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

July 9, 1982

PRINCIPAL STAFF			
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Please determine who should answer for KCH
Let me know KCH

Docket Nos: 50-329
and 50-330

MEMORANDUM FOR: Those on Attached List

FROM: Elinor G. Adensam, Chief
Licensing Branch No. 4
Division of Licensing

SUBJECT: MIDLAND INTERROGATORIES

Enclosed is a copy of the interrogatories submitted by Intervenor M. P. Sinclair on the Midland Plant. Since the ASLB requires the answers to be transmitted to the Board by July 28, 1982, we request that written answers to the questions for which your staff is responsible be transmitted to DOL by July 19, 1982.

We have marked the responsible branches next to the question numbers. If you feel that you are assigned a question for which you are not responsible, please contact the project manager, Darl Hood, at X28474 as soon as possible. Replies are not required for those questions which OELD intends to submit an objection.

Elinor G. Adensam, Chief
Licensing Branch No. 4
Division of Licensing

Enclosure:
As stated

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of:	)	
	)	Doc. Nos. 50-329
CONSUMERS POWER COMPANY,	)	50-330
	)	
(Midland Plant, Units 1 and 2	)	Operating License

addressed to NRC

DISCOVERY QUESTIONS OF INTERVENOR MARY P. SINCLAIR

June 18, 1982

These interrogatories are filed in accordance with the Special Prehearing Conference Order of February 26, 1979.

Terms are defined as follows:

"Staff"--means any consultants or expert witnesses retained by the Nuclear Regulatory Commission (NRC) for any issue discussed as well as the regular NRC staff.

"Documents"--shall include reports, studies, notes, worksheets, meeting reports and summaries, correspondence, telecons or other communications.

Documents to be provided and questions are as follows:

GIB 7

1. Provide the draft copy of NUREG-0410, "The NRC Program for the Resolution of General Issues Related to Nuclear Power Plants" (1978).

2. Contention 6 deals with the poor quality control record of both the Applicant and the architect-engineer both at Palisades and Midland. As the Board has requested, discovery questions are to be directed to current operation of the Quality Assurance program (including the alleged "doctoring" of ~~welding~~ certificates).

Questions: R.J. Cook

Region III

a. Provide all the documentation on the "doctoring" of welding certificates at Midland available to the NRC staff at this time.

Elinor - NRC will object to 3(a), (b) + E) & 6, 14 b 22, 23 and 31 → 36. Q not real follow. Bill P.

DOL b. The current status of the QA program has been most recently commented on by the ACRS in their letter of June 11, 1982. Will the QA audit recommended by the ACRS be undertaken?

Region III, DOL c. What assurance does the public have that it will be an independent audit?

Region III, DOL d. List the procedures by which the Quality Assurance issues that the ACRS has recommended to be reviewed will be undertaken.

DOL e. Will there be opportunity for third party review of these procedures and the results?

3. Contention 7 deals with the fact that the Applicant has distorted and suppressed the truth regarding important new information in proceedings before the Commission. (Exhibits 24, 25, Suspension hearings, Dec. 1, 1976). The Applicant has continued to conceal important information, such as the failure to advise the NRC about the Administration building settlement, the material false statement listed in the December 6, 1979 Order that initiated the OM-OL proceedings, and four other false statements in Appendix A of the December 6 Order.

Questions:

OBJECTION a. In view of their history of concealing the truth, what assurance does the NRC staff have that further soils remedial work, as approved by the Construction Permit Amendment #3 and NRC's May 25, 1982 letter to Mr. Cook, will proceed with due regard for public health and safety? Provide documentation.

OBJECTION b. The Board's April 30, 1982 Memorandum and Order calling for the Amendment to the Construction Permits expressed "doubt whether, in the absence of Staff review and approval, Consumers would carry out certain remedial soils activities using appropriate QA procedures and principles." (p 14-15) What events happened between that April 30, 1982 Memorandum and Order and the May 25, 1982 letter to Mr. Cook granting permission to proceed with Phase II remedial work?

OBJECTION c. Who were all the people involved in making this decision and in drawing up the May 25, 1982 letter to Mr. Cook? Provide documentation that substantiate the validity for coming to the decision that led to the May 25, 1982 letter to Mr. Cook.

AGEB, SEB, MEB, QAB, Region III d. Did any members of the staff not agree with this letter? Who are they? Document their concerns.

No Response Req'd 4. Contentions 20 and 21 on the nuclear fuel cycle and the lack of a method to store nuclear waste should now be admitted for discovery since the U.S. District Court of Appeals struck down as invalid the S.3 Table (April 27, 1982) on which the NRC was relying for compliance with NEPA. I am resubmitting these issues in my amended list of contentions.

No Response Req'd 5. Contention 24 is now the basis for the on-going soil settlement hearings.

6. Contention 27 deals with the lack of an adequate emergency evacuation plan at Midland.

Questions:

EPPO

a. Who will decide when an emergency evacuation is necessary?

b. The area warning system has frequently malfunctioned. How will people be convinced it is a real emergency?

c. How high would radiation doses have to be before evacuation of a 10 mile zone is ordered?

d. Will the radiation dose limits for evacuation vary for men, women, children, pregnant women and infants? In what way?

e. When Dow had a major chlorine leak several years ago, all the communications to the plant were jammed with people calling in or trying to call out. How will this be avoided if the Midland nuclear plant has an emergency?

f. Have parents been consulted about how their children should be taken care of if they are in school during an emergency?

g. During the Dow chlorine leak, people were driving into the cloud to look for their sick relatives, children and pets. Do the emergency plans allow for known human reaction patterns shown in past emergency situations? What are these plans? Provide documentation.

h. How much time does the safe shutdown of all critical processes at Dow require?

i. What protection will the workers have who must stay during an emergency to complete the shutdown process?

j. What special training for an emergency will these workers have?

k. What guarantees do you have that they will stay as long as needed during an emergency?

l. Will uncontaminated food and water supplies be kept available for their use for several days in the event of an emergency?

m. What are the host cities to which people in a 10 mile radius will be evacuated? Have they been notified and prepared for this?

n. How will people who do not understand the English language be notified?

o. How will people in nursing homes be evacuated?

p. How will people in hospitals be evacuated?

q. How will people who do not own cars be evacuated?

r. How many beds for treatment of radiation poisoning does the Midland Hospital have? Bay City General? Saginaw General?

s. What plans are in place to deal with changes in wind direction after evacuation has begun? How will people be notified of this change?

t. Are there segments of the population for whom no evacuation plans can be made? Who are they? Why can't they be evacuated?

u. The NRC says there could be radioactive fallout as far as a 50 mile radius. What protection will there be for residents beyond a 10 mile radius? Have their officials been included in the emergency planning process?

v. Homeowners insurance policies specifically exclude coverage for loss due to a nuclear accident. Will homeowners be able to recover their losses from some other source, since the area could be uninhabitable for decades?

7. Contention 28 deals with the water hammer problem of pressurized water reactors of the Midland type. This problem is identified as one of the unresolved safety issues applicable to Midland 1 & 2 in the SER, C-4.

Questions:

a. Since other reactors are now operating without having this problem resolved, would failure to have this problem resolved be sufficient reason not to approve an operating license for Midland 1 and 2?

ASB, GIB b. Given the same premise, would you allow the Midland plants to operate at full power with this defect?

ASB c. What is the series of events in the reactors that will take place when and if the water hammer problem manifests itself?

