

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
(Midland Plant, Units 1 and 2)	50-330 OM & OL

NRC STAFF TESTIMONY OF JAMES G. KEPPLER WITH RESPECT TO THE
QUALITY ASSURANCE PROGRAM IMPLEMENTATION PRIOR TO DECEMBER 6, 1979

Q. 1. Please state your name and position with the NRC.

A. My name is James G. Keppler. I am Director of the U.S. Nuclear Regulatory Commission's Region III (Chicago) Office and have held that position since September, 1973. A statement of my professional experience is attachment 1.

Q. 2. Please summarize your past involvement with Consumers Power Company's implementation of quality assurance at the Midland site prior to December 6, 1979.

A. In connection with our on-going assessment of quality assurance implementation at Midland, my staff developed a chronological listing of major events and problems at the site which includes quality assurance deficiencies. These events and problems are set forth in attachment 2 (dated February 15, 1979) and attachment 3 (dated October 18, 1979). I was personally involved in deciding the regulatory actions taken for the more significant problems described in attachments 2 and 3.

Q. 3. When did you first learn of the apparent excessive settlement of the diesel generator building?

A. I'm not certain as to the actual date I personally became aware of the diesel generator building settlement problem; however, a written 10 CFR 50.55(e) notification was made to Region III by the licensee on September 25, 1978 concerning the problem. I became personally involved with the problem following an NRC inspection on October 24-27, 1978 which was conducted as a followup to the licensee's report of the matter. This inspection was conducted by Eugene J. Gallagher of my staff and is documented in attachment 2 of his testimony. After being briefed on the inspection findings by Mr. Gallagher, I directed my staff to conduct a comprehensive investigation into the matter to determine whether the problem had been reported to the NRC in a timely manner, to verify the degree of conformance with commitments made by the licensee in the Final Safety Analysis Report, and to assess the root cause(s) of the problem.

Q. 4. Summarize the investigation findings and your role in the assessment of these findings.

A. The detailed investigation findings are discussed in Attachments 4 and 7 to the testimony of Eugene J. Gallagher. Five Region III management representatives (including myself) were briefed initially by the investigation team on February 16, 1979. Based on those detailed investigation findings, it was our unanimous conclusion that the

implementation of the quality assurance/quality control program for assuring the proper soil foundation for the site was ineffective. In addition, several of the commitments in the FSAR related to this work had not been adhered to. With respect to the reportability consideration, we agreed that the NRC had been informed of the problem in a timely manner once it had been identified. Based on this briefing, I instructed my staff to set up a meeting with Consumers Power Company to inform them of our investigation findings. Two meetings were held with the licensee relative to this investigation (February 23, 1979 and March 5, 1979). I participated in both meetings. A summary report of these meetings (Attachments 4 and 5 to the testimony of Eugene J. Gallagher) was provided to the licensee in my letter dated March 15, 1979.

Q. 5. Summarize subsequent actions taken by you with respect to the soil settlement problem.

A. Following the NRC investigation and related meetings with the licensee, Region III management reached the following conclusions:

(1) The technical issues associated with improperly compacted soil needed review and evaluation by NRR. This conclusion resulted in my memorandum of March 12, 1979 to Mr. Thornburg (attachment 5).

(2) The deficiencies identified with respect to implementation of the quality assurance program were limited to soils work. Since the original soil placement activities had been substantially completed, no attempt was made at this time to stop soil work.

(3) Several commitments in the FSAR were incorrect and required review by NRR and ELD to determine whether they constituted material false statements. This conclusion resulted in my memorandum of April 3, 1979 to Mr. Thornburg.

Q. 6. What was the disposition of your recommendations and how does that action relate to the Order that was issued on December 6, 1979?

A. On March 21, 1979 the NRC's Office of Nuclear Reactor Regulation issued a 10 CFR 50.54(f) request to Consumers Power Company requiring the licensee to provide additional information regarding the adequacy of the plant fill and the root causes and corrective actions to be taken regarding quality assurance deficiencies.

I participated in meetings at headquarters which led to the issuance of the December 6, 1979 Order Modifying Construction Permits. I supported issuance of that Order.

JAMES G. KEPPLER - BIOGRAPHICAL INFORMATION

James G. Keppler has been Regional Director of the Nuclear Regulatory Commission's Region III Office of Inspection and Enforcement since 1973. (The Nuclear Regulatory Commission was formed in January 1975 to take over the regulatory functions of the old Atomic Energy Commission (AEC). The research and development activities of the AEC were assumed by the Department of Energy.)

The Regional Office in Glen Ellyn is responsible for inspection and enforcement activities at NRC licensed facilities in eight midwestern states. This encompasses 20 nuclear power plants now in operation, 21 plants licensed for construction or under licensing review, 12 operating research reactors, four fuel facilities and approximately 3700 byproduct materials licenses -- generally for medical, industrial, research or educational applications.

