INDIANA MICHIGAN POWER
A unit of American Electric Power

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U. S. Nuclear Regulatory Commission
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Rockville, Maryland 20852

Donald C. Cook Nuclear Plant Units 1 and 2
RESPONSE TO NUCLEAR REGULATORY COMMISSION GENERIC LETTER 2006-02
REGARDING GRID RELIABILITY

Reference: U. S. Nuclear Regulatory Commission Generic Letter 2006-02, "Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power," dated February 1, 2006 (ML060180352).

By the referenced generic letter, the Nuclear Regulatory Commission requested nuclear power plant licensees submit information so that it may determine if compliance is being maintained with regulatory requirements governing electric power sources and associated personnel training. The attachment to this letter provides the requested information for Donald C. Cook Nuclear Plant, Unit 1 and Unit 2.

This letter contains no new regulatory commitments. Should you have any questions, please contact Mr. Michael K. Scarpello, Regulatory Affairs Supervisor, at (269) 466-2649.

Sincerely,

Joseph N. Jensen
Site Vice President

JRW/jen

Attachment: Response to Nuclear Regulatory Commission Generic Letter 2006-02

A123

c: J. L. Caldwell, NRC Region III
K. D. Curry, AEP Ft. Wayne, w/o attachments
J. T. King, MPSC
MDEQ – WHMD/RPMWS
NRC Resident Inspector
P. S. Tam, NRC Washington, DC

AFFIRMATION

I, Joseph N. Jensen, being duly sworn, state that I am Site Vice President of Indiana Michigan Power Company (I&M), that I am authorized to sign and file this letter 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.

Joseph N. Jensen
Site Vice President

SWORN TO AND SUBSCRIBED BEFORE ME

THIS 31 DAY OF March, 2006

Notary Public

My Commission Expires Apr. 4, 2008

DANIELLE M. BURGOYNE
Notary Public, State of Michigan
County of Berrien
My Commission Expires Apr. 4, 2008
Acting in the County of Berrien

ATTACHMENT TO AEP:NRC:6054-01

RESPONSE TO NUCLEAR REGULATORY COMMISSION
GENERIC LETTER 2006-02

By Generic Letter (GL) 2006-02, "Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power," dated February 1, 2006, the Nuclear Regulatory Commission (NRC) requested nuclear power plant licensees submit information so that it may determine if compliance is being maintained with regulatory requirements governing electric power sources and associated personnel training. This letter provides the requested information for Donald C. Cook Nuclear Plant (CNP), Unit 1 and Unit 2.

CNP Offsite Power Sources

As shown in the sketch provided at the end of this attachment, power from the grid to CNP's preferred qualified offsite circuit is provided by 345 kilovolt (kV) and 765kV sources. These sources are connected via a 765kV/345kV/34.5kV 3-winding transformer (TR4). The CNP electrical distribution system can be supplied from the grid in any of three alignments. In the normal alignment, 345kV/34.5kV transformer TR5 and the 34.5kV tertiary winding of transformer TR4 are configured in a "split bus" alignment such that each transformer supplies one of two automatic load tap changing Reserve Auxiliary Transformers (RATs) in each unit. It is also possible for either TR4 or TR5 to supply the entire plant auxiliary load via the RATs.

The 4kV buses can also be supplied from other sources not shown on the sketch. During normal plant operation, the 4kV buses are supplied from the main generator via the Unit Auxiliary Transformers (UATs). Upon a main generator trip, the plant buses are transferred to the RATs. If the generator trip resulted from a reactor trip, the transfer occurs following a 30-second time delay. If the generator trip resulted from a generator fault, there is no time delay. The 4kV buses may also be supplied by the alternate qualified offsite circuit via a 69kV/4kV transformer. Alignment to the alternate qualified offsite circuit is accomplished manually from the control room.

As recognized in the footnote on page 2 of the GL, some nuclear power plants were designed and licensed to plant-specific principal design criteria, rather than the General Design Criteria (GDC) in Appendix A to 10 CFR 50. CNP was designed to comply with the intent of the Atomic Energy Commission's proposed GDC, as published for comment in July 1967, rather than the current GDC. Plant-specific design criteria for the CNP electrical systems are described in Chapter 8 of the CNP Updated Final Safety Analysis Report.

As used in the GL, the term "offsite power system" appears to refer to the transmission network or grid. The CNP Technical Specifications (TS) contain operability requirements for the preferred and alternate qualified offsite circuits, but do not contain operability requirements for the grid. Therefore, discussions of operability address operability of the preferred and/or alternate qualified offsite circuits.

Organizational Relationships

Indiana Michigan Power Company (I&M) is the operator for CNP and is the licensee in accordance with 10 CFR Parts 30, 40, 50, and 70. As used in this letter, the term CNP refers to the plant (Units 1 and 2) and the plant staff. The portion of the grid that supplies power to, and receives power from, CNP is owned and operated by I&M's parent company, American Electric Power (AEP). AEP is designated as a Transmission Owner, or TO. CNP is located within AEP's Fort Wayne Transmission Dispatch Authority. All communication regarding the offsite power supply to CNP is conducted through the AEP Fort Wayne Transmission Dispatch Center. The AEP Fort Wayne Transmission Dispatch Center communicates with the AEP System Control Center, located in Columbus, Ohio, which conducts all communication regarding transmission-related issues (including such issues as voltage at the CNP switchyards) with PJM Interconnection, LLC (PJM). PJM controls and coordinates the operation of AEP's portion of the grid, along with that of 17 other utilities, i.e., 17 other TOs. The PJM service area includes portions of Illinois, Indiana, Michigan, Kentucky, Ohio, West Virginia, Tennessee, Pennsylvania, Virginia, Maryland, Delaware, and New Jersey.

For CNP generation-related issues (including such issues as CNP power output), CNP communicates with the AEP Generation Dispatch Center, which communicates with PJM.

Information Beyond the Control of CNP

Some of the questions in GL 2006-02 seek information about analyses, procedures, and activities concerning grid reliability of which CNP does not have first-hand knowledge, that are beyond the control of CNP, and which cannot be verified and validated (V&V) through CNP's V&V process. Therefore, in providing information responsive to such questions, CNP makes no representation as to its accuracy or completeness.

PJM provided the information regarding the PJM Operating Agreement, PJM Transmission Owners Agreement, PJM Manual requirements, PJM Energy Management System (EMS) Security Analysis application, and seasonal grid stress, in the responses to NRC Requested Information Items 1(a), (b), and (f), 2(a) through (g), 5(b) and (c), 6(a) and (e), and 7(a). The PJM Operating Agreement, PJM Transmission Owners Agreement, and PJM Manual are available on the internet at: http://www.pjm.com/documents/documents.html.

The CNP TO provided the information regarding the CNP–TO Inter-Organizational Agreement, the TO EMS Security Analysis application, the Cook Online Load Flow (CKOLF) program, and the TO Emergency Operating Plan, in the responses to NRC Requested Information Items 1(a), (b), and (f), 2(a) through (f), 3(a), 5(b) and (f), 6(a), (b), (c), and (e), and 7(a). The plant procedure implementing the CNP–TO Inter-Organizational Agreement is available at CNP.

NRC Requested Information Item 1(a)

Use of protocols between the NPP [nuclear power plant] licensee and the TSO [transmission system operator], ISO [independent system operator], or RC/RA [reliability coordinator/authority] and the use of analysis tools by TSOs to assist NPP licensee in monitoring grid conditions to determine the operability of offsite power systems under plant TS.

GDC 17, 10 CFR Part 50, Appendix A, requires that licensees minimize the probability of the loss of power from the transmission network given a loss of the power generated by the nuclear power unit(s). [In this GL, GDC 17 includes equivalent plant specific principal design criteria.]

1. *Use of protocols between the NPP licensee and the TSO, ISO, or RC/RA to assist the NPP licensee in monitoring grid conditions to determine the operability of offsite power systems under plant TS.*

   (a) Do you have a formal agreement or protocol with your TSO?

Response to Item 1(a)

Yes. The CNP TSO is PJM. All PJM TOs execute the PJM Operating Agreement, which details the obligations and responsibilities of PJM to the TOs and vice versa. In the Operating Agreement, each TO agrees to abide by the requirements contained in the PJM Manuals. The PJM Operating Agreement requires PJM to: "Incorporate the grid reliability requirements applicable to nuclear generating units in the PJM Region planning and operating principles and practices."

The PJM Manuals contain the specific operational requirements that each TO is required to follow and also indicates the requirements of PJM to the TOs. PJM Manual M-1, "Control Center Requirements," Attachment B, "Nuclear Plant Communication Protocol," provides the roles and responsibilities of nuclear stations, TOs, and PJM with regard to communications both in normal and emergency circumstances. The nuclear plant notification requirements are contained in PJM Manual M-3, "Transmission Operations."

The TOs are also signatories to a PJM Transmission Owners Agreement (TOA). Section 4.5 of the TOA requires the TOs to operate and maintain their transmission facilities in accordance with the PJM Manuals. Moreover, the TOs are required under that section of the TOA to conform to PJM's operating instructions as they apply to the TOs' transmission facilities. Also, in section 4.7 of the TOA, the TOs agree to follow PJM's operating instructions during an emergency.

