



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

*Kane*  
*14/87*

January 23, 1984

MEMORANDUM FOR: *[Redacted]* Chief  
Structural and Geotechnical Engineering Branch  
Division of Engineering

THRU: *WJH* Lyman W. Heller, Leader  
Geotechnical Engineering Section  
Structural and Geotechnical Engineering Branch  
Division of Engineering

FROM: Joseph D. Kane, Senior Geotechnical Engineer  
Geotechnical Engineering Section  
Structural and Geotechnical Engineering Branch  
Division of Engineering

SUBJECT: DOW'S REQUEST TO DEPOSE H. SINGH

*Noted*  
*2/2/84*

The purpose of this memorandum is to document contacts with the attorneys from Kirkland and Ellis who are representing Dow Chemical in their suit against Consumers Power Company and to identify questions where I feel technical reviewers for the Midland project should be provided guidance by the NRC legal staff.

NRC Consultant, Mr. Hari Singh, from the U.S. Army Corps of Engineers has been contacted on two occasions by an attorney from Kirkland and Ellis who has requested that Mr. Singh make himself available for deposition questioning. On both occasions Mr. Singh has referred Dow's attorney to COE management. The most recent contact resulted in Mr. Andy Running from Kirkland and Ellis (312-861-2412) calling J. Kane on January 16, 1984 at the suggestion of Neil Gehring, Project Manager for the COE.

In response to Mr. Running's request to depose Mr. Singh, I indicated that it was necessary for me to contact OELD before a response to Kirkland and Ellis's request could be made. I called W. Paton, OELD on January 16, 1984 and apprised him of Dow's request and asked for OELD legal guidance on the following questions:

1. Should NRC recommend that Mr. Singh appear voluntarily for the requested deposition or should it be under a subpoena? Both Mr. Singh and myself feel the Midland safety hearings have been lengthy, demanding and draining and would strongly prefer to stay out of the Dow lawsuit, particularly in recognition that these efforts are unrelated to our official duties and responsibilities to the NRC.

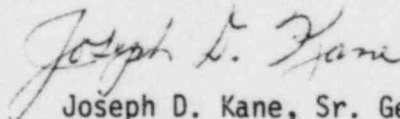
January 23, 1984

2. If directed to appear at a deposition, what arrangements should be made beforehand, for payment of time and travel expenses? The present interagency contract that the DE has with the COE did not anticipate this involvement, nor do we have funds available to cover these costs.
3. Will OELD provide legal representation at Mr. Singh's deposition if he is directed to participate?

Mr. Paton indicated a desire to consider the impact of these questions and discuss them with his supervisors in OELD.

On January 18, 1984 Mr. Paton returned my call and advised me that all questions related to the staff and its consultants involvement in the Dow lawsuit should be directed to the Office of General Counsel and suggested that I contact Marty Malsch (634-1465). In order to fulfill my verbal commitment to get back to Mr. Running from Kirkland and Ellis with a response from NRC, I called Mr. Malsch on January 18, 1984. Mr. Malsch had apparently had previous discussions with OELD and was aware of Dow's request to depose Mr. Singh. I repeated the three questions which sought legal guidance on this matter and was advised that Mr. Malsch would get back to me. A preliminary response from Mr. Malsch indicated that the party requesting the deposition would reasonably be expected to provide the funds to cover costs and that the Office of General Counsel would provide legal representation to our consultant if other arrangements could not be made. Possibly an attorney from the Corps of Engineers could attend Mr. Singh's deposition, if the deposition is ultimately scheduled. Mr. Malsch expressed an initial preference to proceed with interrogatories rather than deposition.

I have requested that a copy of this memorandum be provided to D. Hood and F. Rinaldi for their information, since it is likely that they will also be contacted by Dow's attorney in the future.