Mr. Keppler joined the AEC in 1965 as a reactor inspector. Prior to his present post as Regional Director, he was Chief of the Reactor Testing and Operations Branch in the AEC Headquarters in Bethesda, Maryland.

He is a 1956 graduate of LeMoyne College in New York State. Mr. Keppler's experience in the nuclear field includes nine years with General Electric Company, first in its Aircraft Nuclear Propulsion Department and later in its Atomic Power Equipment Department.

February 15, 1979

MEMORANDUM FOR: H. D. Thornburg, Director, Division of Reactor
Construction Inspection, IE

FROM: James G. Kappler, Director

SUBJECT: MIDLAND SUMMARY REPORT

The attached report, which represents Region III's overall assessment of the Midland construction project to date from a regulatory standpoint, was discussed with you and representatives from your staff, NRR, and OELD during our meeting at HQ's on February 6, 1979. During that meeting, it was concluded that this report should be provided to OELD for transmittal to the Licensing Board and the various parties to the Hearing. As such, this information is being forwarded for your action.

We believe the meeting was quite useful in receiving feedback from the various NRC people involved relative to our position on the status of this facility.

Please contact me if you have any questions regarding this matter.

James G. Kappler
Director

Attachment:
Midland Summary Report

OFFICE	RIII	RIII	RIII	RIII		
SURNAME	Heishman/jr	Fiorelli	Norelius	Kappler		
DATE	2/15/79		2/15/79	2/15/79		

DUPE OF 8104160335

MIDLAND SUMMARY REPORT

Facility Data

Docket Numbers - 50-329 and 50-330

Construction Permits - CPPR-81 and CPPR-82

Permits Issued - December 14, 1972

Type Reactor - PWR; Unit 1, 492 MWe*; Unit 2, 818 MWe

NSSS Supplier - Babcox & Wilcox

Design/Constructor - Bechtel Power Corporation

Fuel Load Dates - Unit 1, 11/81; Unit 2, 11/80

Status of Construction - Unit 1, 52%, Unit 2, 56%; Engineering 80%

*Approximately one-half the steam production for Unit 1 is dedicated, by contract, to be supplied to Dow Chemical Corporation, through appropriate isolation heat exchangers. Capability exists to alternate to Unit 2 for the steam source upon demand.

Chronological Listing of Major Events

July 1970 Start of Construction under exemption

9/29-30 & 10/1/70 Site inspection, four items of noncompliance identified, extensive review during CP hearings

1971 - 1972 Plant in mothballs pending CP

12/14/72 CP issued

9/73 Inspection at Bechtel Ann Arbor offices, five items of noncompliance identified

11/73 Inspection at site, four items of noncompliance identified (cadweld problem) precipitated the Show Cause Order

12/29/73 Licensee answers Show Cause Order commits to improvements on QA program and QA/QC staff

12/3/73 Show Cause Order issued suspending cadwelding operation

12/6-7/73 Special inspection conducted by RIII & HQ personnel

12/17/73 Show Cause order modified to allow cadwelding based on inspection findings of 12/6-7/73

12/5/74 CP reported that rebar spacing out of specification 50
locations in Unit 2 containment

3/5 & 10/75 CP reported that 63 #6 rebar were either missing or
misplaced in Auxiliary Building

3/12/75 RIII held management meeting with CP

8/21/75	CP reported that 42 sets of #6 tie bars were missing in Auxiliary Building
3/22/76	CP reported that 32 #8 rebar were omitted in Auxiliary Building. A stop-work order was issued by CP
3/26/76	RIII inspector requested CP to inform RIII when stop-work order to be lifted and to investigate the cause and the extent of the problem. Additional rebar problems identified during site inspection
3/31/76	CP lifted the stop-work order
4/19 thru 5/14/76	RIII performed in-depth QA inspection at Midland
5/14/76	RIII management discussed inspection findings with site personnel
5/20/76	RIII management meeting with CP President, Vice President, and others.
6/7 & 8/76	RIII follow up meeting with CP management and discussed the CP 21 correction commitments
6/1-7/1/76	Overall rebar omission reviewed by R. E. Shewmaker
7/28/76	CP stops concrete placement work when further rebar placement errors found by their overview program. PN-III-76-52 issued by RIII
8/2/76	RIII recommends HQ notice of violation be issued
8/9 - 9/9/76	Five week full-time RIII inspection conducted
8/13/76	Notice issued
10/29/76	CP responded to HQ Notice of Violations
12/10/76	CP revised Midland QA program accepted by NRR
2/28/77	Unit 2 bulge of containment liner discovered
4/19/77	Tendon sheath omissions of Unit 1 reported
4/29/77	IAL issued relative to tendon sheath placement errors
5/5/77	Management meeting at CP Corporate Office relative to IAL regarding tendon sheath problem

