April 19, 2002

Mr. A. Christopher Bakken III, Senior Vice President
and Chief Nuclear Officer
Indiana Michigan Power Company
Nuclear Generation Group
500 Circle Drive
Buchanan, MI 49107

SUBJECT: DONALD C. COOK NUCLEAR PLANT, UNIT 1 - ISSUANCE OF AMENDMENT (TAC NO. MB3499)

Dear Mr. Bakken:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 268 to Facility Operating License No. DPR-58 for the Donald C. Cook Nuclear Plant, Unit 1. The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated November 16, 2001, as supplemented March 12, 2002.

The amendment would revise TS Table 3.3-4, "Engineered Safety Feature Actuation System Instrumentation Trip Setpoints." The proposed changes are required as part of a planned design change to replace the existing 4kV offsite power transformers, loss of voltage relays, and degraded voltage relays with components of an improved design to increase the reliability of offsite power for safety-related equipment.

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

Sincerely,

/RA/

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

Docket No. 50-315

Enclosures: 1. Amendment No. 268 to DPR-58
2. Safety Evaluation

cc w/encls: See next page

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INDIANA MICHIGAN POWER COMPANY

DOCKET NO. 50-315

DONALD C. COOK NUCLEAR PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 268
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 November 16, 2001, as supplemented March 12, 2002, 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 Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-58 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 268, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

L. Raghavan, Chief, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: April 19, 2002

ATTACHMENT TO LICENSE AMENDMENT NO. 268

TO FACILITY OPERATING LICENSE NO. DPR-58

DOCKET NO. 50-315

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

REMOVE	INSERT
3/4 3-26a	3/4 3-26a
B 3/4 3-1	B 3/4 3-1

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 268 TO 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 dated November 16, 2001, as supplemented March 12, 2002, the Indiana Michigan Power Company (the licensee) requested an amendment to the Technical Specifications (TSs) for the Donald C. Cook (D. C. Cook) Nuclear Plant, Unit 1. The proposed amendment would revise TS Table 3.3-4, "Engineered Safety Feature Actuation System Instrumentation Trip Setpoints." The proposed changes are required as part of a planned design change to replace the existing 4kV offsite power transformers, loss of voltage (LOV) relays, and degraded voltage relays with components of an improved design to increase the reliability of offsite power for safety-related equipment.

By letter dated February 21, 2002, the Nuclear Regulatory Commission (NRC) staff requested additional information from the licensee. The licensee responded to the request by letter dated March 12, 2002. The March 12, 2002, information was clarifying in nature and did not change the scope of the original notice or the proposed no significant hazards consideration determination.

2.0 BACKGROUND

The licensee initiated the planned design change following the discovery that the terminal voltage at some safety-related electrical equipment may not be adequate during a postulated design-basis accident coincident with a degraded voltage condition. This finding was reported to the NRC in Licensee Event Report 315/1999-022-01 dated March 23, 2000, and actions were taken to assure that safety-related loads would have adequate voltage. Subsequently, on May 4, 2000, the licensee committed to a planned design change to replace the existing 4kV offsite power transformers (reserve auxiliary transformers [RATs]) and degraded voltage relays with components of an improved design. These changes are needed to increase the reliability of offsite power for safety-related equipment.

The existing RATs do not have auto load tap changers. The planned design change will replace the existing RATs with load tap changing transformers. When the new RATs are used to provide auxiliary power, they will sense changes in grid voltage and will automatically change taps to maintain the appropriate voltage at the 4kV buses.

The proposed TS revision is needed to allow degraded voltage and LOV relay setpoints to be changed to fully benefit from the improved protection provided by the planned design change. Due to inaccuracies inherent in the existing degraded voltage relays and their associated potential transformer circuits, the relays have wide tolerance. Consequently, spurious trips could occur if the existing relays were set any higher. The design change will replace the degraded voltage relays with relays of an improved design, allowing the degraded voltage trip setting to be increased to maintain voltage above the analytical limit; that is, the value at which all safety-related loads have sufficient voltage to perform their intended safety function.

