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AEP:NRC:7054
10 CFR 50.54

Docket Nos.: 50-315
50-316

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
11555 Rockville Pike
Rockville, MD 20852

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

References:
1. U. S. Nuclear Regulatory Commission (NRC) Generic Letter 2006-02, "Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power," dated February 1, 2006 (ML060180352).
2. Letter from J. N. Jensen, Indiana Michigan Power Company (I&M), to U. S. NRC Document Control Desk, "Response to Nuclear Regulatory Commission Generic Letter 2006-02 Regarding Grid Reliability," dated March 31, 2006, AEP:NRC:6054-01, (ML061000316).
3. Letter from C. Haney, NRC, to holders of operating licenses for nuclear power reactors listed in Enclosure 1 of the letter, "Request for Additional Information Regarding Resolution of Generic Letter 2006-02, Grid Reliability and the Impact On Plant Risk and the Operability of Offsite Power (TAC Nos. MD0947 through MD1050)," dated December 5, 2006 (ML063380300).
4. Letter from C. Haney, NRC, to holders of operating licenses for nuclear power reactors listed in Enclosure 1 of the letter, "Revised Response Date for Request for Additional Information Regarding Resolution of Generic Letter 2006-02, Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power (TAC Nos. MD0947 through MD1050)," dated December 13, 2006 (ML063460440).

By Reference 1, the Nuclear Regulatory Commission (NRC) requested that nuclear power plant licensees submit information regarding the reliability of electric power sources for their plants. Indiana Michigan Power Company provided the requested information for Donald C. Cook Nuclear Plant (CNP) Unit 1 and Unit 2 via Reference 2. By Reference 3, the NRC transmitted a Request for

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Additional Information (RAI) to licensees of operating nuclear power reactors. The RAI consisted of six questions and indicated that two of the questions applied to CNP. By Reference 4, the NRC extended the requested due date for responses to the RAI from January 4, 2007, to January 31, 2007. The attachment to this letter provides responses to the two questions indicated in Reference 3 as applicable to CNP.

This letter contains no new regulatory commitments. Should you have any questions, please contact Ms. Susan D. Simpson, Regulatory Affairs Manager, at (269) 466-2428.

Sincerely,

Joseph N. Jensen
Site Vice President

JRW/rdw

Attachment: Response to Request for Additional Information Regarding Generic Letter 2006-02

c: J. L. Caldwell, NRC Region III
K. D. Curry, AEP Ft. Wayne, w/o attachment
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 a 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 31st DAY OF January, 2007

Regan D. Wendzel
Notary Public

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

My Commission Expires

ATTACHMENT TO AEP:NRC:7054

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING GENERIC LETTER 2006-02

References for this attachment are identified on Page 7.

By Reference 1, the Nuclear Regulatory Commission (NRC) transmitted a Request for Additional Information (RAI) to licensees of operating nuclear power reactors regarding their responses to NRC Generic Letter 2006-02. Two of the RAI questions (Questions 3 and 5) were indicated as applying to Donald C. Cook Nuclear Plant (CNP). This attachment provides Indiana Michigan Power Company's (I&M's) response to these two questions.

As used in this attachment, the term CNP refers to the plant (Units 1 and 2) and the plant staff. I&M is the 10 CFR 50 licensee for CNP. 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. The operation of AEP's portion of the grid, along with that of 17 other utilities, is controlled and coordinated by PJM Interconnection, LLC (PJM). PJM is designated as a Reliability Coordinator. The PJM service area includes portions of 13 states.

RAI Question 3 - Verification of RTCA Predicted Post-Trip Voltage

Your response to question 2(g) [of NRC Generic Letter 2006-02] indicates that you have not verified by procedure the voltages predicted by the online grid analysis tool (software program) with actual real plant trip voltage values. It is important that the programs used for predicting post-trip voltage be verified to be reasonably accurate and conservative. What is the range of accuracy for your GO's [grid operator's] contingency analysis program? Why are you confident that the post-trip voltages calculated by the GO's contingency analysis program (that you are using to determine operability of the offsite power system) are reasonably accurate and conservative? What is your standard of acceptance?

