



**INDIANA  
MICHIGAN  
POWER**

A unit of American Electric Power

Indiana Michigan Power  
Cook Nuclear Plant  
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August 10, 2005

AEP:NRC:5811-03  
10 CFR 50.90

Docket Nos: 50-315  
50-316

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

Subject: Donald C. Cook Nuclear Plant Units 1 and 2  
Docket Nos. 50-315 and 50-316  
Response to Request For Additional Information Regarding License Amendment  
Request to Extend the Allowed Outage Times for Emergency Diesel Generators  
(TAC Nos. MC4525 and MC4526)

References: 1) Letter from J. N. Jensen, Indiana Michigan Power Company (I&M), to U. S. Nuclear Regulatory Commission (NRC) Document Control Desk, "Donald C. Cook Nuclear Plant Units 1 and 2 - Docket Nos. 50-315 and 50-316 - Extension of Allowed Outage Times for Emergency Diesel Generators, 69 kV Offsite Power Circuit, Component Cooling Water, and Essential Service Water," AEP:NRC:4811, dated September 21, 2004 (ML042780478).

2) Letter from D. P. Fadel, I&M, to NRC Document Control Desk, "Response to Request For Additional Information Regarding License Amendment Request to Extend the Allowed Outage Times for Emergency Diesel Generators, 69 kV Offsite Power Circuit, Component Cooling Water, and Essential Service Water (TAC Nos. MC4525 and MC4526)," AEP:NRC:5811-01, dated April 7, 2005 (ML051020239).

Dear Sir or Madam:

By Reference 1, as modified by Reference 2, Indiana Michigan Power Company (I&M) proposed to amend Facility Operating Licenses DPR-58 and DPR-74 for Donald C. Cook Nuclear Plant (CNP), Units 1 and 2. I&M proposed changing the Technical Specifications (TS) to permit extending allowed outage time (AOT) from 72 hours to 14 days for an inoperable emergency diesel generator (EDG), and proposed adding a license condition allowing a one-time extension of the AOT for the

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alternate offsite power (69 kilovolt) supply from 72 hours to 14 days. This letter provides I&M's response to an NRC request for additional information regarding the proposed amendment, as discussed in a telephone call with members of the NRC staff on July 12, 2005. Enclosure 1 to this letter provides an affirmation pertaining to the statements made in this letter. Enclosure 2 provides I&M's responses to the specific NRC questions.

As noted above, the proposed amendment consists of two parts: a change to the TS extending the AOT for the EDGs, and addition of a license condition allowing a one-time extension of the AOT for the 69 kilovolt offsite power supply. The proposed EDG AOT extension is supported by a plant modification to install supplemental diesel generators (SDGs) which will provide an additional source of electrical power to safety-related equipment. The one-time extension of the 69 kilovolt power supply AOT is needed to allow connection of the SDGs to the existing electrical distribution system. I&M requests issuance of the license condition allowing a one-time extension of the AOT for the 69 kilovolt power supply by September 9, 2005 to allow connection of the SDGs during a period in which no work is scheduled on EDGs, preferred offsite power switchyards, or the auxiliary feedwater system, and prior to implementation of Improved Technical Specifications. The one-time extension of the 69 kilovolt power supply AOT is not affected by supplemental EDG AOT risk information discussed in a July 28, 2005, telephone call with members of the NRC staff. The one-time extension of the 69 kilovolt power supply AOT does not affect the TS pages involved in the EDG AOT extension.

Enclosure 2 to the original amendment request transmitted by Reference 1 included an evaluation of significant hazard considerations performed in accordance with 10 CFR 50.92 and an environmental assessment performed in accordance with 10 CFR 51.22. The information in this letter provides supporting information for the amendment request submitted by Reference 1. The information provided in this letter does not alter the validity of the original evaluation of significant hazard considerations for the remaining proposed changes. The environmental assessment provided in Enclosure 2 to Reference 1 also remains valid.