The design change will also replace the LOV relays with an improved relay design. This allows the LOV relay setpoints to be low enough to prevent spurious tripping, while still maintaining voltage high enough to ensure all safety-related loads have sufficient voltage to perform their intended safety function.

10 CFR Part 50 Appendix A, General Design Criteria (GDC) 17 requires that an offsite electric power system shall be provided to permit functioning of structures, systems, and components important to safety. The safety function for each system shall be to provide sufficient capacity and capability to assure that (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences, and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents. The degraded voltage and LOV relay trip set points and associated time delays assure proper operation of safety-related loads as required by GDC 17 of 10 CFR Part 50, Appendix A.

3.0 EVALUATION

The proposed TSs changes are as follows:

a. Revise TS Table 3.3-4, “Engineered Safety Feature Actuation System Instrumentation Trip Setpoints,” to raise the 4kV bus LOV trip setpoint and allowable values for both the motor driven auxiliary feed water pumps and the loss of power functional units. The proposed trip setpoint is 3286 volts with allowable values of greater than or equal to 3245 and less than or equal to 3328 volts.

b. Revise TS Table 3.3-4 to raise the 4kV bus degraded voltage trip setpoint, time delay, and allowable values for the loss of power functional units. The proposed trip setpoint is 3959 volts with allowable values of greater than or equal to 3910 volts and less than or equal to 4000 volts. The proposed time delay for the degraded voltage trip is 9 seconds ±0.25 seconds. The proposed time delay will apply only when a steam generator level low-low or a safety injection signal is present.

c. Revise the TSs 3/4.3.1 and 3/4.3.2 bases to explain the applicability of the time delay associated with the 4kV bus degraded voltage trip setpoint.

The licensee stated that the proposed LOV relay setpoint and the range of allowable values are based on ensuring the setting is low enough to prevent spurious actuation during voltage transient caused by motor starting conditions, yet high enough to ensure safety-related equipment will perform as required by the safety analysis. The criteria used to determine the setpoint included:

a. Preventing running Class 1E motors from stalling.

b. Ensuring any load can be started without damaging any loads that are already running.

c. Preventing load shedding due to thermal overloads/relaying.

The proposed LOV trip setpoint value, 3286 volts, is equal to 79 percent of 4160 volts with an allowable range of 3245 volts to 3328 volts (78 to 80 percent of 4160 volts). This is based on a plant-specific calculation. On March 12, 2002, the licensee provided details on how the above criteria are met. The licensee stated that the minimum required voltage to prevent Class 1E motor stalling is 77.4 percent of the rated bus voltage. The voltage analysis demonstrated that (1) the voltage of the Class 1E buses remains above the upper allowable value of the LOV relay during the start of the largest plant motor; (2) the voltage of the Class 1E buses remains above the upper allowable value of the LOV relay during the start of the largest motor connected to a fully loaded Class 1E bus; (3) the voltage of the class 1E bus remains above the upper allowable value of the LOV relay during sequential motor starting, while connected to the offsite power system. Thus, the minimum allowable voltage is sufficient to preclude the stalling of Class 1E motors. The increased current resulting from the voltage just above the lower allowable value of the LOV relay is within the allowable range of the Class 1E motor overcurrent protection, which is 121 - 141 percent. This ensures that the motor will not be thermally damaged. The lower allowable value of the LOV relay is high enough so that the time required for voltage decay allows the LOV relay to actuate fast enough to meet the emergency core cooling system pump flow requirement established in the accident analysis.

The time delay for the LOV relay has been historically set at 2 seconds with a tolerance of ± 0.2 seconds. The 2-second time delay was chosen to bypass short duration system voltage drops and to function in sufficient time to allow the protective actions initiated by the LOV to meet the accident analysis equipment start times.

The proposed degraded voltage setpoint is based on a voltage response analysis. It was selected to ensure all safety-related loads have sufficient voltage to perform their intended safety function. The criteria used to determine the setpoint included:

- Providing degraded voltage and time delay setpoints that support the voltage requirements of the Class 1E loads at all onsite system distribution levels (i.e., 4kV, 600 V, and 120/208V).

