J. Kane P-214

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

12/11/80

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
CONSUMERS POWER COMPANY	)	Docket Nos. 50-329 OM & OL
	)	50-330 OM & OL
(Midland Plant, Units 1 and 2)	)	

NOTICE OF DEPOSITION

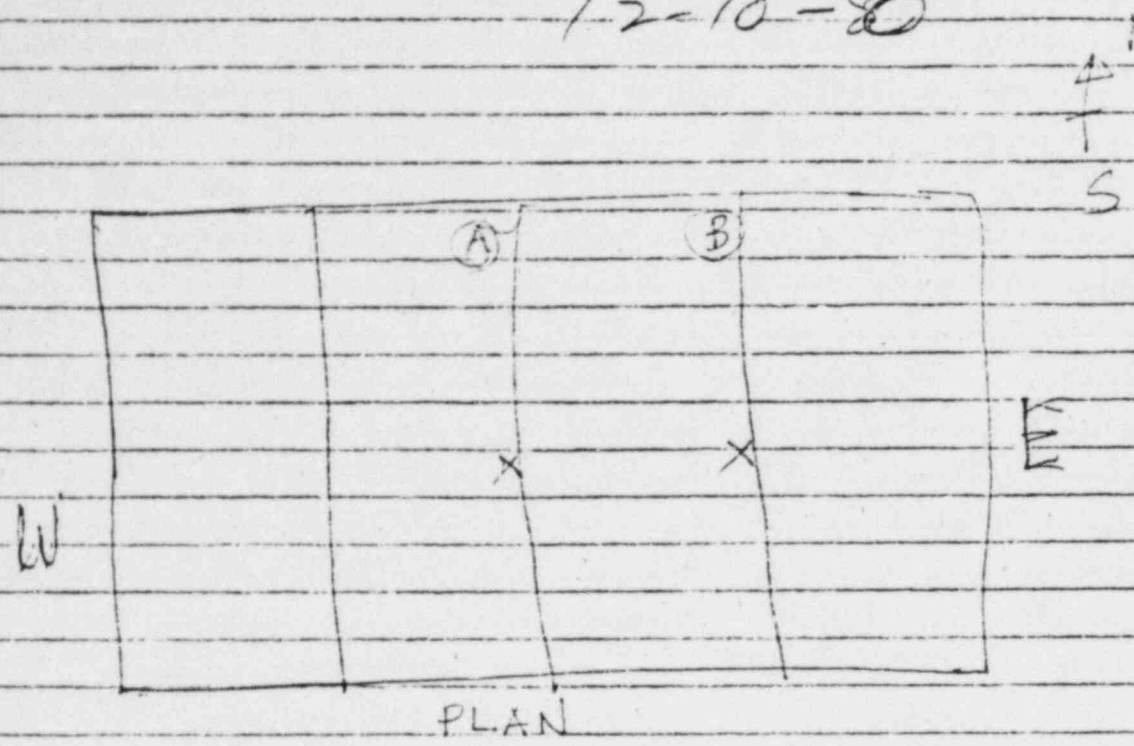
Please take notice that, in accordance with 10 C.F.R. § 2.740a of the Commission's Rules of Practice, the NRC Staff shall take the deposition on oral examination of the following person at the time, date and place indicated.

B. Dahr Bechtel Associates	9:00 a.m., Wednesday December 17, 1980	Bechtel Associates Professional Corporation 777 East Eisenhower Parkway Ann Arbor, Michigan

The subject matter of the deposition shall be all matters relating to the issues set forth in the Licensing Board's Order of December 6, 1979 (Order Modifying Construction Permits), and the contentions of intervenors Stamiris and Warren.