This letter contains no new regulatory commitments. Should you have any questions, please contact Mr. John A. Zwolinski, Safety Assurance Director, at (269) 466-2428.

Sincerely,



Daniel P. Fadel  
Engineering Vice President

JRW/rdw

Enclosures:

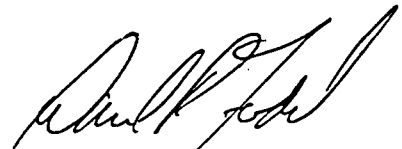
1. Affirmation.
  2. Response to NRC Questions
- c:
- J. L. Caldwell, NRC Region III
  - K. D. Curry, AEP Ft. Wayne, w/o enclosures
  - J. T. King, MPSC
  - MDEQ – WHMD/HWRPS
  - NRC Resident Inspector
  - D. W. Spaulding, NRC Washington, DC

Enclosure 1 to AEP:NRC:5811-03

AFFIRMATION

I, Daniel P. Fadel, being duly sworn, state that I am Engineering Vice President of Indiana Michigan Power Company (I&M), that I am authorized to sign and file this request with the Nuclear Regulatory Commission on behalf of I&M, and that the statements made and the matters set forth herein pertaining to I&M are true and correct to the best of my knowledge, information, and belief.

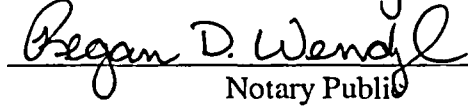
Indiana Michigan Power Company



Daniel P. Fadel  
Engineering Vice President

SWORN TO AND SUBSCRIBED BEFORE ME

THIS 10<sup>th</sup> DAY OF August, 2005

  
\_\_\_\_\_  
Notary Public

My Commission Expires REGAN D. WENZEL  
Notary Public, Berrien County, MI  
~~My Commission Expires Jan. 21, 2009~~

## ENCLOSURE 2 TO AEP:NRC:5811-03

### RESPONSE TO NRC QUESTIONS

As detailed in the transmittal letter for this enclosure, Indiana Michigan Power Company (I&M) previously proposed to amend Facility Operating Licenses DPR-58 and DPR-74 for Donald C. Cook Nuclear Plant (CNP), Units 1 and 2. I&M proposed revising the Technical Specifications (TS) to permit extending allowed outage times (AOTs) from 72 hours to 14 days for an inoperable emergency diesel generator (EDG), and proposed a one-time extension of the AOT for an inoperable alternate offsite power (69 kilovolt) supply from 72 hours to 14 days. This enclosure provides responses to NRC questions regarding the proposed amendment, as discussed in a telephone call with members of the NRC staff, conducted on July 12, 2005.

As discussed in the July 12, 2005, telephone call, the NRC questions pertain to a condition identified at another nuclear power plant. The licensee for that plant determined that, with one unit shutdown and one unit operating, a reactor trip could cause the operating unit to separate from offsite power even though offsite power would have provided sufficient voltage to support operability of connected equipment. This is inconsistent with 10 CFR 50, Appendix A, General design Criterion 17 which requires (in part) that licensees minimize the probability of losing electric power as a result of, or coincident with, the loss of power generated by the nuclear power unit. This condition occurred because the licensee based operability of the offsite power system on the minimum voltage required to operate safety related systems rather than the voltage required to remain connected to the grid (i.e. reset the degraded grid voltage relays).

Accordingly, I&M's responses to the NRC questions are focused on the features that would assure the preferred offsite power source would be considered inoperable if such conditions (trip of one unit with the other unit already off line) existed at CNP.

#### NRC Question 1

*In a case where a plant trip occurred at D.C. Cook with one unit in refueling (or is forced down), what voltage at the switchyard would trigger D.C. Cook to switch from the offsite power source to the emergency diesel generators as a power source for the safety-related busses?*

#### I&M Response to NRC Question 1

As described below, it is not possible to provide a single value for the voltage at the switchyard that would trigger CNP to switch from the offsite power source to the emergency diesel generators. However, the condition identified at another nuclear power plant that is the basis for the NRC question is not directly applicable to CNP. CNP's offsite power operability criteria is based on the degraded voltage relay reset value rather than the relay dropout setpoint.