ASB d. What non-safety related systems can affect or initiate the water hammer problem? Provide documents that explain this interaction between the water hammer problem and non-safety related systems.

GIB e. Provide the most recent summary documents of the Task Force A-1 that indicate methods for resolving the water hammer problems.

ASB f. How will this unresolved safety problem affect the total power output of these nuclear plants?

ASB g. Has there been any incident in an operating reactor which raised this as a concern? Describe it and provide documents on the incident or incidents.

GIB h. Why is this an unresolved safety problem?

8. Contention 29 deals with the failure of the design for the reactors to consider the effect of an asymmetric loading on the reactor vessel supports resulting from a postulated reactor coolant pipe rupture at specific locations.

Questions:

MEB a. What is the precise way in which you have addressed this problem to meet the special design at Midland?

MEB b. Provide names and reports of contractors, consultants and documents of staff work for resolving this problem.

9. Contention 30 deals with the degradation of steam tube integrity. Babcock and Wilcox (B&W) steam generator tube integrity is listed as one of the unresolved safety problems at Midland 1 & 2. (SER, C-4)

MTEB, GIB a. Since other reactors are now operating without having this problem resolved, would failure to have this problem resolved be sufficient reason not to approve an operating license for Midland 1 & 2?

MTEB, GIB b. Given the same premise, would you allow the Midland plants to operate at full power with this defect?

RSB c. What is the series of events in the reactor that will take place when and if the steam generator tube degradation problem manifests itself?

ASB d. What non-safety related systems can affect or initiate the steam generator tube degradation problem? Provide documents that explain this interaction between the steam generator tube degradation problem and non-safety related systems.

GIB e. Provide the most recent summary documents of the Task Force A-3, A-4, and A-5 that indicate possible methods for resolving the steam generator tube degradation problem.

GIB f. How will this unresolved safety problem affect the total power output of these nuclear plants?

ORAB g. Has there been any incident in an operating reactor which raised this as a concern? Describe it and provide documents on the incident or incidents.

GIB h. Why is this an unresolved safety problem?

MTEB, ORAB i. Provide documentation on corrosion problems at other operating B&W plants.

MTEB, ORAB j. Provide documentation to show how the type of corrosion that has occurred at the TMI-1 reactor steam generator while standing idle cannot occur at Midland.

10. Contention 31 deals with anticipated transients without scram (ATWS).

Questions:

RSB a. Indicate precise ways in which this problem will be handled for Midland given the unique design of this plant and its interrelationship with The Dow Chemical Co.

GIB b. Provide draft copy of NUREG-0460, Vol. 4, and documents of staff, consultants and contractors dealing with the resolution of this problem.

RSB c. Indicate all non-safety related systems that can affect ATWS.

11. Contention 32 deals with the questions of suitable safety margins for materials used for reactor vessel fabrication. Reactor Vessel Materials Toughness is listed as one of the unresolved safety problems in the SER, of C-4. The questions of reactor embrittlement and the consequences of thermal shock have had increased attention by the NRC.

Questions:

GIB a. Provide all the documents and papers of Dimitri Basedekas who has stated that cracking of reactors will occur as a result of the embrittlement problem.

MTEB b. Provide documentation on the materials that went into the construction of the Midland reactors as well as the dates they were built and the dates they were installed.

MTEB c. Provide reasons and documentation why Unit 1 which was known to be among 9 defective reactors in the country with a high copper content in a major weld was permitted to be installed even though this defect was known for some time.

MTEB d. Provide evaluations of pressure vessel integrity at other reactors and how these compare with Midland.

MTEB, RSB e. Provide any analysis of rapid cool downs and how they compare with Midland.

MTEB f. What surveillance requirements are required for pressure vessels of the B&W Midland type?

MTEB g. Provide documentation to show that these surveillance requirements are adequate.

MTEB, CRAB h. Has there been any incident in any operating plant which raised a concern on this problem? Describe it and provide documentation.

GIB i. Provide documents to show why this is an unresolved safety problem.

12. Contention 33 addresses the necessity of reassessing the fracture toughness of the steam generator and reactor coolant pump support structure because of the potential for lamellar tearing and low fracture toughness of these materials. This has been identified as an unresolved safety problem in the SER, C-4.

Questions:

GIB a. Since other reactors are now operating without having this problem resolved, would failure to have this problem resolved be sufficient reason not to approve an operating license for Midland 1 & 2?

GIB b. Given the same premise, would you allow the Midland plants to operate at full power with this defect?

RSB c. What is the series of events in the reactors that will take place when and if the low fracture toughness and lamellar tearing problem manifests itself?

RSB, ASB d. What non-safety related systems can affect or initiate this problem? Provide documents that explain this interaction between this problem and non-safety related systems.

GIB e. Provide the most recent summary documents of the Task Force A-12 that indicate methods for trying to resolve this problem.

GIB f. How will this unresolved safety problem affect the total power output of these nuclear plants?

MTEB, ORAB g. Has there been any incident in an operating reactor which raised this as a concern? Describe it and provide documents on the incident or incidents.

GIB h. Why is this an unresolved safety problem?

13. Contention 34 deals with the actual and potential of snubber malfunction.

Questions:

MEB a. Provide documents on the methodology employed to determine the necessity for using snubbers as component supports in the Midland project.

MEB b. How does the snubber problem specifically apply to Midland?

MEB c. List the specific measures that will be taken to resolve this issue.

MEB, ASB d. What non-safety related systems can affect or initiate the malfunction of snubbers? Provide documents that explain this interaction between the snubbers that malfunction and non-safety related systems.

MEB f. How will this unresolved safety problem affect the total power output of these nuclear plants?

MEB, ORAB g. Has there been any incident in an operating reactor which raised this as a concern? Describe it and provide documents on the incident or incidents.

GIB (?) h. Why is this an unresolved safety problem?

14. Contention 35 deals with pressure vessel integrity and the "significant uncertainties" in the ability to detect and adequately size flaws to assure continued integrity of the reactor coolant pressure boundary and to assess margin against failure under various plant conditions for the full life of the plant.

Questions:

MTEB a. What is the precise way in which the staff has addressed this problem for the Midland design?

MTEB b. In the staff's opinion, has this been resolved for Midland? Provide documentation.

MTEB, RSB c. Since the accident at TMI-2, it is known that failure probability of a reactor pressure vessel must be considered as a design basis accident. What is the course of events that will occur that can lead to such an accident?

ACB d. What is the precise probability for such an event for Midland 1 & 2?

MTEB e. Provide all documents on the ability to detect and adequately size flaws in the pressure vessel.

maybe object ACB f. Provide names of contractors, consultants and staff members who are responsible for this PRA.

MTEB g. Identify any staff members or consultants who disagree with these views. Provide documents on their views.

What views MTEB h. Has there been any incident in any operating plant which raised this issue asa concern? Describe it. Provide documents to show how it was resolved.

15. Contention 36 discusses the lack of a systematic process to review different nuclear power plant systems to determine their safety-related impact on other parts of the plant. Systems interactions is identified as an unresolved safety problem applicable to Midland 1 & 2 in the SER, C-4.

Questions:

RRAB, GIB a Since other reactors are now operating without having this problem resolved, would failure to have this problem resolved be sufficient reason not to approve an operating license for Midland 1 & 2?

RRAB, GIB b. Given the same premise, would you allow the Midland plants to operate at full power with this defect?

