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AEP-NRC-2008-27
10 CFR 50.46

Docket Nos.: 50-315
50-316

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Stop O-P1-17
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 M. A. Peifer, 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, Thirty-Day Report For Loss-Of-Coolant Accident Evaluation Model Changes," AEP:NRC:7046-01, dated June 15, 2007.
 2. Letter from M. A. Peifer, I&M, to NRC Document Control Desk, "Donald C. Cook Nuclear Plant Unit 1, Small Break Loss-of-Coolant Accident Evaluation Model Reanalysis," AEP:NRC:7046, dated March 29, 2007.
 3. Letter from J. N. Jensen, I&M, to NRC Document Control Desk, "Donald C. Cook Nuclear Plant Unit 1, Completion of Commitment Regarding Small Break Loss-of-Coolant Accident Analysis 8.75-inch Case (TAC No. MD5297)," AEP-NRC-2008-11, dated July 24, 2008.
 4. Letter from J. N. Jensen, I&M, to NRC Document Control Desk, "Donald C. Cook Nuclear Plant Unit 1, License Amendment Request Regarding Large Break Loss-of-Coolant Accident Analysis Methodology," AEP:NRC:7565-01, dated December 27, 2007.
 5. Letter from M. A. Peifer, I&M, to NRC Document Control Desk, "Donald C. Cook Nuclear Plant Unit 1 and Unit 2 Thirty-Day Report for Loss-Of-Coolant Accident Evaluation Model Changes," AEP:NRC:7046-03, dated October 16, 2007.
 6. Letter from S. D. Simpson, I&M, to 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:7046-02, dated August 31, 2007.

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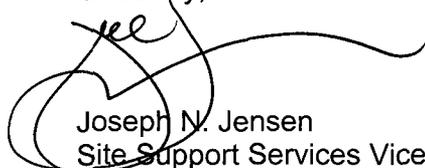
Pursuant to 10 CFR 50.46, Indiana Michigan Power Company (I&M), the licensee for Donald C. Cook Nuclear Plant (CNP), is transmitting an annual report of loss-of-coolant accident (LOCA) model changes affecting the peak cladding temperature (PCT) for CNP Units 1 and 2. The attachment to this letter provides the Unit 1 and Unit 2 large break and small break LOCA analyses of record PCT values and error assessments.

By Reference 1, I&M submitted a schedule for reanalysis of the Unit 2 small and large break LOCA analyses of record. The Unit 1 small break LOCA analysis has been submitted by Reference 2, as supplemented by Reference 3, and the Unit 1 large break LOCA analysis was submitted for Nuclear Regulatory Commission (NRC) review and approval by Reference 4. There was one 30-day report, Reference 5, submitted since the last annual report, Reference 6.

The NRC approved a revised LOCBART Transient Extension Method (TEM) in a Safety Evaluation (SE) dated September 17, 2007, ADAMS Accession Number ML072490348. Consistent with the vendor limitations and conditions described in the subject SE and Reference 10 of the subject SE, CNP Units 1 and 2 are transitioning to realistic large break LOCA analysis methods and not the revised LOCBART TEM. The Unit 1 analysis, as described above, has been submitted to the NRC for review and approval by Reference 4. The reanalysis schedule for the Unit 2 large break LOCA analyses is provided in Reference 1 and remains unchanged.

This letter contains no new or revised commitments. Should you have any questions, please contact John A. Zwolinski, Manager of Regulatory Affairs, at (269) 466-2478.

Sincerely,



Joseph N. Jensen
Site Support Services Vice President

RSP/rdw

Attachment

- c: T. A. Beltz – NRC Washington, DC
J. L. Caldwell – NRC Region III
K. D. Curry – AEP Ft. Wayne, w/o attachment
J. T. King – MPSC, w/o attachment
MDEQ – WHMD/RPS
NRC Resident Inspector

ATTACHMENT TO AEP-NRC-2008-27

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
Scenario 1

Evaluation Model: BASH

$F_Q = 2.15$ $F_{\Delta H} = 1.55$ SGTP = 15% Break Size: $C_d = 0.4$

Operational Parameters: RHR System Cross-Tie Valves Closed, 3250 MWt Reactor Power¹