In addition, CNP has an Inter-Organizational Agreement with its TO, AEP. This agreement establishes responsibilities and lines of communication for the various AEP organizations responsible for the operation, maintenance, and engineering of the switchyard, transmission, and distribution facilities associated with CNP.

NRC Requested Information Item 1(b)

(b) Describe any grid conditions that would trigger a notification from the TSO to the NPP licensee and if there is a time period required for the notification.

Response to Item 1(b)

PJM Manual M-3 requires PJM to initiate notification to a member NPP through its respective TO control center if PJM identifies an NPP switchyard voltage violation. PJM Manual M-3 states: "This notification should occur within 15 minutes for voltage contingency violations and immediately for actual voltage violations. To the extent practical, PJM shall direct operations such that the violation is remedied within 30 minutes."

In addition, PJM Manual M-13, "Emergency Operations," identifies a series of alerts, warnings, and actions that PJM issues to PJM members depending on the identified grid condition. The PJM message is communicated to the NPP by their TO for various grid conditions, including:

Capacity emergencies
Maximum emergency generation loading
Load management curtailment
Voltage reduction initiation
Manual load dump initiation
Light load emergencies
Minimum generation emergency
Local minimum generation emergency
Weather/environmental emergency
Hot/cold weather alerts
Thunderstorms and tornadoes
Solar magnetic disturbances
Sabotage/terrorism emergencies

The CNP-TO Inter-Organizational Agreement describes the TO's notification requirements for generator voltage schedules, switchyard bus voltages, megavolt-amp reactive (MVAR) output, and megawatt (MW) output. The CNP–TO Inter-Organizational Agreement further describes the TO's responsibility to monitor grid conditions to ensure that adequate voltage levels to support CNP in the event of an accident are maintained. The requirement is to promptly notify CNP of any existing or anticipated conditions which would result in inadequate voltage support.

Additionally, the CNP–TO Inter-Organizational Agreement describes the notification and mitigation protocols for CNP voltage limits. Specifically, the CNP–TO Inter-Organizational Agreement requires the TO to perform the following: 1) Independently monitor for CNP actual and contingency voltage violations as reflected on the grid; 2) Communicate notification from PJM if PJM identifies a CNP switchyard voltage violation.

NRC Requested Information Item 1(c)

(c) Describe any grid conditions that would cause the NPP licensee to contact the TSO. Describe the procedures associated with such a communication. If you do not have procedures, describe how you assess grid conditions that may cause the NPP licensee to contact the TSO.

Response to Item 1(c)

In accordance with the CNP-TO Inter-Organizational Agreement, CNP contacts the TO for changes in the following grid conditions:

- Challenges to maintaining voltage schedule.
- MVAR and MW output challenges.
- Adjustments of generating operating parameters, or equipment realignments which have the potential to impact the generation capability of the plant or to create perturbations on the system.
- Current or planned entry into TS Required Actions having the potential to impact scheduled work in the CNP switchyard.

CNP procedures for turbine generator normal startup and operation, power escalation, power operation including load swings, and power reduction contain requirements for notifying the TO. CNP procedures also contain requirements to notify the TO if the generator voltage regulator is not in "automatic" or to restore out-of-service circuits in the event of a threat of severe weather.

CNP would contact the TO as necessary to restore voltage on the preferred qualified offsite circuit when directed by annunciator response procedures for low plant bus voltages and for degraded offsite voltages, and if shiftly surveillances identified an actual or contingency voltage violation affecting the circuit.

NRC Requested Information Item 1(d)

(d) Describe how NPP operators are trained and tested on the use of the procedures or assessing grid conditions in question 1(c).

Response to Item 1(d)

The CNP procedure implementing the CNP-TO Inter-Organizational Agreement is currently reviewed in a classroom setting every two years by licensed (licensed in accordance with 10 CFR 55) and non-licensed operators, and a qualification test on this procedure is administered.

CNP licensed operators are trained to recognize various alignments of the offsite power supplies in the Initial License Training (ILT) program lesson plan for the electrical balance-of-plant

systems. The ILT program includes response to a degraded offsite voltage condition in a lesson plan covering abnormal operating procedures. This lesson includes a discussion of an Institute of Nuclear Power Operations Significant Operating Experience Report (SOER) on loss of grid events. Topics from the SOER were also included in an operating experience discussion in the ILT classroom lesson plan for loss of all alternating current (AC) power. Licensed operators are trained to perform the surveillances which monitor voltage to the preferred qualified offsite circuit.

The 2005 Licensed Operator Requalification (LOR) program contained classroom and simulator lesson plans which included:

- Daily Operations TS surveillances of preferred qualified offsite circuits.
- Weekly Operations TS surveillances of preferred qualified offsite circuits and plant distribution systems.
- Event initiated surveillance for an inoperable TS required AC power supply.
- Degraded offsite voltage response.
- Annunciator responses for low bus voltage.

The ILT program includes training on the power escalation, power reduction, and normal power maneuvering procedures. LOR training typically provides training on power escalation or reductions shortly before planned power changes, such as occur at the beginning and end of planned outages.

Instructions to notify the TO when placing the main generator voltage regulator in manual or returning it to automatic are contained in the normal procedure for generator operation. These instructions are clearly stated in the procedure. The procedure attachment which details instructions for switching the voltage regulator is designated as "continuous use," which means that the attachment must be in-hand and accomplished step-by-step. This task is clearly defined and controlled. Therefore, specific training regarding TO notification has not been administered.

Examinations for the LOR and ILT programs are in accordance with LOR and ILT program descriptions and with Training Department administrative procedures governing examinations.

NRC Requested Information Item 1(e)

> *(e) If you do not have a formal agreement or protocol with your TSO, describe why you believe you continue to comply with the provisions of GDC 17 as stated above, or describe what actions you intend to take to assure compliance with GDC 17.*

Response to Item 1(e)

As described in response to NRC Requested Information Item 1(a), CNP has formal agreements with PJM and the TO. Therefore, this NRC Requested Information Item is not applicable to CNP.

NRC Requested Information Item 1(f)

> *(f) If you have an existing formal interconnection agreement or protocol that ensures adequate communication and coordination between the NPP licensee and the TSO, describe whether this agreement or protocol requires that you be promptly notified when the conditions of the surrounding grid could result in degraded voltage (i.e., below TS nominal trip setpoint value requirements; including NPP licensees using allowable value in its TSs) or LOOP after a trip of the reactor unit(s).*

Response to Item 1(f)

PJM Manual M-3 requires PJM to initiate notification to an NPP through its respective TO's control center if PJM identifies an NPP switchyard voltage violation. PJM Manual M-3 states: "This notification should occur within 15 minutes for voltage contingency violations and immediately for actual voltage violations. To the extent practical, PJM shall direct operations such that the violation is remedied within 30 minutes." A trip of one CNP unit is one of the contingencies analyzed by PJM. PJM analyzes CNP switchyard contingency voltages to the voltage limits provided by CNP. The degraded voltage limits, which are provided by CNP, are derived from the plant's design basis analysis.

The CNP-TO Inter-Organizational Agreement describes the notification and mitigation protocols for CNP degraded voltage limits. The TO is specifically required to: 1) Independently monitor for CNP actual and contingency voltage violations as reflected on the grid; 2) Communicate notification from PJM if PJM identifies a CNP switchyard voltage violation.

Additionally, the CNP-TO Inter-Organizational Agreement describes the CNP contingency voltage drop mitigation strategy. The CNP–TO Inter-Organizational Agreement describes the use of a unique analysis tool that evaluates the current transmission topology and power flow conditions to assess the contingency voltage on the 34.5kV bus after a trip of each CNP unit individually. The derived output of this analysis tool is available for viewing in each CNP unit control room and is checked shiftly by CNP Operations personnel while a unit is in Modes 1 and 2. This analysis tool is described further in the response to NRC Requested Information Item 2(a).

NRC Requested Information Item 1(g)

> *(g) Describe the low switchyard voltage conditions that would initiate operation of plant degraded voltage protection.*

Response to Item 1(g)

Switchyard voltage conditions that would initiate operation of plant degraded voltage protection following a trip of the affected unit are different for each switchyard configuration and for both auxiliary power system alignments (power supplied by the preferred qualified offsite circuit via the RATs or by the main generator via the UATs). In all configurations, CNP has two criteria for determining if post-trip voltages are acceptable. The criteria include a maximum drop in grid voltage as a result of a CNP unit trip (referred to as maximum voltage swing) and a minimum absolute switchyard voltage that would result in the automatic load tap changing RATs reaching the limit of their tap changing capability ("tapping out"). The specific criteria is outlined in the tables below. The "Alarm" values in the tables below are only relevant to CNP's internal contingency analysis tools. These values do not represent operability limits, but are selected, based on Engineering judgment, to allow the transmission operator time to make adjustments prior to reaching an operability limit. The values in the "Limit" column are the operability limits and represent the switchyard voltage conditions that would result in operation of the plant degraded voltage protection.

