

Indiana Michigan  
Power Company  
500 Circle Drive  
Buchanan, MI 49107 1395



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Docket No: 50-315

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Mail Stop O-P1-17  
Washington, DC 20555-0001

Donald C. Cook Nuclear Plant Unit 1  
STARTUP REPORT FOR MID-CYCLE 18 MEASUREMENT UNCERTAINTY  
RECAPTURE POWER UPRATE (TAC No. MB5498)

Reference: Letter from J. F. Stang, NRC, to A. C. Bakken III, I&M, "Donald C. Cook Nuclear Plant, Unit 1 – Issuance of Amendment 273 Regarding Measurement Uncertainty Recapture Power Uprate," dated December 20, 2002

Indiana Michigan Power Company, the licensee for Donald C. Cook Nuclear Plant (CNP) Unit 1, has implemented a power uprate of 1.66 percent from 3250 megawatts thermal (MWt) to 3304 MWt. This Measurement Uncertainty Recapture power uprate was implemented during Cycle 18, following the issuance of the referenced amendment, Unit 1 Operating License DPR-58 Amendment 273. This letter submits a summary report of the test results taken during the power escalation, in accordance with CNP Technical Specifications 6.9.1.1 through 6.9.1.3

This letter contains no new commitments. Should you have any questions, please contact Mr. Brian A. McIntyre, Manager of Regulatory Affairs, at (269) 697-5806.

Sincerely,

A handwritten signature in black ink that reads 'J. E. Pollock'.

J. E. Pollock  
Site Vice President

Attachment

GJH/rdw

IE26

- c: H. K. Chernoff, NRC Washington, DC
- K. D. Curry, Ft. Wayne AEP, w/o attachment
- J. E. Dyer, NRC Region III
- J. T. King, MOSC, w/o attachment
- MDEQ - DW & RPD, w/o attachment
- NRC Resident Inspector
- J. F. Stang, Jr., NRC Washington, DC

bc: A. C. Bakken, w/o attachment  
P. B. Cowan, w/o attachment  
M. J. Finissi, w/o attachment  
J. P. Gebbie, w/o attachment  
J. B. Giessner, w/o attachment  
D. D. Goff  
D. R. Hafer, w/o attachment  
N. Haggerty, w/o attachment  
G. J. Hill  
D. W. Jenkins, w/o attachment  
J. A. Kobyra, w/o attachment  
J. G. Kovarik  
B. A. McIntyre, w/o attachment  
D. H. Malin, w/o attachment  
J. E. Newmiller  
R. C. Paulson  
J. E. Pollock  
D. J. Poupard  
K. W. Riches  
M. K. Scarpello  
P. G. Schoepf, w/o attachment  
A. Verteramo  
M. G. Williams  
G. C. Wilson  
T. K. Woods

## ATTACHMENT TO AEP:NRC:3900

### Donald C. Cook Nuclear Plant Unit 1 Startup Report for Mid-Cycle 18 Measurement Uncertainty Recapture Power Uprate

#### Introduction

Indiana Michigan Power Company (I&M) implemented Amendment 273 to the Donald C. Cook Nuclear Plant (CNP) Unit 1 Operating License (Reference 1) on January 3, 2003. The amendment increases the licensed reactor core power level by 1.66 percent from 3250 megawatts thermal (MWt) to 3304 MWt. Reactor power was raised to the new power level of 3304 MWt on January 9, 2003.

A summary report of appropriate plant power escalation testing results is required to be submitted in accordance with CNP Technical Specification (TS) 6.9.1.1(2). The summary report is required following an amendment to the license involving a planned increase in power level. Furthermore, TS 6.9.1.2 requires that the startup report address each of the tests identified in the Final Safety Analysis Report (FSAR). The tests identified in the CNP Unit 1 FSAR are those that were performed at the beginning of Cycle 1. Only certain portions of the tests identified in the FSAR are applicable to the power uprate. The applicable tests performed are as follows:

- Nuclear Instrumentation Calibration Tests
- Reactor Coolant System (RCS) Loop Delta-Temperature Calibration Tests
- Core Performance Tests

These tests are discussed further below.

This startup report is being submitted, as specified in TS 6.9.1.3, within 90 days following the completion of the startup test program. This startup report is complete for the power escalation testing associated with the Unit 1 Measurement Uncertainty Recapture (MUR) power uprate; thus, no supplementary reports are necessary.

TS 6.9.1.2 also states that any additional specific details required in license conditions based on other commitments be included in the startup report. Amendment 273 to the CNP Unit 1 Operating License required four items to be complete prior to the implementation of the amendment. Three of the four items correspond to commitments made by I&M for the CNP Unit 1 MUR power uprate (References 2 and 3). These items were completed prior to implementing Amendment 273 to the CNP Unit 1 Operating License. A summary of these four items is as follows:

The first item was to complete a formal engineering/reload safety evaluation of the effects of the power uprate on the Updated Final Safety Analysis Report (UFSAR) Sections 14.1.2, 14.1.8, and 14.1.10. The evaluation shall be reflected in the next update

of the UFSAR submitted to the Nuclear Regulatory Commission (NRC) pursuant to 10 CFR 50.71(e). The reload safety evaluation and UFSAR update were completed as part of the design change documentation for the CNP Unit 1 MUR power uprate.

The second item was to complete an analysis of the steam dump valves flow capacity at the uprated power level. An analysis demonstrated that sufficient margin to trip exists with the installed steam dump valve flow capacity, therefore, changes/adjustments are not required. An update to the UFSAR regarding the steam dump valve flow capacity was completed as part of the design change documentation for the CNP Unit 1 MUR power uprate.

