Mr. Oliver D. Kingsley, President Nuclear Generation Group Commonwealth Edison Company Executive Towers West III 1400 Opus Place, Suite 500 Downers Grove, IL 60515

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION ON THE RESOLUTION OF UNRESOLVED SAFETY ISSUE A-46 - DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3 (TAC NOS. M69442 AND M69443)

Dear Mr. Kingsley:

By letter dated June 28, 1996, Commonwealth Edison Company (ComEd, the licensee), provided the plant-specific summary report in accordance with its commitment relating to Generic Letter (GL) 87-02, "Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors, USI A-46," for Dresden Nuclear Power Station, Units 2 and 3. The staff has reviewed the summary report and determined that additional information is necessary to complete the review of the USI A=46 response. The request for additional information (RAI) is enclosed? We request that you respond to the RAI within 90 days.

Sincerely,

ORIGINAL SIGNED BY:

John F. Stang, Project Manager Project Directorate III-2 Division of Reactor Projects - III/IV Office of Nuclear Reactor Regulation

Docket Nos. 50-237, 50-249

Enclosure: RAI

cc w/encl: See next page

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Generic Letter (GL) 87-02, "Verification of Seismic Adequacy of Mechanical and Electrical

Equipment in Operating Reactors, USI A-46," for Dresden Nuclear Power Station, Units 2 and 3.

The staff has reviewed the summary report and determined that additional information is

necessary to complete the review of the USI A-46 response. The request for additional

information (RAI) is enclosed. We request that you respond to the RAI within 90 days.

Sincerely,

ORIGINAL SIGNED BY:

John F. Stang, Project Manager Project Directorate III-2 Division of Reactor Projects - III/IV Office of Nuclear Reactor Regulation

Docket Nos. 50-237, 50-249

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UNITED STATES NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

January 12, 1998

Mr. Oliver D. Kingsley, President Nuclear Generation Group Commonwealth Edison Company Executive Towers West III 1400 Opus Place, Suite 500 Downers Grove, IL 60515

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION ON THE RESOLUTION OF UNRESOLVED SAFETY ISSUE A-46 - DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3 (TAC NOS. M69442 AND M69443)

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By letter dated June 28, 1996, Commonwealth Edison Company (ComEd, the licensee), provided the plant-specific summary report in accordance with its commitment relating to Generic Letter (GL) 87-02, "Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors, USI A-46," for Dresden Nuclear Power Station, Units 2 and 3. The staff has reviewed the summary report and determined that additional information is necessary to complete the review of the USI A-46 response. The request for additional information (RAI) is enclosed. We request that you respond to the RAI within 90 days.

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John F. Stang, Project Manager Project Directorate III-2 Division of Reactor Projects - III/IV Office of Nuclear Reactor Regulation

Docket Nos. 50-237, 50-249

Enclosure: RAI

cc w/encl: See next page

O. Kingsley Commonwealth Edison Company

cc:

Michael I. Miller, Esquire Sidley and Austin One First National Plaza Chicago, Illinois 60603

Commonwealth Edison Company Site Vice President - Dresden 6500 N. Dresden Road Morris, Illinois 60450-9765

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Ms. Irene Johnson, Licensing Director Nuclear Regulatory Services Commonwealth Edison Company Executive Towers West III 1400 Opus Place, Suite 500 Downers Grove, IL 60515

Commonwealth Edison Company Reg. Assurance Supervisor - Dresden 6500 N. Dresden Road Morris, Illinois 60450-9765

REQUEST FOR ADDITIONAL INFORMATION

DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3

UNRESOLVED SAFETY ISSUE A-46

Reference: Letter from Commonwealth Edison Company to NRC with a Summary Report and Attachments, dated June 28, 1996

