UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

February 4, 1999

MEMORANDUM TO: Herbert N. Berkow, Director
Project Directorate II-2
Division of Reactor Projects I/II

FROM: Kamal A. Manoly, Acting Chief
Mechanical Engineering Branch
Division of Engineering

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION ON THE RESOLUTION OF UNRESOLVED SAFETY ISSUE A-46, OCONEE NUCLEAR STATION, UNITS 1, 2 & 3, INCLUDING THE KEOWEE HYDRO UNITS (TAC NOS. M69464/69465/69466)

By letters dated December 30, 1996, and September 28, 1998, Duke Energy Company (DEC) submitted two parts of its plant-specific summary report, respectively, in accordance with its commitment relating to Generic Letter 87-02, on the resolution of the Unresolved Safety Issue (USI) A-46 program at Oconee Nuclear Station. The first part of the summary report addressed the seismic evaluation of the Emergency Power System, and the second part contained the balance of the USI A-46 submittal for Oconee Nuclear Station, Units 1, 2, and 3. The staff in the Mechanical Engineering Branch (EMEB) and the Civil Engineering & Geosciences Branch (ECGB) have reviewed the summary report and determined that additional information is necessary in order to complete the review of the licensee's USI A-46 program. Attached is a list of items in the request for additional information (RAI).

To effectively coordinate the USI A-46 program with the seismic portion of the IPEEE program, which is being evaluated by the Office of Nuclear Regulatory Research (RES) for Oconee, and to ensure consistency between the staff evaluations of the two programs, we request that EMEB be given the opportunity to review the seismic IPEEE portion of the RAI before it is sent to the licensee for response.

Docket Nos.: 50-269/270/287

Attachment: As stated

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REQUEST FOR ADDITIONAL INFORMATION
OCONEE NUCLEAR STATION UNITS 1, 2, AND 3
DOCKET NUMBERS 50-269, 50-270, AND 50-287
UNRESOLVED SAFETY ISSUE A-46

References:

1. Letter from J. W. Hampton (Oconee Nuclear Station, ONS) to NRC (Document Control Desk), "ONS USI A-46 report on the Emergency Power System Equipment at the Keowee Hydro Units and in the Oconee Switchyard," dated December 30, 1996

2. Letter from W. R. McCollum, Jr., (Oconee Nuclear Station, ONS) to NRC (Document Control Desk), "Oconee Nuclear Station Units 1, 2, & 3, USI A-46 Seismic Evaluation Report and USI A-46 Relay Evaluation Report," dated September 28, 1998

Keowee Hydro Units and Oconee Switchyard (Reference 1)

1. As summarized in Section 8 of the Keowee Seismic Evaluation Report in Reference 1, of the 200 SSEL items, 83 outliers were identified, 57 of which were resolved and described in Table 8-1, and 26 of which required further analysis and were discussed in Table 8-2.

   1.1 In Reference 1, on page 5-11, it was stated in Section 5.3, that a total of 70 outliers was identified out of the 202 ONS Emergency Power System SSEL walkdown items. However, these numbers are inconsistent with those (83 out of 200 were outliers) stated in the Executive Summary, in Table 5-1, and on page 8-1 in Section 8.1. Clarify the apparent inconsistency and provide the up-to-date status of the outlier resolutions.

   1.2 26 outliers were described along with their proposed resolution in Table 8-2. Provide the resolution status for these outliers.

2. In Table 5-2 of Reference 1, clarify the following items of equipment which were considered to satisfy the intent but not the letter of caveats.

   2.1 There are several cabinets (IDA, IXA, 2DA, & 2XA) whose depths are 14" deep (as opposed to 18" or 20" deep existed in the earthquake experience database) and were considered adequate because the cabinets are top braced by shielded cable penetrations. Discuss the adequacy of the electrical connection (not the shielded cable) to resist the overturning moment of the cabinet due to safe shutdown earthquake (SSE).

   2.2 The longitudinal bracing for Equipment IDs BB-1 and BB-2 were judged not to be effective due to geometric details. Discuss how the intent of the caveat was met.

