



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATING TO NUREG-0822, SECTION 4.12

DESIGN CODES, DESIGN CRITERIA AND LOADING COMBINATIONS

OYSTER CREEK NUCLEAR GENERATING STATION

DOCKET NO. 50-219

1.0 INTRODUCTION

By letter dated June 4, 1984, (Ref. 1), GPU Nuclear, licensee for Oyster Creek Nuclear Generating Station, provided a response to Section 4.12 of NUREG-0822, the Integrated Plant Safety Assessment Report (IPSAR). This information was reviewed by Franklin Research Center (FRC) under contract to the NRC. The results of the FRC review are provided in the attached Technical Evaluation Report (TER). Staff conclusions based on this review are presented below.

2.0 BACKGROUND

Plants reviewed under the Systematic Evaluation Program (SEP) were designed and constructed in accordance with criteria and codes which differ from those accepted by the NRC for new plants. Under SEP Topic III-7.B, the impact of safety margins in Seismic Category I plant structures was assessed considering the changes in design codes and criteria for loads and load combinations.

The staff, with assistance from Franklin Research Center, evaluated the design codes to identify areas where the code changes may have a significant impact on the margins of safety. In addition, loads and loading combinations were reviewed to identify those of most significance for plant structures, which should therefore be reviewed for adequacy. This assessment was issued by letter dated August 27, 1982, (Ref. 2).

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Based on this review, the staff position in the Integrated Assessment was that GPU Nuclear should:

- (1) review the specific areas of design code changes potentially applicable to Oyster Creek for which the current code requires substantially greater safety margins than did earlier versions of the code or for which no original code provision existed to determine their applicability; and
- (2) perform on a sampling basis, an evaluation of the code, load and load combination changes noted in the August 27, 1982 evaluation on existing as-built structures to assess their adequacy.

3.0 EVALUATION

3.1 Design Code Changes

- 3.1.1 Section 4 of the attached TER summarizes the review findings for issues on design code changes. This table shows the old and new code sections, the licensee's approach to resolution, and FRC's evaluation of the response. For eighteen of the twenty-three entries, the FRC review shows that the issue is resolved. The staff concurs.
- 3.1.2 For two of the issues, FRC noted that the licensee's responses, although partial, may be considered acceptable subject to the NRC staff concurrence. The basis for acceptance of the licensee's conclusion is described in Section 6 of the TER. The first issue relates to Appendix B of ACI-349-76, Steel Embedments. The licensee has argued that those anchors which do not meet current criteria still possess adequate strength for the applied loads. Based on the past review experience and engineering judgment, the staff agrees with FRC's conclusion as stated in the attached TER. Therefore, this issue is considered resolved.

The second case relates to the use of design formulas for hand calculations of the containment (NE-3131). Present codes would restrict use of formulas for analysis of structures such as the containment. This issue relates to the margin of safety in the containment design. The NRC staff notes that an assessment of the Oyster Creek containment under the combined loadings of a main steam line break and the site-specific earthquake was performed by staff consultants as discussed in Reference 2. This analysis demonstrates that the containment is adequate for this severe loading condition using modern analytical techniques and acceptance criteria. Therefore, sufficient margin has been demonstrated in the containment design and no further action on this issue is warranted.

- 3.1.3 Appendix A of ACI-349-76 establishes design requirements for concrete subject to high temperatures and thermal transients; no requirements were provided in the codes to which Oyster Creek was designed.

The licensee determined that recent estimates of drywell thermal conditions warrant reconsideration of the effects on the drywell concrete. This issue therefore, remains open.

- 3.1.4 Two issues relating to reinforcement of openings were raised. In the first instance (NE-3334), the licensee's analysis shows that the existing placement of reinforcement is in accordance with current criteria for some openings but not for others. The licensee has not addressed the significance of these differences. The staff concludes that for those that do not meet current criteria, the licensee should provide an assessment of the effects of the differences from current criteria and their basis for acceptability of the present design. This assessment should consider the loadings on the penetrations and the safety significance of failure.

The second issue concerns openings subject to cyclic loadings (NE-3331(b)). Analysis of cyclic loads is required by current code requirement unless the opening satisfies the exclusion criteria specified in NE-3221.5(d). The licensee should confirm that all openings for which cyclic analysis was not performed satisfy these requirements.

3.2 Loads and Load Combinations

Section 5 of the attached TER summarizes the review of GPU's analysis of loads and load combinations for structures at Oyster Creek. As discussed therein, the licensee has assessed, using a sampling basis, all loads (including the extreme environmental snow load) and load combinations that the previous staff evaluation (Ref. 2) suggested be investigated to demonstrate adequacy of plant structures. Based on the analysis samples, the licensee concluded that all Seismic Category I structures are capable of withstanding currently postulated loading conditions. The staff concludes that the licensee's approach is adequate to judge the safety margin of the affected structural elements. Therefore, the concerns on loads and load combinations are considered resolved.

4.0 CONCLUSIONS

Based on the above discussion, the staff concludes that IPSAR Section 4.12 is complete except for the resolution of the following three issues:

- 1) Evaluation of the drywell for concrete subject to high temperatures and thermal transients (3.1.3);
- 2) Assessment of differences from current criteria for reinforcement of openings (3.1.4);
- 3) Confirmation that cyclic analysis is not required for openings at Oyster Creek in accordance with the code exclusion criteria (3.1.4).

5.0 REFERENCES

- 1) Letter from P. B. Fiedler (GPU) to D. M. Crutchfield (NRC),
dated June 4, 1984, Subject: SEP Topic III-7.B
- 2) Letter from D. M. Crutchfield (NRC), to P. B. Fiedler (GPU),
dated August 27, 1982, Subject: SEP Topic III-7.B

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