ENCLOSURE 1

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATING TO MARK I CONTAINMENT PROGRAM - VACUUM BREAKER INTEGRITY

COMMONWEALTH EDISON COMPANY

DRESDEN NUCLEAR POWER STATION UNITS 2 AND 3

DOCKET NOS.: 50-237 AND 249

I. INTRODUCTION

In addition to the evaluation of the suppression chamber, torus attached piping, pressure relieving lines, etc, under the newly defined loadings, the Mark I containment program required the assurance of the structural integrity of vacuum breakers during operation in all Mark I plants. This additional requirement was categorized as a separate effort, as the adequacy of other components was already discussed in a separate Safety Evaluation.

The Franklin Research Center (FRC) has performed an evaluation of the structural integrity of vacuum breakers in the Dresden Station Units 2 and 3 (Dresden 2 and 3) for the NRC staff. Results of the review are reported in the attached document, TER-C5506-324, "Structural Evaluation of the Vacuum Breakers (Mark I Containment Program), Commonwealth Edison Company, Dresden Station Units 2 and 3." FRC has concluded that vacuum breakers in Dresden 2 and 3 will provide adequate margins of safety under the revised loadings in the Mark I containment for all operating conditions, and therefore need not be modified. NRC staff reviewed the attached document and concurred with the FRC findings.

II. DISCUSSION

In each of the Dresden 2 and 3 Mark I Containments, there are twelve 18" external type vacuum breakers made by Atwood - Morrill mounted on six exterior headers connecting the suppression chamber and the vent line exterior of the wetwell. Loadings on Mark I structures and vacuum breakers are based on the General Electric Company Report, NEDO-21888, "Mark I Containment Program Load Definition Report," Revision 2, dated November, 1981. For vacuum breakers, the loadings included are gravity, seismic, and hydrodynamic loads. The hydrodynamic forcing functions were developed by Continuum Dynamics, Inc. by using a dynamic model of a Mark I pressure suppression system and the full scale test facility data. The system model was capable of predicting pressure transients at specific locations in the vent system. Loading across the vacuum breaker disc caused by pressure differentials based on test data was thus quantified as a function of time. This issue was reviewed and approved by NRC on December 24, 1984. Loadings were combined according to the FSAR commitments.

To determine the structural integrity of the vacuum breakers, results from a finite element model and ANSYS program analyses were compared with design limits specified in the ASME Boiler and Pressure Vessel Code, Section III, Division 1, Subsection NC, 1977 Edition and addenda up to Summer 1977. It was found that the hydrodynamic chugging force in Dresden 2 and 3 will not significantly increase the impact velocity on vacuum breakers to cause any additional loading. Since the original design margin does not need improvement, the licensee decided that no modifications were needed on the construction of its vacuum breakers. The licensee, however, did replace the original aluminum cast discs with aluminum plate material for better ductility.

III. CONCLUSION

The analytical method used by the licensee to evaluate critical stresses has been reviewed and found to be adequate. The structural analysis indicates that the existing vacuum breaker design is acceptable and no additional modifications are required.

Principal contributor: H. Shaw

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