Thin Dep. Ex 2

12-10-80



PLAN

Elevation Wall A

Elevation Wall B

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RESUME

THIRU R. THIRUVENGADAM

2124 Glencoe Hills Dr., Apt. 9
Ann Arbor, Michigan 48104

Telephone: Home: (313) 971-8051
Office: (313) ~~769-9700~~ 994-7770

OBJECTIVE — Structural Engineer; Supervisor-Lead Engineer

EMPLOYMENT

Bechtel Corporation, Ann Arbor, Michigan: 49
From October 1973 -- continuing at present (~~39~~ months).
Lead Engineer of the Containment Subgroup of the Reactor Building for the Midland Nuclear Power Plant. Complete responsibility for the analysis, design and production of working drawings for the Prestressed Concrete Containment. In addition, responsible for supervision of engineering/drafting personnel assigned to the group, project correspondence in terms of client-vendor-construction communication, specifications, preparation of bids, bid evaluation and writing of purchase orders, PSAR/FSAR participation and AEC communication, project scheduling, manpower estimates, drawing control and personnel evaluation.

Sargent & Lundy, Chicago, Illinois:
From August 1971 to September 1973 (26 months).
Senior Structural Analyst in the Special Structures Group of the Structural Design and Drafting Division Responsibilities included complete analysis and design of Prestressed/Reinforced Concrete Containments for both PWR and BWR Reactors, Seismic Analysis of Class I structures, PSAR/FSAR documentation and other special problems such as Cooling Towers, Pipe Whip Effects and Restraints and Tornado Effects and supervision of the three to six engineers assigned to the group. Names of the projects actively participated in are: Byron/Braidwood, Illinois; Zimmer, Ohio; LaSalle County, Illinois; Bailly, Indiana; and Enrico Fermi II, Michigan.

Skidmore, Owings & Merrill, Chicago, Illinois:
From March 1969 to July 1971 (30 months).
Structural Engineer -- equivalent in position to Assistant Project Engineer. Responsible for analysis and design of several concrete and steel highrise buildings. Member of a group of four engineers who were responsible for the complete design of Sears Tower, Chicago (109 stories -- steel framed building -- tallest in the world).

EMPLOYMENT (cont'd)

Other projects personally participated in are: One Shell Square, New Orleans, (50 stories, steel-concrete composite); First Wisconsin Center, Milwaukee, (40 stories, steel-braced building); and Bond Court, Cleveland, (20 stories, steel frame).

University of Illinois, Urbana, Illinois:
From June 1966 to August 1968 (27 months).
Civil Engineering Department. Research Assistant in the Project "Dynamic Stresses in Highway Bridges"--
Developed several Computer Programs for Dynamic Analysis of Single Span to Three Span Bridges under Moving Loads.

Tarapore & Company, Madras, India:
From December 1963 to September 1964 (10 months).
Design and Supervision of several Structures (e.g. office buildings, factory and industrial buildings, airport pavements and shell roofs).

Army School for A.M.I.E. (India) Madras, India:
From February 1964 to July 1964 (6 months).
Part Time Teaching in the Evenings for Licensiate Practicing Engineers preparing for A.M.I.E. (India) Examinations.

Madras State Electricity Board, Madras, India:
From January 1963 to July 1963 (6 months).
Practical Training as a Partial Requirement for Masters Degree in Power Engineering. Assignments in various Division of Hydroelectric Power Projects involved in Analysis and Design of Power Plant Structures, such as, Penstocks, Surgetanks, Transmission Towers and Power Station Structures.

EDUCATION

University of Illinois, Urbana, Illinois: From 9/64 to 3/69
Ph.D. Degree in Civil Engineering (Structures);
Recipient of Government of India Scholarship (64-66);
Research Assistant in Civil Engineering Department (66-68).

Indian Institute of Science, Bangalore, India: From 8/61 to 12/63
M.E. Degree in Power Engineering (Civil & Hydraulic);
Passed with Distinction

University of Madras, Madras, India: From 6/57 to 4/61.
B.E. Degree in Civil Engineering; Passed in First Class with Honours.