GIB c. Provide the most recent summary documents of the Task Force A-17 that indicate methods for resolving this problem.

RRAB d. How will this unresolved safety problem affect the total power output of these nuclear plants?

RRAB e. Describe and document the incidents in operating B&W reactors where systems interaction was a concern.

GIB f. Why is this an unresolved safety problem?

16. Contention 37 deals with the absence of adequate design criteria for postulation of pipe breaks and protection therefrom.

Questions:

MEB a. Precisely how does this lack of design criteria for pipe breaks apply to the Midland plant design?

MEB b. Provide names and reports of all contractors and consultants who have worked on this problem. Provide summary documents on their work.

MEB c. Provide documents of staff that worked on this problem.

MEB d. Have any staff members or consultants disagreed with the criteria being used? Who are they? Describe the substance of their disagreement and provide documents on this.

MEB, ASB e. What non-safety related systems can initiate or aggravate a pipe break problem?

MEB f. How will this interaction be monitored or controlled?

17. Contention 38 deals with the inadequate analyses of main steamline break and the concerns regarding the capability of the equipment to survive such a break inside the containment.

Questions:

EQB, AEB a. Has a PRA been made for this problem? What is it? Provide documents.

EQB, AEB b. Precisely how does this apply to the Midland 1 & 2 design?

EQB, AEB c. Provide names of staff, contractors and consultants who have worked on this problem and their final reports for resolving this issue.

EQB, AEB d. Has any staff member, contractor or consultant disagreed with your final resolution of this issue?

EQB, AEB e. If so, what were the reasons for their dissent? Provide documents on their reasons.

18. Contention 39 deals with the inadequacy of Appendix J to set forth clearly the requirements for acceptable containment leak testing programs and for field inspectors to judge the acceptability of a licensees containment leak testing practices.

Questions:

CSB a. What improvements have been made in Appendix J since 1978? Provide documents that describe them.

CSB b. How does this problem specifically apply to the Midland nuclear plants?

RSB c. In their first summary letter on Midland, the ACRS stated that B&W reactors have a higher leakage rate than other similar type reactors. Provide documents on the extent of this higher leakage rate as compared to other reactors.

CSB, Region III d. What leak testing programs for the Midland nuclear plants has the staff found acceptable? Do the field inspectors agree that this is an acceptable leak testing program? Provide documents to demonstrate these facts.

CSB, Region III e. Has any staff member, field inspector, contractor or consultant disagreed as to the acceptability of the containment leak testing program? If so, provide documentation on the nature of their dissent.

CSB f. If no improvements have been made, does Appendix J remain the regulatory requirement?

19. Contention 40 deals with the lack of adequate qualification methods to satisfy the requirements for safety-related equipment established in IEEE standard 323-1974 for nuclear generating plants.

EQB

a. Have adequate qualification methods been established to meet the IEEE Standard 323-1974 for safety-related equipment at the Midland 1 & 2?

b. If the answer is yes, provide documents to substantiate your answer.

c. If the answer is no, what criteria for qualification and what standards are being used for safety-related electrical equipment? Provide documents to substantiate your answer.

d. Have any staff members or consultants disagreed on the adequacy of your methods or criteria for qualification of safety-related equipment? Provide documents that indicate the nature of their dissent.

20. Contention 41 deals with the present practices of permitting the connection of non-safety loads and required safety loads to Class IE power sources.

Questions:

PSB

a. Have any improvements been made in the manner in which non-safety loads and required safety loads and their connection to Class IE power sources since this contention was written in 1978?

b. If the answer is yes, provide documents to explain changes.

c. If the answer is no, explain the sequence of events that can happen with these types of connections that could lead to significant releases of radioactivity to the environment in the event of an accident.

d. What could be done, if anything, to intercept this course of events?

e. How does this problem specifically apply to Midland?

f. List the specific measures that will be taken to resolve this issue.

21. Contention 42 deals with the fact that there is no assurance of adequate overpressure protection at Midland.

Questions:

RSB

a. Describe and document all the incidents of pressure transients in B&W reactors which have exceeded pressure temperature limits of the reactor vessels.

b. How were each of these incidents inititiated? How were they resolved?

c. How does this problem specifically apply to Midland?

d. What specific measures are being taken to solve this problem at Midland?

OBJECTION

22. Contention 43 deals with the vulnerability of the Midland reactors to industrial (or other) sabotage.

Questions:

a. FEMA has already indicated that the Midland area is a military target because of the Dow production and research operations her , some of which have military uses. Have precautions for security of the plant taken this fact into consideration?

objection

b. To what extent will the civil rights of people working in the nuclear plant, the Dow facilities and the community as a whole be violated as a means of security protection? This includes wire-tapping, surveillance, and other types of invasion of privacy.

c. Has the public or the employees been advised as to how their civil rights will be affected in order to provide security for the Midland nuclear plant?

OBJECTION 23. Contention 44 deals with the need to reexamine The Dow Chemical Co. power systems as set forth in NUREG-0305 because of serious safety-related concerns.

Questions:

Object !!

a. Has this reexamination of Dow Chemical power systems taken place for Midland?

b. If the answer is no, how do you intend to compensate for this problem at Midland?

c. List the specific measures that are being taken to solve this problem.

24. Contention 45 deals with the fact that the offsite power system for the Midland facility fails to meet the requirements of General Design Criterion 17.

Questions:

PSB a. Document the specific manner in which the offsite power source will interface with the onsite power systems at Midland.

PSB b. Will any of this interaction depend on electrical equipment that has been stressed by the soil settlement problem?

MEB c. What are the special testing procedures that will be undertaken prior to operation to solve this problem at Midland given the unique soil settlement problems and their effect of unduly and unevenly stressing underground installations which includes electrical equipment?

25. Contention 46 deals with the absence of acceptable standards and criteria governing the management of heavy loads near spent fuel.

Questions:

ASB a. How does this problem specifically apply to Midland?

b. What specific measures have been taken to improve methods for handling this problem at Midland since it was identified in NUREG-0410?

c. Describe and document incidents where this has been a problem at other operating reactors.

26. Contention 47 deals with the lack of a radionuclide/sediment transport model which has been field verified.

Questions:

HGEB a. How does this problem specifically apply to Midland?

b. Document the specific measures that have been taken to solve this problem at Midland.

27. Contention 48 deals with the lack of an adequate analysis by the NRC staff to design basis floods.

Questions:

HGEB a. What improvements have been made by the Staff on design basis floods as it applies to Midland since it was identified as a problem by the ACRS and in both NUREG-0410 and the Black Fox testimony?

b. Control of flooding at Midland depends on the integrity of a series of dams on the Tittabawassee River system. Are there any plans for continued monitoring of these dams to be assured of their integrity?

c. What will be the series of events that will take place at the Midland nuclear plant if flooding takes place?

d. In the event that all the dewatering systems break down, because of power failure during flood conditions, what will be the affect on the operation of the Midland nuclear plant?

28. Contention 49 deals with the fact that there is no assurance that the design and operation of safety-related water supplies will insure adequate operation of the systems in the event of extreme cold weather and ice build-up.

Questions:

ASB, HGEB

a. How does this problem specifically apply to Midland?

b. List the specific measures that are being taken to resolve this issue.

29. Contention 50 deals with the fact that occupational radiation exposure to station and contractor personnel has been increasing, leading to hiring of transient workers which can increase the risk of operator error, sabotage, etc., as the Staff has recognized in NUREG-0410 and the Black Fox testimony.