### CNP Electrical Systems

Preferred offsite power to CNP Unit 1 and Unit 2 is supplied by two transformers. Transformer TR4 is a 765/345 kilovolt (kv) autotransformer with a 34 kv tertiary winding connected to both the 765 kv and 345 kv switchyards. Transformer TR5 is a 345/34 kv two winding transformer connected to the 345 kv switchyard. Following a unit trip, the 4 kv safety related buses are transferred from the main generator output to the reserve auxiliary transformers (RATs) which are supplied by transformers TR4 and TR5. The voltage that would trigger a transfer of the 4 kv safety related buses from the RATs to the EDGs at CNP (i.e., the voltage that actuates the degraded grid voltage protection and the loss of voltage protection) is measured at the 4 kv safety related buses rather than at the switchyards.

### Degraded Grid Voltage Protection

NRC Question 1 requested the switchyard voltage that would actuate degraded grid voltage protection at CNP. The degraded grid voltage protection actuation setpoints, as sensed at the 4 kv safety related buses, are set in accordance with CNP TS. The current CNP TS specify allowable values for the degraded grid voltage protection actuation setpoint of greater than or equal to 3910 volts, and less than, or equal to 4000 volts. However, the switchyard voltages that would result in the voltage at the 4 kv safety-related bus reaching the degraded grid voltage setpoint vary depending on a) the switchyard lineup with respect to transformers TR4 and TR5, b) the switchyard voltage existing at the time the 4 kv safety related buses are transferred to the RATs, c) whether a safety injection (SI) signal or steam generator (SG) lo-lo level signal is present, and grid conditions. These four variables are discussed below.

- a) Three lineups with respect to transformers TR4 and TR5 are possible. The normal or "split" lineup is such that one 4 kv safety related train in a unit would transfer to transformer TR4 and the other 4 kv safety related train in the unit would transfer to transformer TR5. It is also possible to align the system such that both 4 kv safety related trains in a unit transfer to a single transformer, either TR4 or TR5. Since transformers TR4 and TR5 have different impedances, the switchyard voltages that would result in the voltage at the 4 kv safety-related bus reaching the degraded grid voltage setpoint vary depending on the lineup.
- b) The RATs are auto-load tap changing transformers which automatically adjust their output voltage to compensate for changes in switchyard voltage during normal operation and after a unit trip. The switchyard voltage existing just prior to transfer of the 4 kv safety related buses to the RATs determines their initial tap position. The voltage resulting from the initial tap position determines whether the safety related buses reach the degraded voltage set point, and the time it may take to recover bus voltage back above the relay reset point.
- c) When an SI or SG lo-lo level signal is present, the time delay for the degraded voltage relays to actuate is 9 seconds, rather than a longer time delay that is in effect when these signals are not present. This shorter time delay limits the amount of tap changes that the RATs can

make in response to a degraded voltage. With the shorter time delay, the change in switchyard voltage resulting from the unit trip becomes limiting, rather than the initial switchyard voltage.

- d) Transmission grid conditions, including load and reactive power flow and the reactive power output from the CNP units, will determine the change in system voltage at the switchyard following a trip of a CNP unit.

Therefore, there is no single value for switchyard voltage that corresponds to the 4 kv safety related bus degraded grid voltage setpoint. However, as described below, the Cook Plant Online Load Flow (CKOLF) program assures that, for the preferred offsite power source to be considered operable, grid conditions (including the status of the opposite unit) must be such that voltages on the 4 kv safety related bus would return to above the maximum degraded grid voltage reset point within 9 seconds following a trip of the unit.