Joseph D. Kane, Sr. Geotechnical Engineer  
 Geotechnical Engineering Section  
 Structural and Geotechnical  
 Engineering Branch  
 Division of Engineering, ONRR

- |                |                 |
|----------------|-----------------|
| cc: R. Vollmer | M. Malsch       |
| J. Knight      | E. Adensam      |
| G. Lear        | D. Hood         |
| L. Heller      | F. Rinaldi      |
| P. Kuo         | H. Singh, COE   |
| T. Sullivan    | N. Gehring, COE |
| W. Paton       | J. Kane         |

Meeting

Copy given in deposition documents

Rec'd 4/8/80  
from O. Thompson

J. Kane

15/137

NCEED-T

Geotechnical Engineering Assistance to the NRC - Trip  
Report Meeting at Midland Nuclear Plant -  
Units 1 and 2

NRC FILE

H.A. GEHRING

14 MAR 80  
GEHRING/vw/66793

1. PURPOSE: The purpose of the trip was to acquaint the new NCE team members with the site. None of the NCE people, except Ron Erickson had yet been to the Midland site. It was important for the NCE people to see the site to view the size of the job, the amount of the plant constructed and the visable problems identified to date.

2. DATE AND PLACE: The meeting took place at the Midland Power Plant site on 27 and 28 February 1980.

3. SIGNIFICANT ELEMENTS: The NCE staff and WES consultant, Paul Hadala met the NRC staff and the applicant, Consumers Power Company (CPCo) and its consultants, viewed the site and were briefed on the fixes proposed for structures in need of remedial action. Structures identified as constructed on improperly compacted fill and, therefore, possibly requiring remedial action are the diesel generator building, service water pump station, borated water tanks, underground diesel fuel tanks, feed water valve pits (between Aux. Bldg and reactor containment) and underground utilities. Of these structures only the diesel generator building, service water pump building and the foed water valve pits have remedial action planned. Another significant topic discussed was the site dewatering plan which is important during seismic events to prevent liquefaction.

4. PERSONS PARTICIPATING: See attendees list dated 27 Feb 80, Incl. 1. Essentially the same people attended the 28 Feb 80 meeting with the addition of the four principle consultants; Gould, Peck, Handron and Davisson.

5. NARRATIVE: The meeting agenda is attached as Inclosure 2. The agenda was followed exactly with completion of all presentations through No. 7 being completed on 27 Feb 80 and items 8, 9 and 10 being completed on 28 Feb 80. Lyman Heller (NRC) made introductory remarks and turned the meeting over to Gil Kaeley (CPCO). Gil mentioned that remedial work had been shutdown due to NRC December 6, 1979 show cause notice. He also mentioned that 10 CFR 50.54(f) responses to questions 24-35 along with answer changes to previous questions would be provided to NRC the week of 3 March 80.

Tom Cooke (CPCO) discussed the D.G. building problem which was first noted on 2 Aug 78 and followed by NRC notification on 7 Sept 78. This was the first indication of the improperly compacted fill problem. Fifty-six meetings resulted in selection of the pre-load fix. A major investigative program was initiated for structures placed on fill and associated crack mapping. Tom Cooke outlined the problems, all proposed remedial actions and the dewatering plans.

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The remaining agenda items 3.0 thru 7.3 were covered by primarily technical discussions concerning the status of designs completed. Handouts were provided by the various speakers for agenda items 2.0, 3.0, 4.0 (all), 6.0 and 7.0 (all). These are included as Incl. #3.

On the morning of 28 Feb 80, the site was toured. There were several tour leaders which provided tours on the particular interest. Our geotechnical tour leader was Jim Wanzeck (Bechtel). The areas we observed were as follows:

a. Diesel Generator Building - The west and east bays only. We observed the duct banks and how they had been released from supporting the building and the cracking. Various settlement monitoring devices and crack mapping methods were also observed.

b. The cooling pond at the guide dike was observed. The various intake and outlet pipes were discussed (not visible). Concern was expressed for these Category I utilities.

c. Service Water Building (cantilever portion) was observed along with some of the cracks. The retaining walls on either side of the building were also observed along with about a 1-1/2 differential settlement between wall sections (one each side of building). On our way to the feedwater valve pit, we observed the dewatering system that had just been turned on to begin initial pump down tests.

d. Aux. Bldg - Feed water valve pit (east). Provisions had been started for supporting this area from above with very large structural members. Not much was visible concerning the problem area.

e. Borated Water Tank (west) - observed the large diagonal crack in the ring foundation as well as cracks in the walls of the valve pit area. This completed the site tour.