5/24-27/77	Special inspection by RIII, RI and HQ personnel to determine adequacy of QA program implementation at Midland site
6/75 - 7/77	Series of meetings and letters between CP and NRF on applicability of Regulatory Guides to Midland. Commitments by CP to the guides was responsive
7/24/78	Construction resident inspection assigned
8/21/78	Measurements by Bechtel indicate excessive settlement of Diesel Generator Building. Officially reported to RIII on September 7, 1978
12/78 - 1/79	Special investigation/inspection conducted at Midland sites Bechtel Ann Arbor Engineering offices and at CP corporate offices relative to Midland plant fill and Diesel Generator building settlement problem

Selected Major Events

Past Problems

1. Cadweld Splicing Problem and Show Cause Order

A routine inspection, conducted on November 6-8, 1973, as a result of intervenor information, identified eleven examples of four noncompliance items relative to rebar Cadwelding operations. These items were summarized as: (1) untrained Cadweld inspectors; (2) rejectable Cadwelds accepted by QC inspectors; (3) records inadequate to establish cadwelds met requirements; and (4) inadequate procedures.

As a result, the licensee stopped work on cadweld operations on November 9, 1973 which in turn stopped rebar installation. The licensee agreed not to resume work until the NRC reviewed and accepted their corrective action. However, Show Cause Order was issued on December 3, 1973, suspending Cadwelding operations. On December 6-7, 1973 RIII and HQ personnel conducted a special inspection and determined that construction activity could be resumed in a manner consistent with quality criteria. The show cause order was modified on December 17, 1973, allowing resumption of Cadwelding operations based on the inspection results.

The licensee answered the Show Cause Order on December 29, 1973, committing to revise and improve the QA manuals and procedures and make QA/QC personnel changes.

Prehearing conferences were held on March 28 and May 30, 1974, and the hearing began on July 16, 1974. On September 25, 1974, the Hearing Board found that the licensee was implementing its QA program in compliance with regulations and that construction should not be stopped.

2. Rebar Omission/Placements Errors Leading to IAL

Initial identification and report of rebar nonconformances occurred during an NRC inspection conducted on December 11-13, 1974. The licensee informed the inspector that an audit, had identified rebar spacing problems at elevations 642' - 7" to 652' - 9" of Unit 2 containment. This item was subsequently reported per 10 CFR 50.55(e) and was identified as a item of noncompliance in report Nos. 50-329/74-11 and 50-330/74-11.

Additional rebar deviations and omissions were identified in March and August 1975 and in April, May and June 1976. Inspection report Nos. 50-329/76-04 and 50-330/76-04 identified five noncompliance items regarding reinforcement steel deficiencies.

and concrete placement work.

Licensee response dated June 18, 1976, listed 21 separate items (commitments) for corrective action. A June 24, 1976 letter provided a plan of action schedule for implementing the 21 items. The licensee committed not to resume concrete placement work until the items addressed in licensee's June 24 letter were resolved or implemented. This commitment was documented in a RIII letter to the licensee dated June 25, 1976. Although not stamped as an IAL, in-house memos referred to it as such.

Rebar installation and concrete placement activities were resumed in early July 1976, following completion of the items and verification by RIII.

Additional action taken is as follows:

a. By the NRC

- (1) Assignment of an inspector full-time on site for five weeks to observe civil work in progress
- (2) IE management meetings with the licensee at their corporate offices
- (3) Inspection and evaluation by Headquarter personnel

b. By the Licensee

- (1) June 18, 1976 letter committing to 21 items of corrective action
- (2) Establishment of an overview inspection program to provide 100% reinspection of embedments by the licensee following acceptance by the contractor QC personnel

c. By the Contractor

- (1) Personnel changes and retraining of personnel
- (2) Prepared technical evaluation for acceptability of each identified construction deficiency
- (3) Improvement in their QA/QC program coverage of civil work (this was imposed by the licensee)

3. Tendon Sheath Placement Errors and Resulting Immediate Action Letter (IAL)

On April 19, 1977, the licensee reported, as a Part 50, Section 50.55(e) item, the inadvertent omission of two hoop tendon sheaths from a Unit 1 containment concrete placement at

elevation 703' - 7". The tendon sheaths were, for the most part, located at an elevation in the next higher concrete placement lift, except that they were diverted to the lower placement lift to pass under a steam line penetration and it was where they were omitted. Failure to rely on the proper source documents by construction and inspection personnel, contributed to the omission.

An IAL was issued to the licensee on April 29, 1977, which spelled out six licensee commitments for correction which included: (1) repairs and cause corrective action; (2) expansion of the licensee's QC over view program; (3) revisions to procedures and training of construction and inspection personnel.