TABLE 1
Maximum switchyard voltage swing requirements to reset the degraded voltage relays (DGRs) with the main generator synchronized to the grid and the bus(es) powered from the UATs:

CNP Offsite Power Source (see sketch)	34.5kV Switchyard Source Breaker Position (see sketch)	345kV System Switchyard Swing Limit (Value @ DGR reset.) % of 345kV				TR4 Tertiary 34.5kV System Switchyard Swing Limit (Value @ DGR reset) % of 34.5kV			
		Unit 1		Unit 2		Unit 1		Unit 2	
		Limit	Alarm	Limit	Alarm	Limit	Alarm	Limit	Alarm
TR5 & TR4	BD – Open BE & BC – Closed	5.0%	4.5%	4.0%	3.5%	5.3%	4.8%	3.9%	3.4%
TR5	BD & BE - Closed BC – Open	1.1%	0.6%	0.3%	-0.2%	N/A	N/A	N/A	N/A
TR4	BD & BC – Closed BE – open	N/A	N/A	N/A	N/A	4.3%	3.8%	2.8%	2.3%

TABLE 2
Maximum switchyard voltage swing requirements to reset the DGRs with the main generator synchronized to the grid and the bus(es) powered from the RATs:

CNP Offsite Power Source (see sketch)	34.5kV Switchyard Source Breaker Position (see sketch)	345kV System Switchyard Swing Limit (Value @ DGR reset.) % of 345kV				TR4 Tertiary 34.5kV System Switchyard Swing Limit (Value @ DGR reset) % of 34.5kV			
		Unit 1		Unit 2		Unit 1		Unit 2	
		Limit	Alarm	Limit	Alarm	Limit	Alarm	Limit	Alarm
TR5 & TR4	BD – Open BE & BC – Closed	1.6%	1.1%	1.4%	0.9%	2.4%	1.9%	2.3%	1.8%
TR5	BD & BE - Closed BC – Open	1.0%	0.5%	1.0%	0.5%	N/A	N/A	N/A	N/A
TR4	BD & BC – Closed BE – open	N/A	N/A	N/A	N/A	1.5%	1.0%	1.4%	0.9%

TABLE 3
Minimum switchyard voltages to avoid operation of degraded voltage protection

CNP Offsite Power Source (see sketch)	34.5kV Switchyard Source Breaker Position (see sketch)	345kV System Switchyard Swing Limit (Value @ DGR reset.) % of 345kV		TR4 Tertiary 34.5kV System Switchyard Swing Limit (Value @ DGR reset) % of 34.5kV	
		Unit 1	Unit 2	Unit 1	Unit 2
		Limit	Limit	Limit	Limit
TR5 & TR4	BD – Open BE & BC – Closed	91.3%	91.3%	91.3%	92.1%
TR5	BD & BE - Closed BC – Open	97.2%	97.7%	N/A	N/A
TR4	BD & BC – Closed BE – open	N/A	N/A	93.3	94.0

NRC Requested Information Item 2(a)

2. *Use of criteria and methodologies to assess whether the offsite power system will become inoperable as a result of a trip of your NPP.*

   (a) Does your NPP's TSO use any analysis tools, an online analytical transmission system studies program, or other equivalent predictive methods to determine the grid conditions that would make the NPP offsite power system inoperable during various contingencies? If available to you, please provide a brief description of the analysis tool that is used by the TSO.

Response to Item 2(a)

Yes. The PJM EMS includes a Security Analysis application which runs approximately once per minute and analyzes approximately 4,000 contingencies on the PJM system. The analysis provides results with respect to voltage limit and voltage drop limit violations. One of the contingencies analyzed by the PJM EMS Security Analysis application is a trip of a CNP unit.

The TO also has an EMS Security Analysis application. However, the TO and CNP use a plant-specific application of contingency analysis software that allows near real-time monitoring of offsite power system conditions from the plant control rooms. Using existing applications, a special computer program, the Cook Online Load Flow (CKOLF) program, has been developed and implemented to predict the change in local grid voltage following a simulated trip of either CNP unit. The results are transferred at approximately 30-minute intervals to a web server. CNP control room operators access the results via an intranet web page available on control room workstations. The web page displays the predicted post-trip voltage change and compares the results to pre-established limits shown in Table 1 and Table 2 in the response to NRC Requested Information Item 1(g). If predicted post-trip voltage change is outside of pre-established operability limits, a visual "Limit" condition is displayed. An "Alarm" condition is displayed when the predicted post-trip voltage change is approaching an operability limit. Using plant procedures and the CKOLF results, CNP operators determine operability of the preferred qualified offsite circuit. The CKOLF web page is also monitored by the TO, and alarms are provided in the AEP System Control Center.

The CKOLF calculation is based on a real-time load flow case. The real-time Load Flow base case makes use of as much real-time information about the system as is practical. In particular, the following sources of information are used during the case setup:

- Network configuration as determined by the real-time status of circuit breakers and switches.
- Energy transactions.
- AEP system load.
- Generating unit availability and MW output.
- Complex voltage solution computed by the state estimator function.
- Static network data, such as equipment parameters (e.g., impedance) and topological connectivity.

The physical network model used by the CKOLF program during the calculation is constructed from the static network data by applying the switching device positions. The resulting network model has approximately 18,000 nodes and represents the entire eastern interconnected network. The more distant areas, such as Florida and the upper Midwest, are represented by equivalents; however, the effects of these areas are still present in the model.

Criteria for Alarm and Limits are provided by CNP and are based on plant auxiliary power system load flow models. The Limit values relate to the maximum change in grid voltage that can be accepted while maintaining sufficient voltage to the 4kV safety buses to ensure that degraded voltage protection relays will reset. The models and associated alarm levels include all allowed alignments of the preferred qualified offsite circuit.
Two dedicated systems (CKOLF1 and CKOLF2), located in the AEP System Control Center, have been configured to automatically retrieve the most recent real-time load flow base case from the TO software systems every 30 minutes. The case is immediately solved when it is retrieved from the real-time system. Breaker state changes are automatically made in the program to simulate the outage of the CNP units. A Unit 1 outage is simulated first. Then

Unit 1 is simulated as operating and a Unit 2 outage is simulated. In each case, the output power of the remaining CNP unit is held fixed at the value that was retrieved from the real time system. After each of these changes, the Load Flow case is solved and a special data collection program runs, which locates the CNP voltages in the Load Flow output tables and determines if these voltages are within the established limits.

The dual CKOLF1 and CKOLF2 systems have been provided to increase the reliability of the CKOLF application. Both systems perform the same processing at all times. Prior to sending the results to the web server, each system interrogates the status of the other system in order to determine which system should supply the results. The processing is such that CKOLF1 is considered the primary system and CKOLF2 is considered the secondary system.

The CKOLF system provides control room operators with direct access to critical grid information with minimal reliance on a notification from an external organization. The information provided by the system is used to determine operability of the preferred qualified offsite circuit in accordance with TS. The pre-planned response procedures and communication protocols ensure efficient implementation of corrective action.

CKOLF does not currently monitor the absolute voltage limits provided in Table 3 of the response to NRC Requested Information Item 1(g). With the exception of the TR5 only configuration, the absolute voltage limits are below the normal notification limits of PJM. Use of the TR5 only configuration is very infrequent due to the limited margin and would involve additional grid monitoring, risk reviews, and oversight. The time in this configuration would be minimized.

NRC Requested Information Item 2(b)

> *(b) Does your NPP's TSO use an analysis tool as the basis for notifying the NPP licensee when such a condition is identified? If not, how does the TSO determine if conditions on the grid warrant NPP licensee notification?*

Response to Item 2(b)

Yes. The results of the PJM EMS Security Analysis application contain the specific contingency of an NPP tripping as the contingent element. Violation of the unit trip contingency voltage limit would result in notification of CNP via the TO.

The TO uses the CKOLF program and provides notification to CNP if a contingency voltage violation occurs.

Additionally, CNP uses the CKOLF program as the primary means for determining operability of the preferred qualified offsite circuit.

NRC Requested Information Item 2(c)

(c) If your TSO uses an analysis tool, would the analysis tool identify a condition in which a trip of the NPP would result in switchyard voltages (immediate and/or long-term) falling below TS nominal trip setpoint value requirements (including NPP licensees using allowable value in its TSs) and consequent actuation of plant degraded voltage protection? If not, discuss how such a condition would be identified on the grid.

Response to Item 2(c)

Yes. The trip of a CNP unit is one of the contingencies analyzed by the PJM EMS Security Analysis application. The PJM EMS Security Analysis application compares the CNP switchyard contingency voltages to values established in accordance with PJM Manual M-3.

The TO uses the CKOLF program to analyze the contingency of the loss of a CNP unit. The CKOLF program uses the "Alarm" and "Limit" values in Tables 1 and 2 provided in the response to NRC Requested Information Item 1(g). The Alarm and Limit values are provided by CNP and are based on maintaining the 4kV buses above the reset point of the degraded voltage relays. The set points of the degraded voltage relays are established in accordance with the CNP TS. The CNP operators use the CKOLF program as a means of confirming the operability of the preferred qualified offsite circuit.

