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

Docket Nos.: 50-416/417

APPLICANTS: Mississippi Power and Light Company
Middle South Energy, Inc.

FACILITY: Grand Gulf Nuclear Station, Units 1 and 2

SUBJECT: SUMMARY OF MARCH 17-21, 1980 MEETING

From March 17th to March 21st we met with the applicant and his architect-engineer, Bechtel Power Corporation, in Gaithersburg, Maryland to conduct a structural engineering audit of the Grand Gulf Nuclear Station. Our audit team consisted of engineers from our consultant, the Idaho National Engineering Laboratory (INEL), and Mr. Romuald Lipinski of the Structural Engineering Branch. The personnel who attended the meeting are listed in Enclosure 1.

We identified five areas of major concern during the audit and requested specific additional action by the applicant to alleviate these concerns. These items are listed in Enclosure 2. In addition, we requested that some sample calculations, design drawings, and other information be forwarded to INEL to facilitate their independent analysis of the Grand Gulf Nuclear Station. Enclosure 3 provides a listing of these items.

At the exit interview we expressed our appreciation for the professionalism and enthusiastic cooperation of the Bechtel engineers who participated in the audit.

Thomas C. Houghton, Project Manager
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Division of Licensing

Enclosures:
As stated

cc: See next page

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ENCLOSURE 1

ATTENDANCE LIST - STRUCTURAL ENGINEERING AUDIT
FOR GRAND GULF NUCLEAR STATION
MARCH 17-21, 1980

BECHTEL POWER CORPORATION

M. J. David
R. W. Haviland
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M. D. Archdeacon
J. C. Judd
A. Zaccaria
R. A. Lang

EG&G IDAHO

B. Harris
R. W. Macok
T. L. Bridges
T. Thompson
R. Rahl

MP&L

L. F. Dale

BNL

A. J. Philippacopoulos

NRC

R. E. Lipinski
T. C. Houghton

ENCLOSURE 2

ITEMS REQUIRING FURTHER EVALUATION

1. Select a critical section of a Category I structure, other than containment, and compare, on a quantitative basis, the existing design criteria and loading combinations with those of the Standard Review Plan.

2. Evaluate in quantitative terms the effect on a critical structure of increasing the vertical earthquake from 2/3 of the horizontal earthquake to 3/3 (i.e., equal in intensity to the horizontal earthquake).

3. Select a representative floor system supporting heavy equipment and quantify the effect of coupled subsystems (floors and floor beams) on a response spectra basis for a vertical earthquake.

4. Generate the response spectra per RG 1.60 and by calculating the percentage of seismic contribution to overall load conditions, assess the impact of the use of Grand Gulf's response spectra as compared to those corresponding to RG 1.60.

5. Categorize the loads defined in GE Report 22A4365, "Interim Containment Loads Report - Mark III Containment", Revision 2, in accordance with the Structural Engineering Branch Technical Position, "BWR Mark III Containment Pool Dynamics," (attached).

STRUCTURAL ENGINEERING BRANCH POSITION
U.S. NUCLEAR REGULATORY COMMISSION

BWR MARK III CONTAINMENT POOL DYNAMICS

1. POOL SWELL

   a. Bubble pressure, bulk swell and froth swell loads, drag pressure and other pool swell loads should be treated as abnormal pressure loads, P_a*. Appropriate load combinations and load factors should be applied accordingly.

   b. The pool swell loads and accident pressure may be combined in accordance with their actual time histories of occurrence.

2. SAFETY RELIEF VALVE (SRV) DISCHARGE

   a. The SRV loads should be treated as live loads in all load combinations with the exception of the combination that contains $1.5P_a$ where a load factor of 1.25 should be applied to the appropriate SRV loads.

   b. A single active failure causing one SRV discharge must be considered in combination with the Design Basis Accident (DBA).

   c. Appropriate multiple SRV discharge should be considered in combination with the Small Break Accident (SBA) and Intermediate Break Accident (IBA).

   d. Thermal loads due to SRV discharge should be treated as T_o* for normal operation and T_a* for accident conditions.

   e. The suppression pool liner should be designed in accordance with the ASME Boiler and Pressure Vessel Code, Division 1 Subsection NE to resist the SRV negative pressure, considering strength, buckling and low cycle fatigue.