Response to RAI Question 3

Question 3 seeks information about analyses, procedures, and activities 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.

The North American Electric Reliability Corporation (NERC) standards referenced in the following responses are publicly available via the "Approved Standards" tab on the NERC Reliability Standards Home Page (https://standards.nerc.net/).

The subparts of Question 3 have been assigned letter designations, (i.e., Question 3.a, Question 3.b, Question 3.c.) and addressed individually in the following text.

RAI Question 3.a

What is the range of accuracy for your GO's contingency analysis program?

Response to Question 3.a

There is no established numerical range of accuracy for PJM's or the TO's contingency analysis programs and associated state estimator (SE). However, SE and contingency analysis have been used for many years by PJM and the TO to aid in evaluating and maintaining transmission system reliability and are proven tools for analyzing transmission system contingencies.

RAI Question 3.b

Why are you confident the post-trip voltages calculated by the GO's contingency analysis program (that you are using to determine operability of the offsite power system) are reasonably accurate and conservative?

Response to Question 3.b

PJM and the TO each run their own contingency analysis programs. Both programs include the contingency of a CNP unit trip.

PJM Contingency Analysis Program

PJM provided the following information regarding its contingency analysis program, designated by PJM as real time contingency analysis (RTCA).

Description of SE and Relation to RTCA

SE is an advanced application that is used to ensure that power system analysis that relies on complete power system models can be performed even when incomplete or conflicting data is received from the sensing devices in the field. The SE compares actual field data to an expected value based on the power system model resident in the application. If the actual data are unavailable or out of their expected range, the SE will calculate a value and substitute it into the power system model, creating an SE solution, so that other applications can provide reasonable results.

The relevance of the SE to post-contingency voltage calculation is that the SE results are used as the input to the RTCA. The RTCA takes the SE solution and calculates post-contingency flows, voltages, and voltage drops for each contingency in the contingency list (in PJM's case, the RTCA analyzes about 4,000 contingencies, approximately every two minutes). However, without a valid SE solution, the RTCA is not possible.

On rare occasions, the SE is not able to provide a valid solution due to the magnitude of missing, conflicting, or inaccurate data. Normally, such events are caused by communications or equipment failure in the field. In these cases, PJM is required to notify the TOs that PJM's capability to calculate the necessary nuclear plant post-contingency voltages is temporarily unavailable and that PJM will be deferring to the TO's RTCA results. If both PJM and the TO lose the capability to perform RTCA, the impacted nuclear power plants are notified.

Advanced applications, like the SE and the RTCA, are critical to executing PJM's tasks as a Reliability Coordinator. All Reliability Coordinators are required to have such tools to be in compliance with NERC Standard IRO-002, "Reliability Coordination - Facilities." Requirements addressing the accuracy and capability of field sensors and communications systems that feed the SE are covered in the PJM Manual, and must be compliant with NERC Standard TOP-006, "Monitoring System Conditions."

Confidence that the Post-Trip Voltages Calculated by the PJM RTCA Program are Reasonably Accurate and Conservative

PJM provided the following information regarding confidence that the post-trip voltages calculated by its RTCA program are reasonably accurate and conservative.

Issues Related to SE Accuracy

Input Data Accuracy - Continuous and accurate input data are critical to the proper functioning of the SE. An accurate representation of the configuration of the grid components that actually exist in the field is essential. The data coming in from the sensors in the field must be accurately mapped to the correct elements in the SE model.

Model Scope and Level of Detail - The other key factor to ensuring accurate SE solutions is the scope and level of detail of the model. The model must contain sufficient monitoring capability of its surrounding Reliability Coordinator areas to ensure that potential and actual operating limits are not violated.