NRC Requested Information Item 2(d)

(d) If your TSO uses an analysis tool, how frequently does the analysis tool program update?

Response to Item 2(d)

The PJM EMS Security Analysis application updates approximately every minute. The CKOLF program used by the TO and CNP updates approximately every 30 minutes.

NRC Requested Information Item 2(e)

(e) Provide details of analysis tool-identified contingency conditions that would trigger an NPP licensee notification from the TSO.

Response to Item 2(e)

PJM is required to notify the TO System Control Center if actual or contingency voltages are determined to be below CNP switchyard voltage limits as described in the response to NRC Requested Information Item 2(c). This requirement applies to all contingencies involving the tripping of a CNP unit or any transmission facility. The notification is required even if the voltage limits are the same as the standard PJM voltage limits.

CKOLF is monitored by the TO and alarms are provided in the TO's System Control Center. The TO is required to notify CNP if the CKOLF program indicates that contingency voltages are determined to be below CNP switchyard voltage limits as described in the response to NRC Requested Information Item 2(c). The TO is also required to comunicate the above described PJM notifications to CNP.

The CKOLF program display provides a visual alarm if the program indicates that actual or contingency voltages are determined to be below CNP switchyard voltage limits as described in the response to NRC Requested Information Item 2(c). The CKOLF program display is available in the control rooms of both units and is checked shiftly.

NRC Requested Information Item 2(f)

(f) If an interface agreement exists between the TSO and the NPP licensee, does it require that the NPP licensee be notified of periods when the TSO is unable to determine if offsite power voltage and capacity could be inadequate? If so, how does the NPP licensee determine that the offsite power would remain operable when such a notification is received?

Response to Item 2(f)

Yes. As described in the response to NRC Requested Information Item 2(a), CNP unit trip contingency voltage calculations are performed by the PJM EMS Security Analysis application. The PJM EMS Security Analysis application consists of a primary and backup system. CNP is notified if the real time contingency analysis capability of PJM and the TO is lost simultaneously.

The CKOLF program runs on two independent servers. The ability to determine adequacy of offsite power voltage is maintained even if one server fails. If the CKOLF intranet web page is found to be unavailable during shiftly checks, CNP procedures require that the information be obtained from the TO, who has access to CKOLF. PJM provides another level of backup and would be contacted if the CKOLF program was unavailable.

If CNP is notified that both PJM and the TO have lost their real-time contingency analysis capability, CNP would request that PJM and the TO provide an assessment of the current condition of the grid based on the tools that PJM and the TO have available, e.g., real time and historical grid voltage current readings. The determination of the operability of the preferred qualified offsite circuit would consider the assessment provided by PJM and the TO, and whether the current condition of the grid was bounded by the last valid contingency analysis.

NRC Requested Information Item 2(g)

(g) After an unscheduled inadvertent trip of the NPP, are the resultant switchyard voltages verified by procedure to be bounded by the voltages predicted by the analysis tool?

Response to Item 2(g)

No. There is no formal process for comparing the actual post-trip voltages to the post-trip contingency voltage results calculated by the PJM EMS Security Analysis application or by CKOLF.

The following additional information regarding NRC Requested Information Item 2(g) was provided by PJM to its member NPP licensees.

Because the PJM transmission owning member companies have similar Security Analysis programs to PJM, there are many opportunities to compare the results of the respective Security Analysis programs. In this manner, there is high confidence that the Security Analysis results are accurate within the precision of the calculations.

PJM retains the EMS results for a period of approximately three weeks after real time. It is possible to use those saved EMS results to repeat the Security Analysis calculations and compare them to the actual voltages from a unit trip. However, the NPP trips occur so infrequently that it would take a number of data points to verify the accuracy with any statistical significance. This process could take years if the process is limited to a comparison of only NPP trips.

NRC Requested Information Item 2(h)

(h) If an analysis tool is not available to the NPP licensee's TSO, do you know if there are any plans for the TSO to obtain one? If so, when?

Response to Item 2(h)

As described in the responses to NRC Requested Information Items 2(a) through 2(f), PJM, CNP's TO, and CNP have analysis tools available. Therefore, this NRC Requested Information Item is not applicable to CNP.

NRC Requested Information Item 2(i)

(i) If an analysis tool is not available, does your TSO perform periodic studies to verify that adequate offsite power capability, including adequate NPP post-trip switchyard voltages (immediate and/or long-term), will be available to the NPP licensee over the projected timeframe of the study?

(a) Are the key assumptions and parameters of these periodic studies translated into TSO guidance to ensure that the transmission system is operated within the bounds of the analyses?

(b) If the bounds of the analyses are exceeded, does this condition trigger the notification provisions discussed in question 1 above?

Response to Item 2(i)

As described in the responses to NRC Requested Information Items 2(a) through 2(f), PJM, CNP's TO, and CNP have analysis tools available. Therefore, this NRC Requested Information Item is not applicable to CNP.

NRC Requested Information Item 2(j)

(j) If your TSO does not use, or you do not have access to the results of an analysis tool, or your TSO does not perform and make available to you periodic studies that determine the adequacy of offsite power capability, please describe why you believe you comply with the provisions of GDC 17 as stated above, or describe what compensatory actions you intend to take to ensure that the offsite power system will be sufficiently reliable and remain operable with high probability following a trip of your NPP.

Response to Item 2(j)

As described in the responses to NRC Requested Information Items 2(a) through 2(f), PJM, CNP's TO, and CNP have analysis tools available. Therefore, this NRC Requested Information Item is not applicable to CNP.

NRC Requested Information Item 3(a)

3. Use of criteria and methodologies to assess whether the NPP's offsite power system and safety-related components will remain operable when switchyard voltages are inadequate.

(a) If the TSO notifies the NPP operator that a trip of the NPP, or the loss of the most critical transmission line or the largest supply to the grid would result in switchyard voltages (immediate and/or long-term) below TS nominal trip setpoint value requirements (including NPP licensees using allowable value in its TSs) and would actuate plant degraded voltage protection, is the NPP offsite power system declared inoperable under the plant TSs? If not, why not?

Response to Item 3(a)

The criteria used to determine contingency limits are described in the response to NRC Requested Information Item 2(c). The criteria are based on the trip of a CNP unit. If the TO notifies CNP that a voltage contingency limit or an actual voltage limit has been reached, Operations personnel would enter the procedure for responding to degraded offsite voltage. If the CKOLF program indicates that a voltage contingency limit has been reached, plant procedures direct operators to declare the preferred qualified offsite circuit inoperable.

The above discussion applies to the contingency of a CNP unit trip. If CNP was notified that loss of the most critical transmission line or the largest supply to the grid would result in switchyard voltages below TS nominal trip setpoints, the affected qualified offsite circuit would not be declared inoperable. TS definition of operability states that "A system, subsystem, train, component, or device shall be operable or have operability when it is capable of performing its specified safety function(s)...." The NRC Inspection Manual, Part 9900, definition of "specified safety function," states that "The specified function(s) of the system, subsystem, train, component or device (hereafter referred to as system) is that specified safety function(s) in the CLB [current licensing basis] for the facility." The CNP current licensing basis does not include loss of the most critical transmission line or the largest supply to the grid.

NRC Requested Information Item 3(b)

> *(b) If onsite safety-related equipment (e.g., emergency diesel generators or safety-related motors) is lost when subjected to a double sequencing (LOCA [loss of coolant accident] with delayed LOOP [loss of offsite power] event) as a result of the anticipated system performance and is incapable of performing its safety functions as a result of responding to an emergency actuation signal during this condition, is the equipment considered inoperable? If not, why not?*

Response to Item 3(b)

The CNP licensing basis includes a coincident LOCA and LOOP. The CNP licensing basis does not address a LOCA with a delayed LOOP. Nevertheless, CNP recognized the possibility of a LOCA with delayed LOOP and evaluated the response of the emergency diesel generator (EDG) and sequenced safety related motors to such an event. This evaluation identified a condition in which a LOCA with delayed LOOP event could result in certain sequenced safety-related pumps failing to restart without operator intervention, or abnormal sequencing of loads onto the EDG. Control circuit modifications were implemented to address this condition. With the modified design, CNP has determined that the EDGs and safety-related motors that are sequenced onto the EDGs will respond appropriately to a LOCA with delayed LOOP event.

Note that the CNP emergency operating procedures contain provisions for operators to reset the safety injection (SI) signal after certain criteria have been met. This would likely not occur for at least several minutes after the accident occurred. If a LOOP were to occur after the SI signal

was reset, certain safety-related motors would not automatically restart, and would have to be manually started if they were required to mitigate the consequences of the accident. Operations procedures provide the appropriate cautions to alert the operators to the need to restart the needed motors manually.

NRC Requested Information Item 3(c)

(c) Describe your evaluation of onsite safety-related equipment to determine whether it will operate as designed during the condition described in question 3(b).