Questions:

RAB

a. What methods have been taken to reduce occupational exposure at Midland since this problem was identified in NUREG-0410 and the Black Fox testimony?

RAB

b. Has any staff member or consultant disagreed with the adequacy of these measures?

RAB

c. Describe and document the nature of these concerns.

OLB

d. Are there plans to use transient workers at Midland at this time?

OLB

e. If so, what kinds of criteria for qualifications of these workers will be used?

30. Contention 51 deals with the fact that there is no assurance that existing geometry can adequately satisfy the functional design criteria for the behavior of fuel element assemblies during accident conditions.

Questions:

CPB

a. How does this problem specifically apply to the Midland nuclear plant?

b. List and document the specific measures that have been taken to resolve this issue.

N.B. Due to a typographical error in the numbering of my contentions, numbers 46 on are incorrect. I have renumbered them correctly for these interrogatories.

OBJECTION

31. Contention 52 deals with the unreliable performance of diesel generators.

Questions:

a. Describe and document the incidents of failures in diesel generators at operating reactors.

b. Provide documentation on the causes of these failures.

c. How have these problems been resolved?

d. Will the serious questions raised about the integrity of the diesel generator building itself further exacerbate the problems with the performance of the diesel generators? Provide documentation for the answer.

OBJECTION

32. Contention 53 deals with the lack of adequate safety and environmental criteria for replacement of major pieces of equipment and of total decommissioning.

a. What mode is now planned for decommissioning these plants?

b. If mothballing is the choice of decommission, who will pay for the guards, security, surveillance, monitoring and maintenance that the plants will require?

c. If entombing in concrete is planned, have local and state officials been notified that because of the long half-life of nickel-59, which has a half-life of 80,000 years, means that the structures will remain there until they disintegrate and will have to be monitored permanently and with no tax base to pay for this?

d. How long can concrete structures already stressed by the soil settlement problems be expected to last?

e. If dismantling will be done under water, where will the highly radioactive parts be stored?

f. The costs of these options will vary greatly. How have they been considered in the cost benefit analysis? In what way? What are the guidelines for cost?

g. What environmental and safety criteria have been established for the possible replacement of the steam generators or other major parts as has occurred at other nuclear plants?

OBJECTION

33. Contention 54 deals with the possibility of damage to safety systems due to turbine missiles.

Questions:

a. The ACRS stated that this plant is unusually susceptible to the turbine missile problem. What additional safeguards will be provided to avoid this problem?

b. Describe and document the incidents of turbine missile problems in operating reactors.

OBJECTION

34. Contention 55 deals with questions of adequacy of seismic design.

Questions:

a. Will the most recent seismic criteria be implemented at the Midland site for all the buildings when the plant begins operation?

b. Which buildings will not be included?

OBJECTION

35. Contention 56 deals with the fact that Midland is not designed to accommodate a total loss of AC power.

Questions:

a. What back-up systems have been provided for loss of AC power? Provide documentation.

b. How will loss of AC power affect the operation of this plant?

c. Describe and document incidents of the loss of AC power and their effects at other operating reactors.

OBJECTION

36. Contention 57 deals with the fact that the electrical system will not function adequately under accident and/or fire conditions.

Questions:

a. What fire tests have been done since those made in September and October, 1978? Document.

b. What improvements have been made in electrical wiring equipment since the September, October, 1978 fire tests?

c. How will the environmental qualifications be met for operating under accident conditions for the electrical equipment in the following critical safety systems: Containment spray, core flood, emergency core cooling, auxiliary feedwater, nuclear service water, containment isolation, decay heat removal and containment cooling?

Addendum #1

OBJECTION

Contention 13 deals with the financial qualifications of Consumers Power Co. to operate the plant. While a recent ruling by the NRC states that reviewing financial qualifications of utilities will no longer be required at licensing procedures, the fact is that consideration of Consumers Power Co.'s financial plight as the result of the construction of these plants taints all of their decisions as well as those of the staff.

For example, Inspector Joseph Kane said that from the standpoint of public safety alone, that removal and replacement would be a better solution to the diesel generator building, but since costs and impact on schedule were important than that is not the best option (p 4209-10).

Similarly, the most recent letter to Cook on May 25, 1982, does away with all the disclosures that the soil settlement hearings have yet to provide on what are adequate remedial measures for the cracked and sinking buildings. This letter surely reflects a total concession to Consumers' financial plight and schedule without regard for public safety.

Consumers Power Co. has been placed on Credit Watch by Standard and Poors.

This ruling on not reviewing financial qualifications is being appealed in court.

PROOF OF SERVICE

I certify that on June 18, 1982, I mailed copies of the foregoing Interrogatories of Intervenor Mary P. Sinclair to the Nuclear Regulatory Commission Docketing and Services Section for filing, and that on the same day I mailed copies of said Interrogatories to the persons shown on the attached Service List below, all by first class mail, postage prepaid.

Mary P. Sinclair

Mary P. Sinclair, Intervenor

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Region III

July 9, 1982

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QAB	J. Gilray		W. Haas
EPPO	J. Mathes		F. Pagano
ASB	W. LeFave	R. Lobel	O. Parr
MTEB	B. Elliot		W. Hazleton
RSB	W. Jensen	G. Mazetis	B. Sheron
ORAB			T. Ippolito
AEB	A. Chu	T. Quay	L. G. Hulman
RRAB	F. Coffman		T. Ashok
CSB	P. Hearn	J. Shapaher	W. Butler
EQB	A. Lee	G. Bachi	Z. Rosztoczy
PSB	O. Chopra	J. Knight	M. Srinivasan
	E. Tomlinson	A. Ungaro	
OLB	V. Deliso	B. Wilson	D. Beckham
NMSS (PSLB)	C. Gaskin		G. McCorkle
CPB	J. Holonich	P. Laurence	C. Berlinger
	D. Powers	R. Meyer	

Cook

August 10, 1982

Note to: Elinor G. Adensam

From: William D. Paton

Subject: Quality Assurance Issues to be Addressed at an Evidentiary Session in the Midland Proceeding

Attached to this note is the July 7, 1982 Memorandum and Order (hereafter "July Order") by the Midland licensing board in which they comment on issues they wish to have addressed at the forthcoming evidentiary session on quality assurance and quality control matters. Those issues are:

1. As discussed on page 3 of the July Order, Staff testimony should discuss "in detail" the basis for the Staff's position set forth in our June 29, 1982 letter in which we expressed our conclusion that it was necessary to supplement the testimony previously submitted with respect to quality assurance. The Board suggests that not only Mr. Keppler be available but also any QC inspectors who might have more detailed knowledge of significant matters dealt with by Mr. Keppler to the extent that their presence might in assist creating an adequate record. We will have to consult with Mr. Keppler to determine precisely what he had in mind when he concluded that it was necessary to supplement his previous testimony, but it appears at this point that one of the major factors was the apparent discrepancies in the facts set forth in our recent SALP report and Consumers' response to that report.

2. Qualifications of QC inspectors. (July Order, p.4)

3. Questions asked by the Board concerning the adequacy of the QA program for underpinning activities. (July Order p.4)

4. "Certain matters" discussed in the Licensing Board's April 30, 1982 Memorandum and Order (hereafter April Order). (I also attached a copy of the April Order).