Next the four consultants to CPCo gave their summaries for the fixes. Mr. Gould discussed the feed water valve pit fix. A handout was provided - Incl 4. Basically the plan is to locally dewater at each pit (east and west), install SSP access shaft elev 634 - 600', support valve pit from surface, install caisson between reactor and aux. building and test load caissons. Then install jacked piles or caissons under electrical penetration area, excavate under valve pit to till and backfill with reinforced concrete lifts. Each caisson load is to be tested to 1.5 x design load.

Mr. Davisson described the service water building fix which is placement of 32 - 75 Ton/pile, 14" dia. 1/2" thick piles driven into place with an O10 hammer. See incl. 5 for details. The final driving capacity is to 20 blows/in, 60 blows last 3". The piles will then be jacked against the concrete korbels 1/4 of the 75 ton load applied to each pile until the full 75 T/pile is obtained. The above piles



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are not to be subject to loads which would equal or exceed Euler column buckling loads for no lateral pile support.

Mr. Handron described the D.G. building fix alternatives considered by the applicant.

- a. No correction plus grout between foundation and soil - not selected because soil still settling.
- b. Modify footing to a mat foundation - not selected as the soil is still not densified.
- c. Preload the area and disconnect duct banks, eliminate settlement before connection to utilities  $\phi$  is completed. How long to preload was of major concern.
- d. Combination of b + c - not selected
- e. Underpin the structure - settlement of utility piping would continue, no fix for soil, therefore, not selected.
- f. Remove and replace building
- g. Alternative f. + removal of fill, piping, and replacement  
Alternative c. selected

Dr. Peck also discussed the D.G. building fix. The preload alt. had several advantages in that it would provide good data for future settlement predictions and provide a good proof load test. Grouting of poorly completed fill layers could not be an easily defensible solution in court. Dewatering would eliminate liquefaction potential and would be easy to monitor. It would also reduce seismic shakedown settlements in sand layers. Each plant repair has a legal precedent.

A question and answer period followed this presentation. The initial <sup>CyE</sup> questions that were asked were answered throughout the two day meeting.

6. CONCLUSIONS: The proposed fixes appeared to be generally acceptable pending review of these designs when they become available to NRC. Some additional data, boring<sub>1</sub> etc. are likely to be required in order to fully satisfy us concerning the future plant safety.

7. ACTIONS TO BE TAKEN: Once the fix design data and computations are received, our recommendations can be made as to their acceptability. Some areas of concern are likely to exist as determined by the district technical staff that may require additional investigation to satisfy. These should be made known to the NRC as soon as possible so that information can be obtained quickly and prevent further delays.

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8. RECOMMENDATIONS: Request additional data from NRC as soon as possible.  
Additional information and data required to be identified by the technical staff  
to Project Manager so it can be requested from NRC.

5 Incls  
as

*NRC*  
N.A. GEHRING  
Project Manger  
Technical Branch

cc: NCDED-~~6~~ w/incls 1 & 2 only  
✓ NRC w/incls 1 & 2 only

Feb 27, 1980

A. Hedley  
J.O WANZECIK  
Paul A. Wood  
Pao HUANG

D.S. Riel

W.C. Paris, Jr

Harris H. Burke

WALTER R. FERRIS  
Joseph D. Kane

B. DHAR

J.V. Rotz

Thomas Heller

W.C. Otto

James W. Simpson

PAUL F. HADALA

JOHN F. NORTON

John Brammer

A.J. CAPPUCCI

W. PAUL CHEN

Neil A Gehring

JOHN GRUNDSTROM

Ronald Erickson

THIRU R THIRUVENGADAM

I. H. Curtis

JOHN ZUTGORS

D. E. HORN

William Lawhead

Gil Keelzy

TC COOK

CPCO  
Bechtel - GEOTECH  
NRR/DPM/  
HSUIC

Bechtel

Bochtel - Geotech

Bechtel - SF

Bechtel - SF

NRC/DSS, Geotech. Engr.

