

March 17, 2006

Mr. Mano K. Nazar  
Senior Vice President and  
Chief Nuclear Officer  
Indiana Michigan Power Company  
Nuclear Generation Group  
One Cook Place  
Bridgman, MI 49106

SUBJECT: DONALD C. COOK NUCLEAR PLANT (DCCNP), UNITS 1 AND 2 - ANNUAL  
AND 30-DAY REPORTS OF LOSS-OF-COOLANT ACCIDENT EVALUATION  
MODEL CHANGES (TAC NOS. MC8409 AND MC8410)

Dear Mr. Nazar:

The Nuclear Regulatory Commission (NRC) staff has reviewed the DCCNP letters dated December 28, 2004, April 29, and August 26, 2005, which reported errors and changes to the DCCNP Units 1 and 2 large-break and small-break loss-of-coolant accident (LBLOCA and SBLOCA) analyses of record. In telephone conferences on August 26, 2005, and January 17, 2006, the NRC staff discussed the information in these reports with DCCNP personnel Mr. K. Steinmetz, et al., and heard them clarify the intent of the information. Based on review of the referenced letters, as clarified in the telephone conferences, the NRC staff finds the information and the proposed schedules for reanalyses of DCCNP Units 1 and 2 LBLOCA and SBLOCA analyses of record acceptable. The enclosed safety evaluation provides details of the NRC staff's evaluation.

This completes the NRC efforts under the above TAC Nos.

Sincerely,

**/RA/**

Peter S. Tam, Senior Project Manager  
Plant Licensing Branch III-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-315 and 50-316

Enclosures:  
As stated

cc w/encl: See next page

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\*Safety evaluation transmitted by memo dated 2/14/06

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## SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

### D. C. COOK NUCLEAR PLANT (DCCNP), UNITS 1 AND 2

#### DOCKET NOS. 50-315 AND 50-316

#### ANNUAL AND 30-DAY REPORTS OF

#### LOSS-OF-COOLANT ACCIDENT EVALUATION MODEL CHANGES

### 1.0 INTRODUCTION

By letters dated December 28, 2004 (Accession No. ML050040216), April 29 (Accession No. ML051300368), and August 26, 2005 (Accession No. 052500285), Indiana Michigan Power Company, LLC (the licensee), reported errors and changes to the DCCNP Units 1 and 2 large-break and small-break loss-of-coolant accident (LBLOCA and SBLOCA) analyses of record (AOR). In telephone conferences on August 26, 2005, and January 17, 2006, the Nuclear Regulatory Commission (NRC) staff discussed these reports with DCCNP personnel and heard the licensee's clarification of the above referenced submittals.

### 2.0 REGULATORY EVALUATION

The Commission's regulation at 10 CFR §50.46 requires that the emergency core cooling system (ECCS) be designed so that its calculated cooling performance following a postulated loss-of-coolant accident can be predicted by acceptable evaluation models. These models may prove to contain errors, or may have experienced changes, which are defined as "a calculated peak fuel cladding temperature difference by more than 50 °F from the temperature calculated for the limiting transient using the last acceptable model, or is a cumulation of changes and errors such that the sum of the absolute magnitudes of the respective temperature changes is greater than 50 °F." The regulation requires that the licensee shall report such change or error "within 30 days and include with the report a proposed schedule for providing a reanalysis or taking other action as may be needed to show compliance with §50.46 requirements."

### 3.0 TECHNICAL EVALUATION

#### 3.1 Unit 1 LBLOCA

The licensee reported that the AOR of 2038 °F has experienced at least 71 °F (including -11 °F, attributed as an absolute value due to cladding emissivity errors) of estimated change in peak cladding temperature ( ) PCT) added since the year 2000 when the AOR was performed, not including a 31 °F transition core penalty (which disappeared after one cycle). During the transition cycle, the estimated PCT is 2118 °F. Consistent with the 71 °F ) PCT (greater than the 10 CFR 50.46 changes and errors sum of absolute values limit), the licensee submitted a report, and proposed a reanalysis schedule, associated with a March 2007 reload, using the

Westinghouse ASTRUM LBLOCA methodology. The licensee's ) PCT estimates were derived from calculations using the same BASH model as used to perform the AOR, assuring consistency of the ) PCT estimates with the AOR. The licensee indicated that it is impractical to schedule fuel conversions (including reanalyses) for both DCCNP units in the same time period. The licensee's proposed reanalysis schedule (March 2007) for DCCNP Unit 1, is more expedited than for Unit 2, because Unit 1 has a significant number of fuel failures that could necessitate a forced outage if a number of additional failures were encountered.

