the errors incorporated would not change. Thus, the analysis-of-record remains as the 1995 analysis at a power level of 3588 MWt. The difference between the limiting case PCT (2051°F) and the PCT from the reanalysis of that limiting break size at 3413 MWt is the 58°F being reported. The 3413 MWt power level used in the reanalysis is acceptable because it bounds the Unit 2 3468 MWt steady state power limit in the operating license after adjusting for recapture of feedwater flow measurement and power calorimetric uncertainty.
  2. Includes 9°F penalty due to rebaselining of the limiting LOCBART calculation.

CNP UNIT 2  
LARGE BREAK LOCA  
Scenario 2

Evaluation Model: BASH

$F_Q = 2.335$        $F_{\Delta H} = 1.644$        $SGTP = 15\%^4$       Break Size:  $C_d = 0.6$

Operational Parameters: RHR System Cross-Tie Valves Closed, 3413 MWt Reactor Power<sup>3</sup>

LICENSING BASIS

Analysis-of-Record, December 1995

PCT = 2051°F

MARGIN ALLOCATIONS (Delta PCT)

A.	PREVIOUS 10 CFR 50.46 ASSESSMENTS	
1.	ECCS double disk valve leakage	+8°F
2.	BASH current limiting break size reanalysis to incorporate LOCBART spacer grid single phase heat transfer and LOCBART zirc-water oxidation error	+58°F
3.	LOCBART Pellet Volumetric Heat Generation Rate Error	+14°F
4.	Increased Accumulator Water Temperature Evaluation <sup>4</sup>	+27°F
B.	PLANNED 50.59 PLANT CHANGE EVALUATIONS	
1.	Cycle 13 ZIRLO Fuel Evaluation	-50°F
C.	NEW 10 CFR 50.46 ASSESSMENTS	0°F
D.	OTHER	0°F

LICENSING BASIS PCT + MARGIN ALLOCATIONS

PCT = 2108°F

- 
3. Power level used as basis for PCT acceptance is 3413 MWt due to the reanalysis (see Item A.2) to provide an integrated error effect on the limiting case. This reanalysis (Item A.2) is not considered the analysis-of-record due to the spectrum of break sizes not being reanalyzed to ensure that the limiting break size at 3413 MWt with the errors incorporated would not change. Thus, the analysis-of-record remains as the 1995 analysis at a power level of 3588 MWt. The difference between the limiting case PCT (2051°F) and the PCT from the reanalysis of that limiting break size at 3413 MWt is the 58°F being reported. The 3413 MWt power level used in the reanalysis is acceptable because it bounds the Unit 2 3468 MWt steady state power limit in the operating license after adjusting for recapture of feedwater flow measurement and power calorimetric uncertainty.
  4. Margin allocation A.4 utilized a reduced SGTP of one percent.

## CNP UNIT 2

## SMALL BREAK LOCA

Evaluation Model: NOTRUMP	
$F_Q = 2.45$	$F_{\Delta H} = 1.666$ SGTP = 15%    3" cold leg break
Operational Parameters: SI System Cross-Tie Valves Closed, 3250 MWt Reactor Power <sup>1</sup>	

## LICENSING BASIS

Analysis-of-Record, March 1992

PCT = 1956°F

## MARGIN ALLOCATIONS (DELTA PCT)

A.	PREVIOUS 10 CFR 50.46 ASSESSMENTS	
1.	Limiting NOTRUMP and Small Break LOCA analysis	-214°F
2.	Burst and blockage / time in life	+95°F
3.	Asymmetric HHSI Delivery	+50°F
4.	NOTRUMP mixture level tracking / region depletion errors	+13°F
5.	NOTRUMP Bubble Rise / Drift Flux Model Inconsistency Corrections	+35°F
B.	PLANNED 50.59 PLANT CHANGE EVALUATIONS	
1.	Artificial Leak-By	+12°F
C.	NEW 10 CFR 50.46 ASSESSMENTS	0°F
D.	OTHER	0°F

## LICENSING BASIS PCT + MARGIN ALLOCATIONS

PCT = 1947°F

- 
- Unit 2 is licensed to a 3468 MWt steady-state power level. However, 3304 MWt is assumed for the small break LOCA analysis with the safety injection (SI) system cross-tie valves closed. This is because Unit 2 Technical Specification 3.5.2 limits thermal power to 3304 MWt with a SI cross-tie valve closed. The 3250 MWt power level used in the reanalysis is acceptable because it bounds the Unit 2 3304 MWt steady state power limit in the operating license after adjusting for recapture of feedwater flow measurement and power calorimetric uncertainty.



CNP UNIT 2  
SMALL BREAK LOCA

Evaluation Model: NOTRUMP			
$F_Q = 2.32$	$F_{\Delta H} = 1.62$	SGTP = 15%	4" cold leg break
Operational Parameters: SI System Cross-Tie Valves Open, 3588 MWt Reactor Power			

## LICENSING BASIS

Analysis-of-Record, August 1992

PCT = 1531°F

## MARGIN ALLOCATIONS (DELTA PCT)

A.	PREVIOUS 10 CFR 50.46 ASSESSMENTS	
	1. Effect of SI in Broken Loop	+150°F
	2. Effect of Improved Condensation Model	-150°F
	3. Drift Flux Flow Regime Errors	-13°F
	4. LUCIFER Error Corrections	-16°F
	5. Containment Spray During Small Break LOCA	+20°F
	6. Boiling Heat Transfer Correlation Error	-6°F
	7. Steam Line Isolation Logic Error	+18°F
	8. Axial Nodalization, and Small Break LOCA correction	+3°F
	9. NOTRUMP Specific Enthalpy Error	+20°F
	10. Small Break LOCA Fuel Rod Initialization Error	+10°F
	11. Loop Seal Elevation Error	-38°F
	12. NOTRUMP Mixture Level Tracking / Region Depletion Errors	+13°F
	13. NOTRUMP Bubble Rise / Drift Flux Model Inconsistency Corrections	+35°F
B.	PLANNED 50.59 PLANT CHANGE EVALUATIONS	
	1. Artificial Leak-By	+12°F
C.	NEW 10 CFR 50.46 ASSESSMENTS	0°F
D.	OTHER	0°F

LICENSING BASIS PCT + MARGIN ALLOCATIONS

PCT = 1589°F