September 1, 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, UNIT 1 (DCCNP-1) - ISSUANCE OF AMENDMENT REGARDING DIESEL GENERATOR VOLTAGE LIMIT REQUIREMENTS (TAC NO. MD1130)

Dear Mr. Nazar:

The Commission has issued the enclosed Amendment No. 295 to Renewed Facility Operating License No. DPR-58 for DCCNP-1. The amendment consists of changes to the Technical Specifications in response to your application dated April 10, 2006, as supplemented by letters dated April 12, 13 (two letters), and June 27, 2006. A similar amendment was issued on April 13, 2006, to DCCNP-2 under emergency circumstances.

The amendment revised Surveillance Requirement 3.8.1.11 of the DCCNP-1 Technical Specifications, raising the diesel generator load rejection voltage test limit from 5000 volts to 5350 volts.

A copy of our related safety evaluation is enclosed. A Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,

/RA/

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

Docket No. 50-315

Enclosures:
1. Amendment No. 295 to DPR-58
2. Safety Evaluation

cc w/encls: See next page

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Package Accession Number: **ML062010589**
Amendment Accession Number: **ML061350255**
TS Page Accession Number: **ML0062490114**

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INDIANA MICHIGAN POWER COMPANY

DOCKET NO. 50-315

DONALD C. COOK NUCLEAR PLANT, UNIT 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 295
License No. DPR-58

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Indiana Michigan Power Company (the licensee) dated April 10, 2006, as supplemented by letters dated April 12, 13 (two letters), and June 27, 2006, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Renewed Facility Operating License and Technical Specifications as indicated in the attachment to this license amendment.

3. This license amendment is effective as of its date of issuance and shall be implemented within 45 days.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Martin C, Murphy, Acting Chief
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the Renewed Operating License

Date of Issuance: September 1, 2006

ATTACHMENT TO LICENSE AMENDMENT NO. 295

RENEWED FACILITY OPERATING LICENSE NO. DPR-58

DOCKET NO. 50-315

Replace the following page of Renewed Facility Operating License No. DPR-58 with the attached revised page. The change area is identified by a marginal line.

REMOVE	INSERT
3	3

Replace the following page of Appendix A, Technical Specifications, with the attached revised page. The change area is identified by a marginal line.

REMOVE	INSERT
3.8.1-10	3.8.1-10

and radiation monitoring equipment calibration, and as fission detectors in amounts as required.

(4) Pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument and equipment calibration or associated with radioactive apparatus or components; and

(5) Pursuant to the Act and 10 CFR 30 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.

C. This renewed operating license shall be deemed to contain and is subject to the conditions specified in the following Commission regulations in 10 CFR Chapter I: Part 20, Section 30.34 of Part 30, Section 40.41 of Part 40, Section 50.54 and 50.59 of Part 50, and Section 70.32 of Part 70; and is subject to all applicable provisions of thee Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

The licensee is authorized to operate the facility at steady state reactor core power levels not to exceed 3304 megawatts thermal in accordance with the conditions specified therein.

(2) Technical Specifications

The Technical Specifications contained in Appendix A and Appendix B, as revised through Amendment No. 295, are hereby incorporated in the renewed operating license. The licensee shall operate the facility in accordance with the Technical Specifications. |

(3) Less Than Four Loop Operation

The licensee shall not operate the reactor at power levels above P-7 (as defined in Table 3.3.1-1 of Specification 3.3.1 of Appendix A to this renewed operating license) with less than four reactor coolant loops in operation until (a) safety analyses for less than four loop operation have been submitted, and (b) approval for less than found loop operation at power levels above P-7 has been granted by the Commission by amendment of this license.

(4) Indiana Michigan Power Company shall implement and maintain, in effect, all provisions of the approved Fire Protection Program as described in the Final Safety Analysis Report for the facility and as approved in the SERs dated December 12, 1977, July 31, 1979, January 10, 1981, February 7, 1983, November 22, 1983, December 23, 1983, March 16, 1984, August 27, 1985

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

AMENDMENT NO. 295 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-58

INDIANA MICHIGAN POWER COMPANY

DONALD C. COOK NUCLEAR PLANT, UNIT 1

DOCKET NO. 50-315

1.0 INTRODUCTION

By application to the U.S. Nuclear Regulatory Commission (NRC, Commission) dated April 10, 2006 (Accession No. ML061080660), as supplemented by letters dated April 12 (Accession No. ML061240382), 13 (two letters, Accession Nos. ML061150354 and ML061230511), and June 27, 2006 (Accession No. ML061870388), Indiana Michigan Power Company (I&M, or the licensee) requested an amendment to the Operating Licenses for Donald C. Cook Nuclear Plant, Units 1 and 2 (DCCNP-1 and DCCNP-2). The proposed amendment would revise Surveillance Requirement (SR) 3.8.1.11 of the Technical Specifications (TSs), changing the AB diesel generator (DG) load rejection voltage limit from #5000 volts to #5350 volts.

