

April 2, 2001

Mr. Robert P. Powers, Senior Vice President  
Indiana Michigan Power Company  
Nuclear Generation Group  
500 Circle Drive  
Buchanan, MI 49107

SUBJECT: DONALD C. COOK (D. C. Cook) UNIT 1 - LOSS-OF-COOLANT ACCIDENT  
(LOCA) ANALYSES OF RECORD (TAC NOS. MA7777, MA8958, AND MA9409)

Dear Mr. Powers:

By letters dated December 9, 1999, March 31, 2000, and December 20, 2000, the Indiana Michigan Power Company (I&M) submitted reports of changes to the large break and small break LOCA analyses-of-record for D. C. Cook Unit 1, as required by 10 CFR 50.46. The December 20, 2000, letter, reported that new analyses-of-record for D. C. Cook Unit 1, had been performed to correct previously identified analysis errors and changes; to account for use of Westinghouse (W) Vantage+ (ZIRLO) fuel; and, to account for replacement steam generators at D. C. Cook, Unit 1. The reanalyses demonstrate conformance with the requirements of 10 CFR 50.46(b).

The Nuclear Regulatory Commission (NRC) has reviewed the submittals as documented in the enclosed safety evaluation. The NRC finds that the submittals satisfy the requirements of 10 CFR 50.46(a)(3)(ii), and, therefore, are acceptable.

Sincerely,

**/RA/**

John F. Stang, Sr. Project Manager, Section 1  
Project Directorate III  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-315

Enclosure: As stated

cc w/encls: See next page

Donald C. Cook Nuclear Plant, Units 1 and 2

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The Nuclear Regulatory Commission (NRC) has reviewed the submittals as documented in the enclosed safety evaluation. The NRC finds that the submittals satisfy the requirements of 10 CFR 50.46(a)(3)(ii), and, therefore, are acceptable.

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO LOSS-OF-COOLANT ACCIDENT (LOCA) ANALYSES OF RECORD

INDIANA MICHIGAN POWER COMPANY

DONALD C. COOK NUCLEAR PLANT, UNIT 1

DOCKET NO. 50-315

1.0 INTRODUCTION

In letters dated December 9, 1999, March 31, 2000, and December 20, 2000, the Indiana Michigan Power Company (I&M) submitted reports of changes to the large break (LB) and small break (SB) LOCA analyses-of-record for its D. C. Cook, Unit 1 plant. The reports were submitted in accordance with the requirements of 10 CFR 50.46. The results of the re-analyses demonstrate conformance with the requirements of 10 CFR 50.46(b). The licensee also identified that it would clarify any ambiguities with regard to the assessments of effects on peak cladding temperature in its annual 10 CFR 50.46 report to be submitted this upcoming summer.

2.0 EVALUATION

The Nuclear Regulatory Commission (NRC) staff reviewed both Unit 1 LBLOCA and SBLOCA evaluation models, and the results of previously existing LOCA analyses-of-record, re-analyses, and LOCA analysis assessments made by the licensee. The staff reviewed the information provided by the licensee against the requirements of 10 CFR 50.46, 10 CFR Part 50, Appendix A, GDC 35, and 10 CFR Part 50, Appendix K. The staff review included the licensee's December 9, 1999, March 31, 2000, and December 20, 2000, letters.

2.1 December 9, 1999, Letter

The licensee's December 9, 1999, letter, reported the status of the D. C. Cook Unit 1, LBLOCA and SBLOCA licensing basis analysis methodologies and analyses-of-record. The letter identified errors in the LBLOCA and SBLOCA methodologies. The letter also provided schedules for assessments of analysis-of-record changes for both LBLOCA and SBLOCA analyses, and a re-analysis schedule for SBLOCA analyses-of-record. This letter, with the subsequent implementation of its assessments and with the incorporation of a SBLOCA re-analysis schedule for D C Cook, Unit 1, satisfies the reporting requirement of 10 CFR 50.46(a)(3)(ii), and is acceptable.

ENCLOSURE

## 2.2 March 31, 2000, Letter

The licensee's March 31, 2000, letter, provided a new analysis of record for D. C. Cook, Unit 1 to accommodate the use of Westinghouse Vantage+ fuel (ZIRLO), with the Westinghouse Integral Fuel Burnable Absorber (IFBA) feature. The NRC license amendment approving the use of ZIRLO fuel with IFBA in Unit 1, was transmitted to I&M by letter dated January 6, 2000. The licensee performed the LBLOCA analyses using the ESHAPE version of the approved Westinghouse BASH methodology. The analyses included a mixing penalty to account for the geometric difference between the IFBA featured ZIRLO fuel and the co-resident previous fuel which does not feature IFBA. Including the mixed-core penalty is in accordance with the mixed-core provisions of the ZIRLO topical report WCAP-12610-P-A, April 1995. The LBLOCA analyses included sensitivity studies to identify the limiting case. The calculated peak cladding temperature (PCT) for the new analysis-of-record included the analytically-determined mixed core penalty. These analyses were acceptable because 1) they were performed with an approved generic LBLOCA evaluation model; 2) the licensee provided documentation to justify the use of the methodology for Unit 1; and 3) the calculated results conform with the criteria given in 10 CFR 50.46(b).