### CKOLF Program

As described in the I&M letter dated April 7, 2005 (ML051020239), transmission network conditions, including the status of CNP Unit 1 and Unit 2, are monitored during normal operation by the CKOLF program. The CKOLF program determines, based on existing grid conditions, what the magnitude of the change in switchyard voltage would be following a trip of a CNP unit. The CKOLF program compares switchyard voltage change to pre-established limits determined by load flow calculations. If following a simulated unit trip with one CNP unit already off line, the CKOLF predicted switchyard voltage drop is too large to ensure the 4kV bus voltage will return to above the highest allowable degraded grid protection system reset point (currently 4045 volts) within the degraded grid voltage protection time delay (9 seconds), the CKOLF program status screen in the control room will indicate that the preferred offsite power circuit operability limit has been reached. Operations procedures would require that the preferred offsite power source for the unit would be declared inoperable, and the appropriate TS Action statement would be entered.

### NRC Question 2

*Would the post trip voltages at the safety-related busses during the above scenario be adequate to ensure that all safety-related equipment would operate and that the degraded grid relays won't drop out?*

### I&M Response to NRC Question 2

The degraded grid voltage protection actuation set point assures that all safety-related equipment will operate with adequate voltage margin. The degraded voltage relay reset voltage is higher than the dropout voltage. Analysis shows that, in most cases, the degraded grid voltage protection relays will reset within 9 seconds for the scenario described in NRC Question 1.

For example, with the preferred offsite power in the normal split lineup, and with the normal 4 kv safety related bus alignment to the main generator, the Unit 1 and Unit 2 design can tolerate switchyard voltage decreases of approximately 5 percent (%) and approximately 4% (respectively) as a result of the unit trip without resulting in separation of the 4 kv safety related buses from offsite power and transfer to the EDGs. Voltage decreases of this magnitude following a unit trip would not be likely unless there were significant reductions in grid reliability (e.g., regional line and power plant outages) not identified in NRC Question 1. The switchyard voltage decreases that would actuate the degraded grid protection relays are smaller for single transformer (TR4 or TR5) switchyard lineups. However single transformer alignment is rarely used and significantly increased administrative control and monitoring are implemented when it is used.

In those unlikely cases where the degraded grid voltage protection relays would not reset within 9 seconds (e.g., multiple local sources of power to the grid unavailable), the CKOLF program would alert the operators that the preferred offsite power source was inoperable and the appropriate TS Actions would be followed.

The voltage change following a CNP unit trip is the most limiting criteria for offsite power operability for all reasonable grid contingency scenarios considered in grid voltage studies. Based on the design of the load tap changing transformers, there are absolute grid voltage low limits at which the RATs will reach their maximum boost of 15% and be unable to raise 4kv bus voltage further. These limits are below 95% of nominal switchyard voltage for the split and TR4 switchyard lineups, and below 98% of nominal switchyard voltage for the TR5 switchyard lineup. For reference purposes, it is noted that the limiting value of 98% is significantly (5%) below the Unit 1 scheduled voltage. Grid studies have determined that grid voltages this low will not occur for any reasonably expected grid contingency. As such, these conditions are extremely unlikely. Additionally, in the letter dated April 7, 2005, I&M committed to evaluate the condition of the switchyard, offsite power supply, and the grid prior to entering an extended EDG AOT or the extended 69 kv circuit AOT, and hold discussions with the system load dispatcher to 1) ensure no significant grid perturbations were expected during the extended AOT, and 2) request that the system load dispatcher inform CNP if conditions change during extended AOT such that significant grid perturbations do occur or become expected. These commitments provide further assurance that such extremely unlikely grid voltages would not occur during an extended AOT.



**NRC Question 3**

*Would the offsite power system be declared inoperable in the event the voltages are not adequate?*

**I&M Response to NRC Question 3**

As described above, the preferred offsite power source would be declared inoperable if the CKOLF program predicted that, following a unit trip with one CNP unit already off line, the degraded grid voltage protection relays would not reset within 9 seconds. Operability of the preferred offsite power source is judged by functionality. Even if the CKOLF program predicted that adequate voltage would be restored, i.e., restored to above the degraded grid voltage protection set point, the offsite power source would be declared inoperable if voltage were not predicted to return to above the degraded grid voltage protection reset point.