- Providing minimum continuous running voltage (nominally 90 percent of nameplate) to Class 1E motors on the emergency buses.

The analytical limit, that is, the voltage at which all safety-related loads have sufficient voltage to perform their intended safety function, was determined to be 3902 volts, but a higher value of 3910 volts was used to bound the low end of the allowable value range and to provide margin for future load changes.

The proposed time delay for the degraded voltage relay is based on setting the relay short enough to allow safety-related equipment to operate within the assumptions of the safety analysis, but long enough to avoid spurious operation of the relay. The proposed 9-second time delay only applies when a safety injection signal or a steam generator low-low level signal is present. This time delay supports the safety analysis assumptions for safety-related equipment operation. On March 12, 2002, the licensee stated that the time delay associated with the voltage changes by the new automatic load tap-changing transformer has been considered in the proposed 9-second time delay determination.

The proposed setpoint and time delay values were determined by a plant-specific calculation using the methodology provided in the Institute of Electrical and Electronics Engineers Standard 741-1997, "Standard Criteria for the Protection of Class 1E Power Systems and Equipment in Nuclear Power Generating Stations." The calculation considers the errors associated with the circuit that monitors the voltage at the 4kV safety-related switchgear. It also reflects factors associated with the design change, which includes replacing the existing voltage relays with new relays furnished with internal harmonic filters. The accuracy of the relays and associated components, as well as the tolerances associated with setting the relays, have been considered.

The proposed bases change explains that the proposed time delay for the 4kV bus degraded voltage setpoint presented in the TS protects during situations addressed in the safety analysis in Chapter 14 of the updated final safety analysis report. A different, longer time delay will apply when a steam generator low-low level or a safety injection signal is not present. This longer time delay is not included in the TS. This is consistent with NRC Branch Technical Position PSB-1, "Adequacy of Station Electrical Distribution System Voltages." The longer time delay will be included in an owner-controlled document instead of the TSs. This is consistent with NUREG-1431, "Standard Technical Specifications Westinghouse Plants," Revision 2, and its bases.

On March 12, 2002, in response to the NRC staff's request for additional information (RAI), the licensee stated that the longer time delay is the original 2-minute delay. The longer time delay is for non-accident conditions. It will continue to prevent unnecessary disconnecting of the offsite power source due to short, inconsequential grid disturbances and prevent unnecessary challenges to safety systems of the unit. As part of the design change to install the automatic load tap-changing transformer, the licensee has developed an additional shorter time delay for the degraded voltage relays. The second time delay, 9 seconds, is for accident conditions and will be in effect when a safety injection or steam generator low-low level signal occurs coincident with a degraded voltage condition. This shorter time delay assures that the requirements of the updated final safety analysis report Chapter 14 analyses are met.

The intent of the design change is not to address the concerns of Information Notice (IN) 93-17, "Safety Systems Response to Loss of Coolant and Loss of Offsite power," related to conditions in which automatic safety systems could respond inappropriately to certain sequences of loss of coolant and loss of offsite power. The main intent of the design change is to improve the ability

of the electrical auxiliary system to accommodate changes in the grid voltage and also improve the accuracy of the relay to ensure sufficient voltage is maintained. The D. C. Cook Nuclear Plant, Unit 1, was licensed on the basis of a loss-of-coolant accident coincident with a loss-of-offsite power event. Nevertheless, D. C. Cook, Unit 1, can adequately accommodate the conditions described in IN 93-17. This capability will not be impacted by the design change. In response to the NRC staff's RAI regarding auxiliary bus voltage analysis, the licensee stated that Electrical Transient Analyzer Program (ETAP) was used to perform the power system analysis and the system model is developed from approved design drawings and procedures. The system model reflects the configuration of D. C. Cook Unit 1, and the expected configurations under design-basis accident conditions. Connected loads and their operating conditions used in the model (i.e., percent loading, duration, etc.) are based on available design information for meeting their most demanding design requirements. The results of the analysis confirm that all essential loads in the system will have adequate voltage to perform their design function as long as the voltages remain at or above the analytical limit of 3902 volts or 93.8 percent of 4160 volts at the 4kV safety-related buses.