*AS defined in ACI 359-74

ENCLOSURE 3

REQUESTED ADDITIONAL INFORMATION

1. The following list of sample calculations and information was requested by the NRC during the audit for the purpose of further methodology review (Proprietary):

General

- Live load drawings
- Representative generic calculations for tornadic missiles considering 12" dia pipe and automobile
- Copy of civil design criteria
- Provide rationale on seismic structure-soil-structure analyses using lumped mass.
- Give stiffness properties for rodofoam used between buildings.
- Artificial seismic time history development

Containment

- Define "new loads" pressure fields spatially and temporally by figures. These are time varying loads on suppression pool.
- Provide summary of stiffness and mass matrix used to model the enclosure building.
- Justify or account for failure to consider torsional effect on drywell from filter demineralization room.
- Verify statements on concrete stress from p. 77-78 of G102 of analysis calculations.
- Request sample calculations for determining governing steel and concrete stresses at characteristic points through foundation and containment shell.
- Request tangential rebar calculations (G341.0 pp 85 to 102).
- Request sample calculations for resolving element forces to sectional forces (Finite element stress distribution).
- Pool swell loads on Elev. 135 (G 200).
- Sample of enclosure building bracket (G181.0).

- Stiffness summary table for containment and internals.
- Compare liner plate stresses to ACI-359 requirements.
- Locations in containment and auxiliary building for which spectra are generated.
- Need explanation of modified working stress design with sample calculations.
- Explain 21.3 ksi shear allowable for 38 ksi material (FSAR for shield wall).

Control Building

- Sample design calculation for Seismic Category I concrete masonry walls.
- Floor framing calculations
- Shear wall calculations
- Column Calculations
- Damping ratio for soil.
- Displacement for structure-structure interaction.

Auxiliary Building

- Comparison of two dimensional and three dimensional seismic models and results.
- Example of three dimensional stiffness and mass calculations.
- Calculations for hydrodynamic analysis for spent fuel pool using TID 7024.
- Sample of calculations for west wall.
- Beam and girder framing calculations.
- Sample of composite column under Unit 2 pool.
- Containment and auxiliary building relative deflection.
- Example floor response spectra.
- Design calculations for 150 ton crane.
- Strain in fuel pool liner plate as related to ACI 359 criteria.

Standby Service Water Cooling Tower Basin

. Sample calculation showing loads and load combination (pages CC200).

. Sample of SSWCTB supply pipe attachment to building.

. Do both Finite Element and Elastic Half Space analyses for the generation of design response spectra and evaluate the effect of the envelope of above on equipment and piping design.

Electrical Duck Banks

. Sample of calculations at building and in free field.

. Combination of stresses.

. Bond between conduit and concrete.

. Concrete shear stress in free field.

Underground Category I Piping and Tanks

1) Analysis of buried diesel oil storage tank (to be requested from the vendor).

2) Calculations of the underground piping analysis.

3) Relative displacement calculations between tank and piping and between building and piping.

2. The following drawings were requested by the NRC during their audit of the Grand Gulf project (Proprietary):

*Drawing No.	
C-1002A&B	C-1057
*C-1036A	*C-1059
C-1036B	C-1061
C-1042	C-1062
*C-1043A	C-1067B&C
C-1043B	C-1068A
C-1046A	C-1071
*C-1046B	*C-1074B
C-1046C	*C-1075
*C-1048A	C-1084A&B
C01051A&B	C-1093A&B
C-1094	*C-1098

*Previously Submitted.