



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

ENCLOSURE 1

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

EVALUATION OF THE PUBLIC SERVICE ELECTRIC AND GAS COMPANY'S

SALEM NUCLEAR GENERATING STATION, UNITS 1 AND 2

120-DAY RESPONSE TO SUPPLEMENT 1

TO GENERIC LETTER 87-02

DOCKET NOS. 50-272 AND 50-311

1.0 INTRODUCTION

By letter dated September 21, 1992, the Public Service Electric and Gas Company, the licensee, submitted its response to Supplement No. 1 to Generic Letter (GL) 87-02, "Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors, Unresolved Safety Issue (USI) A-46," dated May 22, 1992, for the Salem Nuclear Generating Station, Units 1 and 2. In this supplement, the staff requested that affected licensees submit the following information within 120 days of the issue date of the supplement:

1. A statement whether you commit to use both the Seismic Qualification Utility Group (SQUG) commitments and the implementation guidance provided in the Generic Implementation Procedure, Revision 2 (GIP-2) as supplemented by the staff's Supplemental Safety Evaluation Report No.2 (SSER No. 2) for the resolution of USI A-46. In this case, any deviation from GIP-2, as supplemented by the SSER No. 2, must be identified, justified, and documented. If you do not make such a commitment, you must provide your alternative for responding to GL 87-02.
2. A plant-specific schedule for the implementation for the GIP and submission of a report to the staff that summarizes the results of the USI A-46 review, if you are committing to implement GIP-2. This schedule shall be such that each affected plant will complete its implementation and submit the summary report within 3 years after the issuance of the SSER No. 2, unless otherwise justified.
3. The detailed information as to what procedures and criteria were used to generate the in-structure response spectra to be used for USI A-46 as requested in the SSER No. 2. The licensee's in-structure response spectra are considered acceptable for USI A-46 unless the staff indicates otherwise during a 60-day review period.

In addition, the staff requested in SSER No. 2 that the licensee inform the staff, in the 120-day response, if it intends to change its licensing basis to reflect a commitment to the USI A-46 (GIP-2) methodology for verifying the seismic adequacy of mechanical and electrical equipment, prior to receipt of the staff's plant-specific safety evaluation resolving USI A-46.

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## 2.0 EVALUATION

With regard to Item 1, the licensee stated that, "Specifically, PSE&G hereby commits to the SQUG commitments set forth in the IGP in their entirety, including the clarifications, interpretations, and exceptions identified in SSER-2 as clarified by the August 21, 1992, SQUG letter responding to SSER-2." The licensee also stated that, "PSE&G will be guided, generally, by the remaining (non-commitment) sections of the GIP, i.e., GIP implementation guidance, which comprises suggested methods for implementing the applicable commitments."

The licensee's response is unclear as to whether or not the licensee intends to implement both the SQUG commitments and the implementation guidance. In accepting GIP-2 as a method for resolving USI A-46, it was the staff's understanding that the SQUG members who chose to implement GIP-2 would essentially use the entire procedure, including the SQUG commitments, which contain the general programmatic objectives and goals, and the implementation guidance, which contains the specific criteria and procedures to be used for the resolution of USI A-46. This understanding was the basis for the staff's position, which was stated in SSER No. 2, that if the licensee commits to use GIP-2 for the implementation of USI A-46, it must commit to both the SQUG commitments and the use of the entire implementation guidance provided in GIP-2, unless otherwise justified to the staff. In order to allow some flexibility in implementing GIP-2, the staff acknowledged in the supplement to GL 87-02 that SQUG members who commit to GIP-2 (both the SQUG commitments and the implementation guidance) may deviate from it provided that such deviations are identified, documented, and justified. However, it was also indicated in SSER No. 2 that if a licensee uses methods that deviate from the criteria and procedures described in the SQUG commitments and in the implementation guidance of GIP-2 without prior NRC approval, the staff may find the use of such methods unacceptable with regard to satisfying the provisions of GL 87-02.

In light of the above, the staff interprets the licensee's response to Supplement No. 1 to GL 87-02 as a commitment to the entire GIP-2 including both the SQUG commitments and the implementation guidance, and therefore, considers it acceptable. If the staff's interpretation is incorrect, then in accordance with Supplement No. 1 to GL 87-02, the licensee should provide for staff review, as soon as practicable prior to implementation, its alternative criteria and procedures for responding to GL 87-02.

In addition, Enclosure 2 provides the staff's response, dated October 2, 1992, to the August 21, 1992, SQUG letter. The staff does not concur with all of the SQUG's clarifications and positions stated in that letter, and thus, the license should not use the August 21, 1992, letter as guidance in responding to Supplement No. 1 to GL 87-02. The licensee should refer to Enclosure 2 for the staff's position on the SQUG letter.

With regard to Item 2, the licensee stated that it will submit a summary report to the NRC summarizing the results of the USI A-46 program at the Salem Nuclear Generating Station, Units 1 and 2, by May 2, 1995. This submittal date is within the 3-year response period requested by the staff and is therefore acceptable.