Response to Item 3(c)

As described below, CNP's evaluation of a LOCA with delayed LOOP event consisted of an engineering evaluation of control logic response for the EDGs and the safety-related motors that sequence onto the EDGs.

The 4kV safety-related pump circuit breaker control circuits and the non-safety related 600V non-essential service water pumps have individual timing relays that control sequencing onto the EDGs. The evaluation methodology for a delayed LOOP scenario included a review of control circuit response for each pump considering a LOOP occurrence 1) any time between 0 seconds (SI signal initiation) and the point at which the individual pump's sequence timer times out (with tolerance), and 2) any time after an individual pump's sequence timer has timed out. It also included consideration of the normal and allowable pump control switch positions. The evaluation ensured 1) the pump's circuit breaker would trip and the timing relay would reset in response to a LOOP signal to avoid out-of-sequence loading onto the EDG; and 2) the circuit breaker would re-close when required. As described in the response to NRC requested Information Item 3(b), issues with pump response were identified and were corrected via the plant modification process.

NRC Requested Information Item 3(d)

(d) If the NPP licensee is notified by the TSO of other grid conditions that may impair the capability or availability of offsite power, are any plant TS action statements entered? If so, please identify them.

Response to Item 3(d)

As described in the response to NRC Requested Information Item 3(a), the preferred qualified offsite circuit would be declared inoperable in accordance with plant procedures if CNP operators received TO notification or CKOLF indication that a voltage contingency limit or an actual voltage limit had been reached. If CNP was notified of other grid conditions that may impair the capability or availability of offsite power, CNP would evaluate the conditions in accordance with plant operability determination procedures as necessary to determine operability of the affected qualified offsite circuit based on its capability to perform its safety function as

specified in the CNP licensing basis. Appropriate TS action statements would be entered based on the results of the evaluation.

NRC Requested Information Item 3(e)

> *(e) If you believe your plant TSs do not require you to declare your offsite power system or safety-related equipment inoperable in any of these circumstances, explain why you believe you comply with the provisions of GDC 17 and your plant TSs, or describe what compensatory actions you intend to take to ensure that the offsite power system and safety-related components will remain operable when switchyard voltages are inadequate.*

Response to Item 3(e)

As described in the response to NRC Requested Information Item 3(a), if the TO notifies CNP that a voltage contingency limit or an actual voltage limit has been reached, Operations personnel would enter the procedure for responding to degraded offsite voltage. If the CKOLF program indicates that a voltage contingency limit has been reached, plant procedures direct operators to declare the preferred qualified offsite circuit inoperable.

As described in the response to NRC Requested Information Item 3(a), if the TO notifies CNP that loss of the most critical transmission line or the largest supply to the grid would result in switchyard voltages below TS nominal trip setpoints, the affected qualified offsite circuit would not be declared inoperable. This conclusion is based on the TS definition of operability, the NRC Inspection Manual, Part 9900, definition of "specified safety function," and the CNP current licensing basis.

As described in the response to NRC Requested Information Item 3(b), CNP has taken measures to address the potential for a LOCA with a delayed LOOP, even though this event is not addressed in the CNP licensing basis.

As described in response to NRC Requested Information Item 3(d), if CNP was notified of other grid conditions that may impair the capability or availability of offsite power, the specific circumstances involved in the condition would be evaluated in accordance with plant operability determination procedures as necessary to determine the operability of the affected qualified offsite circuit. The determination would be based on the capability of the affected qualified offsite circuit to perform its safety function as specified in the current CNP licensing basis. This is consistent with the TS definition of operability, which states that "A system, subsystem, train, component, or device shall be operable or have operability when it is capable of performing its specified safety function(s)....," and consistent with the NRC Inspection Manual, Part 9900, definition of "specified safety function," which states that "The specified function(s) of the system, subsystem, train, component or device (hereafter referred to as system) is that specified safety function(s) in the CLB [current licensing basis] for the facility."

NRC Requested Information Item 3(f)

> *(f) Describe if and how NPP operators are trained and tested on the compensatory actions mentioned in your answers to questions 3(a) through (e).*

Response to Item 3(f)

There are actions that would be taken in response to conditions identified in NRC Requested Information Items 3(a), 3(b), and 3(d) that may be considered to be "compensatory." Training on these actions is described below.

For the CNP unit trip contingency condition identified in Requested Information Item 3(a), the "compensatory action" is that Operations personnel would enter the procedure for responding to degraded offsite voltage if the CKOLF program indicates that a voltage contingency limit has been reached.

Operations personnel are trained to monitor grid voltage conditions using the CKOLF program. The ILT program lesson plan on balance-of-plant electrical systems introduces the CKOLF program. The ILT program provides further emphasis on CKOLF in a lesson plan covering abnormal operating procedures. The lesson includes identifying a CKOLF Alarm or Limit condition as an entry condition for the abnormal operating procedure response to degraded offsite AC voltage. Licensed operators are also trained to perform the surveillances which monitor voltage of the preferred qualified offsite circuit. These surveillances include shiftly monitoring of the CKOLF display in Modes 1 and 2.

The LOR program classroom and simulator lesson plans for 2005 included:

- The purpose of the CKOLF program and types of operational changes that can affect switchyard voltage.
- Shiftly surveillance reading of offsite voltages using the CKOLF.
- Weekly Operations surveillance using CKOLF.
- Event initiated surveillance using CKOLF.
- Degraded offsite AC voltage response entry condition based on CKOLF.

For the "LOOP following SI reset" condition identified in Requested Information Item 3(b), the "compensatory action" is for operators to manually start needed safety-related motors. Procedures caution operators that emergency core cooling system pumps will not automatically restart if a LOOP occurs after an SI signal is reset. One of the objectives in the Operations training lesson plans for Emergency Operating Procedures is that the operator understand the basis for each procedural caution. Operations crews have demonstrated their understanding of this caution in LOR training during the past year. This training included a simulator exercise in which offsite power was lost after the SI signal was reset. The crews responded by manually starting needed motors.

For the "other grid conditions that may impair the capability or availability of offsite power" identified in Requested Information Item 3(d), the "compensatory action" is to evaluate the condition in accordance with plant operability determination procedures as necessary to determine operability of the affected qualified offsite circuit. Training on Operability Determinations is provided in the ILT program. LOR program training on Operability Determinations is generally performed as requested by the applicable Curriculum Development Committee based on training requests. Training on Operability Determinations was presented in spring 2005. Engineering support personnel are mentored on, and required to complete, specific requirements to be qualified to perform operability determinations in accordance with the CNP procedure that implements NRC operability guidance.

Examinations for the LOR and ILT programs are developed in accordance with LOR and ILT program descriptions and in accordance with Training Department administrative procedures which govern the development of examinations.

NRC Requested Information Item 4(a)

4. *Use of criteria and methodologies to assess whether the offsite power system will remain operable following a trip of your NPP.*

   (a) Do the NPP operators have any guidance or procedures in plant TS bases sections, the final safety analysis report, or plant procedures regarding situations in which the condition of plant-controlled or -monitored equipment (e.g., voltage regulators, auto tap changing transformers, capacitors, static VAR compensators, main generator voltage regulators) can adversely affect the operability of the NPP offsite power system? If so, describe how the operators are trained and tested on the guidance and procedures.

Response to Item 4(a)

Operator Guidance

Yes. The four RATs are equipped with auto tap changing secondary windings. Operations procedures require that the RATs be in the automatic mode for the preferred qualified offsite circuit to be considered operable during operation with the unit at power. CNP does not have any onsite reactive load controlling equipment such as capacitors or static VAR compensators. The main generators at CNP are equipped with automatic voltage regulators. If a main generator voltage regulator is placed in manual, more restrictive limitations are placed on reactive load carrying capability of the affected unit. In accordance with CNP procedures, Operations personnel would maintain manual voltage control and the TO would be notified. The operability of the preferred qualified offsite circuit would continue to be monitored by the PJM EMS Security Analysis application and by CKOLF.

Training

The requirement in the Operations surveillance procedures that the RATs automatic load tap changers be in automatic mode for the preferred qualified offsite circuit to be considered operable is included in the ILT lesson plan for balance of plant electrical systems and was reviewed in the LOR lesson for loss of offsite power/loss of all AC power.

NRC Requested Information Item 4(b)

(b) If your TS bases sections, the final safety analysis report, and plant procedures do not provide guidance regarding situations in which the condition of plant-controlled or -monitored equipment can adversely affect the operability of the NPP offsite power system, explain why you believe you comply with the provisions of GDC 17 and the plant TSs, or describe what actions you intend to take to provide such guidance or procedures.

Response to Item 4(b)

As described in the response to NRC Requested Information Item 4(a), the only such equipment at CNP are the automatic load tap changing RATs, and plant procedures provide guidance for situations in which the operation of this equipment can adversely affect the operability of the NPP offsite power system. Therefore, this NRC Requested Information Item is not applicable to CNP.

NRC Requested Information Item 5(a)

Use of NPP licensee/TSO protocols and analysis tool by TSOs to assist NPP licensees in monitoring grid conditions for consideration in maintenance risk assessments.