   2.3 For Equipment IDs U1 SWGR and U2 SWGR, what is the weight of the breaker hoist? Demonstrate by calculations and/or other means that the weight of the breaker hoist (and its potential eccentricity) would not cause the SWGR cabinet and their anchorage to be inadequate due to SSE.

ATTACHMENT

3. For equipment outlier resolution in Table 8-1 of Reference 1, explain how would the "capacity greater than demand" resolve the Bounding Spectra caveats for the following equipment: 10GTK0001, 89A1X, 89G-1, and BPC-1.

4. For the proposed resolution for equipment outliers in Table 8-2 of Reference 1, it is not clear how the caveats are going to be resolved for the Equipment IDs 1XA, 1XXFMR, SRF6, and SY-DC1. Provide clarifications.

5. As stated in the Keowee hydro station (KHS) Seismic Evaluation Report, emergency power would be transmitted to Oconee Station through two separate routes, one of which is a 230 KV overhead transmission line. Describe whether the 230 KV overhead transmission line is included in the SSEL, and how the seismic adequacy of this transmission line and its supports were determined.

6. In the Keowee Cable and Conduit Raceway Review effort, 4 cable tray bounding samples were selected for a Limited Analytical Review (LAR). Provide a summary of the LAR evaluation for the case designated as AR-K-4.

7. The description of the review effort in both Keowee Station (Reference 1) and Oconee Units 1, 2, and 3 (Reference 2) for tanks does not include enough information to allow for an assessment of their adequacy.

   7.1 Provide the SEWS and a summary description of the calculations performed to verify seismic adequacy for tank Nos:: 1CTK000C, and 2ESVTK0001 from the Oconee Units 1, 2, & 3 tank list, and tank Nos.: GOT1 and GPT2 from the Keowee Station tank list.

   7.2 The "1CTK000C tank" and "Dome Tanks" are installed at Elevation 838 feet in the Turbine Building. Were the liquid sloshing effects in the tanks considered in the calculations? If not, explain your rationale. Also, clarify Note 3 of Table 5.3 in Reference 2.

8. With respect to the walkdown inspection of relays at both Keowee Station (Reference 1) and Oconee Units 1, 2, and 3 (Reference 2), provide the following information:

   8.1 Approximately what fraction of the relay population was spot-checked for the seismic adequacy of their supports?

   8.2 Two examples from each of the evaluation approaches performed to screen relays by the EPRI Relay GERS, the GIP Switchgear Relay Method, seismic test reports and seismic analyses.

<u>Oconee Nuclear Station, Units 1, 2, and 3 (Reference 2)</u>

9. As described in the Oconee Seismic Evaluation Report, Method A.1 of GIP, Section 4.2, was used for comparing seismic capacity to seismic demand for equipment that is mounted below 40-feet-above grade, and has a natural frequency greater than about 8 Hz. However, there is a restriction for applying Method A.1 in accordance with GIP-2. The restriction is that the amplification factor established between the free-field

response spectrum and the in-structure response spectra (IRS) will not exceed 1.5. For cases where this condition is not met, the use of Method A.1 may not be appropriate and may lead to unconservative results. Provide a justification for the use of Method A.1 where this restriction was not met, or provide a description of the basis for finding the use of Method A to be acceptable.

10. Table 5-3 of the Oconee Seismic Evaluation Report provides building locations and frequency ranges for which Method B.1 of GIP-2 was not satisfied, and according to the footnotes, all SSEL components identified with these situations were considered as capacity outliers. As summarized in Section 8 of the Seismic Evaluation Report, 83 capacity outliers were identified, 21 of which were resolved and described in Table 8-1, and 62 of which were unresolved and discussed in Table 8-2.