Steps Taken by PJM to Assure SE Accuracy

Given the issues stated above, PJM and its members take steps to ensure that the SE runs as accurately as possible, including the following:

Overlapping Coverage of PJM and Member Company SEs - In addition to PJM, the TOs have their own SEs running in parallel with the PJM SE. The respective models are different with respect to scope and level of detail, but the results obtained generally agree. If discrepancies between the two SEs are identified, PJM and the TO work together to correct the discrepancy. During the interim period, the more conservative limit becomes the operational limit.

PJM works closely with the TOs and the generation owners to ensure the accuracy of the PJM data model. PJM updates the model and verifies its accuracy in a test environment before installing the updated model in the production system. Model updates are performed on a quarterly basis.

Review of post-contingency parameters prior to switching - Prior to switching transmission equipment out of service, the PJM operator is required to calculate the post-switching system parameters in the vicinity of the switching, using the RTCA. This step is taken to ensure that the switching will not result in a reliability problem. Once the switching has been completed, the operator monitors the post-switching parameters, providing a near real-time comparison to the RTCA predicted value. Seldom does that comparison yield an unexpected result, attesting to the accuracy of the SE and RTCA solution. Any case that does yield an unexpected result is investigated and understood. Corrective actions are taken as appropriate.

TO Contingency Analysis Program

The TO provided the following information regarding its contingency analysis program.

The TO and CNP use a plant-specific application of contingency analysis software, designated as the Cook Online Load Flow (CKOLF) program. CKOLF allows near real-time monitoring of offsite power system conditions from the CNP control rooms. A web page displayed in the control room shows the CKOLF results in the form of a switchyard single line diagram with predicted voltages following a unit trip.

Confidence that the Post-Trip Voltages Calculated by CKOLF are Reasonably Accurate and Conservative

The TO provided the following information regarding confidence that the post-trip voltages calculated by CKOLF are reasonably accurate and conservative.

The TO's main computer system including the CKOLF program and SE (consisting of the hardware, automatic data collection, and other programs) were evaluated and accepted by the TO. The CKOLF program was originally tested according to the TO's documented Operator Load Flow Acceptance Test Plan. Changes to the program are tested by the TO's engineering staff against SE results and real-time conditions. The programs successfully solve typical load flow problems as shown by daily operation of the system.

One method used by the TO to check the reasonability of calculated post contingency voltages is to periodically check the SE's measurement biases. This indicates the relative accuracy of the program's ability to calculate realistic voltages from a mixed set of telemetered quantities. The measurement bias is the average, over a large number (thousands) of SE cases, of the difference between the measured quantity and the corresponding calculated value.

The TO has on occasion verified the reasonability of predicted post contingency voltages from the CKOLF program by comparing them to actual voltages after an unscheduled inadvertent trip of a CNP unit. Thus, based upon the above type of verification checks and based upon the TO's experience gained from using these tools on a daily basis for grid operation for many years, the tools have proven to be reasonably accurate and reliable.

RAI Question 3.c

What is your standard of acceptance?

Response to Question 3.c

I&M relies on PJM and the TO to operate their respective analysis programs to evaluate the CNP contingency voltages. The programs are used by PJM and the TO as tools for evaluating and maintaining the reliability of the transmission system. PJM and the TO use these tools as a means to satisfy their respective responsibilities as a NERC Reliability Coordinator and as a TO as delineated in NERC Standards IRO-002 and TOP-006. The NERC standards provide the standard of acceptance with which PJM and the TO must comply.

RAI Question 5 - Seasonal Variation in Grid Stress (Reliability and Loss-of-offsite Power (LOOP) Probability)

Certain regions during certain times of the year (seasonal variations) experience higher grid stress as is indicated in Electric Power Research Institute (EPRI) Report 1011759, Table 4-7, Grid LOOP Adjustment Factor, and NRC NUREG/CR-6890. Do you adjust the base LOOP frequency in your probabilistic risk assessment (PRA) and Maintenance Rule evaluations for various seasons? If you do not consider seasonal variations in base LOOP frequency in your PRA and Maintenance Rule evaluations, explain why it is acceptable not to do so.