   A. The coverage of the QA program for soils related activities. Pg 4

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AUG 13 19[illegible]

E/19

B. The matter referred to by the Licensing Board beginning at page 16 of its April Order concerning a 42 inch diameter hole that was drilled to a depth of 40 feet within the "Q" fill area apparently without proper authority without the development of or adherence to written procedures without the participation of the onsite geotechnical engineer and without adequate QA/QC surveillance.

Hood C. The matter referred to at page 17 of the Board's April Order concerning loose sands.

D. Staff inspection reports 82-05 (Detp) and 82-06 (Detp).
M01-4-2-008; M01-9-2-032

E. NCR #M01-9-2-051 (April 21, 1982), Bechtel Non-Conformance Reports Nos. 4199 (including Stop Work Order FSW-22) and 4245.

F. The suggestion in the interim ACRS report of June 8, 1982 that there be a broader assessment of Midland's design adequacy and construction quality.

G. The results of the Staff evaluation of Drawing 7220-C-45 (See Memorandum and Order of May 7, 1982).

The above subjects were addressed by the Licensing Board in its April 30, and July 7, 1982 Orders. There are other QA matters that will have to be addressed at the evidentiary hearing. One is fairly extensive testimony concerning the impact of the subject matter of the "management meeting" that is to take place with CPC sometime within the next 3 weeks. If Mr. Keppler believes that the outcome of that meeting remedies CPC's QA problems, he will have to explain that to the Board.

We may also have to address the subject of recent affidavits provided NRC by GAP and other documents provided Region III concerning ZACK (provided by T.Howard).

Region III confirmed yesterday that they expect to be able to prepare their QA testimony by October 31, 1982.

Bill

William D. Paton
Midland Counsel

Enclosures:
July Order
April Order

cc w/enclosures:
Robert F. Warnick (Reg. III)
Ross B. Landsman (Reg. III)
Darl Hood

PROBLEMS IDENTIFIED DURING OCTOBER-NOVEMBER, 1982 MIDLAND CONSTRUCTION INSPECTION

1. Heat number traceability in structural steel
2. Discrepancies between design drawings and actual construction
3. Design control problems
4. Design document control problems - Field sketches used, - not done iaw QA - FCN not identified on drawing
5. Receipt inspections failed to identify problems
6. Overinspection (or reinspection) failed to identify same problem repeat item as in item 5 D/G control panel with unacceptable termination (lead has been inspected to 19 pages of problems with DeLaval panel
7. Cable tray segregation problem - power cables too close to instrument cables
8. Concrete chipping not controlled per procedure - prior to work being Containment approved
9. Field inspections failed to identify above problems
10. One QC inspection was not correct
11. Almost 16,000 open inspection records (IR's) in plant
12. In Process Inspection Notices (IPIN's) hide extent of problems QC failed to adequately identify and document problems
13. Not all problems documented on nonconformance reports by direction of QA supervisors

E/20

no problem with piping system & welds —

12/9/82

PROBLEMS IDENTIFIED DURING OCTOBER-NOVEMBER, 1982 MIDLAND CONSTRUCTION INSPECTION

1. Heat number traceability in structural steel — lay down area —
2. Discrepancies between design drawings and actual construction structural steel — bracing bolted — welded — welded — bolted electrical pull-boxes panels — bolting buried in concrete
3. Design control problems — I beam not seismic + not by Q standards
4. Design document control problems field sketches used & change design w/o eng. review
5. Receipt inspections failed to identify problems
6. Overinspection (or reinspection) failed to identify same problem as in item 5
7. Cable tray segregation problem
8. Concrete chipping not controlled per procedure
9. Field inspections failed to identify above problems ?
10. One QC inspection was not correct
11. Almost 16,000 open inspection records (IR's) in plant
12. In Process Inspection Notices (IPIN's) hide extent of problems ?
13. Not all problems documented on nonconformance reports ?

No inprocess inspections going on —

field change notice —
some had gotten through QC organization

hangars not built Q
cooling pond — rock not Q
NDE on class 3 pipe welds — always went away as problem unresolved items
Transducer — output not under Q program

E/21

Design document control problems —
field sketches used for design
Not labeled Q so work done non-Q

Drawings not referenced to field sketches
field change notice not identified
red line sketches — circumscribed
document control

Receipt inspections failed to identify problems

— terminations on diesel generator not
acceptable — Vendor problem ??? 50.55(e)
19 pages on panel relayed to Region 4 —

Cable trace segregation — power cables too
close to instrument cables

concrete chipping — hole in wall —

1 example
field inspections failed to identify problems

field engineer did not pick up
1 QC record incorrect — but only looked at one —

almost 16,000 open inspection records

in process inspection notices —

instead of complete rejection —
so no documentation of problems
no confidence 157,000 inspection
reports closed are OK — NCR

Not all problems documented in NCR
QC people instructed them to only write up 2-3 problems

Sinclair Ex. 1

ASLBP
5/10/84
A/G

DEPARTMENT OF THE ARMY

DETROIT DISTRICT, CORPS OF ENGINEERS
BOX 1027
DETROIT, MICHIGAN 48231

REPLY TO
ATTENTION OF

16 NOV

NCEED-T

SUBJECT: Testimony for ASLB Hearings, Midland Nuclear Power Plant - Diesel Generator Building and Service Water Pump Structure

THRU: Commander, North Central Division
ATTN: NCDED-G (James Simpson)

TO: Mr. George Lear
U. S. Nuclear Regulatory Commission
Chief, Hydrologic and Geotechnical Engr. Br.
Division of Engineering
Mail Stop P-21
Washington, DC 20555

The testimony of Mr. Hari N. Singh for the Atomic Safety and Licensing Board hearings pertaining to the Diesel Generator Building and Service Water Pump Structure is inclosed. The testimony of Mr. William C. Otto pertaining to the Diesel Generator Building is also inclosed.

FOR THE COMMANDER:

P. McCALLISTER, P.E.
Chief, Engineering Division

3 Incl
as

NUCLEAR REGULATORY COMMISSION
Docket No. 50-329 OL-OM
50-330 OL-OM
Official Exh. No. Sinclair Ex. 1
In the Matter of Consumers Power Co.
Midland Plant, Units 1 & 2

Staff _____ Identified _____
Applicant _____ Received ✓
Intervenor _____ Rejected _____
Cont'g Off'r _____
Contractor _____ Date 12-8-82
Other ✓ Sinclair Witness Singh
Reporter P. James

8311030(3)XT

E/22

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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)	)	

TESTIMONY OF HARI NARAIN SINGH CONCERNING
DIESEL GENERATOR BUILDING

Q.1. Please state your name and position with the U.S. Army Corps of Engineers.

A. My name is Hari N. Singh. I am a Civil Engineer in the Geotechnical Branch of the Engineering Division, NCD Chicago District of the U.S. Army Corps of Engineers.

Q.2. How did the U.S. Army Corps of Engineers get involved in the review process of the Midland Plant, and what are the areas of its responsibilities?

A. Pursuant to an interagency agreement between the U.S. Nuclear Regulatory Commission (NRC) and the U.S. Army Corps of Engineers (the Corps) which became effective in September 1979, the Corps undertook to provide technical assistance to the NRC. The Corps provides assistance on the geotechnical engineering aspects of the Midland Plant.

Q.3. Have you prepared a statement of your professional qualifications?

A. Yes, a copy is attached.

Q.4. Please state the nature of your responsibilities with respect to the Midland Plant.