### 3.2 Unit 1 SBLOCA

The licensee's AOR (1720 °F), done in year 2000, is normal for this design. However, since then, the AOR has experienced 3 major increases summing to an estimated 270 °F ) PCT. The new estimated SBLOCA PCT is 1990 °F. This estimated PCT is high; however, the estimated PCT remains within regulatory limits with assurance that the PCT will not exceed 2200 °F. Therefore, the NRC staff finds it acceptable for the licensee to schedule the reanalysis consistent with the proposed refueling outage (March 2007).

### 3.3 Unit 2 LBLOCA

The licensee stated that the Unit 2 LBLOCA AOR (i.e., 2051 °F) performed in year 1995, has had at least 113 °F ) PCT added, not including a -50 °F ) PCT ZIRLO adjustment. The total estimated ) PCT is 163 °F (sum of the absolute values of ) PCT changes and errors), and the adjusted PCT is 2114 °F. Consistent with the 163 °F ) PCT, which is greater than the 10 CFR 50.46 sum of absolute values limit, the licensee submitted a report, and proposed a reanalysis schedule associated with a March 2009 reload using the Westinghouse ASTRUM LBLOCA methodology. The licensee's ) PCT estimates were derived from calculations using the same BASH model as used to perform the AOR, thus assuring consistency of the ) PCT estimates with the AOR. The licensee indicated that it is impractical to schedule fuel conversions (including reanalyses) for both DCCNP units in the same time period.

Because the licensee has determined that replacing failed fuel for DCCNP Unit 1 (including reanalysis), is more expedient than implementing a reanalysis for DCCNP Unit 2, the licensee plans to devote its resources on the Cook Unit 1 fuel activities, including reanalyses, in March 2007, and postpone the Unit 2 reanalyses to March 2009.

### 3.4 Unit 2 SBLOCA

The licensee reported that the AOR (i.e., 1956 °F) performed in 1992, is normal for this design. However, since then the AOR has experienced several changes, the absolute values of these changes summing to an estimated 354 °F ) PCT. Given due consideration to the increases and decreases in PCT associated with the changes, the resulting estimated PCT is 1739 °F. The licensee performed an additional assessment of the Unit 2 SBLOCA AOR using an NRC-approved revision of the 1992 SBLOCA methodology NOTRUMP. The result was a 150 °F ) PCT benefit in the assessment of the SBLOCA PCT, bringing the estimated PCT down to 1589 °F; but this also raised the total absolute value of ) PCT due to changes and errors to 504 °F. The estimated ) PCT is thus equivalent to about 54 percent of the SBLOCA temperature rise from pre-accident normal operating conditions and raises question about the fidelity of the

Unit 2 model for SBLOCA analyses. However, even if all the estimated ) PCTs were added, the PCT would still be more than 150 °F below the 10 CFR 50.46 PCT limit.

Because the licensee has determined that replacing failed fuel for Unit 1 (including reanalysis), is more expedient than implementing a reanalysis for Unit 2, the licensee plans to devote its resources on the Unit 1 fuel activities, including reanalyses, in March 2007, and postpone the Unit 2 reanalyses to March 2009. This schedule is acceptable to the NRC staff.

#### 4.0 CONCLUSION

Based on the above evaluation, the NRC staff concludes that :

- (1) The licensee has discovered, accounted for (by quantifying the effects of the reported changes and errors and of off-setting considerations for LBLOCA and SBLOCA analyses), and reported changes and errors in the LBLOCA and SMLOCA analyses of record for DCCNP Units 1 and 2 in accordance with 10 CFR 50.46(a)(3).
- (2) The licensee has proposed schedules for reanalyses of both LBLOCA and SBLOCA for both units in accordance with 10 CFR 50.46(a)(3). The reanalysis schedules proposed for both units are acceptable. However, the licensee's proposed schedules do not appear to have fully considered the accumulations of estimated ) PCT corrections due to changes and errors. The ) PCTs estimates have enhanced credibility because they are based on sensitivity analyses performed with DCCNP licensing ECCS analysis methodologies. In the case of Unit 2, the SBLOCA was reassessed using a different NRC-approved revision of the SBLOCA methodology from the version approved for Unit 2.
- (3) The NRC staff finds the Unit 1 and Unit 2 ECCS errors and changes reports submitted by the licensee acceptable as discussed above, but suggest that the licensee implement a program of heightened vigilance and reporting in consideration of the large sums of changes and errors ( ) PCTs) noted above, and the proximity of the estimated PCTs (and implied oxidation and hydrogen generation) to 10 CFR 50.46(b) PCT limits.

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Date: March 17, 2006

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