

Indiana Michigan  
Power Company  
500 Circle Drive  
Buchanan, MI 49107 1373



December 9, 1999

C1299-04  
10 CFR 50.46

Docket No: 50-315  
50-316

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

Donald C. Cook Nuclear Plant Units 1 and 2  
ERRORS IN LOSS-OF-COOLANT-ACCIDENT  
EVALUATION MODELS

Pursuant to 10 CFR 50.46, Indiana Michigan Power Company, the Licensee for Donald C. Cook Nuclear Plant Units 1 and 2 is reporting errors in loss-of-coolant-accident (LOCA) models that have been used for those units. These errors affect the small break LOCA and large break LOCA analysis results for both Units 1 and 2, and are classified as significant in accordance with 10 CFR 50.46(a)(3)(i).

Attachment 1 provides descriptions of the errors, their effect on the limiting ECCS analysis, and proposed schedules for providing reanalysis or taking other actions to show compliance with 10 CFR 50.46 requirements. Attachment 2 contains a summary of new commitments made in this submittal.

Should you have any questions, please contact Mr. Robert C. Godley, Director of Regulatory Affairs, at (616) 466-2698.

Sincerely,

A handwritten signature in black ink that reads 'M. W. Rencheck'.

M. W. Rencheck  
Vice President Nuclear Engineering

Attachments

/jen

ADD1

PDR ADDCK 05000315

c: J. E. Dyer  
MDEQ – DW & RPD, w/o attachment  
NRC Resident Inspector  
R. Whale, w/o attachment

Attachment 1 to C1299-04  
Description of Loss-of-Coolant Accident Model Changes

Errors have been identified in small break loss-of-coolant-accident (SBLOCA) and large break loss-of-coolant-accident (LBLOCA) models used at Donald C. Cook Nuclear Plant (CNP). These errors are described below. The errors are classified as significant in accordance with 10 CFR 50.46(a)(3)(i) since the SBLOCA model error results in a change to the calculated peak cladding temperature (PCT) of more than 50°F, and the sum of the absolute values of the individual PCT changes resulting from the LBLOCA model errors is greater than 50°F.

ERROR IN SBLOCA MODEL

Indiana Michigan Power Company (I&M) was notified in a July 12, 1999, letter from Westinghouse Electric Company (WEC) that an error in the application of a SBLOCA model had been identified. The error involved the emergency core cooling system (ECCS) model used to evaluate asymmetric safety injection (SI) system delivery.

Nature of the Error

The discharge of each SI pump is piped to two reactor coolant loops. Since the SI pump discharge lines are normally cross-tied, flow would be delivered to all four reactor coolant loops during ECCS operation, even if one of the pumps is assumed to fail. Although Units 1 and 2 operate the majority of the time with the SI pump discharges cross-tied, the cross-tie valves must be closed during operation at least quarterly to accomplish Technical Specification required surveillance testing. With the SI pump discharges not cross-tied, asymmetric SI delivery could occur since flow would only reach two of the reactor coolant loops if a pump were to fail. This was previously recognized and SBLOCA analyses with the SI system not cross-tied have been included in past reports submitted pursuant to 10 CFR 50.46.

However, WEC determined that an asymmetric SI delivery is beyond the capability of the version of the NOTRUMP evaluation model used to analyze the CNP SBLOCAs with the SI system not cross-tied. This version of the NOTRUMP model employs a lumped, intact loop noding scheme (for a four-loop plant, the three intact loops are modeled as one large loop for computing the thermal/hydraulic transient due to a SBLOCA).

Effect on Limiting ECCS Analysis

An evaluation has been performed for CNP Unit 2 using a different, CNP specific, four-loop version of the NOTRUMP model which provides an estimate of the effect on PCT that would result from asymmetric SI delivery during a SBLOCA. This Unit 2 evaluation was considered bounding for Unit 1 since the effects are expected to be similar for both units and the Unit 1 PCT is significantly lower than that of Unit 2.

The evaluation resulted in an estimated PCT penalty of 50°F. Additionally, the SBLOCA burst and blockage/time-in-life PCT penalty that has been previously assessed for Unit 2 will change since the magnitude of the penalty depends on the net PCT resulting from other assessments such as the asymmetric SI delivery assessment, for a given case. Actions have been taken to quantify burst and blockage/time-in-life penalty and demonstrate compliance with 10 CFR 50.46. Margin utilization tables showing how compliance with the 10 CFR 50.46 PCT limit is maintained will be submitted as described below.

#### Commitment to Provide Reanalysis/Take Other Actions to Show Compliance with 10 CFR 50.46

Margin utilization tables for Units 1 and 2 addressing the SBLOCA model error identified in this submittal, including a quantified estimate of the Unit 2 burst and blockage/time-in-life penalty, will be included in the next annual reports submitted pursuant to 10 CFR 50.46 for the respective units. The margin utilization tables will show how compliance with the 10 CFR 50.46 PCT limit is maintained. The next annual reports submitted pursuant to 10 CFR 50.46 will be submitted no later than March 31, 2000, for Unit 1, and no later than January 31, 2000, for Unit 2. These dates are prior to restart of the respective units.