The Maintenance Rule (10 CFR 50.65(a)(4)) requires that licensees assess and manage the increase in risk that may result from proposed maintenance activities before performing them.

5. *Performance of grid reliability evaluations as part of the maintenance risk assessments required by 10 CFR 50.65(a)(4).*

   (a) Is a quantitative or qualitative grid reliability evaluation performed at your NPP as part of the maintenance risk assessment required by 10 CFR 50.65(a)(4) before performing grid-risk-sensitive maintenance activities? This includes surveillances, post-maintenance testing, and preventive and corrective maintenance that could increase the probability of a plant trip or LOOP or impact LOOP or SBO [station blackout] coping capability, for example, before taking a risk-significant piece of equipment (such as an EDG, a battery, a steam-driven pump, an alternate AC power source) out-of-service?

Response to Item 5(a)

Yes. The CNP 10 CFR 50.65(a)(4) on-line risk assessment tool has provisions to estimate the risk associated with severe weather, significant switchyard work, and grid load coincident with unavailability of grid-risk-sensitive equipment such as an EDG, station battery, steam driven auxiliary feedwater pump, or an alternate AC power source. Operations personnel determine when conditions exist such that these provisions should be used.

The on-line risk management procedure requires that, at least daily, a qualified Operations individual review the status of both units to verify it is consistent with the approved risk assessment for the work week. As noted in that procedure, the daily review identifies conditions that may not have existed when the initial risk assessment was performed, e.g., severe weather inhibiting EDG maintenance. An Operations department instruction provides requirements for an aggregate risk review that may be used to fulfill the requirement in the on-line risk management procedure for daily risk review. The aggregate risk review assesses the cumulative effect on nuclear safety resulting from known or anticipated plant conditions and planned production work or testing. The review includes consideration of weather conditions that may impact off-site power supplies and the instruction requires that the risk assessment be adjusted to account for severe weather.

CNP also has a procedural requirement to perform a qualitative grid reliability evaluation as part of the daily maintenance process which applies to all maintenance activities, although this requirement is part of the overall work control process rather than the 10 CFR 50.65(a)(4) process. The Work Control procedure that establishes the process for the execution and documentation of work activities contains a section addressing potentially degrading or challenged grid conditions, as indicated by the issuance of an Operating Reserve Warning (ORW). An ORW is issued by the TO when it appears that a capacity deficiency will occur such that the next contingency could not be covered by the normal operating reserve. When an ORW is issued, Operations and Work Control personnel evaluate scheduled activities to determine which activities may continue. Specific activities are reviewed for impact on plant operations to avoid plant trips or transients.

NRC Requested Information Item 5(b)

> *(b) Is grid status monitored by some means for the duration of the grid-risk-sensitive maintenance to confirm the continued validity of the risk assessment and is risk reassessed when warranted? If not, how is the risk assessed during grid-risk-sensitive maintenance?*

Response to Item 5(b)

Yes. Grid status is monitored shiftly while the unit is operating. During grid risk sensitive maintenance, grid status may be monitored more frequently based on specific requirements

contained within the applicable maintenance plan. The maintenance plan may be changed based on the status of the grid as determined by the reviews.

Additionally, grid status is continually evaluated by PJM using the EMS Security Analysis application. PJM notifies CNP through its TO of emergent grid conditions as discussed in the response to NRC Requested Information Item 1(b). The TO also monitors and evaluates grid status as discussed in the response to NRC Requested Information Item 1(b). Based on notifications from the TO, CNP personnel reassess impact on plant maintenance activities.

NRC Requested Information Item 5(c)

> *(c) Is there a significant variation in the stress on the grid in the vicinity of your NPP site caused by seasonal loads or maintenance activities associated with critical transmission elements? Is there a seasonal variation (or the potential for a seasonal variation) in the LOOP frequency in the local transmission region? If the answer to either question is yes, discuss the time of year when the variations occur and their magnitude.*

Response to Item 5(c)

The following information regarding NRC Requested Information Item 5(c) was provided by PJM to its member TOs.

> Stress on the grid is manifested in a number of ways. Stress can mean the loading levels on individual facilities, overall demand levels, the degree of facilities out of service for maintenance, occurrence of severe weather, etc. Each aspect creates a level of stress on the grid and challenges for the system operators.
>
> Regarding the seasonal variability of the stress causers, each has a seasonal component. For example, peak load levels occur at the peak seasons of the summer and winter seasons. While the specific days cannot be predicted, it is known roughly when they will occur. Consequently, [grid] maintenance during these times of the year is avoided.
>
> From a transmission system operations perspective, it is the simultaneous combination of stress causers that results in the most difficult operational challenges. For example, experiencing very hot (or cold) weather when we are in the maintenance seasons with a lot of equipment out of service can cause the most severe challenges.
>
> We [PJM] are aware of the existence of the NERC [North American Electric Reliability Council] and NRC data regarding LOOP frequency. However, it is difficult to assign differential risks to any seasonal variation because of the complexity of the various competing factors, as explained above.

NRC Requested Information Item 5(d)

(d) Are known time-related variations in the probability of a LOOP at your plant site considered in the grid-risk-sensitive maintenance evaluation? If not, what is your basis for not considering them?

Response to Item 5(d)

No. As described in the responses to NRC Requested Information Items 5(a) and 5(b), maintenance evaluations are based on existing grid conditions, regardless of the season, as determined by discussions with the TO. The evaluations include consideration of specific weather or other conditions that exist in the plant vicinity. The TO input on conditions such as grid margin and load constraints, regardless of season, is used to determine if there is an increased probability of a LOOP. If weather-related increased grid stress is noted, Operations procedures require personnel to consider adjusting the risk assessment tool input to indicate that there is an increased risk to the plant. These risk tool adjustments use predetermined factors that are based on generic industry data. Additionally, TO personnel contact CNP control rooms to warn of potential grid problems that may be due to weather in areas remote from the plant, as well as severe weather conditions in the vicinity of the plant. Again, the risk assessment tool input can be adjusted accordingly based on Operations personnel judgment. Increased probability of a LOOP to either unit can be modeled for either of the CNP switchyards depending on which yard has significant work planned or on-going. Adjusting the risk assessment tool in this manner addresses seasonal variations attributable to severe weather or heavy grid load, rather than using a gross baseline adjustment of the overall risk based on the season.

NRC Requested Information Item 5(e)

(e) Do you have contacts with the TSO to determine current and anticipated grid conditions as part of the grid reliability evaluation performed before conducting grid-risk-sensitive maintenance activities?

Response to Item 5(e)

Yes. A shift turnover procedure directs Operations personnel to contact the TO each day to discuss status of the plant and any scheduled switchyard work. This discussion will normally include both plant and offsite power system maintenance that may affect overall risk. In addition, an Operations instruction provides for assessing the cumulative effect on nuclear safety resulting from known or anticipated plant conditions and planned production work or testing on a daily basis. The instruction addresses severe weather conditions that may impact off-site power supplies and requires that the risk assessment be adjusted to account for severe weather or other external conditions identified in the procedure. Operations personnel would also contact the TO based on identified grid disturbances in accordance with low bus voltage annunciator response

procedures or the abnormal operating procedure for response to degraded offsite voltage. These procedures and instructions apply regardless of the status of grid-risk-sensitive maintenance.

NRC Requested Information Item 5(f)

(f) Describe any formal agreement or protocol that you have with your TSO to assure that you are promptly alerted to a worsening grid condition that may emerge during a maintenance activity.

Response to Item 5(f)

The CNP–TO Inter-Organizational Agreement requires the TO to notify CNP of any existing or anticipated conditions which would result in inadequate voltage support. The requirement in the CNP–TO Inter-Organizational Agreement to notify CNP of worsening grid conditions applies at all times, not just during grid-risk-sensitive maintenance.

NRC Requested Information Item 5(g)

(g) Do you contact your TSO periodically for the duration of the grid-risk-sensitive maintenance activities?

Response to Item 5(g)

Yes. As described in the response to NRC Requested Information Item 5(e), Operations procedures and instructions require that the TO be contacted periodically regardless of the status of grid-risk-sensitive maintenance.

NRC Requested Information Item 5(h)

(h) If you have a formal agreement or protocol with your TSO, describe how NPP operators and maintenance personnel are trained and tested on this formal agreement or protocol.

Response to Item 5(h)

Non-licensed and licensed operators are currently trained and tested in a classroom setting on the CNP-TO Inter-Organizational Agreement every two years. Maintenance personnel who routinely perform work or oversight of work in the switchyards are also currently trained and tested in a classroom setting on the CNP-TO Inter-Organizational Agreement every two years.

NRC Requested Information Item 5(i)

(i) If your grid reliability evaluation, performed as part of the maintenance risk assessment required by 10 CFR 50.65(a)(4), does not consider or rely on some

arrangement for communication with the TSO, explain why you believe you comply with 10 CFR 50.65(a)(4).