BECHTEL - ENGG.

" " Civil Struct  
NRC - Geotech

Corps Engrs Detroit

" " NCD

Corps of Engineers, WES

Corps of Eng Chicago-IL

ETEC

NRC/DSS, MEB

ETEC

Corps of Engineers, Detroit D.

" "

CONSUMERS POWER

Bechtel

BECHTEL

CONSUMERS POWER, PEAC

C of E, Detroit

CONSUMERS POWER Proj

" " "

Meeting 2/27/80

NRC / CPOs / Bechtel  
Bechtel Consultants / US Corp of Eng  
E Tec / US Navy Weapons Center

B.C. McConnel  
Ray Gonzales  
Gene Gallagher  
Frank Rinaldi  
John P. Haggerty

Bechtel - Annapolis  
NRC  
NRC III I:E  
NRC NRR/DSS/SEB  
NSW:



MEETING WITH NRC ON MIDLAND PLANT FILL STATUS AND RESOLUTION  
February 27 & 28, 1980  
Midland Site

1.0 INTRODUCTION

G. Keeley

2.0 PRESENT STATUS OF SITE INVESTIGATIONS

T. Cooke

2.1 Meetings with Consultants and Options Discussed (Historical)

2.2 Investigative Program

- A. Boring Program
- B. Test Pits
- C. Crack Monitoring and Strain Gauges
- D. Utilities

2.3 Settlement

- A. Area Noted
- B. Preload
- C. Instrumentation

3.0 WORK ACTIVITY UPDATE

J. Wanzeck

3.1 Summary of work activities and settlement surveys for all Category I structures and facilities founded partially or totally on fill

4.0 REMEDIAL WORK IN PROGRESS OR PLANNED (Q4, 12, 27, 31, 33 & 35)

S. Afifi

- 4.1 Diesel Generator Structures
- 4.2 Service Water Pump Structures
- 4.3 Tank Farm
- 4.4 Diesel Oil Tanks
- 4.5 Underground Facilities
- 4.6 Auxiliary Building and FW Isolation Valve Pits
- 4.7 Liquefaction Potential

5.0 EVALUATION OF PIPING (Q16, 17, 18, 19 & 20)

D. Riat

6.0 DEWATERING (Q24)

B. Paris

7.0 ANALYTICAL INVESTIGATION

B. Dhar

7.1 Structural Investigation (Q14, 26, 28, 29, 30 & 34)

7.2 Seismic Analysis (Q25) (Chuck McConnell)

7.3 Structural Adequacy with Respect to PSAR, FSAR, etc. Julius Riat

8.0 SITE TOUR

All

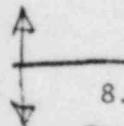
9.0 CONSULTANTS SUMMARY

Peck/Hendron/  
Gould/Davisson

10.0 DISCUSSION

All

27 Feb 80



29 Feb 80

7.1.12

ATTENDEES

Consumers Power

G. S. Keeley  
T. C. Cooke  
T. Thiruvengadam

Bechtel

Harris Burke  
Sherif Afifi  
Don Riat  
Bimal Dhar  
Bill Paris  
Julius Rotc  
Jim Wanzeck  
Karl Wiedner  
John Rutgers  
Lynn Curtis  
Al Boos  
Chuck McConnel

Consultants

R. B. Peck  
A. J. Hendron, Jr.  
C. H. Gould  
M. T. Davisson

NRC

L. Heller  
R. Jackson  
J. Kane  
T. Cappucci  
F. Rinaldi  
R. Gonzalis  
F. Schauer  
D. Hood  
G. Gallagher  
R. Cook

US Corp Of Engineers

N. Gehring  
J. Grundstrom  
B. Otto  
W. Lawhead  
P. Hadala

E-TEC

P. Chen  
J. Brammer

US Navy Weapons Center

P. Huany  
J. Matra

**DISPOSITION FORM**

For use of this form, see AR 140-15, the proponent agency is The Adjutant General's Office.