The licensee requested that the application for DCCNP-2 be processed under emergency circumstances; accordingly, the DCCNP-2 amendment was issued on April 13, 2006. This safety evaluation addresses only the application for DCCNP-1.

The supplemental letters contained clarifying information and did not change the initial no significant hazards consideration determination, and did not expand the scope of the original *Federal Register* notice.

2.0 REGULATORY EVALUATION

The regulatory requirements that the NRC staff applied in its review of the application include:

General Design Criterion* (GDC) 17, “Electric power systems,” of Appendix A, ”General Design Criteria for Nuclear Power Plants,” to Title10, Part 50, of the *Code of Federal Regulations* (CFR) requires, in part, that nuclear power plants have onsite and offsite electric power systems to permit the functioning of structures, systems, and components that are important to safety. The onsite system is required to have sufficient independence, redundancy, and testability to perform its safety function, assuming a single failure. The offsite power system is required to be supplied by two physically independent circuits that are designed and located so as to minimize, to the extent practical, the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions. In addition, this criterion requires provisions to minimize the probability of losing electric power from the remaining electric power supplies as a result of loss of power from the unit, the offsite transmission network, or the onsite power supplies.

*DCCNP-1 was constructed before promulgation of the General Design Criteria in 10 CFR Part 50. The NRC staff used the GDCs in this safety evaluation solely as a convenient summary of acceptable standards.

GDC-18*, "Inspection and testing of electric power systems," requires that electric power systems that are important to safety must be designed to permit appropriate periodic inspection and testing.

Title 10, Part 50, of the *Code of Federal Regulations* 50.36*, "Technical Specifications," requires a licensee's TS to establish Limiting Conditions of Operation and SRs for equipment that is required for safe operation of the facility.

3.0 BACKGROUND

The licensee stated that existing SR 3.8.1.11 requires verification, at least once per 24 months, that each DG does not trip and voltage is maintained #5000 volts during and following a full load rejection, i.e., rejection of a load greater than or equal to ($) 3150 kilowatts (kW) and #3500 kW. The basis for the 5000 volt limit is DG damage protection. During a performance of SR 3.8.1.11 for the DCCNP-2 AB DG on March 26, 2006, the maximum measured voltage was 4993 volts. Adding the 55 volts instrument uncertainty margin to the measured values resulted in a test value of 5048 volts, which exceeded the 5000 volt TS criterion.

The licensee replaced the DCCNP-2 voltage regulator and tuned it to optimize the system response. The full load rejection test was performed on April 8, 2006. During this test, the peak measured voltage reached 5105 volts, again exceeding the test criterion. Additional voltage regulator tuning was initiated. While performing the tuning, an abnormal voltage regulator response was observed when shifting to manual voltage control. Based on troubleshooting results, the transfer switch contacts were replaced. Tuning was recommenced on April 9, 2006, and was terminated when manual voltage control did not respond as expected.

Subsequently, the DCCNP-2 manual voltage regulator card was replaced and voltage regulator tuning was successfully completed. A full load rejection test was performed on April 9, 2006, resulting in a maximum measured DG output voltage of 5042 volts. The voltage regulator was re-tuned and another full load rejection was performed. The maximum measured voltage was 5049 volts, again exceeding the acceptance criterion. After consulting with the vendor, the licensee determined that the regulator was functioning as designed and that additional tuning would have no impact on the ability to meet the acceptance criterion.

4.0 TECHNICAL EVALUATION

The purpose of a full load rejection test as performed under SR 3.8.1.11 is to demonstrate that the DG is capable of rejecting a full load (90 percent to 100 percent of the DG continuous rating) without overspeed tripping or exceeding the predetermined voltage limits. The DG full load rejection may occur because of a system fault or inadvertent breaker tripping. This SR ensures proper DG load response under the simulated test conditions. This test simulates the loss of the total connected load that the DG experiences following a full load rejection and verifies that the DG does not trip upon loss of the load. These acceptance criteria provide for DG damage protection. While the DG is not expected to experience this transient during the event, the SR requirements ensure that the DG is not degraded for future operation, including re-connection to the bus if the trip initiator can be corrected or isolated. The existing 5000 volt limit in SR 3.8.1.11 is a standard industry value as indicated in NUREG-1431. This value was incorporated in the DCCNP-1 and DCCNP-2 TS as part of the conversion to improved standard TS in September 2005. The licensee believed then that the 5000 volt limit would be readily

achievable based on the 2004 testing. The previous TS did not specify a voltage limit for the DG full load rejection test SR.