A. My involvement with the Midland Plant began in May 1980, when I was assigned the responsibility as the Corps' lead reviewer for the geotechnical concerns at the Midland Plant. As lead reviewer, I worked with engineers and geologists in the Geotechnical Engineering Section of the Detroit District, who were engaged in reviewing the materials used in the foundation design of the plant. As the full-time lead reviewer, my responsibilities were to coordinate with all the reviewers, examine their comments, perform my own review, discuss comments with the Section Chief and prepare a final letter report to be transmitted to the NRC. The structures being reviewed include the following: 1) Auxiliary Building, 2) Reactor Building Units 1 and 2, 3) Diesel Generator Building, 4) Borated Water Storage Tanks Units 1 and 2, 5) Service Water Pump Structure, 6) Diesel Fuel Storage Tanks, 7) Seismic Category

I Piping and Conduits, 8) Retaining Walls, and 9) the dikes adjacent to the Emergency Cooling Water Reservoir (ECWR).

Q.5. What are the existing soil problems at the Diesel Generator Building Site?

A. (a) Settlement: The soil surface, supporting the Diesel Generator Building, has settled excessively as well as unevenly, causing warping of the footings and cracking of the building's walls. Further, whether or not the process of settlement is stabilized has not yet been determined; therefore, further propagation of the existing cracks and development of new cracks might continue jeopardizing the safety of the structure.

It began in August, 1978, when through the normal settlement monitoring program, it was discovered that the partially completed Diesel Generator Building had settled more than the expected settlement for the structure at that time. A preliminary investigation of the foundation soils, which consist of compacted fill materials, revealed that soils were inadequately compacted, and that the soils were heterogenous in nature. They consisted of sands with relative density varying from loose to very dense and clay with consistency soft to very stiff. As a consequence of such poor soil properties, in some area under the structure, the foundation soils did not provide adequate support to the structure, resulting in excessive and uneven settlements. As of 19 January 1979, the corners of the east wall of the structure had settled approximately 50% more than their counterparts of the west wall, with maximum settlement of 4.25" at the southeast corner and minimum settlement of 2.09" at the northwest corner (See Attachment 1) and there was no evidence to indicate that the foundations have stabilized.

To accelerate the settlements under the existing loads, and to minimize them under the future loads (dead loads of additional construction, live loads, dewatering loads, etc.), so that necessary piping connections to the structure could be made with assurance that no overstressing in piping could occur due to future settlements of the building, the applicant surcharged the partially built structure and a portion of the surrounding areas with 2200 lbs per square foot of surcharge loading. The full surcharge remained in effect for 132 days, beginning on 6 April 19[illegible].

The surcharge, as expected, produced additional consolidation in the fill materials which accelerated the settlements, but it raised questions; (1) whether the precompression stress produced by the surcharge would exceed the stresses that would be created by future loads, and as such any future settlement would be insignificant to the safety of the structure, (2) whether the rigidity of the structure prevented the surcharge loads to become effective in producing consolidation in areas of more compressible soil, and in future a redistribution of loads on the foundation surface is possible, and (3) whether the additional settlements created by the surcharge load (See Attachment 2 for settlements due to surcharge), have done any permanent

damage to, or have induced stresses in the partially completed structure, and the piping underneath the structure, which would be detrimental to the ability of the structure to withstand severe future environmental loads (earthquake, tornado, etc.). The Corps of Engineers questioned the validity of the surcharge results, and in its report of 16 July 1980, which was transmitted to the applicant on 7 August 1980 by the NRC, requested the applicant to verify the field observed settlements by settlements computed on the basis of results of laboratory tests conducted on representative soil samples (details of request for soil explorations and testing given in item...). The Corps also requested the applicant in its report of 7 July 1980 and 15 April 1981, and at various meetings (structural audit in April 1981 at Ann Arbor, and in a meeting at Bethesda in first week of June 1981) to compute stresses in the foundation due to settlements. The above requests would have provided answers to the three questions, but as of today, no response to the above request has been received and as such, the Corps of Engineers is not in a position to complete its review and testify regarding the adequacy of the Diesel Generator Building.

Q.6. What are the effects of the past settlements and the settlements created by the surcharge?

A. Structures founded on soil mass settle to a degree depending upon the compressibility and uniformity of the soil mass under the foundation. Before building a structure, soil explorations and testings are carried out to determine soil characteristics, which form the basis to determine the most suitable location for the structure and to proportion its foundation. One of the main purposes of exploration and testing is to enable the engineer to select the site which will cause minimum settlement so that no additional consideration for settlements is needed in design.

The settlements of the foundation soil under the Diesel Generator Building have exceeded the expected limits of settlements. Because of the structure being rigid, approximately uniform settlements were expected under the building. However, the settlements observed prior to the surcharge indicate uneven settlements creating differential settlements resulting in curvatures. Consequently, additional flexural and shear stresses have been induced in the structure. Subsequent to the surcharge, the magnitude of the settlements further increased and the curvatures of the footings in some area increased causing further increase in bending and shear stresses. Attachment 3 shows a qualitative assessment of increase in curvature of the footings under the east wall of the Diesel Generator Building. The wall supported by this footing has shown considerable increase in number of cracks, since the surcharge load was applied (number of cracks prior to surcharge 10, as per response to question 14, 10 CFR 50.54 (f), Figure 142, number of cracks since surcharge 16). The additional curvature created by the surcharge appears to be a major factor in creating these cracks.

The Corps of Engineers, in its reports of 15 April 1981, indicated that an analysis of stresses induced by the warping should be performed

taking into account the differential settlements over the life span of the plant (40 years). As of this date, the applicant has not furnished the requested analysis.

Q.7. What are the results of soil exploration and testings (July 1981 reports of Woodward-Clyde consultants and Dr. Peck's enclosures)?

A. In response to the Corps of Engineers request for soil exploration and testing, the applicant retained the Woodward-Clyde consultant to perform borings and testings. The consultant performed soil exploration in the areas designated by the Corps of Engineers around the Diesel Generator Building, conducted laboratory testings and presented the exploration and test results in a two volume report. In early August 1981, the applicant transmitted to the Corps of Engineers a copy of the report and a copy of its evaluation by Dr. Ralph Peck. Part one of the report contains the following:

(1) Boring logs for 12 borings advanced by the Woodward-Clyde consultant.
(2) Index properties test results.
(3) Particle-size distribution curves.
(4) Shear strength test results.
(5) Consolidation test results.
(6) Supporting data for CIU triaxial tests.
(7) Supporting data for CAU triaxial tests.
(8) Supporting data for consolidation tests.

Part two of the report contains the Index properties of the consolidation tests specimens (Tables 1&2), the maximum past consolidation pressure (Table 3) reportedly computed independently by three different engineers of the Woodward-Clyde consultants' staff. Also contained in part two are; (a) the results of the preconsolidation pressures (Table 4) computed by the three engineers using the results of the consolidation tests carried out by the Goldberg - Zoino - Dunnicliff (GZD) in 1978; (b) Graphical comparison of the precompression pressures with the actual pressures at various depth below the ground surface (Figure 3 & 4); and (c) strains - log P curves for the Woodward-Clyde test as well as GZD tests (Appendix A and Appendix B).

Q.8. Did you evaluate and draw your own conclusions on Woodward-Clyde report and Dr. Peck's evaluation of the test results? If yes, then what are your comments?