Rec'd 2/22/80  
from L. Heller

REFERENCE OR OFFICE SYMBOL NCEED-T	SUBJECT Geotechnical Engineering Assistance to NRC-Trip Report Site Investigation Midland Nuclear Facility 14 November 1979		
TO NRC File	FROM Kubinski	DATE 4 Feb 80	CMT 1 KUBINSKI/ww/66786

1. The purpose of this trip was of orientation in nature to familiarize NCE personnel with site conditions at the Midland Nuclear Facility.
2. The meeting took place on 14 November 1979 at the Midland Nuclear Facility, Midland, Michigan.
3. The trip consisted of two phases: a meeting at the Bechtel offices on the site and a walk through the entire site as well as in the completed structures. The meeting was intended to bring NCE staff up to date as far as area of concern and proposed solutions to questions raised by NRC. The site visit was made to familiarize NCE staff with foundation conditions, the buildings in the state of completion in which they exist, and general site conditions.
4. A list of people in attendance at the meeting as well as making the site visit is attached to this report. The following individuals are considered of significant nature in reading trip report:
  - T. C. Cooke (CPCo-Project Superintendent)
  - Darl Hood (NRC-Overall Project Manager)
  - Ray Gonzales (NRC-Hydrology)
  - Gene Gallagher (NRC-Region III, I&E)
  - Al Boos (Bechtel-Project Engineer)
  - Various other Bechtel and CPCo staff as indicated on sign in sheet.
5. The following is a list of significant items which were discussed at the meeting or during the inspection:
  - a. T. C. Cooke made an introduction and from then on, Darl Hood chaired the meeting. The introduction hinged around discussions concerning the quality control program with respect to problems which were initially observed in the settlement of the diesel generator building. At this point Bechtel personnel gave a presentation concerning the facility.
  - b. Bechtel Corporation was responsible for the construction of the facility. Canonic was responsible for the placement of the fill and any excavation at the facility. At the present time all foundations are in place and the actual civil/structural work is 90% complete. All the foundations and slabs are in place at the present time.
  - c. The following discussion concerns the diesel generator building. The diesel generator building is placed on shallow strip footings with the generators on the inside, placed on pedestals. A number of sketches are available. See the correspondence. The generator building is in the main construction area of the facility. The reactor towers, which are near the generator building, are placed on till material, whereas the generator building was placed on fill material. The type of material this building is placed on

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SUBJECT: Geotechnical Engineering Assistance to NRC-Trip Report Site  
Investigation Midland Nuclear Facility 14 November 1979

consist of sands, clays, some lean concrete. A control survey first detected the problem and from then on settlement has been monitored. Doctors Hendron and Peck have been retained as consultants to Bechtel and CPCo and according to those present at the meeting, they recommended pre-consolidation which would limit the amount of settlement in the future. The foundation was placed in October of 1977 and monitoring did not begin until May of 1978. It is assumed by the Bechtel staff that the foundations are sound and that they had settled with the building, "going along for the ride" so to speak. The sands under the building are of major concern because of improper density and liquefaction potential. At one point in time the entire building was supported by a vertical duct bank at one corner. The foundation as well as the pedestals supporting the diesel generators were in some cases placed on a lean concrete mud mat which is placed for ease of construction. The excessive loading due to the weight of the pedestals caused a "bow" which caused minor cavitation underneath the spread footings. This is detailed in a report by Dan Gillen, available in the District file. The building was thought to have undergone rigid body rotation which caused the differential settlement. After the building was preloaded with approximately 20 feet of sand both inside and around it, a rebound of approximately 3/8 of an inch was observed. Not more than 1-1/4 inches of settlement is anticipated in the next 40 years according to Bechtel Geotechnical staff. Refer to the questions and answers raised by NRC staff and responded to by CPCo concerning these issues. They should be analyzed and studied ~~and~~ to determine if the responses are adequate.