Response to Item 5(i)

As described in the responses to NRC Requested Information Items 5(e) and 5(g), personnel contact the TO each day to discuss status of the plant and any scheduled switchyard work, including plant and offsite power system maintenance that may affect overall risk. As described in the response to NRC Requested Information Item 5(f), the TO is required to notify CNP of any existing or anticipated conditions which would result in inadequate voltage support. These procedures and instructions apply regardless of the status of grid-risk-sensitive maintenance. Therefore, this NRC Requested Information Item is not applicable to CNP.

NRC Requested Information Item 5(j)

(j) If risk is not assessed (when warranted) based on continuing communication with the TSO throughout the duration of grid-risk-sensitive maintenance activities, explain why you believe you have effectively implemented the relevant provisions of the endorsed industry guidance associated with the maintenance rule.

Response to Item 5(j)

As discussed in the answers to NRC Requested Information Items 5(e), 5(f) and 5(g), CNP does rely on communication with the TO before and during grid-risk-sensitive maintenance in the evaluation of overall risk, and CNP does reassess risk based on these communications. Therefore, this NRC Requested Information Item is not applicable to CNP.

NRC Requested Information Item 5(k)

(k) With respect to questions 5(i) and 5(j), you may, as an alternative, describe what actions you intend to take to ensure that the increase in risk that may result from proposed grid-risk-sensitive activities is assessed before and during grid-risk-sensitive maintenance activities, respectively.

Response to Item 5(k)

As discussed in the responses to NRC Requested Information Items 5(i) and 5(j), CNP does contact the TO prior to and during grid-risk-sensitive maintenance. Therefore, this NRC Requested Information Item is not applicable to CNP.

NRC Requested Information Item 6(a)

6. *Use of risk assessment results, including the results of grid reliability evaluations, in managing maintenance risk, as required by 10 CFR 50.65(a)(4).*

(a) Does the TSO coordinate transmission system maintenance activities that can have an impact on the NPP operation with the NPP operator?

Response to Item 6(a)

Yes. Planned transmission outages are coordinated in accordance with the TOA, and in accordance with a process detailed in PJM Manual M-3. The process requires advanced notice and subsequent PJM approval for all outages to ensure grid reliability. On the outage start day, a final contingency analysis is performed by PJM before permitting the equipment to be switched out of service.

The TO is required to notify CNP of switching activities that have the potential to create perturbations on the CNP main generator or CNP switchyard prior to performing such activities.

Once the equipment is switched out of service, grid status is continually evaluated by the PJM EMS Security Analysis application. The TO performs similar monitoring and evaluation. PJM notifies CNP through the TO of adverse grid conditions as described in the response to NRC Requested Information Item 1(b).

NRC Requested Information Item 6(b)

(b) Do you coordinate NPP maintenance activities that can have an impact on the transmission system with the TSO?

Response to Item 6(b)

Yes. Except for maintenance activities that require, or result in, a large power reduction or unit outage, no CNP maintenance activity would make a significant change to the status of the grid. Nevertheless, CNP is required to notify the TO if conditions exist that may create difficulties in meeting unit operating parameters for voltage schedule, desired switchyard bus voltage, minimum and maximum MVAR output, and MW output. CNP is also required to notify the TO of adjustments to generating operating parameters or equipment realignments which have the potential to impact the generation capability of the plant or to create perturbations on the system prior to performing the activity, provided that the notification is not a barrier to prompt operator action demanded by the situation. Finally, CNP is required to notify the TO of any existing or anticipated TS Limiting Conditions for Operation having the potential to impact scheduled work in the switchyard.

NRC Requested Information Item 6(c)

(c) Do you consider and implement, if warranted, the rescheduling of grid-risk-sensitive maintenance activities (activities that could (i) increase the likelihood of a plant trip, (ii) increase LOOP probability, or (iii) reduce LOOP or SBO coping capability) under existing, imminent, or worsening degraded grid reliability conditions?

Response to Item 6(c)

Yes. I&M does consider and implement, if warranted, the rescheduling of grid-risk-sensitive maintenance activities under existing, imminent, or worsening degraded grid reliability conditions.

As described in the response to NRC Requested Information Item 1(a), there is a CNP procedure documenting the CNP–TO Inter-Organizational Agreement that establishes responsibilities and lines of communication for the various AEP organizations responsible for the operation, maintenance, and engineering of the switchyard, transmission, and distribution facilities associated with CNP. Additionally, the agreement provides guidance to ensure that the organizations responsible for operation, maintenance, and engineering consider the impact of their activities on facilities located at CNP and on the AEP transmission system.

In accordance with the CNP–TO Inter-Organizational Agreement procedure, Work Control Department personnel contact the TO to discuss and adjust identified work in the work schedule. The Work Control Department personnel will also contact the TO one week in advance of the scheduled work to ensure that CNP and grid conditions have not changed, and that the scheduled work will be supported. Additionally, an individual in the Operations Department is required to contact the TO daily to discuss the status of the plant and the switchyard.

The CNP on-line risk management procedure requires that, at least daily, a qualified Operations individual review the status of both units to verify it is consistent with the approved risk assessment for the work week. The CNP on-line risk procedure continuous risk assessment section states that "The daily review identifies current conditions that may not have existed when initial risk assessment was performed: e.g. Severe weather inhibiting EDG maintenance." The current Work Control procedure that establishes the process for the execution and documentation of work activities contains a section addressing TO declaration of an ORW, i.e., potentially degrading or challenging grid conditions. This procedure requires evaluation of which work or previously scheduled activities may continue if an ORW is issued.

NRC Requested Information Item 6(d)

> *(d) If there is an overriding need to perform grid-risk-sensitive maintenance activities under existing or imminent conditions of degraded grid reliability, or continue grid-risk-sensitive maintenance when grid conditions worsen, do you implement appropriate risk management actions? If so, describe the actions that you would take. (These actions could include alternate equipment protection and compensatory measures to limit or minimize risk.)*

Response to Item 6(d)

Yes. As discussed in the responses to NRC Requested Information Items 5(e) and 5(g), grid reliability is considered prior to and during performance of grid-risk-sensitive maintenance. If grid-risk-sensitive maintenance must be performed during periods of degraded grid reliability, then additional risk management activities would be implemented. The risk management activities would be unique to the specific occurrence, but may include guarding of equipment or the rescheduling of other activities that adversely impact aggregate risk. These actions may also include additional management approvals based on the existing or potential risk.

NRC Requested Information Item 6(e)

> *(e) Describe the actions associated with questions 6(a) through 6(d) above that would be taken, state whether each action is governed by documented procedures and identify the procedures, and explain why these actions are effective and will be consistently accomplished.*

Response to Item 6(e)

The transmission outage coordination process described in the response to NRC Requested Information Item 6(a) is documented in the PJM Manuals. The actions involved in this process will be consistently accomplished because PJM and AEP are signatories of the TOA identified in the response to Requested Information Item 1(a). In addition, PJM has computerized tools to track the transmission outage coordination process throughout its evolution, so that both PJM and the TOs are clear regarding the outage status, and PJM and TO expectations.

The actions described in the response to NRC Requested Information Item 6(b) are required by a CNP procedure documenting the CNP-TO Inter-Organizational Agreement that establishes responsibilities and lines of communication for the various AEP organizations responsible for the operation, maintenance, and engineering of the switchyard, transmission, and distribution facilities associated with CNP.

The actions described in the responses to NRC Requested Information Items 6(c) and 6(d) are requirements contained in the CNP procedure for managing online risk, the CNP procedure documenting the CNP-TO Inter-Organizational Agreement, and the CNP procedure governing execution of work control activities.

The actions described in the responses to NRC Requested Information Items 6(b), 6(c), and 6(d) are effective and will be consistently accomplished because they are required by procedures prepared, reviewed, and approved in accordance with CNP procedure control processes.

NRC Requested Information Item 6(f)

(f) Describe how NPP operators and maintenance personnel are trained and tested to assure they can accomplish the actions described in your answers to question 6(e).

Response to Item 6(f)

The CNP procedure implementing the CNP-TO Inter-Organizational Agreement is currently reviewed every two years by licensed and non-licensed operators, and a qualification test on this procedure is administered. Maintenance personnel who routinely perform work or oversee work in the switchyards are currently trained and tested in a classroom setting on the CNP-TO Inter-Organizational Agreement every two years. Operations personnel receive training on procedures for managing online risk as part of the ILT curriculum. The topic of risk assessment was included in the LOR program training conducted in August and September of 2004. Requirements in the procedure governing execution of work control activities are explicitly stated and no specific training is administered.

NRC Requested Information Item 6(g)

(g) If there is no effective coordination between the NPP operator and the TSO regarding transmission system maintenance or NPP maintenance activities, please explain why you believe you comply with the provisions of 10 CFR 50.65(a)(4).

Response to Item 6(g)

As described in the responses to NRC Requested Information Items 6(a), 6(b), 6(e), and 6(f), there is effective coordination between CNP personnel and the TO regarding transmission system maintenance or CNP maintenance activities. Therefore, this NRC Requested Information Item is not applicable to CNP.

NRC Requested Information Item 6(h)

(h) If you do not consider and effectively implement appropriate risk management actions during the conditions described above, explain why you believe you effectively addressed the relevant provisions of the associated NRC-endorsed industry guidance.