The licensee stated that the proposed amendment would increase the SR 3.8.1.11 limit on the maximum voltage following a DG full load rejection from a value #5000 volts to a value of #5350 volts. The voltage overshoot following a full load rejection is a transient condition typically lasting for only a few seconds, with the peak voltage lasting for a much shorter period. The DG control components quickly reduce excitation and return voltage to its normal control point. The DG full load rejection tests show that the maximum voltage was present for approximately two cycles. Components subjected to these transient voltages include the generator, the cables that connect the DG to the safety buses, the 4160-volt switchgear, and the DG control components. The licensee analyzed the effect of an increased voltage limit on these components as described below.

4.1 Generator

The factory hi-potential (hi-pot) test value for the DG is 2E + 1000 volts for 60 seconds, where E is the rated line to line voltage of the generator. The DCCNP-1 DGs are rated 4160 volts. Therefore, the factory ac hi-pot test value is 9320 volts. For initial field testing, the vendor recommends the test be conducted at 75 percent of this value or 6990 volts. After initial testing and generator service or repair, the vendor recommends a test value of 1.25E +500 volts. This equates to 5700 volts. In a telephone call on April 11, 2006, the NRC staff asked the licensee to provide verification from the generator manufacturer that the generator would not experience detrimental effects due to transient voltages up to 5350 volts. In its April 12, 2006, response, the licensee stated that personnel have contacted General Electric Company (generator vendor) regarding the ability of the generator to withstand elevated voltage. The representative of GE stated that the transient overshoot voltage of 5350 volts that may be experienced every 18 months does not adversely impact the generator. Based on the above, the NRC staff finds that the generators would not experience detrimental effects due to transient voltages up to 5350 volts.

4.2 Cables

Cables used in the 4160-volt system at DCCNP-1 are rated at a nominal 5 kilovolts. Electric Power Research Institute (EPRI) guidance for factory hi-pot tests recommends a 5-minute, 13-kilovolts test for 5-kilovolt-rated cables. The EPRI guidance indicates a typical maintenance hi-pot test value of 60 percent of the factory value, or 7800 volts. The DG control cable is rated at a minimum of 600 volts, which provides acceptable margin over the 163 volt value that would result from a DG voltage of 5700 volts. In a telephone call on April 11, 2006, the NRC staff asked the licensee to provide verification from the cable manufacturer that the 4160-volt cables would not experience detrimental effects due to transient voltages up to 5350 volts. In its April 12, 2006, response, the licensee stated that 5-kilovolt cables are manufactured by Okonite Company and have a 15 minute rating at 5500 volts. Based on the above, the NRC staff finds that 5 kilovolt cables would not experience detrimental effects due to transient voltages up to 5350 volts.

4.3 Switchgear

A review of industry standards applicable at the time DCCNP-1 was constructed, shows that the insulation withstand capability of 4-kV-rated breakers significantly exceeds 5700 volts. Accordingly, the 4-kV breakers and switchgear are not limiting with respect to peak voltage during a full load rejection. In a telephone call on April 11, 2006, the NRC staff asked the licensee to provide verification from the switchgear manufacturer that the 4-kV breakers and switchgear would not experience detrimental effects due to transient voltages up to 5350 volts. In its April 12, 2006, response, the licensee stated that the switchgear is manufactured by Asia Brown Boveri (ABB), and that ABB confirmed that there would be no adverse effect on the ability of the switchgear to operate following a voltage transient of 5350 volts for a short duration. Accordingly, the NRC staff finds that the 4-kV breakers and switchgear would not experience detrimental effects due to transient voltages up to 5350 volts.

4.4 Control Components

The licensee determined that the most limiting control system component required to function for operation of the DG is the voltage regulator. The licensee's discussions with the vendor determined that the voltage transient that would result from a short-term DG output voltage of 5700 volts would not prevent the voltage regulator from fulfilling its safety function, although its service life could be shortened.