PROFESSIONAL SOCIETY MEMBERSHIP	American Society of Civil Engineers -- Associate Member American Concrete Institute -- Member

PERSONAL DATA	Date of Birth:	December 15, 1940
	Height:	5 feet, 8 inches
	Weight:	175 lbs.
	Marital Status:	Single
	Health:	Excellent
	Sex:	Male
	Citizenship:	Indian (Immigrant to U.S.A.)

REFERENCES	Available on Request
SALARY	Open
AVAILABILITY	Four weeks after acceptance; earlier, if necessary.

Records requested from folder
maintained by Joseph Kane
entitled "Midland 50.54 (f)
Impt. Meeting Minutes
Bechtel & Consultants".

Consumers Power Company

Midland Project: P.O. Box 1963, Midland, Michigan 48640 · Area Code 517 631-0951

December 7, 1978

Mr. P. A. Martinez
Bechtel Power Corporation
P.O. Box 1000
Ann Arbor, MI 48106

MIDLAND PROJECT GWO 7020 - DECEMBER 3 & 4, 1978
NRC VISIT REGARDING DIESEL GENERATOR SETTLEMENT
File: B3.0.3 Serial: CSC-3663

While this is not a set of minutes or an open item action list, during the subject visit several issues or questions were raised or inferred as noted below:

1. New settlement readings taken after duct bank freeing would seem to indicate the building may be pivoting about a north-south axis located somewhere in the vicinity of the condensate pipes. This raised a question concerning the potential hard spot developed by the 20" condensate line encased in the 24" lines surrounded by concrete and possibly resting on well compacted sand. If this is the case, we should examine the Diesel Generator Building structure in the vicinity for cracks in the concrete and consider the possibility of cutting loose the condensate lines immediately adjacent to the Diesel Generator Building.

2. When Mr. Ferris discussed possible causes, he made the point that it may be impossible to state the exact cause and that the more immediate concern was the remedial action. Although we concur that remedial action is most important, it should be noted that Mr. Gallager took strong issue with this point in that I & E believed cause determination to be mandatory and relative "to preclude repetition," etc. This aspect should receive more attention.

3. During this discussion it was noted that instrumentation will show when surcharge may be removed. In response to the NRC question regarding same, it was also noted that most settlement should occur rapidly as the area is being preloaded and that total settlement could take weeks or months. Our final response will have to provide sufficient rationale for determination that required settlement has taken place and answer the question of how we arrived at what was required.

4. Bechtel agreed to provide R. Cook a list of the equipment (small hand equipment and vibratory rolling equipment) which Bechtel utilized for compacting the fill from EL 618' to EL 628' in the Diesel Generator Building.

5. During Mr. McConnell's discussion regarding Item V, Mr. Gallager questioned the possible interference by the 20" condensate line. Bechtel should in-

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vestigate and document the effects of additional outside pressure on the condensate lines resulting from the preload. Again Bechtel should consider cutting same at this point in time since it appears that it could be acting as a cantilever type restraint with the fixed end being the Turbine Building wall and/or the well compacted sands existing in that area. In a separate discussion, Mr. Don Miller noted that we have to consider the effect of rupture of the condensate line and subsequent flooding on a Class I structure during a tornado and/or an earthquake.

6. Mr. Gallager appeared to find Mr. Dahr's explanation connected with VII a. 1), table oversite, unacceptable or at least extremely difficult to accept. Bechtel should be prepared to completely satisfy the NRC concern in this area.

7. VII a. 7) Mr. Gallager appeared to find the ± 2% Industrial Standard discussion unacceptable. Bechtel should be prepared to completely satisfy the NRC concern in this area. We believe Mr. Gallager's question not only relates to the characteristics of the proctor curves in terms of optimum moisture content but additionally whether the material being placed relates to the selected proctor. To go a little further, he may be questioning the validity of your tests; i.e., was it really 80% or 95% compaction.