    10.1 Provide graphical comparisons of IRS vs. 1.5 x Bounding Spectrum for each of the floor elevations identified in Table 5-3;

    10.2 Table 8-1 identified the 21 capacity outliers, which have been resolved by either Duke calculations or existing test reports contained in Miscellaneous section of A-46/IPEEE calculation. However, no references or descriptions of these calculations or reports were provided. To facilitate our evaluation, provide SEWS and calculations for the following equipment:

    (a) 125/250 VDC distribution centers, Equipment ID: 3DP;
    (b) Power battery chargers, Equipment IPA/BC, and 3PA/BC;
    (c) From miscellaneous section of A-46/IPEEE calculation, Equipment ID: 1MVC3 (250 VDC MCC) and 3XS3 (MCC 3XS3).

    10.3 62 unresolved capacity outliers were described and their resolution proposed in Table 8-2. It appears that the proposed method for resolution of the 62 capacity outliers will involve the use of the screening table 2-4 of EPRI NP-6041. NRC has not approved the use of the seismic margin methodology outlined in EPRI NP-6041 for resolving A-46 outliers. Provide the justification for using EPRI NP-6041 to resolve these capacity outliers.

11. Based on our review of the Screening Verification Data Sheets (SVDS), we noted that where equipment GERS define the seismic capacity, the seismic demand is listed as the RRS. According to GIP Method B.3, the demand should be defined as the RRS (median-centered) amplified by 1.5 when the GERS are used to define capacity. Provide an explanation for this apparent inconsistency with the GIP methodology.

12. In Section 5.1.4 of the Oconee Seismic Evaluation Report in Reference 2, unreinforced masonry block walls are identified as a source of interaction concern. It is also stated that 75 block walls, not previously reviewed as part of the IE Bulletin 80-11, needed a detailed review. Of these, 65% were qualified either by comparison to an existing calculation or with a unique calculation. Provide examples of the unique qualification methods.

13. In the Oconee Cable and Conduit Raceway Review effort in Reference 2, 584 typical analytical cases were selected for a Limited Analytical Review (LAR), with 539 being selected from the reactor building.

13.1 Provide a sample of LAR evaluations including three from the plant tray system, three from the reactor building and review Nos. R-4, R-6, R-18 and R-22.

13.2 Clarify the number of analytical review cases and the number of supports involved in Sections 7.12, 7.13, and 7.14 of the Oconee Seismic Evaluation Report in Reference 2. Why were there so many samples selected in the reactor building compared to those other buildings?

14. The Control Room Ventilation System (CRVS) was included in the Oconee A-46 review to ensure the integrity of the system. Section 7.3 of the Oconee Seismic Evaluation Report in Reference 2 states that the evaluation methodology used to verify the seismic adequacy of CRVS HVAC ducting and supports is consistent with the GIP-2. Since HVAC systems are not specifically addressed in the GIP-2, provide a description of the evaluation methodology used to review these systems including the walkdown screening and evaluation criteria and the walkdown screening guidelines.

15. Referring to the Outlier Description and Proposed Resolution in Table 8-2 of the Oconee Seismic Evaluation Report:

15.1 For outlier Reference No.12 on page 1 of the Table, both capacity vs. demand and category "0" concerns are checked in the Table. It is indicated that this outlier will be resolved per Table 2-4 of the EPRI report NP-6041. Noting the comments in question No. 10.3, provide the justification for the seismic adequacy of this equipment.

15.2 For outlier Reference No. 91 on page 8 of the Table, it is stated that an existing test report is to be used to resolve the capacity vs. demand concern. Provide a summary description of the test report.

16. In section 5.1.3 of the Oconee Seismic Evaluation Report, a description of the inspections made for equipment anchorage is provided.

16.1 Item No.11 addresses electrical equipment with essential relays. In the description provided it is stated that " where other reduction factors were required (gaps greater than 1/4 inch etc.) . . . " What is the reduction factor for the condition that gaps are greater than 1/4 inch?

16.2 Under item No.12, it is stated that, where anchorage and load path could produce significant prying action, an analysis was performed in accordance with EPRI report TR-103960. Submit the EPRI report and provide two examples to demonstrate how the significant prying action issue was resolved.