Response to RAI Question 5

The subparts of Question 5 have been assigned letter designations (i.e., Question 5.a and Question 5.b) and addressed individually in the following text.

RAI Question 5.a.

Do you adjust the base LOOP frequency in your probabilistic risk assessment (PRA) and Maintenance Rule evaluations for various seasons?

Response to RAI Question 5.a

I&M accounts for seasonal variations in risk by assessing specific factors associated with grid stress, such as transmission system conditions and weather concerns, when performing PRA and

10 CFR 50.65 Maintenance Rule (MR) evaluations for specific maintenance activities. CNP has an on-line risk management program consistent with the MR and focused on the risk impact of the plant configuration, the grid integrity, and environmental conditions at the time of the on-line work window Assessment of risk on the basis of current, rather than average or adjusted average, plant configuration, weather, and grid conditions is judged to be the most appropriate input to safe, risk-informed work control and is therefore the most appropriate technical approach for managing risk. The quantitative PRA evaluation tool used in MR (a)(4) maintenance related risk assessments includes grid risk environmental factors such as "severe weather," "peak electrical demand," and "significant switchyard work." When used, these environmental factors increase the frequency of corresponding initiating events in the baseline PRA model, such as the single and dual LOOP frequencies, and the frequency of a unit trip with and without heat removal systems available.

These environmental factors are applied, when warranted, as part of the online risk MR (a)(4) assessments that are performed whenever risk-significant equipment is removed from service, or whenever the CNP operating crews become aware or are notified that such conditions exist, regardless of the season. Criteria for applying these environmental factors are included in the CNP on-line risk procedure. The operating crews have the means to detect grid voltage concerns without input from external organizations because the CKOLF results are displayed in the control room. Additionally, a CNP-TO Inter-Organizational Agreement requires the TO to promptly notify CNP of any existing or anticipated conditions which would result in inadequate voltage support. Finally, CNP procedures require a daily evaluation of grid risk versus the scheduled maintenance work. If warranted, the scheduled maintenance work, whether in the switchyard or the plant, would be deferred.

Following application of needed increased LOOP parameters, the MR (a)(4) risk assessments are compared against the baseline model to determine plant risk consistent with NUMARC 93-01 (Reference 2). The PRA baseline model uses yearly-averaged initiating event frequencies for single and dual unit LOOP. This process provides a relatively larger risk measure (e.g., the configuration specific risk minus the baseline risk value) than would be the case if the baseline model for summer months included an increased grid LOOP initiator. Thus, by using a baseline model with a yearly average value, the risk of grid related conditions (with or without grid risk significant equipment out of service) is conservatively assessed via timely application of environmental factors.

The above described processes assure that factors which may cause seasonal variation in risk are identified and addressed by the CNP work, MR (a)(4) risk assessment, and management process. Consequently, it is not necessary to adjust baseline model LOOP frequencies based on seasonal time of year.

RAI Question 5.b

If you do not consider seasonal variations in base LOOP frequency in your PRA and Maintenance Rule evaluations, explain why it is acceptable not to do so.

Response to RAI Question 5.a

As described in the preceding response to RAI Question 5.a, I&M accounts for seasonal variations in risk by assessing specific factors associated with grid stress, such as transmission system conditions and weather concerns, when performing PRA and MR evaluations for specific maintenance activities. I&M considers that this method consistently provides a more accurate assessment of plant risk due to the maintenance on equipment than a seasonal adjustment in base loop frequency.

References

1. Letter from C. Haney, NRC, to holders of operating licenses for nuclear power reactors listed in Enclosure 1 of the letter, "Request for Additional Information Regarding Resolution of Generic Letter 2006-02, Grid Reliability and the Impact On Plant Risk and the Operability of Offsite Power (TAC Nos. MD0947 through MD1050)," dated December 5, 2006 (ML063380300).

2. NUMARC 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Section 11, "Assessment of Risk Resulting from Performance of Maintenance Activities," dated February 22, 2000.