8. In my opinion, we should be prepared to fully address Mr. Heller's summary comments regarding the fact that the response to the Diesel Generator Settlement questions will have to improve or exceed the reviewer's expectations. Mr. Heller was discussing the fact that the construction permit was based on the original reviewer's examination of the program, and that licensing will now have to judge whether or not the modification program meets or exceeds the construction permit intentions and qualifications. This would seem to indicate that our responses are going to undergo an extremely critical review and that none of our answers will be acceptable unless they can withstand the most intense scrutiny. It would also appear that this will become part of the operating license hearings. In that respect, I cannot emphasize too strongly the need for absolute documented accuracy and the strongest argument in our responses.

As a separate issue we are also extremely interested in as early as possible resolution to the Turbine Building basement wall problem and preload relative of the area between the Turbine Building and the Diesel Generator Building.

I am submitting this list of items for your review and consideration as part of the overall development or resolution to the Diesel Generator Settlement problem. No response is required at this time.

T. C. Cooke
Project Superintendent

TCC/sd
cc: DBMiller
JLCorley
ABoos

Interim Report 4

13

Consumers Power Company

Stephen H. Howell
Senior Vice President

General Offices: 1945 West Parnall Road, Jackson, Michigan 49201 • (517) 788-0453

February 23, 1979
Howe-58-79

accompanying Drawings given to Dan Hillen

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 NUCLEAR PLANT
UNIT NO 1, DOCKET NO 50-329
UNIT NO 2, DOCKET NO 50-330
SETTLEMENT OF DIESEL GENERATOR FOUNDATIONS AND BUILDING

Reference: S H Howell letters to J G Keppler; Midland Nuclear Plant: Unit No 1, Docket No 50-329; Unit No 2, Docket No 50-330; Settlement of Diesel Generator Foundations and Building;

a) Serial Howe-183-78; dated September 29, 1978
b) Serial Howe-230-78; dated November 7, 1978
c) Serial Howe-267-78; dated December 21, 1978
d) Serial Howe-1-79; dated January 5, 1979

This letter, as were the referenced letters, is an interim 50.55(e) report on the settlement of the diesel generator foundations and building.

The enclosure provides the status of the actions being taken to resolve the problem.

Another report, either interim or final, will be sent on or before April 30, 1979.

Stephen H Howell

Enclosure: MCAR 24, Settlement of the Diesel Generator Foundations and Building, Interim Report #4, dated February 16, 1979

CC: Director, Office of Inspection & Enforcement
Att: Mr John G Davis, Acting Director, USNRC (15)

Director, Office of Management
Information and Program Control, USNRC (1)

FEB 26 1979

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Enclosure to
Howe-58-79

Bechtel Associates Professional Corporation

SUBJECT: MCAR 24 (issued 9/7/78)

Settlement of the Diesel Generator Foundations and Building

INTERIM REPORT 4

DATE: February 16, 1979

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

Introduction

This report is submitted to advise of the interim status of the project's actions relating to the settlement of the diesel generator foundation and building as described in MCAR 24 and NCR 1482. This report describes developments and action since Interim Report 3 dated December 27, 1978.

Description of Deficiency

The general diesel generator foundation and building settlements as of February 2, 1979, are shown in Figures 1 and 2 and Figures 13 through 16 (attached). Figures 15 and 16 have been added since Interim Report 3 and show the maximum/minimum time settlement curves for the diesel generator building and one diesel generator foundation, respectively. It should be noted that over the last 5 weeks the rate of settlement for these foundations has significantly decreased.

Corrective Action

As discussed in Interim Report 3, preloading of the diesel generator building area was the selected option for corrective action. The preload sequence consists of placing granular fill inside the diesel generator building and for a distance of 20 feet outside the building. The level of preload will be brought up in a sequence in the designated areas as shown in Figures 11 and 12. The maximum expected height of preload will be 20 feet above final plant grade.

The placement of the preload between the diesel generator building and the turbine building will utilize temporary retaining forms. Because the turbine building is located just north of the diesel generator building, the preload will extend approximately 19 feet from the diesel generator building wall.

