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AEP
INDIANA MICHIGAN POWER

January 28, 2003

AEP:NRC:3008
10 CFR 50.90

Docket No: 50-316

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

Donald C. Cook Nuclear Plant Unit 2
SUPPLEMENTAL INFORMATION REGARDING 4KV SETPOINT
LICENSE AMENDMENT

Reference: Letter from J. E. Pollock, Indiana Michigan Power Company, to Nuclear Regulatory Commission Document Control Desk, "License Amendment Request to Revise Loss-of-Voltage and Degraded-Voltage Setpoints," Submittal AEP:NRC:2332, dated October 16, 2002

In the referenced letter, Indiana Michigan Power Company (I&M), the licensee for Donald C. Cook Nuclear Plant, Unit 2, requested a license amendment to change the Unit 2 Technical Specification values for the 4 kilovolt degraded-voltage and loss-of-voltage relays. During subsequent telephone conversations with members of the Nuclear Regulatory Commission staff, I&M was requested to provide supplemental information to support the license amendment request. The attachment to this letter provides the additional information.

The enclosure to this letter provides an affirmation affidavit.

A001

This letter contains no new commitments. Should you have any questions, please contact Mr. B. A. McIntyre, Manager of Regulatory Affairs, at (269) 697-5806.

Sincerely,

A C. Bakken III
Senior Vice President

RV/rdw

Enclosure:
Affirmation

Attachment:
4kV Bus Undervoltage Setpoint Supplemental Information

c K. D. Curry, Ft. Wayne AEP, w/o enclosure/attachment
J. E. Dyer, NRC Region III
J. T. King, MPSC, w/o enclosure/attachment
MDEQ – DW & RPD, w/o enclosure/attachment
NRC Resident Inspector
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B. A McIntyre, w/o enclosure/attachment
J. E. Newmiller
J. E. Pollock, w/o enclosure/attachment
M. K. Scarpello, w/o enclosure/attachment
T. K. Woods, w/o enclosure/attachment

ENCLOSURE TO AEP:NRC:3008

AFFIRMATION

I, A. Christopher Bakken III, being duly sworn, state that I am Senior Vice President, Nuclear Operations of American Electric Power Service Corporation and 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.

American Electric Power Service Corporation

A. C. Bakken III
Senior Vice President, Nuclear Operations

SWORN TO AND SUBSCRIBED BEFORE ME

THIS 28 DAY OF January, 2003

Danielle M. Schrader
Notary Public

My Commission Expires Apr. 4, 2004

DANIELLE M. SCHRADER
Notary Public, Berrien County, MI
My Commission Expires Apr 4, 2004

ATTACHMENT TO AEP:NRC:3008

4KV BUS UNDERVOLTAGE SETPOINT
SUPPLEMENTAL INFORMATION

Indiana Michigan Power Company (I&M), the licensee for Donald C. Cook Nuclear Plant (CNP) Unit 2, submitted proposed revisions to Unit 2 Technical Specification (TS) Table 3.3-4 and the bases for TS 3/4.3.1 and 3/4.3.2 in a letter from J. E. Pollock to the Nuclear Regulatory Commission (NRC) Document Control Desk dated October 16, 2002. The proposed revisions are:

- Change the settings for the loss-of-voltage (LOV) relay trip setpoint for the motor driven auxiliary feedwater pumps and the loss of power functional units.
- Revise the degraded-voltage relay trip setpoint, time delay, and allowable values for the loss of power functional unit.
- Explain the applicability of the time delay associated with the 4.16 kilovolt (kV) bus degraded-voltage relay trip setpoint.

In subsequent telephone conversations, NRC personnel requested additional information regarding the proposed amendment. I&M's responses to the NRC requests are provided below.

NRC Request Number 1

Clarify that all onsite distribution levels include 120/208 volt levels.

I&M Response

The degraded-voltage relay's setpoint and time delay values were established based on the requirements that essential loads perform their design functions. The auxiliary bus voltage analysis used to establish the relay setpoints considers essential loads at all auxiliary system distribution levels, including the 120/208-volt system level.

NRC Request Number 2

Provide details of the auxiliary bus voltage analysis (specifically, assumptions, loading and summary of results).

I&M Response

The auxiliary bus voltage analysis established the analytical limit (AL), the minimum required steady state voltage at the 4.16 kV safety-related busses. Essential loads in the system will have adequate voltage to perform their design function, provided the 4.16 kV safety-related voltages remain at or above the AL. The auxiliary bus voltage analysis calculated the available voltages at the bus level and the equipment terminals, and verified that the available voltages were adequate for essential loads to perform their design functions. The Electrical Transient Analyzer Program was used to perform the power system analysis. The system model was developed from approved design drawings and procedures. The system model reflects the normal configuration of CNP and the expected configurations under design basis accident conditions. Connected loads and their operating conditions used in the model (e.g., percent loading, duration) were based on available design information for meeting the most demanding design requirements. The results of the analysis confirmed that essential loads in the system will have adequate voltage to perform their design function, provided that the voltages remain at or above the AL of 3902 volts, or 93.8 percent, at the 4.16 kV safety-related busses.

Details of the loads are provided in Figure 1, which is a one-line drawing of the 4.16 kV and 600 volt busses for Train "A". Train "B" is similar. The assumptions used in the auxiliary bus voltage analysis that are pertinent to the degraded-voltage relay setpoints are provided in Table 1.

