

May 20, 2016

AEP-NRC-2016-46  
10 CFR 50.46

Docket Nos. 50-315

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

Donald C. Cook Nuclear Plant Unit 1  
30-Day Report of Changes To or Errors In An Evaluation Model

References:

1. Letter from J. P. Gebbie, Indiana Michigan Power Company (I&M), to U. S. Nuclear Regulatory Commission (NRC), "License Amendment Request Regarding Restoration of Normal Reactor Coolant System Operating Pressure and Temperature Consistent with Previously Licensed Conditions," dated October 8, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13283A121).
2. Letter from A. W. Dietrich, NRC, to L. J. Weber, I&M, "Donald C. Cook Nuclear Plant, Unit 1 – Issuance of Amendment Regarding Restoration of Normal Reactor Coolant System Pressure and Temperature Consistent With Previously Licensed Conditions (CAC No. MF2916)," dated November 30, 2015 (ADAMS Accession No. ML14197A097).
3. Letter from J. P. Gebbie, I&M, to NRC, "Donald C. Cook Nuclear Plant Units 1 and 2, Response to Information Request Pursuant to 10 CFR 50.54(f) Related to the Estimated Effect on Peak Cladding Temperature Resulting from Thermal Conductivity Degradation in the Westinghouse-Furnished Realistic Emergency Core Cooling System Evaluation (TAC No. M99899)," dated March 19, 2012 (ADAMS Accession No. ML12088A104).
4. Letter from J. P. Gebbie, I&M, to NRC, "Donald C. Cook Nuclear Plant Units 1 and 2, U. S. Nuclear Regulatory Commission Commitment Change Related to Estimated Effect on Peak Cladding Temperature Resulting from Thermal Conductivity Degradation," dated June 9, 2015 (ADAMS Accession No. ML15162A095).

Pursuant to 10 CFR 50.46, Indiana Michigan Power Company (I&M), the licensee for Donald C. Cook Nuclear Plant (CNP) Unit 1, is reporting significant changes to emergency core cooling system evaluation model (EM), or in the application of such a model that affects the calculated peak fuel cladding temperature (PCT). By Reference 1, I&M submitted a license amendment request to return CNP Unit 1 to normal operating pressure and normal operating temperature (NOP/NOT). By Reference 2, the U. S. Nuclear Regulatory Commission issued a license amendment that approved the request in Reference 1.

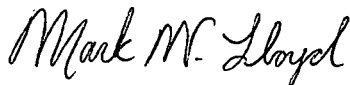
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Implementation of the modification to restore NOP/NOT in CNP Unit 1 was completed on April 23, 2016. The modification resulted in a significant change to the best-estimate large-break loss-of-coolant accident (LB LOCA) PCT for CNP Unit 1. The CNP Unit 1 small-break LOCA analysis is not affected by this modification.

The enclosure to this letter provides a description of each LB LOCA EM change and the associated impact to the CNP Unit 1 LB LOCA analysis of record and the analysis performed for the CNP Unit 1 NOP/NOT project. By Reference 3, I&M previously provided a schedule for a reanalysis of LB LOCA to address an unrelated error associated with thermal conductivity degradation. The schedule description for the existing reanalysis commitment was subsequently revised by Reference 4. Since the changes from these errors did not lead to PCT temperatures in excess of the limit, there are no additional or altered plans for a reanalysis as a result of these errors and the Reference 4 commitment remains the same. This condition has been entered into CNP's corrective action program.

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

Sincerely,



Mark W. Lloyd  
Engineering Vice President

TLC/ml

Enclosure: Donald C. Cook Nuclear Plant Unit 1 Report of Significant Changes Related to Westinghouse Large-Break Loss-of-Coolant Analysis Emergency Core Cooling System Evaluation Model

c: R. J. Ancona, MPSC  
A. W. Dietrich, NRC, Washington, D.C.  
MDEQ – RMD/RPS  
NRC Resident Inspector  
C. D. Pederson, NRC, Region III  
A. J. Williamson, AEP Ft. Wayne, w/o enclosures

## **Enclosure to AEP-NRC-2016-46**

### **Donald C. Cook Nuclear Plant Unit 1 Report of Significant Changes Related to Westinghouse Large-Break Loss-of-Coolant Analysis Emergency Core Cooling System Evaluation Model**

#### **Abbreviations:**

BELOCA	best-estimate loss of coolant accident
CNP	Donald C. Cook Nuclear Plant
°F	degrees Fahrenheit
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
NRC	Nuclear Regulatory Commission
NOP/NOT	normal operating pressure/ normal operating temperature
PCT	peak cladding temperature
RCS	reactor coolant system
SGTP	steam generator tube plugging
TCD	thermal conductivity degradation
WEC	Westinghouse Electric Company

#### **Summary**

Pursuant to 10 CFR 50.46, I&M, the licensee for CNP, is submitting a 30-day report of LOCA model changes resulting in a significant change in calculated PCT for the CNP Unit 1 LBLOCA analysis. A significant change is defined as a change or error identified in the model which results in a calculated PCT greater than 50°F or cumulative changes and errors such that the sum of the absolute magnitudes of the respective temperature changes is greater than 50°F.