The NRC staff evaluated the assumptions, loading, and summary of results provided by the licensee, and finds them acceptable. The licensee stated that ETAP is widely accepted and used in the industry as the power system analysis tool. This program meets 10 CFR Part 50, Appendix B requirements and has been verified and validated. The system modeled in ETAP was developed in accordance with approved design drawings and procedures.

Regarding the restoration of switchyard voltage, the licensee has established provisions to monitor and maintain adequate switchyard voltages and to respond in the event that the switchyard voltages drop below the minimum acceptable levels. To ensure that all essential loads can adequately perform their design functions, an interface agreement between the American Electric Power (AEP) Energy Delivery and Customer Relations Group and the AEP Nuclear Generating Group, a real-time switchyard voltage monitoring computer program and response procedures have been developed.

The interface agreement provides guidance to ensure that the organizations responsible for operation, maintenance, and engineering consider the impact of their activities on facilities located at D. C. Cook and on the AEP transmission system. Specifically, the interface agreement contains a provision that system control center personnel monitor system conditions to ensure that adequate voltage levels to support the D. C. Cook in the event of an accident are maintained.

Switchyard voltages are monitored on the D. C. Cook Online Load Flow (CKOLF) computer program, which is a real-time state-estimator/load-flow computer program. CKOLF determines the expected voltage levels at the switchyard assuming a D. C. Cook one-unit trip (if only one unit is operating) or a D. C. Cook two-unit trip (if both units are operating). The program provides an alarm to the AEP Transmission Coordinator (AEPTC) if the expected switchyard voltage is not within the acceptable limits. A special operating procedure, "Cook Nuclear Plant Transmission/Auxiliary Voltage Operating Guide," is followed by the AEPTC. This procedure provides directions for the AEPTC to respond to switchyard voltage conditions outside of the limits acceptable to D. C. Cook as indicated by the alarm. The AEPTC's required actions include notifying D. C. Cook Unit Supervisors of the switchyard voltage conditions and also

taking immediate compensatory actions to restore voltage levels within acceptable limits. Additionally, D. C. Cook has an operating procedure “Degraded Offsite AC Voltage Response,” that provides directions for responding to degraded switchyard voltage conditions.

4.0 SUMMARY

The NRC staff has reviewed the information in the license amendment request and the response to the RAI and concluded that the requirements of GDC 17 will be fulfilled via implementation of this amendment and is, therefore, acceptable. The NRC staff’s conclusion is based on the following:

(1) The results of the analysis using ETAP confirm that all essential loads will have adequate voltage to perform their design function as long as the voltage remains at or above the analytical limit of 3902 volts or 93.8 percent of 4160 volts at the 4 kV safety-related buses.

(2) The criteria used to determine the LOV and degraded voltage relay setpoint are adequate.

(3) The assumptions, loading, and results of the analysis are reasonable.

(4) The proposed 9-second time delay for the degraded voltage relay considered the time delay associated with voltage changes by the new load tap-changing transformer and supports the safety assumptions for safety-related equipment operation.

(5) The longer time delay (2 minute) associated with degraded voltage relay is for non-accident conditions and will be included in an owner controlled document instead of the TSs. This will continue to prevent unnecessary disconnecting of the offsite power source due to short, inconsequential grid disturbances and prevent unnecessary challenges to safety systems of the unit.

(6) The 2-second time delay for the LOV relay was to bypass short duration system voltage drops and to function in sufficient time to allow the protective actions initiated by the LOV to meet the accident analysis equipment start times.

(7) Switchyard voltages are monitored on the CKOLF computer program. The program provides an alarm to the AEPTC if the expected switchyard voltage is not within the acceptable limit.

Also, the NRC staff finds that the change of the TSs Bases section is consistent with the amendment request and 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. The NRC 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 (66 FR 64298). 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 Contributor: Amar Pal

Date: April 19, 2002