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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

INTEGRATED PLANT SAFETY ASSESSMENT, SECTION 4.11, SEISMIC DESIGN CONSIDERATION

ITEMS 4.11(1), PIPING SYSTEMS AND 4.11(3), ELECTRICAL EQUIPMENT

GPU NUCLEAR CORPORATION AND
JERSEY CENTRAL POWER & LIGHT COMPANY

OYSTER CREEK NUCLEAR GENERATING STATION

DOCKET NO. 50-219

I. INTRODUCTION

The Systematic Evaluation Program (SEP) was initiated by the U.S. Nuclear Regulatory Commission in 1977 to review the design of older operating nuclear reactors in order to reaffirm and document the plant safety. The scope of the seismic review is stated in Reference 1. The review was performed and the findings documented in References 2, 3 and 4.

This Safety Evaluation only addresses Topic III-6, Seismic Design Considerations, Subsection 4.11(1), Piping Systems and 4.11(3), Electrical Equipment of Reference 2.

II. EVALUATION

1 - Piping Systems

In Reference 2 it is stated that the piping audit disclosed that some locations of the control rod drive (CRD) piping system were found overstressed. The staff requested that the licensee perform analyses of two randomly selected piping system 2½ to 10 inch in diameter and also verify adequacy of piping supports for the main steam and feedwater piping systems.

Responding to the request by the staff in Reference 4, the licensee reanalyzed all of the above piping systems (Reference 7). The piping systems were analyzed to the ASME Code 1980 Edition including the summer 1981 addenda. Operating basis earthquake (OBE) was considered level B event and it was analyzed accordingly. Safe shutdown earthquake (SSE) was analyzed as a level C event with the mode responses summed by the square-root-sum-of-the squares (SRSS) method for both OBE and SSE loadings.

The liquid poison system which consists of 1½, 2½ and 3 inch diameter piping satisfies the requirements of the staff. The main steam and feedwater piping supports were reanalyzed using finite element method. The appropriate models were modified to especially include support substructure and current as-built configuration data. New snubber loads were generated by computer analyses using NRC approved safe shutdown earthquake response spectra.

The only load case applied to the system snubbers was the SSE. Service level D stress limit as specified by Section III, Division I, Subsection NF of the ASME code (1980 edition plus winter 1982 addenda) was used as the acceptance criterion. The staff finds that the analyses are acceptable.

2 - Electrical Equipment

According to the request stated in Reference 2 the licensee analyzed the 4160V switchgear and 460 V unit substation cabinets for seismic adequacy for the operating basis earthquake and the safe shutdown earthquake (Reference 7). The analysis was performed utilizing the zero period acceleration (ZPA) multiplied by .165g/.22g in vertical direction. Horizontal peak accelerations were multiplied by the same factor. This scaling factor was used on the basis of the site specific spectrum development program and its use for assessing the actual safety margins present for any structures, systems and components was approved by NRC in Reference 6. The licensee performed also a load path evaluation on the internals of the 4160V switchgear and 460 V unit substation cabinets. The limiting structural and support members of these cabinets were examined and the results of these calculations were compared with the recommended allowables in the ASME Code. The analysis was performed using the simpler equivalent static method rather than a dynamic analysis.

Furthermore, the values of the ZPA in vertical direction and the peak values of the response spectra in the horizontal direction were not multiplied by 1.5 to account for the fact that a simple model was used in the analysis. The rationale for such an approach, presented by the licensee, was that for base mounted cabinets such as these, seismic response is dominated by the fundamental frequency in both the vertical as well as in the horizontal directions. Also, it can be demonstrated that the dynamic characteristics of base mounded cabinets are such that additional load factors to account for participation of higher frequency modes are unnecessary. Generic studies have shown that the base shear and overturning movement for an equivalent static coefficient of 1.0 always give conservative results with respect to the rigorous solutions (Reference 8). We concur with this assessment and conclude that the licensee satisfied the regulatory requirements.

III. CONCLUSIONS

Based on the review of the material submitted by the licensee it can be concluded that Subsections 4.11(1) Piping Systems and 4.11(3) Electrical Equipment of Reference 2 are acceptable and can be considered closed.

IV. REFERENCES

1. Seismic Review of the Oyster Creek Nuclear Power Plant as Part of the Systematic Evaluation Plan, NUREG/CR 1981, April 1981.

2. Integrated Plant Safety Assessment, Systematic Evaluation Program, NUREG-0822, January 1983.

3. Integrated Plant Safety Assessment, Systematic Evaluation Program, NUREG-0822 Supplement I, July 1988.

4. Letter from John Zwolinski (NRC) to P. B. Fielder (GPU) date January 9, 1986.

5. "Oyster Creek Seismic Analysis of Reactor Vessel Intervals," Pyron, J. W. and Schabazian A, NSEO-55-0682, General Electric Company August 1982.

6. Letter from Dennis M. Crutchfield (NRC) to P. B. Fiedler dated May 12, 1982.

7. Letter from R. F. Wilson (GPU) to John Zwolinski (NRC) dated June 24, 1986.

8. "Seismic Verification of Nuclear Plant Equipment Anchorage, "Vol. 1 EPRI EPRI NP-5228, May 1987.

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