A. The Corps of Engineers has reviewed the results of the exploration, testing and precompression pressures provided in the Woodward-Clyde Consultants' report, and Dr. R.B. Peck's evaluation of the test results provided in a separate volume. The following are the review comments:

(1) Corps of Engineers' representatives observed the soil exploration program carried out by the Woodward-Clyde Consultant and found that it had been carried out in accordance with the state-of-the-art method. Drilling operation, taking samples from

ground, logging visual classifications, recording readings from the various gages on the drill-rig, handling of samples, transportation to the testing laboratory and extrusion of the samples from the tubes, etc. were carried out by experienced drillers, geologists and lab technicians. The Corps of Engineers is satisfied by the soil exploration program.

(2) The drained shear strength parameters ($\bar{\phi}$, $\bar{c}$) determined by the consolidated undrained tests with pore pressure measurement (CIU, CAU) and presented in Tables D-1, D-2 are better than those used by the applicant in its computation of the bearing capacity analysis, which was submitted by the applicant in response to Question 40(2), 10CFR 50.54(f). However, in its response to Question 40(2), the applicant has not demonstrated that shear strength parameters, $\bar{\phi} = 29.2°$ and $\bar{C} = 114$ lbs per square foot, used in its analysis were the representative parameters for the soil underneath the Diesel Generator Building.

(3) The results of the consolidation tests indicate that all the tests were carried out to a maximum consolidation stress of 64 tons per square foot (tsf). The maximum past consolidation pressure (preconsolidation pressure) have reportedly been computed by three engineers independently on the basis of the tests carried to 64 tsf consolidation pressure as well as on the basis as if the tests stopped at 16 tsf consolidation pressures. The computed preconsolidation pressures are tabulated in Table 3 of part 2. The results indicate that preconsolidation pressure computed on the basis of the consolidation tests carried to 64 tsf stress are not consistent with the settlements that have occurred under the foundations of the Diesel Generator Building prior to surcharging. For example, the computed preconsolidation pressures for eight samples taken from COE-13A and COE-13B varies from 1.48 tsf to 5.20 tsf with an average of 3.41 tsf. Excluding the effects of 1.1 tsf of surcharge and approximately 1.05 tsf of overburden (overburden pressure at mid-depth of the clay column at COE-13A, with average soil density of 140 lbs/cf), the net average precompression prior to surcharge turned out to be 1.2. tsf. With this preconsolidation pressure in the clay soil at COE-13 and its close vicinity, the south-east corner of the Diesel Generator Building, any settlement caused by a foundation pressure of 1.2. tsf and less would have been negligible, being the results of precompression. However, field measurements have indicated that the southeast corner of the building had settled 4.25" (See Attachment-1) under a foundation pressure of 0.7 tsf (See Attachment-2, Fig. 4-A, 10CFR 50.54(f)). Thus the observed settlement of 4.25" under a pressure 0.7 tsf at the southeast corner is inconsistent with the preconsolidation pressure computed on the basis of consolidation test carried to 64 tsf consolidation pressure.

(4) The e - log $\bar{p}$ curves for the samples, that show high precompression pressures at 64 tsf maximum consolidation pressure,

appear to have been affected by factors other than consolidation, such as high elastic deformation and some crushing of sand particles. Therefore, portions of the e - log p curves influenced by these non-consolidation factors should not be considered in computing preconsolidation pressure.

The Corps of Engineers replotted the e - log $\bar{p}$ curves (Attachment 5) for boring COE 13A and COE 13B at a larger scale than those used in the Woodward-Clyde report. These curves provided somewhat better perception of the behavior of the curves; the points of maximum curvature were more perceptible, the straight line portions of the curves were more defined, and with some curves a trend of increasing curvature at larger consolidation pressure was noticed. Of the eight samples tested for which preconsolidation pressures were computed on 64 tsf and 16 tsf maximum consolidation pressures, four samples (S-1B, S-3D, S-4B, S-9B) showed practically no change in their preconsolidation pressures computed on the above two basis. The remaining four (S-3C, S-6C, S-8B, S-5C) showed considerable variation in their precompression pressure under the two testing conditions with higher values at 64 tsf. A close review of the curves indicates that curves for the later group show an unusual behavior. Two of the specimen (S-3C, S-5C) show increase in curvature, and the other two (S-6C, S-8B) show constant curvature at higher pressure after showing a trend of decrease at gradually increasing pressure from 0.0 to somewhere between 16 tsf to 32 tsf. This may be due to high elastic strains and some crushing of the sand components which constitutes approximately 40% of the soil. The high rebound at 64 tsf indicates influence of high elastic strain after 16 tsf. The curve, beyond the point at which increase in curvature begins, does not represent consolidation; the change in void ratio might be the results of the sliding as well as crushing of the particles and high elastic strains. The Corps of Engineers is of the opinion that the portions of the e - log p curves showing increasing curvature should not be considered in computation of preconsolidation pressure. In cases of curves with constant curvature after some specific value of consolidation stress, the initial portion of the curve with constant curvature should be used in computing preconsolidation pressure.

(5) In paragraph 3 of page 3 of Dr. R.B. Peck's evaluation, it has been concluded that preconsolidation pressures for the surchaged clay of Boring 9 (COE-9) were substantially greater than those determined by means of sampling and testing. This conclusion was reached on the basis of information obtained from pocket penetrometer, verbal description of soils and a empirical equation $\frac{c}{pn} = .10 + .004Ip$. In the opinion of the Corps of Engineers, soil information obtained by proper sampling and testing, as in the case of the soils in this discussion, are more reliable than those obtained on the basis of the index properties and verbal soil description. The three factors used by Dr. Peck provide only rough guidance to engineers and cannot be relied upon. The results obtained using these factors could very well be used to design an ordinary structure, but for a Category I structure of a nuclear power plant. It is not advisable to depend on them. The value obtained by actual test should be used.

The Corps of Engineers computed and compared $\frac{c}{pn}$ values obtained from the empirical equation ($\frac{c}{pn}$ = .10 + .004Ip) and from actual laboratory tested values, using test data provided in C of E Engineering Manual EM-1110-2-5008 dated 15 October 1980 (See Attachment). The empirical equation provided a $\frac{c}{pn}$ value approximately 45% higher than actual value. Therefore, it is concluded that the empirical equation ($\frac{c}{pn}$ = .10 + .004Ip) provides very approximate values of $\frac{c}{pn}$ and cannot be used with confidence in important structures such as the Diesel Generator Building.

The test results obtained from Pocket Penetrometers are not reliable; they provide some guidance for visual classification during exploration. Messrs M.G. Spangler and R.L. Handy have stated on page 101 of their book "Soil Engineering", "The pocket penetrometer is sometimes used on drive samples obtained from standard penetration test, but little or no reliance should be placed on such tests." Therefore, the Corps of Engineers does not concur with Dr. Peck's conclusions obtained using Pocket Penetrometer values to evaluate the test results.

The verbal description of soil, normally done during soil exploration, is not an accurate method of determining the engineering properties of soils. Consistency of clay determined by visual inspection or by pocket penetrometer tests are not reliable. This is because the pocket penetrometer values are not reliable and the results of the visual classifications may vary from one individual to the other. Thus, to rely on the consistency of soil recorded by verbal description as described for samples of COE-9 is not a sound engineering practice. Therefore, the shear strength inferred from the visual soil classification as used on page 3 of Dr. Peck's evaluation is not justified.