With regard to Item 3, the staff has reviewed and evaluated the information which can be summarized as follows:

1. The horizontal ground response spectra used are the Housner spectra anchored at 0.20g for SSE. Only the development of horizontal in-structure response spectra is presented.
2. Structural damping value of 5% is used.
3. The seismic analysis models used consist of: an axisymmetrical finite element model for the containment building and a lumped mass stick model for the auxiliary building and the fuel handling building.
4. An axisymmetrical finite element model of the subgrade, including the weight of the five structures founded on it, was used to perform a time history analysis using the N-S component of the EL Centro May 18, 1940 earthquake as input. Horizontal and rotational time histories at the bottom of the lean concrete fill were obtained and used in the in-structure response analysis of the auxiliary building as well as the fuel handling building. For the analysis of each structure, a lumped mass stick model was used for E-W and N-S directions. For each direction two analyses were performed: (1) rocking springs were added at the base of the stick model and the horizontal time history, normalized to 0.20g peak ground acceleration (PGA), was applied as a base motion at the bottom of the lean concrete fill, using 5% structural damping; (2) the horizontal and rotational time histories, normalized to 0.20g PGA, were applied as input motion at the base of the lean concrete fill without the use of rocking springs. Results of the four analyses were enveloped to produce the horizontal in-structure response spectra.
5. As indicated in 4. above, all structures are supported on lean concrete fill above a silty cementitious sand foundation material.
6. Vertical in-structure response spectra are given, but how these spectra are applied is not described in the submittal.
7. How the vertical in-structure response spectra are generated is not given.
8. The in-structure response spectra are broadened +/-10%.
9. a) The in-structure response spectra as contained in the submittal are unbroadened and should be broadened for A-46 application.  
b) The in-structure response spectra for the service water in-take structure are not given and should be provided for A-46 application.

Based on our review of the licensee's response to the in-structure response spectra and the staff positions delineated in the SSER No. 2, we conclude that if the licensee follows the criteria and the procedure as summarized above, "conservative design" in-structure response spectra should result, and the licensee's response is adequate and acceptable. This conclusion is based on the assumption that the statements made in the submittal, including the criteria and procedure used in the generation of the in-structure response spectra, correctly reflect what is contained in the FSAR on seismic design and other licensing bases. The staff reserves the option of auditing the process by which the floor response spectra were generated.

Additionally, the staff disagrees with the licensee's comments regarding the timing of staff responses to additional information requested from a licensee. The licensee indicated that it subscribes to the SQUG positions stated in the August 21, 1992, letter form SQUG to the NRC. The licensee should refer to Item I.2 in Enclosure 2 for the staff's position on this issue.

The licensee indicated that it intends to augment its licensing basis methodology, via 10 CFR 50.59, to include the IPG methodology as an alternative for verifying the seismic adequacy of new, replacement, and existing electrical and mechanical equipment prior to receipt of a final plant-specific SER resolving USI A-46. The staff recognizes that the licensee may revise its licensing basis in accordance with 10 CFR 50.59 to reflect acceptability of the USI A-46 (GIP) methodology for verifying the seismic adequacy of electrical and mechanical equipment covered by the GIP. However, if the licensee does not commit to implement both the SQUG commitments and the implementation guidance, and the licensee has not committed to any acceptable alternative criteria and procedures, than the staff does not believe that it is feasible, at this time, for the licensee to change its licensing basis in the manner described. In addition, since the licensee intends to augment, rather than revise, its licensing basis methodology for verifying seismic adequacy of equipment, the staff cautions that it is not acceptable to combine any part of GIP-2 with the current licensing basis methodology such that it results in a less conservative approach than if GIP-2 or the current licensing basis methodology were applied separately.

### 3.0 CONCLUSIONS

The staff interprets the licensee's response to Supplement No. 1 to GL 87-02 as a commitment to the entire GIP-2 including both the SQUG commitments and the implementation guidance, and therefore, considers it acceptable. If the licensee does not commit to implement the entire GIP-2, then in accordance with Supplement No. 1 to GL 87-02, the licensee should provide for staff review, as soon as practicable prior to implementation, its alternative criteria and procedures for responding to GL 87-02. Additionally, the licensee should not merely follow the August 21, 1992, SQUG letter for implementing GIP-2, but should refer to Enclosure 2 for the staff's response to the SQUG letter.

The implementation schedule proposed by the licensee is within the 3-year response period requested by the staff in Supplement No. 1 to GL 87-02 and is therefore acceptable.

The staff finds that if the licensee follows the criteria and procedures as summarized in section 2.0 of this evaluation, "conservative design" in-structure response spectra should result, and the licensee's response is adequate and acceptable.

The staff disagrees with the licensee's comments regarding the timing of staff responses to additional information requested from the licensee. The licensee should refer to Item I.2 in Enclosure 2 for the staff's position on this issue.

The staff recognizes that the licensee may revise its licensing basis in accordance with 10 CFR 50.59 to reflect the acceptability of the USI A-46 (GIP) methodology for verifying the seismic adequacy of electrical and mechanical equipment covered by the GIP. However, if the licensee does not commit to implement both the SQUG commitments and the implementation guidance, and the licensee has not committed to any acceptable alternative criteria and procedures, then the staff does not believe that it is feasible, at this time, for the licensee to change its licensing basis in the manner described. In addition, since the licensee intends to augment, rather than revise, its licensing basis methodology for verifying seismic adequacy of equipment, the staff cautions that it is not acceptable to combine any part of GIP-2 with the current licensing basis methodology such that it results in a less conservative approach than if GIP-2 or the current licensing basis methodology were applied separately.

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