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Power
Company

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July 31, 1981

Mr J G Keppler, Regional Director
Office of Inspection and Enforcement
US Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, IL 60137

MIDLAND PROJECT -
DOCKET NOS 50-329, 50-330
AUXILIARY BUILDING SEISMIC ANALYSIS
FILE: 0.4.9.48 SERIAL: 12067

Reference: CFCo letters to J G Keppler, Same Subject:

- 1) Serial No 11200, dated February 20, 1981
- 2) Serial No 11972, dated April 16, 1981
- 3) Serial No 12008, dated May 29, 1981

The referenced letters were interim 50.55(e) reports concerning the auxiliary building seismic analysis. This letter is the final report. Attachment 1 provides a summary of the actions which have been taken to resolve this concern. Final resolution will be demonstrated by the seismic analysis being performed in conjunction with the 50.54(f) concerning soils.

WRB/lr

Attachment 1: MCAR-47, Final Report, dated July 17, 1981
"Auxiliary Building Seismic Analysis"

CC: Director of Office of Inspection & Enforcement
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81-02 #1



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Bechtel Associates Professional Corporation

Attachment 1
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SUBJECT: MCAR 47 (Issued 1/29/81)
Auxiliary Building Seismic Analysis

FINAL REPORT

DATE: July 17, 1981

PROJECT: Consumers Power Company
Midland Plant Units 1 and 2
Bechtel Job 7220

Description

During a seismic reanalysis associated with the 10 CFR 50.54(f) plant fill issue, it was noted that the 1977 auxiliary building seismic model considered the control tower and the main portion of the auxiliary building as an integral unit between el 614' and 659'. This assumption is not appropriate for the north-south direction because of the connection between the control tower and the main structure, which consists primarily of reinforced concrete slabs. The auxiliary building and the control tower were structurally designed using input from a 1974 seismic model that included flexibility at the connection between the control tower and main structure. Equipment and systems have been seismically qualified using output from the 1974 or 1977 seismic models, depending on the purchase date.

Safety Implications

There is actually no potential safety impact on the auxiliary building and its contents because it will be modified under the 10 CFR 50.54(f) remedial soils action and the final design will meet acceptance criteria prior to plant operation. The investigation described in this report was initiated solely to determine the potential safety impact on the "pre" 10 CFR 50.54(f) auxiliary building structure and did not include the structural modifications in progress to resolve the 10 CFR 50.54(f) remedial soils action.

Potential safety implications on the "pre" 10 CFR 50.54(f) remedial soils action structure were determined for equipment and piping as described in this report but were not determined for the control tower, its connections to the main auxiliary building, or the electrical penetration areas.

Investigation

The investigation presented was limited to the north-south, 1977 seismic model (FSAR Figure 3.7-10) because the structural behavior due to seismic motions in the east-west and vertical directions is judged not to be influenced by this change. The control tower and the main auxiliary

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building (el 614' to 659') were modeled as two separate structures connected by flexible links, this investigation considered resulting changes in the building forces and floor response spectra curves.

The investigation consisted of:

- 1) A response spectrum analysis to develop building forces
- 2) A time-history analysis to develop in-structure floor response spectra at selected locations
- 3) Comparison of building responses to values calculated in 1974 and 1977.
- 4) Comparison of instructure floor response spectra to those generated in 1977 at selected locations, and comparison of loads in selected piping systems and equipment systems to allowable loads if necessary.

The current status of this investigation follows.

- 1) The response spectrum analysis has been completed.
- 2) The time-history analysis and selected in-structure floor response spectra have been generated.
- 3) A comparison of the building forces has been made. The greatest change in building forces was confined to the structural steel superstructure, the control tower, and the electrical penetration areas at el 674'-6" and above. By inspection, the forces in the other portions of the building meet the acceptance criteria.

Based on a preliminary stress analysis of the "pre" 10 CFR 50.54(f) remedial soils action structure, several areas in the control tower and its connection to the auxiliary building were calculated to be overstressed in load combinations with seismic forces. This preliminary analysis distributed the seismic forces to various structural elements using conventional long hand methods. Because this was not a definitive analysis, a conclusion regarding potential safety implication cannot be drawn. The analysis being performed for the building as modified by the 10 CFR 50.54(f) remedial soils action will demonstrate the adequacy of the final design of this structure.

- 4) A comparison of the in-structure response spectra curves has been made. The greatest changes were confined to the structural steel superstructure, control tower, and electrical penetration areas at el 674'-6" and above. The frequencies most affected by this change were between 4 and 10 cps. The maximum increase in acceleration

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occurred at approximately 6 cps and was 1.6 times the previous spectra values. In other areas in the building, the new in-structure response spectra did not differ significantly from the existing spectra and, therefore, by inspection, the components in these areas satisfy the acceptance criteria.

A selected sample of piping systems in the affected area were checked and found to meet acceptance criteria except as noted below. The piping systems that were selected for evaluation were located in the area where the greatest change in seismic loads occurred and where the pipe or hanger stresses were close to the maximum allowable before checking the new seismic stresses. The auxiliary steam and turbine exhaust vent stack to the atmosphere is the only system found that could not meet the acceptance criteria. The analysis of the vent stack system for the increase in seismic loads identified one of the supports that did not satisfy the acceptance criteria. Because this support has a substantial factor against ultimate failure, this does not appear to have a safety impact. The analysis being performed for the 10 CFR 50.54(f) soils issue will demonstrate the adequacy of the final design of this piping system.

whose criteria is this?

A selected sample of equipment in the area affected were found to satisfy acceptance criteria. Equipment was selected to be checked based on its potential for change. The revised spectra were compared to the spectra used to seismically qualify the equipment, and the equipment still satisfied acceptance criteria.

Corrective Actions Completed

- 1) During the week ending January 23, 1981, the assumption that the control tower and the main portion of the auxiliary building is a nonintegral unit between el 614' and 659' was incorporated in a modified model of the auxiliary building. Accordingly, this action is complete.
- 2) The structural response spectra analysis has been completed.
- 3) The time-history analysis and corresponding in-structure floor response spectra have been generated.
- 4) Selected equipment systems, selected piping systems, the structural steel superstructure, and the stability of the main auxiliary building have been checked.

Corrective Actions to be Completed

- 1) Demonstrate that the final design meets acceptance criteria. This will be done through the 50.54(f) remedial soils action. The schedule will be established in 10 CFR 50.54(f) responses.

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- 2) FSAR Section 3.7 and Specification 7220-G-7 will be changed upon completion of the 10 CFR 50.54(f) remedial soils action.

Root Cause

This assumption was not caused by a failure to follow a procedure. All procedures pertaining to the origination, checking, review, and approval of calculations were followed.

This assumption involves a subjective technical determination of the most effective way to mathematically model a physical feature of the structure. The methods and values used were appropriate for the east-west direction, but detailed design review revealed that the methods and values used did not adequately represent the structure in the north-south direction.

Because these parameters are specifically and uniquely determined for each portion of the structure, this assumption is believed to be a random occurrence with no generic implications. Therefore, there is no generic or process corrective action planned. To support this, all models used in the analysis of Seismic Category I were visually inspected, and no geometric situation was identified which would lead to a similar model assumption in development of modal properties.

Reportability

This was reported by Consumers Power Company to the NRC as a potentially reportable 10 CFR 50.55(e) item on January 21, 1981. To date, it has not been established whether this item is "reportable" under the criteria of 10 CFR 50.55(e). The final design under the 10 CFR 50.54(f) soils issue will eliminate the safety implications (reportability), if any, addressed by this MCAR.

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