LICENSING BASIS

Analysis-of-Record, December 2000

PCT = 2038°F

MARGIN ALLOCATIONS (Delta PCT)

A.	PREVIOUS 10 CFR 50.46 ASSESSMENTS	
1.	LOCBART Cladding Emissivity Errors	-11°F
2.	Rebaseline Using PAD 4.0	+57°F
3.	LOCBART Pellet Volumetric Heat Generation Rate Error	+11°F
B.	PLANNED 50.59 PLANT CHANGE EVALUATIONS	
1.	Reduced Containment Spray Temperature	+23°F
2.	15x15 Upgrade Fuel	-59°F
C.	New 10 CFR 50.46 ASSESSMENTS	0°F
D.	OTHER	<u>0°F</u>
E.	LICENSING BASIS PCT + MARGIN ALLOCATIONS	PCT = 2059°F

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1. 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 1
LARGE BREAK LOCA
Scenario 2

Evaluation Model: BASH

$F_Q = 2.15$ $F_{\Delta H} = 1.55$ $SGTP = 15\%^2$ Break Size: $C_d = 0.4$

Operational Parameters: RHR System Cross-Tie Valves Closed, 3250 MWt Reactor Power³

LICENSING BASIS

Analysis-of-Record, December 2000

PCT = 2038°F

MARGIN ALLOCATIONS (Delta PCT)

A.	PREVIOUS 10 CFR 50.46 ASSESSMENTS	
	1. LOCBART Cladding Emissivity Errors	-11°F
	2. Rebaseline Using PAD 4.0	+57°F
	3. LOCBART Pellet Volumetric Heat Generation Rate Error	+11°F
	4. Increased Accumulator Water Temperature Evaluation ²	-16°F
B.	PLANNED 50.59 PLANT CHANGE EVALUATIONS	
	1. 15x15 Upgrade Fuel	-59°F
C.	New 10 CFR 50.46 ASSESSMENTS	0°F
D.	OTHER	<u>0°F</u>
E.	LICENSING BASIS PCT + MARGIN ALLOCATIONS	PCT = 2020°F

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2. Margin allocation A.4 utilized a reduced SGTP of one percent.
 3. 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 1
SMALL BREAK LOCA

Evaluation Model: NOTRUMP			
$F_Q = 2.32$	$F_{\Delta H} = 1.55$	SGTP = 10%	3.25" cold leg break
Operational Parameters: SI System Cross-Tie Valves Closed, 3304 MWt Reactor Power			

LICENSING BASIS

Analysis-of-Record, March 2007

PCT = 1725°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		
	1. None		0°F
D.	OTHER		
	1. None		0°F
			0°F
E.	LICENSING BASIS PCT + MARGIN ALLOCATIONS		PCT = 1725°F

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 Power⁴

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 ⁵	+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
E.	LICENSING BASIS PCT + MARGIN ALLOCATIONS	PCT = 2139°F

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4. 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.
 5. Includes 9°F penalty due to rebaselining of the limiting LOCBART calculation.

CNP UNIT 2
LARGE BREAK LOCA
Scenario 2

Evaluation Model: BASH			
$F_Q = 2.335$	$F_{\Delta H} = 1.644$	$SGTP = 15\%^6$	Break Size: $C_d = 0.6$
Operational Parameters: RHR System Cross-Tie Valves Closed, 3413 MWt Reactor Power ⁷			

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 ⁶ | +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

E. LICENSING BASIS PCT + MARGIN ALLOCATIONS

PCT = 2108°F

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6. Margin allocation A.4 utilized a reduced SGTP of one percent.
7. 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.

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 ⁸			

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	
	1. None	0°F
D.	OTHER	
	1. None	0°F
E.	LICENSING BASIS PCT + MARGIN ALLOCATIONS	PCT = 1947°F

8. 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 an 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	
	1. None	0°F
D.	OTHER	
	1. None	0°F
E.	LICENSING BASIS PCT + MARGIN ALLOCATIONS	PCT = 1589°F