The third item was to incorporate the secondary side pressure limitation of 679 pounds per square inch - absolute into the UFSAR. This limitation was described in the CNP Unit 1 MUR power uprate license amendment request (Reference 2), but was not identified as a commitment. An update to incorporate this limitation into the CNP UFSAR was completed prior to implementing Amendment 273 to the CNP Unit 1 Operating License.

The fourth, and last, item was to submit a license amendment application to the NRC proposing new Unit 1 reactor coolant system pressure-temperature (P-T) curves that reflect the limiting reactor vessel beltline material in accordance with 10 CFR Part 50, Appendix G. New P-T curves for CNP Unit 1 were submitted by I&M for NRC review and approval by Reference 4.

#### Nuclear Instrumentation (NI) Calibration Tests

The objective of these tests is to determine the difference between operable power range nuclear instrumentation channels and thermal power as determined using the Leading Edge Flow Meter (LEFM). Prior to raising power to 3304 MWt, software changes were made to the computer program that calculates reactor power. These software changes reflected the changes in the power calorimetric calculation that were necessary to implement the use of the LEFM instrumentation as an input to the calorimetric calculation. Power range NI channels were calibrated to reflect actual power levels prior to raising power to 3304 MWt. This calibration was performed using the procedures that implement the TS-required quarterly and daily calibrations of the power range NI channels. The power range NI channel calibration as well as intermediate range NI output currents and setpoints, were evaluated after raising power to 3304 MWt, and no further adjustments were required to these parameters.

#### RCS Loop Delta-Temperature Calibration Tests

The objective of these tests is to evaluate the need to recalibrate the overtemperature delta-temperature (delta-T) and overpower delta-T channels and/or the need to normalize delta-T power indication. Prior to raising power to 3304 MWt, adjustments were made to the delta-T

amplifier gains to reflect the change in rated thermal power. These adjustments of the delta-T amplifier gains were evaluated after raising power to 3304 MWt. The delta-T gain adjustments met the test acceptance criteria and no immediate adjustments were required. New delta-T scaling data was calculated for each RCS loop based upon data recorded with the plant actually operating at 3304 MWt. This new scaling data was subsequently used to normalize the delta-T channels consistent with actual reactor operation at 3304 MWt.

### Core Performance Tests

The objective of these tests is to verify that core performance margins are within design predictions for expected normal and abnormal rod configurations. To verify acceptable differences between measured and predicted peaking factors and RCS boron concentrations, the flux map surveillance and reactivity anomaly surveillance were performed prior to, and following, raising power to 3304 MWt. The results of these flux map and boron concentration measurements are presented in Tables 1 and 2.

### References

1. Letter from J. F. Stang, NRC, to A. C. Bakken III, I&M, "Donald C. Cook Nuclear Plant, Unit 1 – Issuance of Amendment 273 Regarding Measurement Uncertainty Recapture Power Uprate," dated December 20, 2002
2. Letter from J. E. Pollock, I&M, to NRC Document Control Desk, "Donald C. Cook Nuclear Plant Unit 1 License Amendment Request for Appendix K Measurement Uncertainty Recapture – Power Uprate Request," AEP:NRC:2900, dated June 28, 2002
3. Letter from J. E. Pollock, I&M, to NRC Document Control Desk, "Donald C. Cook Nuclear Plant Unit 1 Supplement to License Amendment Request for Appendix K Measurement Uncertainty Recapture – Power Uprate Request (TAC No. MB5498)," AEP:NRC:2900-02, dated October 15, 2002
4. Letter from J. E. Pollock, I&M, to NRC Document Control Desk, "Donald C. Cook Nuclear Plant Unit 1 License Amendment Request for Unit 1 Reactor Coolant System Pressure-Temperature Curves, and Request for Exemption from Requirements in 10 CFR 50.60(a) and 10 CFR 50, Appendix G," AEP:NRC:2349-03, dated December 10, 2002

**Table 1 - Power Distribution Measurements**Review Criterion: Incore Quadrant Power Tilt  $\leq 1.02$ Acceptance Criteria: Nuclear Enthalpy Rise Hot Channel Factor ( $F_{\Delta H}^N$ )  $\leq$  TS 3.2.3 Limit  
Heat Flux Hot Channel Factor ( $F_Q(Z)$ )  $\leq$  TS 3.2.2 Limit

	Incore Quadrant Power Tilts		Most Limiting $F_{\Delta H}^N$	$F_{\Delta H}^N$ Limit	$F_{\Delta H}^N$ Margin	Most Limiting $F_Q(Z)$	$F_Q(Z)$ Limit	$F_Q(Z)$ Margin
Before Uprate (Flux Map # 118-14 performed 12/31/02)	1.00007	0.99965	1.3724	1.4974	9.11%	1.7936	2.1864	21.90%
	1.00083	0.99946						
After Uprate (Flux Map # 118-15 performed 01/10/03)	0.99929	0.99991	1.3742	1.4903	8.45%	1.7793	2.1514	20.92%
	1.00092	0.99988						

**Table 2 - Full Power Critical Boron (PPM)**Acceptance Criterion:  $\pm 1\%$  Delta k/k ( $\pm 1000$  pcm) per TS Surveillance 4.1.1.1.2

Burnup (EFPD)	Predicted Boron (ppm)	Corrected Measured Boron (ppm)	Predicted Boron and Corrected Measured Boron Difference (ppm)	$\Delta$ Core Reactivity (pcm)
Before Uprate (Burnup 194.0 EFPD performed 12/29/02)	889.0	945.2	-56.2	494.2
After Uprate (Burnup. 209.9 EFPD performed 01/14/03)	839.0	893.6	-54.6	483.0

**Legend of Terms**

EFPD- Effective Full Power Days

ppm - parts per million

pcm - percent millirho