By Reference 1, I&M requested an amendment to Renewed Facility Operating License No. DPR-58 for the CNP Unit 1. The amendment requested approval to restore the RCS to NOP/NOT consistent with previously licensed conditions for CNP Unit 1. By Reference 2, the NRC approved the amendment request submitted by Reference 1. The amendment was implemented by an engineering change that was completed on April 23, 2016. As a result of implementing NOP/NOT, there was a significant change in the calculated PCT for the CNP Unit 1 LBLOCA analysis.

By WEC report WCAP-17762-NP, "D. C. Cook Unit 1 Return to Reactor Coolant System Normal Operating Pressure/Normal Operating Temperature Program – Licensing Report," dated September 2013 (Enclosure 6 of Reference 1), WEC provided I&M with the analyses and evaluations to demonstrate that the CNP Unit 1 will continue to comply with its design and licensing basis with a return to RCS NOP/NOT. Enclosure 6 of Reference 1 discusses the design parameters that serve as the basis for the nuclear steam supply system analyses and evaluations, along with their estimated effect on the calculated PCT of CNP Unit 1 LBLOCA analysis of record associated with the NOP/NOT implementation.

**Nature of the Change or Error:**

Specific changes to the CNP Unit 1 technical specifications associated with NOP/NOT implementation include a revised start time for the containment air recirculation/hydrogen skimmer system to support BELOCA PCT analysis; adoption of a modified set of accident analysis inputs for BELOCA PCT TCD evaluation; and a revision to the CNP Unit 1 Updated Final Safety Analysis Report to describe the containment spray system actuation delay time as an input to BELOCA PCT. The cumulative impact of these changes results in a LBLOCA PCT of 2008°F applicable to CNP Unit 1 at NOP/NOT conditions. The CNP Unit 1 small break LOCA PCT remains unchanged.

**RCS NOP/NOT Changes Affecting the Calculated PCT**Design Input Changes with Respect to Plant Operation for Return to NOP/NOT Evaluation

The value identified for this change to PCT was previously described in Reference 1.

Return to NOP/NOT Including Pellet TCD and Peaking Factor Burndown

The value identified for this change to PCT was previously described in Reference 1.

Revised Heat Transfer Multiplier Distributions for NOP/NOT conditions

The value identified for this change to PCT was previously described in Reference 1.

**Estimated Effect**

The attached PCT rack-up table summarizes the impact of TCD, peaking factor burndown, heat transfer multiplier distribution revisions, error in burst strain application, decay group uncertainty factors errors, and plant modification evaluations on the CNP Unit 1 LBLOCA analyses of record at NOP/NOT conditions.

As shown in the PCT rack-up table, the calculated LBLOCA PCT, with assessments, becomes 2008°F for Unit 1 with NOP/NOT implementation. Thus, it is seen that the 10 CFR 50.46 acceptance criterion of not exceeding 2200°F continues to be satisfied for CNP Unit 1.

**References:**

1. Letter from J. P. Gebbie, Indiana Michigan Power Company (I&M), to U. S. Nuclear Regulatory Commission (NRC), "License Amendment Request Regarding Restoration of Normal Reactor Coolant System Operating Pressure and Temperature Consistent with Previously Licensed Conditions," dated October 8, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML 13283A121).
2. Letter from A. W. Dietrich, NRC, to L. J. Weber, I&M, "Donald C. Cook Nuclear Plant, Unit 1 – Issuance of Amendment Regarding Restoration of Normal Reactor Coolant System Pressure and Temperature Consistent With Previously Licensed Conditions (CAC No. MF2916)," dated November 30, 2015 (ADAMS Accession No. ML14197A097).

Estimated Effect On The Calculated PCT For CNP Unit 1 LBLOCA at NOP/NOT Conditions:

Evaluation Model: ASTRUM (2004)			
$F_Q = 2.15$	$F_{dH} = 1.55$	SGTP = 10%	Break Size: Split
Analysis Date: November 20, 2007			

## LICENSING BASIS

Analysis-of-Record

PCT = 2128°F

## MARGIN ALLOCATIONS (Delta PCT)

A. PREVIOUS 10 CFR 50.46 ASSESSMENTS		
1. Error in Burst Strain Application		85°F
2. Decay Group Uncertainty Factors Errors		-29°F
B. PLANNED PLANT MODIFICATION EVALUATIONS		
1. Design Input Changes with Respect to Plant Operation for Return to NOP/NOT Evaluation		-489°F <sup>(a)</sup>
C. NEW 10 CFR 50.46 ASSESSMENTS		
1. Return to NOP/NOT Including Pellet Thermal Conductivity Degradation and Peaking Factor Burndown		404°F <sup>(a)</sup>
2. Revised Heat Transfer Multiplier Distributions for NOP/NOT conditions		-91°F <sup>(b)</sup>
D. OTHER		0°F

## LICENSING BASIS PCT + MARGIN ALLOCATIONS

PCT = 2008°F

## Notes:

- These assessments are coupled via an evaluation of burnup effects which include thermal conductivity degradation, peaking factor burndown and design input changes.
- The return to NOP/NOT evaluation in AEP-NRC-2013-79, dated October 8, 2013, contains revised heat transfer multiplier distributions.