- 1. In Appendix I to the Seismic Evaluation Report attached to the referenced letter, the licensee listed all of the USI A-46 outliers for equipment, heat exchanger, and cable trays. In Appendix G to the Relay Evaluation Report, the licensee also listed all of the relay outliers. In Note 1 on each page of both Appendixes, the licensee indicated that all outlier resolutions, either by analysis, physical modifications, or replacements will be completed for each respective unit by the end of the second refueling outage for that unit after receipt of the NRC staff's Safety Evaluation. The licensee is requested to elaborate on its decision to defer the resolution of identified outliers and its evaluation in support of the conclusion that the licensee is requested to provide the justification for assuring operability of the affected systems and components while a number of safety-related components in the safe shutdown path have been identified as outliers, thus, rendering their seismic adequacy questionable and their conformance to the licensing basis uncertain.
- 2. On Page 4-3, the report stated that a total of 5638 contacts was identified during the detailed circuit analysis. Of those contacts identified, 1210 were screened as "Chatter Acceptable," 1939 were identified as "Not Vulnerable" and 52 contacts were screened from further consideration using "Operator Action." On Page 4-4, the report stated that following the detailed circuit analysis, a total of 2340 contacts was evaluated for seismic adequacy using the Seismic Capacity Screening Methodology. Provide information to show how the remaining 97 contacts were verified for seismic adequacy.

Furthermore, on Page 4-5, the report stated that of the 2340 contacts evaluated using the seismic capacity screening process, 1252 of the contacts passed. The 1058 contacts which did not pass have been declared outliers. Provide information to show how the remaining 30 contacts were verified for seismic adequacy.

- 3. In Appendix C to the Seismic Evaluation Report, "Dresden Nuclear Station Walkdown Personnel Resumes," and Appendix F to the Relay Evaluation Report, "Resumes of Individuals Performing Relay Review," the staff noted that certificates were not provided for some of the personnel who participated in the seismic walkdown inspections and relay review to demonstrate that they have completed all the necessary Seismic Qualification Utilities Group (SQUG) training courses. The licensee is requested to provide appropriate documentation to demonstrate that those individuals are qualified to participate in the USI A-46 Implementation Program.
- 4. In Appendix D to the Seismic Evaluation Report, it is not clear how the less than 40 ft criterion has been established. Provide the effective grade-elevations for each of the seismic Class 1 structures. It appears that in some cases, the seismic demand for

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equipment located within 40-feet above the effective grade has been defined by the Housner ground response spectrum (GRS) and compared with the bounding spectrum, utilizing provision A.1 of Table 4-1 of GIP-2. Section 4.2.3, "Advantage and Limitations," of GIP-2 indicates that this provision is based on an assumption that the factor between the GRS and the IRS will not be more than 1.5. A review of an IRS at 545 ft 6 in. (N-S direction) for example, indicates that the demand for the equipment located on this elevation is higher than 1.5 times the bounding spectrum at frequencies higher than 8 Hz. Provide justification for using this approach even when the amplified IRS is shown to be higher than the 1.5 times the bounding spectrum and identify the floors where such conditions exists. Also, explain the acronyms DOC, RRS, and CRS used in Appendix D.

- 5. GIP-2 (Section 4.4) recommends that expansion anchors not be used for anchoring vibratory equipment, such as pumps and air compressors. If used, GIP-2 recommends a large margin between the pullout loads and the pullout capacities. The screening verification data sheets (SVDS) in Appendix D to the Seismic Evaluation Report did not provide any information regarding the type of anchors used for the listed equipment. Provide information about the seismic adequacy of vibratory equipment secured by expansion anchors.
- 6. In Table 5-1, Commentary Regarding GIP Deviations, the licensee lists some interpretations or measures that were taken to meet the intent of the GIP caveats. For some electrical equipment identified in that Table, the Commentary states that capacity exceeds demand in a small region (small frequency range), but in the judgement of the Seismic Capacity Engineers it was considered inconsequential. It is not clear as to how that equipment was determined to meet the intent of the GIP caveat. The licensee is requested to provide additional information to demonstrate that how it was determined that the intent rather than the specific letter of the referred GIP caveat has been met.
- 7. Table 5-1 in Section 5 indicates that the low-pressure coolant injection (LPCI) pumps are anchored by epoxy grouted anchor bolts. Recent testing sponsored by the NRC Office of Research at the University of Texas has shown that the dynamic behavior of the Portland cement grouted anchors is inferior to that of the other expansion anchors and certainly inferior to that of the cast-in-place anchors¹. Provide test data which could verify that the epoxy-grouted anchors used for the LPCI pump supports have the same allowables as the cast-in-place anchors.
- 8. In Table 8.2, A-46 Equipment Outliers, it appears that in some cases, the licensee has relocated spare circuit breakers due to the concerns of potential seismic spatial interactions with certain switchgears. It is not clear as to where those spare circuit breakers were located. However, it should be noted that removal of the circuit breaker from the switchgear will result in mass redistribution of the switchgear. Mass redistribution of the switchgear may then change the frequency of the switchgear and its dynamic