A reanalysis of the Unit 1 SBLOCA with the SI system cross-tie closed using the four-loop version of NOTRUMP will be submitted for NRC review within 120 days of the start of Unit 1 Cycle 18.

A reanalysis of the Unit 2 SBLOCA with the SI system cross-tie closed using the four-loop version of NOTRUMP will be submitted for NRC review within 120 days of the start of Unit 2 Cycle 13.

#### ERRORS IN LBLOCA MODEL

I&M was notified in a November 8, 1999, letter from WEC that it has identified two errors in the LBLOCA model involving the LOCBART computer code that is used to calculate PCTs.

#### Nature of the Errors

**Spacer Grid Heat Transfer Error:** In the portion of the LOCBART code used for computing the single phase heat transfer enhancement at axial locations downstream of spacer grids, the length-averaged value of the heat transfer coefficient at a given node was incorrectly (non-conservatively) calculated in some cases.

**Metal-Water Oxidation Error:** A logic error in the LOCBART code caused the metal-water reaction calculations to be performed three times per timestep rather than once. Correcting the error reduced the total cladding oxidation while increasing the heat disposition in the cladding as determined by the code.

Effect on Limiting ECCS Analysis

Spacer Grid Heat Transfer Error: A plant specific reanalysis correcting the spacer grid heat transfer error was performed for Unit 1, resulting in a PCT benefit of 13°F. For Unit 2, a plant specific reanalysis was performed that included corrections for both the Spacer Grid Heat Transfer Error and the Metal-Water Oxidation Error. The effect on PCT as determined by that reanalysis is addressed in the following paragraph.

Metal-Water Oxidation Error: A plant specific reanalysis correcting the metal-water oxidation error was performed for Unit 1 resulting in a PCT penalty of 39°F. A plant specific reanalysis was performed for Unit 2, including corrections for both the Metal-Water Oxidation and the Spacer Grid Heat Transfer Errors. The Unit 2 reanalysis resulted in a PCT penalty of 58°F.

Commitment to Provide Reanalysis/Take Other Actions to Show Compliance with 10 CFR 50.46

As described above, plant specific reanalyses for the identified LBLOCA model errors have been performed, demonstrating that compliance with the 10 CFR 50.46 PCT limit is maintained. PCT margin utilization tables addressing these errors will be provided in the next annual reports submitted pursuant to 10 CFR 50.46 for Unit 1 and Unit 2. The margin utilization tables will show how compliance with the 10 CFR 50.46 PCT limit is maintained. The next annual reports submitted pursuant to 10 CFR 50.46 will be submitted no later than March 31, 2000, for Unit 1 and no later than January 31, 2000, for Unit 2. These dates are prior to restart of the respective units.

Conclusion

CNP Units 1 and 2 were already in their current shutdown at the time I&M received notification of these errors. Submittal of the annual reports as described above will satisfy the provisions of 10 CFR 50.46(a)(3)(ii), with the exception of the 30-day reporting time limit that was not met for one of the errors. The failure to comply with the 30-day reporting requirement is being addressed by the CNP corrective action program.

Attachment 2 to C1299-04  
New Commitments Made in this Submittal

The following table identifies those actions committed to by Indiana Michigan Power Company (I&M) in this submittal. Other actions discussed in the submittal represent intended or planned actions by I&M. They are described to the Nuclear Regulatory Commission (NRC) for the NRC's information and are not regulatory commitments.

COMMITMENT	DATE
Margin utilization tables for Units 1 and 2 addressing the SBLOCA model error identified in this submittal, including a quantified estimate of the Unit 2 burst and blockage/time-in-life penalty, will be included in the next annual reports submitted pursuant to 10 CFR 50.46 for the respective units. The margin utilization tables will show how compliance with the 10 CFR 50.46 PCT limit is maintained.	For Unit 1: March 31, 2000 For Unit 2: January 31, 2000
A new Unit 1 SBLOCA analysis of the high head safety injection cross-tie valve closed case will be submitted.	Within 120 days after the start of Unit 1, Cycle 18
A new Unit 2 SBLOCA analysis of the high head safety injection cross-tie valve closed case will be submitted.	Within 120 days after the start of Unit 2, Cycle 13
PCT margin utilization tables addressing the LBLOCA model errors identified in this submittal will be provided in the next annual reports submitted pursuant to 10 CFR 50.46 for Unit 1 and Unit 2. The margin utilization tables will show how compliance with 10 CFR 50.46 PCT limits is maintained.	For Unit 1: March 31, 2000 For Unit 2: January 31, 2000