NRC Request Number 3

Describe how the following criteria are met in the voltage response analysis.

- Preventing running Class 1E motors from stalling.
- Ensuring any load can be started without damaging any loads that are already running.
- Preventing load shedding due to thermal overload/relaying.

I&M Response

The lowest anticipated transient voltage on the 4.16 kV bus is 79.88 percent of the rated bus voltage, and is the result of starting a reactor coolant pump. The minimum required voltage to prevent Class 1E motor stalling has been determined to be 76.68 percent of the rated bus voltage. The proposed TS LOV relay setting has a range of 3195 volts to 3280 volts. These values correspond to 76.80 percent and 78.85 percent, respectively. This range is sufficient to prevent spurious actuation during transients (i.e., the relay should not actuate during voltage transients experienced during the starting of plant motors) The range is also sufficient to preclude the stalling, damage, or spurious tripping of Class 1E motors due to low voltage.

The auxiliary bus voltage analysis demonstrated that:

- The voltage of the 4.16 kV bus remains above the upper allowable setpoint value for the LOV relay during the start of the largest plant motor (reactor coolant pump).

- The minimum allowable voltage is sufficient to preclude the stalling of Class 1E motors.

- The increased current resulting from a voltage just above the lower allowable setpoint value of the LOV relay is within the allowable current versus time range for Class 1E motor overcurrent protection. This ensures that motors will not be thermally damaged or trip prior to degraded-voltage relay actuation.

NRC Request Number 4

Why do the proposed Unit 2 Technical Specification LOV setpoint values differ from the Unit 1 Values?

I&M Response

The difference in the LOV setpoint values is the result of differences in plant layout and design. These differences include cable lengths and the total electrical load of each unit (e.g., Unit 1 has three circulating water pumps while Unit 2 has four circulating water pumps).

TABLE 1
ASSUMPTIONS FOR THE DEGRADED-VOLTAGE ANALYSIS

1. Safety-related cable conductor temperature was assumed to be 90 degrees Celsius (°C) for load flow and voltage drop modeling unless otherwise noted. This was based on the continuous rating of the cable insulation.

2. Cable conductor temperature for motor operated valve (MOV) cables was assumed to be 90°C outside of containment and in non-high energy line break areas.

3. If walkdown information was not available, motor information (power factor, starting power factor, and efficiency) were based on NEMA Standard MG-1 and Sargeant and Lundy (S&L) Standards S&L ESC-165 and ESC-193.

4. Battery chargers and inverters were modeled as constant kilovolt ampere (kVA) loads, which is conservative. These devices are essentially regulated power supplies at or below their ratings and they current limit when their ratings are exceeded. Modeling them as constant power loads ensures maximum current when input line voltage is low, which is conservative for voltage drop and loading calculations.

5. Intermittent loads (e.g., valves, compressors, sump pumps) are modeled as "off" for steady state load flow cases. These loads operate for short periods and are not likely to operate simultaneously.

6. Unless specifically indicated otherwise, the allowable operating voltages for electrical equipment were assumed to be plus or minus 10 percent of nominal.

7. Unless specifically indicated otherwise, the minimum allowable operating voltages for safeguards motors were as follows (excluding MOVs):

   - 4.16 kV or 4 kV class motors (starting): 80 percent nominal rating
   - 4.16 kV or 4 kV class motors (running): 90 percent nominal rating
   - 575 volt class motors greater than 200 horsepower (starting): 80 percent nominal rating
   - 575 volt class motors less than 200 horsepower (starting): 85 percent nominal rating
   - 575 volt class motors (running): 90 percent nominal rating

8. When the starting power factor was not available, 85 percent is used for motors less than 0.5 horsepower and 20 percent was used for motors greater than 250 horsepower.

9. When locked rotor current was not available, 625 percent of rated full load current was used.

10. For lighting and distribution transformers, the loading on the transformer was assumed to be 80 percent of the kVA rating.

11. When walkdown data was not available, the design document (e.g., station drawings) data was assumed to be correct.

12. A 90 percent power factor was used for MOV starting power factor if nameplate information was not available.

13. It was assumed that 575 volt AC motor parameters (power factor, service factor, etc.) were the same as for 460 volt AC motors on a per unit basis.

14. Small distribution transformer (e.g., 600 volt-240/120 volt) loading was assumed to be 80 percent of nameplate if the loading was not shown on design documents.

FIGURE 1

MAIN AUXILIARY ONE-LINE DIAGRAM
BUS "A" & "B"
ENGINEERED SAFETY SYSTEM
(TRAIN "A")

Note: In accordance with the restrictions stated on the drawing, I&M hereby releases this document to the NRC for its information and use in connection with the review of I&M's submittal. I&M also permits the NRC to reproduce the drawing as necessary to facilitate review and distribution of the submittal to meet NRC requirements.

THIS PAGE IS AN OVERSIZED DRAWING OR FIGURE,

THAT CAN BE VIEWED AT THE RECORD TITLED: DWG. NO. OP-2-12002-29 MAIN AUXILIARY ONE-LINE DIAGRAM BUS "C" & "D" ENGINEERED SAFETY SYSTEM (TRAIN "A") WITHIN THIS PACKAGE...OR, BY SEARCHING USING THE DRAWING NUMBER:

NOTE: Because of this page's large file size, it may be more convenient to copy the file to a local drive and use the Imaging (Wang) viewer, which can be accessed from the Programs/Accessories menu.