(6) In paragraph 4 of page 2 of his evaluation, Dr. Peck has evaluated the accuracy of the preconsolidation pressure computed for three samples taken from three different elevations of a 7' high clay column. The computed preconsolidation pressure for the sample located in the middle of the 7' high clay column is lower than that for samples located near the top and bottom of the column. Quoting Dr. Peck, he has concluded, "In reality, the preconsolidation pressure must have been nearly identical at all three points, unless the fill was extremely heterogeneous. The latter conclusion is not born out by the detailed log of Boring 12A. Therefore, one must conclude that the preconsolidation pressure determined for the sample at intermediate is too low. The most conservative interpretation would place the preconsolidation pressure for intermediate point at value greater than 2.1 tons per square foot, the least value estimated by any of the three engineers for overlying sample."

The Corps of Engineers disagrees with Dr. Peck's conclusion. The lower

preconsolidation pressure at the intermediate point might have been caused due to a variation in compactive efforts during compaction of the fill material. It has already been established that inadequate compaction has caused the settlements under the structure. The soil layers in the top and the bottom of the 7' clay column might have been compacted better than those in the middle, which caused difference in preconsolidation pressure.

(7) Referring to paragraph 3, page 2 of Dr. Peck's evaluation; the Corps of Engineers agree that strain - log p curves are smooth curves, without obvious breaks between flatter upper and steeper lower branch. But the point of maximum curvature can be determined within reasonable accuracy if the curves are plotted on somewhat larger scale than that used in Woodward-Clyde report. No doubt, there will be some variation in choice of point of maximum curvature, but the margin of interpretation shown by the three engineers is too large. The Corps of Engineers' evaluation of precompression pressures for samples of COE-13 ~~are~~ is given and compared in Attachment 6 with those provided in Woodward-Clyde report. The Corps' values are consistently less than those of Woodward-Clyde values.

(8) Conclusions:

(a) Shear strength parameters determined for the foundation soils under the Diesel Generator Building are more reliable based on test data than those previous arbitrarily assumed parameters used in bearing capacity analysis and furnished in response to Question 40 (10CFR 50.54(f)). Therefore, the bearing capacity of the foundation soils is adequate.

(b) The precompression pressures, computed on the basis of the consolidation test results obtained after extending the tests to full 64 tsf consolidation pressure, are not valid in all cases, because the e - log p curves for these cases show an increase in curvature at higher pressures, a behavior not expected in consolidation of soils. Also, the inconsistency between settlements and preconsolidation pressures described in paragraph 3 substantiates the fact that precompression stresses provided in report are not accurate. Therefore, the preconsolidation pressure$_s$ computed and reported in the Woodward-Clyde report are not acceptable.

(c) The precompression pressures for many samples, for example, samples of Boring COE-9, have indicated that the preconsolidation pressures are less that the total design external pressure (stresses due to dead load, semi-permanent loads, etc.), therefore, some additional settlements should be determined and be used in determination of stresses in the structure.

(d) The applicant has not yet furnished any information that indicates that it has determined the stresses in the structure incorporating the effects of total settlements (the settlements that has already occurred, future primary and secondary settlements).

(e) The settlement stresses are permanent in nature and as such are equivalent to the stresses produced by dead loads. Therefore, in checking structure stresses in various load combinations it must be considered as dead load stress.

ASLBP
5/10/84
A/4

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the matter of	)	Docket Nos. 50-329-OM&OL
Consumers Power Company	)	50-330-OM&OL
(Midland Nuclear Power Plant)	)	

Testimony of William C. Otto with respect to Geotechnical review, Midland Nuclear Power Plant.

Q-1. Please state your name and position with the U.S. Army Corps of Engineers.

A. My name is William C. Otto. My position with the U.S. Army Corps of Engineers is Chief of the Geotechnical Section of the Technical Branch, Engineering Division, Detroit District.

Q-2. When did the U.S. Army Corps of Engineers get involved in the review process of the Midland Nuclear Power Plant, and what are the areas of its responsibilities?

A. According to Interagency Agreement No. NRC-03-79-167, between the U.S. Nuclear Regulatory Commission (NRC) and the U.S. Army Corps of Engineers.

Q-3. Have you prepared a statement of your professional qualification?

A. Yes. A copy of this statement is attached.

Q-4. Please state the nature of responsibilities that you have with respect to the Midland Nuclear Power Plant units 1 and 2.

(Joe Kane to write)

Q-5. Please state the purpose of this testimony?

A. The purpose of this testimony is to evaluate whether the soil investigations made at the Diesel Generator Building were sufficient to determine the engineering properties of the fill material under and around the building and to evaluate the settlement of the fill and or consolidation of the fill material.

Q-6. Why was the request for borings at the Diesel Generator Building made?

A. The information concerning record sampling of the fill material furnished in the FSAR is not adequate to evaluate the stability and settlement of the Diesel Generator Building.

Q-7. Did you review the applicant's soil data and analysis of the Diesel Generator Building boring and settlement analysis including the Preload Program?

A. Yes - but the soil data is not adequate. Additional soil borings and laboratory tests at the site were needed.

Q-8. Was the original request for additional borings at the Diesel Generator Building ever revised.

A. Yes - originally SPT borings and borings to obtain undisturbed samples were requested. This was later modified since there were SPT borings that were already taken that could be used to determine the sampling in the undisturbed sample borings.

Q-9. Were the results of the borings completed by Woodward and Clyde reviewed and did they supply the needed soil data?

A. Yes - Mr. Hari Singh has reviewed them and he has included his findings in his testimony of the Diesel Generator Building.

Statement of Professional

Qualifications
of
William C. Otto

Name William C. Otto

Education

(1) One year at Purdue University
(2) Three years at University of Notre Dame
graduated "Cum Laude" BS in C.E. in 1932

Publications

(1) ASTM Statistical Study of Concrete Beams. June 1956
(2) Soil Settlement Conference - Paper on settlement study at Selfridge AF Base - 1964
(3) Paper collaborated with Dr. Lipicom of WES on Erosion Control of River Banks - 1965

Committee

U.S. member of ADHOC Committee for investigation of the Compensating Structure for the International Joint Commission of the International Lake Superior Board of Control.

Professional Experience

(1) Chief of Geotechnical Engineering Section, Engineering Division of the Corps of Engineers, Detroit District 1957 to date. Design of all types of Soil Structures on land and water. Serves as soil expert for the District on all phases of soil mechanics.

(2) From 1950 to 1957 in the Navy Consultants on Soil Designs of 140 airfields world wide, dry docks, multi-story hospitals, earth and rock embankments and stability of same and other related military structures.

(3) From 1946 to 1950 - In charge of asphaltic and aggregate laboratory of the Nebraska Highway.

(4) From 1944 to 1946 - An officer in the Bureau of Yards and Docks on all phases of military Civil Works Construction.

(5) 1941 to 1944 - Engineer with Corps of Engineers Omaha District on airfield design and construction, hospital construction, airplane manufacturing plants and other related military base design and construction.

(6) 1938 to 1941 - Engineer with International Boundary Commission United States and Mexico, United States Section - Construction of Levees and Floodway Structures.

(7) 1936 - 1938 - Engineer for Indiana Highway on construction of 4 lane divided highways.

(8) 1934 to 1936 - Engineer for U.S.G.S., Head of Ada & Street for Building Service Co. & Bureau of Aeronautics.