In a telephone conference call on April 12, 2006, the NRC staff expressed its concern regarding proper operation of the DCCNP-2 DG with a new voltage regulator. On April 13, 2006, the licensee provided additional information to satisfy the NRC staff's concern. The licensee stated that it has conducted the following tests at the DCCNP-2 DGs incorporating a power factor adjustment to demonstrate proper operation of the voltage regulator. In its June 27, 2006, letter, the licensee stated that it does not intend to replace any voltage regulators on the DCCNP-1 DGs during the upcoming fall 2006 refueling outage; hence, the following information (in *italics*) is excerpted from the April 13, 2006, DCCNP-2 safety evaluation for information:

Three Full Load Rejection Tests

Results from all three tests, performed on both the installed and replacement voltage regulators, including those performed before optimum tuning, fall within approximately 2 percent of the peak voltage. After voltage regulator tuning, the results fall within approximately 1 percent of the peak voltage. The licensee stated that these are repeatable results that provide high confidence that the voltage regulator is performing as designed.

Eight-Hour Load Power Factor Adjusted Test

This test was performed on the installed voltage regulator with the power factor between 0.80 and 0.86. During initial power factor adjustment, and reactive load sharing during the run, the licensee indicated that all regulator responses were normal.

Full Load Runs Reactive Load Minimized (Power Factor Maintained as Close as Possible To 1.0)

These tests were performed on both the installed and replacement regulators. Although not at reduced power, these runs still require voltage regulator adjustment to minimize reactive load. Normal voltage was maintained, with no problems minimizing reactive currents (reactive load sharing capability with grid normal).

The licensee has also conducted the following tests to demonstrate proper operation of the new voltage regulator.

Fast Start Test

Proper voltage response was noted by the licensee during fast start tests on both the installed and replacement regulator.

Half Load (1750 kilowatt) Reject Tests

Proper voltage response was observed during these tests on the replacement regulator.

The licensee indicated that voltage regulator response was assessed based on response of the above tests. Performance during all these tests was consistent with that previously observed. All of these tests provided indication of normal voltage regulator and governor response.

During a conference call with the NRC staff on April 12, 2006, the licensee indicated that the difficulty in meeting the full load rejection voltage limit is likely the result of not appropriately considering the effect of the power factor difference when selecting the SR values during the conversion to the improved standard technical specifications (STS) of NUREG-1431 in September 2005. The conversion of the previous DG full load rejection TS SR to the improved STS of NUREG-1431 resulted in the addition of a limit for the power factor (#0.86). This limit resulted in higher voltages following the full load rejection.

Additionally, by a separate letter dated April 13, 2006, the licensee committed to perform all TS SR that challenge the operation of the Unit 2 AB emergency diesel generator voltage regulator prior to Unit entering Mode 3 during the current refueling outage. By the June 27, 2006, letter, the licensee stated that all these tests were successfully completed. Based on the above, the staff's concern is resolved.

On the basis of its review, the NRC staff agrees with the licensee that the proposed voltage overshoot limit during a full load rejection test once every 24 months would not adversely affect the generator, the cables that connect the DG safety buses, the 4160-volt switchgear, the DG control components, or the capability of the DG to perform its intended safety function. The NRC staff's determination is based on (1) the maximum voltage (5350 volts) during full load rejection test lasts for approximately two cycles; (2) generator, cables and switchgear are tested (hi-pot) at much higher voltage with longer duration; (3) the voltage regulator will fulfill its safety function per the vendor; and (4) manufacturers' confirmation that the generator, cables and switchgear would not have any adverse effect on performance due to transient voltage of up to 5350 volts for a short duration.

4.5 Summary of Evaluation

The NRC staff has reviewed the licensee's submittal and finds that the proposed change for DCCNP-1 to increase the SR 3.8.1.11 limit on maximum voltage following a DG full load rejection from a value of #5000 volts to a value of #5350 volts would not adversely affect the capability of the DG to perform its intended safety function. The NRC staff also concludes that the proposed change conforms with acceptable standards as summarized in GDC 17 and GDC 18. The proposed amendment is, therefore, acceptable.

5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Michigan State official was notified of the proposed issuance of the amendment. The State official had no comments.

6.0 ENVIRONMENTAL CONSIDERATION

The amendment changes the requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 or change the surveillance requirements. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration and there has been no public comment on such finding (71 FR 43534). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

7.0 CONCLUSION

The NRC staff has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: A. Pal
P. Tam

Date: September 1, 2006