¹Zhang, Yong-Gang, "Dynamic Behavior of Multiple-Anchor Connections in Cracked concrete," Ph.D. Dissertation, Department of Civil Engineering, The University of Texas at Austin, August 1997.

response during a seismic event and may invalidate the original seismic qualification of the switchgear. The licensee is requested to evaluate this concern for applicability to those identified switchgear.

In Section 6 of the Seismic Evaluation Report attached to the referenced letter, the licensee indicated that the Conservative Deterministic Failure Margin (CDFM) method of Electric Power Research Institute (EPRI) NP-6041, "Seismic Margin Report," was utilized to resolve the vertical tanks that did not meet the GIP caveats. The methodology has not been approved by the staff for the analysis of safety-related systems and components, including the resolution of mechanical, electrical, and structural component outliers in the USI A-46 program. The licensee is requested to reevaluate its program and to ensure that all the identified systems and components will be resolved using the plant licensing-basis methodologies or other approaches acceptable to the staff.

10. Section 6 of the Seismic Evaluation Report provides a summary describing the methodology for evaluating large, flat-bottom, vertical tanks (two condensate storage tanks). However, Table 6.1 does not contain information about either of them. Provide the following information about these tanks:

a. Sketches showing tank dimensions, anchor chairs, anchorages (including embedment) and foundation.

b. A detailed calculation of a representative tank in accordance with the GIP-2 procedure. If it can not meet the GIP caveats, describe the weaknesses; including an assessment of potential modifications, that if implemented, could enable the tanks to meet the GIP-2 criteria.

c. Calculations showing the adequacy of the ring foundations.

Item 5 of Table 6-1 indicates that ComEd is currently (when the Summary Report was 11. developed) evaluating the adequacy of the four LPCI heat exchangers' support steel. Provide a summary of the results of the evaluation and details of any proposed or implemented modifications on the support steel.

12. The limited analytical reviews (LAR) described in Section 7.3 indicated that 10 out of 12 reviews required outlier evaluations. In light of this finding, provide a justification for not expanding the reviews to a larger sample size, particularly, when the outlier evaluations indicated hardware modifications.

13. Provide detailed calculations showing how the outliers for LAR 001 and LAR 007 identified in Table 7.3 were resolved including a summary of the rod fatigue test data and the generic acceptability curve.

In evaluating the raceway supports, a recent audit of a GIP-2 plant indicated that some 14. licensees may be misusing the "ductile support" definition of Figure 8-7 of GIP-2 to avoid the check for lateral seismic loads. In this context, please provide the following information: (1) the number of supports (percentage of the total number of supports

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evaluated in the limited analytical review) considered as ductile; (2) the specific criteria used in determining that the supports are ductile; and (3) the extent to which the supports and their anchorages (which do not meet the vertical capacity check) will deform under the two horizontal components of the design basis earthquake.

- 15. Tables 8.1 and 8.2 in the Seismic Evaluation Report show a number of equipment that do not meet the seismic demand. The special review team (SRT) has recommended methods for resolving these outliers. Provide a table showing how these outliers were actually resolved.
- 16. ID A46 in Table 8.3 indicated that the eight component cooling service water (CCSW) Pump Cooler Supports are anchored using lead cinch anchors. It is also noted that the licensee utilized RTR 2661 (Westinghouse Report documenting the lead cinch anchor tests for Savannah river site) in arriving at the capacity of the anchors. Provide information regarding the use of this test report including the allowables and proof torque requirement, etc.