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

February 23, 1979

Docket No. 50-373
and 50-374

Mr. Byron Lee, Jr.
Vice President
Commonwealth Edison Company
P. O. Box 767
Chicago, Illinois 60690

Dear Mr. Lee:

Subject: REEVALUATION OF EQUIPMENT QUALIFICATION FOR SEISMIC AND HYDRO-DYNAMIC LOADS - LA SALLE COUNTY STATION, UNITS 1 AND 2

The purpose of this letter is to discuss two issues related to vibratory loads applicable to your facility.

1. In 1975, the Regulatory Requirements Review Committee characterized Regulatory Guide 1.100 as Category 2 - further staff consideration required in order to determine the need for backfitting. The Guide concerns the seismic qualification of electrical equipment. Further staff consideration of this issue resulted in the position published in Standard Review Plan (SRP) 3.9.2 and 3.10 in November 1975, regarding the staff requirements for implementation on mechanical and electrical equipment and their supports, which were approved by the Director, Office of Nuclear Reactor Regulation.

   The Guide provides guidelines to account for the effects of an input which has both multifrequency and multiaxis characteristics for seismic Category I equipment and supports. Plants which are currently being reviewed for an operating license had construction permit reviews prior to 1975, and most of the equipment and supports were qualified by using single frequency, single axis methods. During a seismic event, it is likely that such equipment could be exposed to multifrequency, multiaxis vibration.

2. Pursuant to General Design Criterion 2, seismic Category I equipment and supports are to be designed for appropriate load combinations arising from accidents and severe natural phenomena. Insofar as vibratory motion is concerned, the staff has interpreted General Design Criterion 2 to require the combination of seismic effects and, in the Mark II and Mark III containments designed by General Electric, the vibratory loads attributed by General Electric to feedback of hydrodynamic loads from the pressure suppression pool of these designs.

A meeting was held in Bethesda, Maryland, on April 4, 1978 among the NRC staff, the General Electric Company, and those utilities having boiling water reactor plants under construction and identified as having equipment qualified via single frequency, single axis methods. Those present at the meeting were advised that:

1. During the review process necessary to issue an operating license, we will reevaluate the adequacy of the original single frequency, single axis testing or analysis methods in view of the multifrequency, multi-axis concerns.

2. The objective of the reevaluation is to find whether the original seismic qualification of the equipment was adequate. Additional justification of the validity of the original qualification, or in some cases requalification, may be necessary. In assessing the validity of the original qualification or requalification, the criteria to be used by the staff to determine acceptability will be IEEE 344-1975, Regulatory Guides 1.100 and 1.92, and Standard Review Plan Sections 3.9.2 and 3.10. Other criteria may be used if justified by an applicant and approved by the staff.

3. In the reevaluation phase of the program we will select certain items from a plant-specific listing of seismic Category I items, paying particular attention to systems required for safe shutdown following a seismic event.

During the reevaluation phase, a plant specific review will be conducted by our Seismic Qualification Review Team (SQRT). In its review, the team will reevaluate the original qualification adequacy of selected seismic Category I items of equipment for which single frequency, single axis methods were used. The team will determine those items which are acceptable and those which require requalification.

The second issue concerning equipment design and qualification for combined vibratory loads was not discussed in the April 4 meeting, but has been the subject of generic discussions between the General Electric Company and the staff and discussions on individual plant dockets. We require that seismic Category I equipment and supports be designed and qualified to withstand effects of hydrodynamic vibratory loads associated with either safety relief valve discharge or LOCA blowdown into the pressure suppression containment in addition to the effects of dynamic loads arising from earthquakes. The response of each item of seismic Category I equipment that is affected by these loads will depend on its location in the plant and the input transmitted to it from the suppression pool via the intermediate structural members.