CPCo NOTE: Figure 15 shows a date of 1/19/79 as the end of pond fill. The correct date is 1/12/79.

The instrumentation installed in and around the diesel generator building, as shown in Figures 1 and 17, will monitor settlement and changes in the soil conditions as the preload is placed. Cross sections showing elevations of the Borros anchors and piezometers in the diesel generator building area are presented in Figures 23, 24 and 25. Mr. C.J. Dunnicliff, our soil instrumentation consultant, is presently preparing a report summarizing details of installation and monitoring of instrumentation.

Activities Completed Since the Previous Interim Report

1. Monitoring Cracks in the Diesel Generator Building Walls

   The existing cracks in the diesel generator building walls have been mapped to assist in the evaluation of the structure. Strain gages have been placed at select locations shown in Figures 17 and 18 to monitor changes in crack width during the preloading operations. On February 2, 1979, the maximum recorded crack width was approximately 28 mils.

2. Utility Monitoring

   The underground utilities passing near and under the diesel generator building are being monitored during the preload operation. Pipe profile settlement gage measurements have been taken on selected pipelines by Goldberg-Zoino-Dunnicliff & Associates under the direction of Mr. C.J. Dunnicliff. Figure 19 shows the location of all the surveyed pipelines and the locations of the readout points. Additional profiling of the condensate line under the diesel generator building will be performed after the preload Steps IV, VI, and VII given by Table 1 of Figure 12.

3. Soil Exploration

   The soil borings and test pits addressed in MCAR 24, Interim Report 3 have been completed. Locations of these borings, pits, and dutch cone penetrations are shown in Figures 7, 8, and 20. Cross sections summarizing results of field work in the tank farm and diesel generator building are presented in Figures 21 through 28. The pocket penetrometer readings in the test pits are summarized on Figures 29 through 32, with the test pit borings shown in Figure 40.

Results of density and compaction tests made in the test pits are presented in Figure 33, with the percent compaction referenced to ASTM D 1557 (56,000 ft-lbs).

Laboratory soil tests have been performed by Goldberg-Zoino-Dunnicliff & Associates, Inc. These results include data on moisture content, unit weight, plasticity, gradations, strength, consolidation, compaction, mineralogy, and cation exchange capacity. Graphical summaries of the diesel generator building soil plasticity, water content, dry unit weight, total unit weight, and shear strength are presented in Figures 34 through 39.

These tests indicate that the diesel generator building backfill samples had:

a. Plasticity characteristics from nonplastic to low plasticity (Figure 34)

b. Moisture content from approximately 2 to 35% averaging about 13% (Figure 35)

c. Dry unit weights between 96 and 130 pcf, averaging about 120 pcf (Figure 36)

d. Total unit weights between 112 and 143 pcf, averaging about 133 pcf (Figure 37)

e. Shear strengths based on unconfined compression test results on the samples obtained ranged from approximately 100 to 3,646 psf (Figure 38)

f. A shear strength to moisture content relationship as shown in Figure 39

Additional laboratory tests are being made, including consolidated-undrained triaxial tests in which consolidation pressures will be selected to model stress histories that will be experienced in the field at the different locations.

4. NRC Inspection Report

In response to the conflicts addressed in NRC Inspection Reports 50-329/78-12 and 50-330/78-12 dated November 14, 1978, FSAR Change Notice 1065 has been initiated to address Items a, b, c, and d listed in Section 4 of Activities in Progress for Interim Report 3. Further evaluations of the additional items are continuing and will be addressed in subsequent reports.

5. Evaluation of Underground Pipe for Preload Pressure

The condensate pipes (20" Ø), service water pipes (26" Ø), and circulating water pipes (6' Ø and 8' Ø) have been evaluated for the pressure the preload will impose upon them.