The licensee's March 31, 2000, letter, also contained SBLOCA analysis-of-record assessments of PCT effects due to changes and errors. The NRC staff concluded that the assessments did not indicate a need to change the schedule for re-analysis given in the December 9, 1999, letter.

## 2.3 December 20, 2000, Letter

The December 20, 2000, letter, reported that the licensee had performed new analyses-of-record for Unit 1 to correct previously identified analysis errors and changes; to account for use of Westinghouse (W) Vantage+ (ZIRLO) fuel; and, to account for replacement steam generators at Unit 1.

In the December 20, 2000, letter, the licensee stated that I&M and Westinghouse have ongoing processes to ensure that the as-operated plant values for PCT-sensitive parameters are bounded by the values assumed in the (LB and SB) LOCA analyses. These processes used to identify and quantify mixed-core penalties are needed (as identified in the March 31, 2000, letter) to supplement the approved LBLOCA and SBLOCA analysis methodologies to constitute plant-specific LOCA methodologies which apply to DC Cook, Unit 1. These LOCA methodologies are suitable for reference in Unit 1 licensing documentation, including technical specifications, core operating limits report, and final safety analysis report.

The December 20, 2000, letter, included the results of a re-calculation of the LBLOCA analysis-of-record case previously provided in the March 31, 2000, letter. This recalculation used the approved LBLOCA methodology and accounted for an error in one of the models in the approved methodology. It is not clear from the letter whether the licensee meant for this recalculation to be a new licensing basis analysis (analysis-of-record) or if the licensee intended for this to be an assessment of the effect of model errors. The recalculation properly included a mixed-core penalty to account for the presence of ZIRLO-IFBA fuel. The NRC staff has the following comments regarding the ambiguity of the letter in presenting the re-calculated LBLOCA results:

- 1) While the mixed-core penalty should be included in the licensing basis PCT, and the report for comparison to the criteria in 10 CFR 50.46(b), it is not necessary to include it in the evaluation of methodology changes and errors in addressing the 50 ° F reporting criterion of 10 CFR 50.46(a)(3)(ii). This is because the mixed-core penalty is neither a methodology change nor a methodology error. The mixed-core penalty is determined by a plant-specific process associated with the plant-specific LBLOCA methodology. Also, the mixed-core penalty can change and, in most core changeovers to a new fuel, will eventually disappear when the old fuel is gone, independent of other methodology changes or errors;
- 2) If the licensee intended that the recalculation of the previous limiting case analysis-of-record be a re-analysis to establish an updated analysis-of-record, the letter should have stated why the licensee concluded that the identification of the worst case is not changed by the methodology error correction; and,
- 3) If the licensee intended that the recalculation of the previous limiting case analysis-of-record be an assessment of the PCT effect on the previous analysis-of-record, the letter should have also included the previous PCT and the effect of the error on the PCT.

The December 20, 2000, letter, included the results of a re-calculation of the SBLOCA analysis-of-record case provided in December 1994. This recalculation used approved SBLOCA methodology and accounted for the accumulation of changes and errors in the models in the methodology. The SBLOCA PCT table in the December 20, 2000, letter, provides the recalculated analysis-of-record PCT, but the table also includes items totaling over 200 °F change to the PCT. It is not clear from the letter whether these added PCT changes are items covered by the December 2000, recalculation or are in addition to it. At least one of the items appears to be a permanent penalty appended to the plant-specific SBLOCA methodology to account for a plant-specific configuration, as opposed to an error or change. If this is the case, then that penalty may be analogous to the mixed-core penalty in the way it should be reported. The other items are also unclear, but are less likely to fall into the same category. Regardless of how these items are clarified, the licensee committed in the December 9, 1999, letter, to provide a re-calculated analysis-of-record in the spring 2002 time frame.

The next Unit 1 10 CFR 50.46 report is forthcoming in the summer of 2001. The staff will review this report to assure that clarifications of the ambiguities discussed above are included.

Despite the ambiguities noted above, the licensee's December 20, 2000, letter, satisfies 10 CFR 50.46(a)(3)(ii) based on the following :

- a) for LBLOCA, all of the alternatives comply with 10 CFR 50.46(a)(3)(ii),
- b) for SBLOCA, all of the alternatives, along with the re-analysis schedule, comply with 10 CFR 50.46(a)(3)(ii), and
- c) the licensee has agreed to provide additional clarification of the ambiguities discussed above and the staff will review the report to assure that all issues have been resolved.

### 3.0 CONCLUSION

The NRC staff has reviewed the licensee's submittals. As discussed in Section 2 above, the NRC staff concludes that the 10 CFR 50.46 reports for D. C. Cook, Unit 1, contained in the licensee's letter's dated December 9, 1999, March 31, 2000, and December 20, 2000, are acceptable, and satisfy the requirements of 10 CFR 50.46(a)(3)(ii).