The magnitude and frequency content of the hydrodynamic loads is being defined as part of the Mark II Containment Program. There has been a continuing discussion with the Mark II owners as to what constitutes an acceptable method for the combination of seismic and hydrodynamic vibratory responses of seismic Category I equipment and supports. The staff has previously accepted the use of square-root-sum-of-squares (SRSS) methods for combination of responses due to LOCA and safe shutdown earthquake (SSE) loads on the reactor coolant pressure boundary and its supports (see NUREG-0484). Our review is continuing and we are concentrating on the proposed Kennedy-Newmark criteria for the combination of safety relief valve (SRV) and operating basis earthquake (OBE) loads, and for general use in combining responses due to vibratory loads on other seismic Category I equipment. The eventual outcome is expected to establish our position and criteria for general acceptance of response combinations using SRSS methods.

To decide whether seismic Category I equipment meets the requirements of General Design Criterion 2, the SQRT team will review the combined required response spectra (RRS) or the combined dynamic response, examine the equipment configuration and mounting, and then determine whether the test or analysis which has been conducted demonstrates compliance with the RRS if the equipment was qualified by test, or acceptable analytical criteria if qualified by analysis.

As we indicated in our meeting on April 4, 1978 with applicants and General Electric, we strongly believe that the reevaluation phase of the program, and any requalification which results from the reevaluation, be done generically to the extent possible as the most efficient utilization of the resources of NRC and BWR owners in meeting licensing schedules. We are sending a similar letter to two other applicants with ongoing operating license reviews - the Zimmer facility of Cincinnati Gas and Electric Company and the Shoreham facility of Long Island Lighting Company. We believe that a generic program for these facilities, at least for NSSS-supplied equipment, is preferable to individual case reviews. We will urge consideration of a generic approach also by other affected applicants with Mark II and Mark III designs. We believe that a generic program should at least include the elements contained in Enclosure 1 to this letter.

Satisfactory completion of the reevaluation phase of the program for a majority of the seismic Category I equipment and supports and initiation of the requalification phase of the program will be required prior to any staff recommendation concerning the granting of an operating license, with appropriate license conditions required concerning an acceptable completion schedule of the requalification program. In addition, some confirmatory in situ testing to characterize the ability of equipment and supports to accommodate hydrodynamic loads may also be a licensing prerequisite.

We request a reply concerning your plans and schedule for completion of the submission detailed in the enclosure for those items not already provided in your application, and whether a generic program will be initiated with the other affected applicants.

Sincerely,

Roger S. Boyd, Director
Division of Project Management
Office of Nuclear Reactor Regulation

Enclosure:
Request for Additional Information

cc:
See next page

cc: Richard E. Powell, Esq.
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ENCLOSURE 1

REQUEST FOR ADDITIONAL INFORMATION

(a) For your plant identify those items of nuclear steam supply system and balance-of-plant equipment requiring reevaluation and specify why reevaluation is necessary (i.e. because the original qualification used the single frequency, single axis methodology, because equipment is affected by hydrodynamic loads, or because both of the above conditions were present) for each item of equipment.

(b) Develop the combined required response spectra, or the combined dynamic response as appropriate, for all items of equipment identified in (a) for each plant. The combined required response spectra, or combined dynamic response, is to include all applicable vibratory (seismic and hydrodynamic) loads.

(c) Develop the proposed methods and criteria to be used to determine the acceptability of the original equipment qualification to meet the required response spectra of (b). The presentation of the proposed methods and criteria and final acceptance by the staff should be scheduled to be completed early in 1979.

(d) Using the final methods and criteria developed in (c), provide the results of the review of the original equipment qualification (reevaluation phase) with identification by plant of (1) equipment which has failed to meet the required response spectra and will

require requalification, and (2) equipment which is acceptable, together with the necessary information to justify the adequacy of the original qualification.

(e) Indicate the availability of equipment identified in (d)(2) by plant or other location for staff inspection and review.

(f) Develop procedures and schedule plan for the requalification phase for items identified in (d)(1).

(g) Develop a confirmatory in-situ test program to characterize the ability of equipment to accommodate hydrodynamic loading.