The condensate and service water pipes can resist the temporarily imposed pressure. The evaluation of the circulating water pipes indicated that temporary internal bracing may be needed. A survey was made on the roundness of these circulating water lines which showed that the bracing may not be needed. The roundness survey will be performed at key preload levels to verify that the pipe will not be adversely affected by the preload.

Activities in Progress

1. Strengthening of the Turbine Building Wall

The structures in the area of the preload have been evaluated. Because of the close proximity of the turbine building, a temporary reinforcement of the below grade turbine building wall is required to support the lateral earth pressure resulting from the preload. This wall reinforcement consists of a system of tie rods between the buildings, shimming of the turbine building wall to existing structural elements inside the turbine building, and adding steel braces, buttresses, and composite reinforcement to the existing turbine building wall. This work will be completed before the preload is placed above el 644'-0".

2. Preload Operation

Preloading of the diesel generator building is continuing. As of February 2, 1979, the granular fill material for the preload has been placed to the elevations shown in Figure 41.

3. Cutting of the Condensate Pipelines

The two 20-inch condensate lines and two 6-inch condensate lines shown in Figures 9 and 10 have been cut outside the turbine building wall to prevent potential overstressing of the pipes during preload. Continued surveillance will be provided on the cut pipelines and further evaluation will be provided in subsequent reports.

4. Evaluation of Field Records

Field density test records prepared by the testing subcontractor (UST) are being evaluated.

5. Summary of Plant Fill Under Seismic Category I Structures

Action required for Seismic Category I structures on plant fill were discussed with Dr. R. Peck, Bechtel's consultant in a meeting in Alburquerque, New Mexico, on December 8, 1978. A discussion of the current status of these Seismic Category I structures is given below.

a) Tank Farm

Field studies in the tank farm area show generally stiff to very stiff clay backfill with some soft zones and occasional medium to very dense sand backfill over natural soils. Current plans involve filling the tanks and measuring structure settlements. Loading duration will be determined based on predictions of future settlements. No surcharge in addition to tank loading is planned, but settlement measurements will be continued after completion of preloading.

b) Diesel Generator Building

Field studies in this area indicate that the backfill consists primarily of very soft to very stiff clay backfill with pockets and layers of very loose to dense sand backfill over natural soils. These clay backfill materials are highly variable in strength, moisture content, and unit weight, but are relatively uniform in plasticity and grain size distribution characteristics. The sands also have relatively uniform grain size distribution.

c) Diesel Fuel Tanks

Field studies made adjacent to the diesel fuel tanks show loose to dense sand backfill and stiff to very stiff clay backfill with some soft zones over natural soils. Settlement of these tanks will be monitored to observe the behavior of these tanks.

d) Retaining Walls Adjacent to the Service Water Pumphouse

Borings in the retaining wall areas indicate that this wall may be supported by stiff to very stiff clay backfill over natural soils. The wall will continue to be monitored to allow further evaluation.

e) Service Water Building Area on Plant Fill

Borings in this area indicate loose to dense sand backfill exists adjacent to the building. Conditions of the building are under evaluation.

f) Service Water Pipes

Borings adjacent to the service water pipes showed soft to very stiff clay backfill with occasional dense sand backfill over natural soils. Borings Q-3 through Q-7 (see Figure 7) indicated some very soft clay backfill. These conditions are under evaluation. These pipes will be monitored for settlement.

6. Cooling Pond Fill

Since November 8, 1978, the cooling pond has been filled from el 621.9 to its current level of 625.8. Additional filling to the maximum level of 627.0 will be accomplished after the spring river-flows begin.

Affect on Project Schedule

According to the present schedule, the 10-foot uniform preload stage will be reached during the middle of March 1979. Further preload operation is dependent on the structural evaluation at that time. The removal of the preload material is anticipated in late June 1979. However, the present preload schedule is not anticipated to impact the scheduled fuel load dates.

Submitted by:

Reviewed by:

Approved by:

Concurrence by:

RM/pd
2/6/4

DRAWING SUMMARY

Figures Included in MCAR 24

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