Response to Item 6(h)

As described in the responses to NRC Requested Information Items 6(a) through 6(f), CNP considers and effectively implements appropriate risk management actions during the conditions described above. Therefore, this NRC Requested Information Item is not applicable to CNP.

NRC Requested Information Item 6(i)

(i) You may, as an alternative to questions 6(g) and 6(h) describe what actions you intend to take to ensure that the increase in risk that may result from grid-risk-sensitive maintenance activities is managed in accordance with 10 CFR 50.65(a)(4).

Response to Item 6(i)

As described in the responses to NRC Requested Information Items 6(g) and 6(h), there is effective coordination between CNP personnel and the TO regarding transmission system maintenance or CNP maintenance activities, and CNP considers and effectively implements appropriate risk management actions during the conditions described above. Therefore, this NRC Requested Information Item is not applicable to CNP.

NRC Requested Information Item 7(a)

Offsite power restoration procedures in accordance with 10 CFR 50.63 as developed in Section 2 of RG [Regulatory Guide] 1.155.

Pursuant to 10 CFR 50.63, the NRC requires that each NPP licensed to operate be able to withstand an SBO for a specified duration and recover from the SBO. NRC RG 1.155 gives licensees guidance on developing their approaches for complying with 10 CFR 50.63.

7. *Procedures for identifying local power sources[2] that could be made available to resupply your plant following a LOOP event.*

   Note: Section 2, "Offsite Power," of RG 1.155 (ADAMS Accession No. ML003740034) states:

   > *Procedures should include the actions necessary to restore offsite power and use nearby power sources when offsite power is unavailable. As a minimum, the following potential causes for loss of offsite power should be considered:*

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2 *This includes items such as nearby or onsite gas turbine generators, portable generators, hydro generators, and black-start fossil power plants.*

- *Grid undervoltage and collapse*
- *Weather-induced power loss*
- *Preferred power distribution system faults that could result in the loss of normal power to essential switchgear buses*

(a) Briefly describe any agreement made with the TSO to identify local power sources that could be made available to resupply power to your plant following a LOOP event.

Response to Item 7(a)

The following information regarding NRC Requested Information Item 7(a) was provided by PJM to its member NPP licensees.

The PJM Restoration Manual (M-36) details the process to be followed during a system restoration. The process reiterates the specific offsite power requirements for NPPs:

"Offsite power should be restored as soon as possible to nuclear units, both units that had been operating and those that were already offline prior to the system disturbance, without regard to using these units for restoring customer load."

However, due to the myriad of possible restoration scenarios, no specific power sources to restart NPPs are identified. The PJM restoration process allows for the fact that the blacked out area may or may not be separated from the remainder of the system. Regardless of the scenario, there is a clear recognition of the importance of restoring an NPP offsite power source.

PJM Manual M-36 further states: "Transmission Owners and Nuclear Power Plants must effectively communicate to keep the Nuclear Power Plant apprised of the anticipated restoration time for offsite power."

The manual also states that for PJM Restoration Drills the objectives should include "Ensure that all nuclear units have been provided with one offsite source within 4 hours" and that the PJM Nuclear Generation Owner/Operator Users Group should be debriefed on the drill results.

In support of the restoration objectives outlined in the PJM Restoration manual, there are generating units designated as critical black-start units. These black-start units are required to provide black-start capability whenever necessary. The adequacy of black-start resources to support system restoration is managed through a process contained in PJM Manual M-10, "Pre-Scheduling Operations." The process ensures the continuous availability of black start units to support the restoration needs of the NPPs even when a designated black-start unit is on a planned outage.

The TO Emergency Operating Plan details the process to be followed during a system restoration. The plan includes the following offsite power requirements for CNP:

> The highest priority during system restoration is the creation of critical transmission paths to provide off-site power to the generating units. This ensures quick unit start-up when system conditions permit and provides the frequency stability requirements of on-line units. First priority should be given to provide off-site power to Cook Nuclear units.

Additionally, CNP has two supplemental diesel generators (SDGs) connected in a radial bus configuration to the existing 4.16kV Bus 1, located in the 69kV Substation, southeast of Unit 2. In this configuration, the two SDGs are capable of supplying loads in either Unit 1 or 2. The SDGs operate in parallel to support one unit's reactor coolant system inventory control loads in the event of a LOOP and failure of the safety-related EDGs. Each unit's control room is equipped for remote control and monitoring of the SDGs.

NRC Requested Information Item 7(b)

> *(b) Are your NPP operators trained and tested on identifying and using local power sources to resupply your plant following a LOOP event? If so, describe how.*

Response to Item 7(b)

Yes. Licensed and non-licensed operators have received training on the above described local power sources which are under their control, the SDGs. This training was provided in the classroom during the LOR program. This training is also provided during the ILT program. Additional training was provided on the simulator. The class exercised the control manipulations required for the SDG surveillances and for associated emergency operating procedure manual actions.

NRC Requested Information Item 7(c)

> *(c) If you have not established an agreement with your plant's TSO to identify local power sources that could be made available to resupply power to your plant following a LOOP event, explain why you believe you comply with the provisions of 10 CFR 50.63, or describe what actions you intend to take to establish compliance.*

Response to Item 7(c)

As described in the response to NRC Requested Information Item 7(a), CNP has agreements with PJM and the TO that power would be restored to NPPs as soon as possible, and that first priority should be given to restoring power to CNP. Moreover, CNP has installed SDGs capable of providing power to 4kV buses in the event all offsite power to a unit is lost and the unit's EDGs were unavailable. The status of the SDGs is controlled by CNP and they are operated by CNP personnel. Therefore, this NRC Requested Information Item is not applicable to CNP.

NRC Requested Information Item 8(a)

Losses of offsite power caused by grid failures at a frequency of equal to or greater than once in 20 site-years in accordance with Table 4 of Regulatory Guide 1.155 for complying with 10 CFR 50.63.

Pursuant to 10 CFR 50.63, the NRC requires that each NPP licensed to operate be able to withstand an SBO for a specified duration and recover from the SBO. NRC RG 1.155 gives licensees guidance on developing their approaches for complying with 10 CFR 50.63.

8. Maintaining SBO coping capabilities in accordance with 10 CFR 50.63.

(a) Has your NPP experienced a total LOOP caused by grid failure since the plant's coping duration was initially determined under 10 CFR 50.63?

Response to Item 8(a)

No. A review of CNP Licensee Event Reports did not identify any occurrences of a total LOOP caused by grid failure since the plant's original 10 CFR 50.63 coping duration was determined in 1989. As part of an amendment request to extend the TS allowed outage time for the EDGs, available historical information was reviewed to identify occurrences of partial or complete loss of offsite power. The review did not identify a complete single or dual unit loss of offsite power event at CNP.

NRC Requested Information Item 8(b)

(b) If so, have you reevaluated the NPP using the guidance in Table 4 of RG 1.155 to determine if your NPP should be assigned to the P3 offsite power design characteristic group?

Response to Item 8(b)

As described in the response to NRC Requested Information Item 8(a), CNP has not identified any occurrences of a total LOOP caused by grid failure since the plant's original coping duration was initially determined in accordance with 10 CFR 50.63. Therefore, this NRC Requested Information Item is not applicable to CNP.

NRC Requested Information Item 8(c)

(c) If so, what were the results of this reevaluation, and did the initially determined coping duration for the NPP need to be adjusted?

Response to Item 8(c)

As described in the response to NRC Requested Information Item 8(a), CNP has not identified any occurrences of a total LOOP caused by grid failure since the plant's original coping duration was initially determined in accordance with 10 CFR 50.63. Therefore, this NRC Requested Information Item is not applicable to CNP.

NRC Requested Information Item 8(d)

> *(d) If your NPP has experienced a total LOOP caused by grid failure since the plant's coping duration was initially determined under 10 CFR 50.63 and has not been reevaluated using the guidance in Table 4 of RG 1.155, explain why you believe you comply with the provisions of 10 CFR 50.63 as stated above, or describe what actions you intend to take to ensure that the NPP maintains its SBO coping capabilities in accordance with 10 CFR 50.63.*

Response to Item 8(d)

As described in the response to NRC Requested Information Item 8(a), CNP has not identified any occurrences of a total LOOP caused by grid failure since the plant's original coping duration was initially determined in accordance with 10 CFR 50.63. Therefore, this NRC Requested Information Item is not applicable to CNP.

NRC Requested Information Item 9

Actions to ensure compliance

9. *If you determine that any action is warranted to bring your NPP into compliance with NRC regulatory requirements, including TSs, GDC 17, 10 CFR 50.65(a)(4), 10 CFR 50.63, 10 CFR 55.59 or 10 CFR 50.120, describe the schedule for implementing it.*

Response to Item 9

As described in the responses to the preceding NRC Requested Information Items, no actions are needed to bring CNP into compliance with the NRC regulatory requirements. Therefore, this NRC Requested Information Item is not applicable to CNP.

Sketch of Interface Between CNP Electrical Distribution System and Preferred Qualified Offsite Circuit