

APPENDIX 5A

5A.0 STRUCTURAL DESIGN BASIS

5A.1 GENERAL

The design basis for structures for normal operating conditions are governed by the applicable building design codes. The design bases for specific systems and equipment are stated in the appropriate Updated Final Safety Analysis Report (UFSAR) section. The design basis for the maximum loss-of-coolant accident (LOCA) and seismic conditions is that there be no loss of function if that function is related to public safety. The method used to determine the seismic response resulting from the Operating Basis (OBE) and Safe Shutdown Earthquake (SSE) is described in Sections 2.6.5 and 5.1.3.2.b.

5A.1.1 RESPONSIBLE DESIGN ORGANIZATIONS

Calvert Cliffs Nuclear Power Plant (CCNPP), as the applicant, has the ultimate responsibility for the design and construction of Calvert Cliffs Nuclear Power Plant, Units 1 and 2. Calvert Cliffs Nuclear Power Plant utilizes its experienced staff to perform project management, engineering review, construction coordination and quality assurance functions.

Combustion Engineering, Inc. (CE), as the Nuclear Steam Supply System (NSSS) supplier, has supplied the components of the Reactor Coolant System, the Chemical and Volume Control System and the Safety Injection System. Babcock & Wilcox, Canada is the supplier of the replacement steam generators. As the suppliers, they are responsible for the seismic design of their components in a manner consistent with the design criteria for the project.

Bechtel Associates (Bechtel), as the Architect-Engineer for CCNPP, was responsible for developing the seismic criteria and the design of Category I structures and for the approval of all other Category I equipment. Once the seismic criteria for the project were established by Bechtel with the assistance of Dames and Moore, soil consultants, Bechtel ensured that these criteria were implemented in the design of Category I structures.

Bechtel Associates also developed response spectra curves and all other requirements necessary for the design of all Category I equipment including the NSSS. This information is given to all suppliers of Category I equipment including CE who has implemented these seismic criteria in their design. All interdisciplinary exchanges, between Bechtel, CE, CCNPP and any vendor supplying Category I equipment, were documented with memoranda or conference notes. Exchanges of letters, specifications and drawings in accordance with defined procedures are used to maintain uniform design throughout the plant.

In 2001 Stevenson and Associates developed in-structure acceleration time-histories and seismic response spectra to be utilized for the design and evaluation of Category I equipment within the Containment, including the NSSS.

5A.1.1.1 Design Control

Design control is effected by successive levels of review of seismic criteria, calculations, and seismic sections of specifications and drawings. At Bechtel, these levels are the Responsible Engineer, Group Supervisor, and Chief Engineer with final approval by the Project Engineer. These reviews also cover seismic requirements placed on suppliers, such as CE, where reviews are performed by the Specialty Group and Project Manager.

5A.1.2 SPECIFIC REQUIREMENTS FOR SAFETY-RELATED PURCHASES

Both the NSSS supplier and the Architect Engineer included requirements for seismic design in specifications for Category I equipment. Combustion Engineering, Inc. is required to design the NSSS to withstand the load imposed by the maximum hypothetical accident, and by the maximum seismic disturbance without loss of functions required for reactor shutdown and emergency core cooling.

Definitions in typical seismic specifications for Category I equipment:

- a. The OBE: has a maximum horizontal ground acceleration of 0.08 g and a maximum vertical ground acceleration of 0.053 g, acting simultaneously.
- b. The SSE: has a maximum horizontal ground acceleration of 0.15 g and a maximum vertical ground acceleration of 0.10 g, acting simultaneously. These seismic acceleration levels were established to provide an appropriate margin of safety for withstanding stresses greater than those recorded and reflect uncertainties about the historical data and their suitability for design basis.
- c. All Category I systems, equipment and components shall be designed to withstand the appropriate seismic load combined with other applicable loads without loss of function. The analysis of the dynamic loads on Category I systems is accomplished by using the Response-spectrum Method as outlined in Bechtel's seismic specification.

All vendors supplying Category I equipment or systems, are required to submit copies of their dynamic analyses or dynamic test results, based on seismic criteria, for approval.