d. The service water pump structure <sup>and</sup> ~~in~~ the associated cracks were also discussed. Please refer to Dan Gillen's report to the NRC file.

e. The diesel oil storage tanks, also Category I structures, were filled with water to hold the structures to a safety factor of approximately one and exhibited no problems in settlement. There were a lot of questions concerning the reliability of loading to a safety factor of one to determine no future problems with settlement. The service water valve pits were subjected to preload during the preload placed on the diesel generator building. They were moving with the soil as the diesel generator building was moving.

f. The <sup>borated</sup> ~~stabilized~~ water storage tanks are thin shelled tanks placed on ring footings with sand in the center. It is proposed that these tanks be filled with water and monitor the settlement after filling. Questions were raised concerning the applicability once again of loading the structure with a dead load safety factor of one and extrapolating future settlements due to the load. Borings indicate good material under the tanks, but as exhibited in other areas nature of the fill material seems to vary significantly in short distances.

g. Lines to tanks and valve pits are now also considered to be of Category I nature, and no system of proof loads has yet been developed to ascertain that they will not settle beyond anticipated amounts. <sup>These</sup> ~~These~~ load tests were performed in the vicinity which yielded satisfactory results locally.



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Investigation Midland Nuclear Facility 14 November 1979

Cracks were observed in the valve water pits between 20 and 30 millimeters but no reported settlement has been observed. This is, however, inconclusive since settlement was not monitored during construction and immediately afterwards.

h. The proposed fixes to the auxillary building were described and discussed by Bechtel staff. Once again see Gillen's summary of conditions at the site.

i. Liquefaction potential of sand at the site was discussed. The proposed solution is to permanently dewater the site.

j. The following remedial actions are being considered at the site.

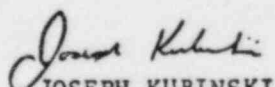
(1) At the service water intake structure, closed-in, 14 inch diameter piles will be placed adjacent to the cantilever portion, and then permanently fixed to the building. These piles will be driven to the till material and support the building by the till material.

(2) The wing walls of the auxillary building will be underpinned using ~~concrete~~ <sup>caissons</sup> placed down to the till material, and then dowelled to the building itself. Apparently, Professor Gould of U of M has been brought in to consult concerning this matter.

(3) The entire site is intended to be dewatered to eliminate any possibility of liquefaction potential within sand areas. According to Bechtel staff, no settlement is anticipated due to an increase in unit weight of the soil. The dewatering system is not yet finalized and there is still a possibility of installation of cut-off wells coupled with permanently dewatering the area.

k. Various minor discussions were held concerning specific issues between Darl Hood and Bechtel staff, which were of a nature which did not concern NCE at this time.

6. The site visit was extremely helpful in recognizing relative magnitude of problems as they exist in the correspondence. It was also beneficial to view how Bechtel and CPCo staff are attempting to analyze and address these problems. At this time no conclusions can be made concerning the issues, but it is imperative that all the transmitted correspondence be "gone through" to find a proper history of occurrence at the site, as well as familiarize NCE personnel with current resolution of problems as proposed by Bechtel and CPCo.

  
JOSEPH KUBINSKI

Concurrence:

R. Erickson (NCE)

Darl Hood (NRC-Overall Project Manager)

TC Casco

RAY GONZALES

AL BOOS

JOE KUENSKI

CLIVE McCONNEL

RON ERICKSON

J.O WANZICK

R.J. COOK

G. GALLAGHER

~~Daryl Hood~~

RG WOLLNEY

CPCO

NRC

Bechtel

Corps of Engineers

Bechtel

Corps of Engineers

BECHTEL GEOTECH ANN ARBOR

NRC

NRC

NRC

CPCO-QA

Prod Supv

Washington

Proj. Field Engr

DETROIT

Eng - Ann Arbor

DETROIT

RESIDENT INSPECTOR

RTH Inspector

DPM/NRR

GROUP SUPV