A special QA program inspection was conducted in early May 1977. The inspection team was made up of personnel from RI, RIII, and HQ. Although five items of noncompliance were identified, it was the consensus of the inspectors that the licensee's program was an acceptable program and that the Midland construction activities were comparable to most other construction projects.

The licensee issued its final report on August 12, 1977. Final review on site was conducted and documented in report No. 30-329/77-08.

Current Problems

1. Plant Fill - Diesel Generator Building Settlement

The licensee informed the RIII office on September 8, 1978, of per requirements of 10 CFR 50.55(e) that settlement of the diesel generator foundations and structures were greater than expected.

Fill material in this area was placed between 1975 and 1977, with construction starting on diesel generator building in mid-1977. Filling of the cooling pond began in early 1978 with the spring run-off water. Over the year the water level has increased approximately 21 feet and in turn increasing the site ground water level. It is not known at this time what effect (if any) the higher site ground water level has had on the plant fill and excessive settlement of the Diesel Generator Building. It is interesting to note however, that initially the PSAR indicated an underdrain system would be installed to maintain the ground water at its normal (pre pond) level but that it later was deleted.

The NRC activities, to date, include:

- a. Transfer of lead responsibility to NRR from IE by memo dated November 17, 1978
- b. Site meeting on December 3-4, 1978, between NRR, IE, Consumers Power and Bechtel to discuss the plant fill problem and proposed corrective action relative to the Diesel Generator Building settlement
- c. RIII conducted an investigation/inspection relative to the plant fill and Diesel Generator Building settlement

The Constructor/Designer activities include:

- a. Issued NCR-1482 (August 21, 1978)
- b. Issued Management Corrective Action Report (MCAR) No. 24 (September 7, 1978)
- c. Prepared a proposed corrective action option regarding placement of sand overburden surcharge to accelerate and achieve proper compaction of diesel generator building sub soils

Preliminary review of the results of the RIII investigation/inspection into the plant fill/Diesel Generator Building settlement problem indicate many events occurred between late 1973 and early 1978 which should have alerted Bechtel and the licensee to the pending problem. These events included nonconformance reports, audit findings, field memos to engineering and problems with the administration building fill which caused modification and replacement of the already poured footing and replacement of the fill material with lean concrete.

2. Inspection and Quality Documentation to Establish Acceptability of Equipment

This problem consists of two parts and has just recently been identified by RIII inspectors relative to Midland. The scope and depth of the problem has not been determined.

The first part concerns the adequacy of engineering evaluation of quality documentation (test reports, etc.) to determine if the documentation establishes that the equipment meets specification and environmental requirements. The licensee,

by the licensee's
QA REVIEW PROGRAM }

on November 13, 1978, issued a construction deficiency report (10 CFR 50.55(e)) relative to this matter. Whether the report was triggered by RIII inspector inquiries or by IE Circular or Bulletin is not known. An interim report dated November 28, 1978 was received and stated Consumers Power was pursuing this matter not only for Bechtel procured equipment but also for NSS supplied equipment.

The second part of the problem concerns the adequacy of equipment acceptance inspection by Bechtel shop inspectors. Examples of this problem include: (1) Decay Heat Removal Pumps released by the shop inspector and shipped to the site with one pump assembled backwards, (2) electrical penetrations inspected and released by the shop inspector for shipment to the site. Site inspections to date indicate about 25% of the vendor wire terminations were improperly crimped.

Inspection History

The construction inspection program for Midland Units 1 and 2 is approximately 50% complete. This is consistent with status of construction of the two units. (Unit 1 - 52%; Unit 2 - 56%) In terms of required inspection procedures approximately 25 have been completed, 33 are in progress and 36 have not been initiated.

The routine inspection program has not identified an unusual number of enforcement items. Of the selected major events described above, only one is directly attributable to RIII enforcement activity (Cadweld splicing). The other were identified by the licensee and reported through the deficiency report system (50.55(e)). The Midland data for 1976 - 78 is tabulated below.

<u>Year</u>	<u>Number of Noncompliances</u>	<u>Number of Inspections</u>	<u>Inspector Hours On Site</u>
1976	14	9	646
1977	5	12	648
1978	11	18	706

A resident inspector was assigned to the Midland site in July 1978. The on site inspection hours shown above does not include his inspection time.

The licensee's QA program has repeatedly been subject to in-depth review by IE inspectors. Included are:

1. July 23-26 and August 8-10, 1973, inspection report Nos. 50-329/73-06 and 50-330/73-06: A detailed review was conducted relative to the implementation of the Consumers Power Company's QA manual and Bechtel Corporation's QA program for design activities at the Bechtel Ann Arbor office. The identified concerns were reported as discrepancies relative to the Part 50, Appendix E, criteria requirements.

2. September 10-11, 1973, report Nos. 50-329/73-08 and 50-330/73-08: A detailed review of the Bechtel Power Corporation QA program for Midland was performed. Noncompliances involving three separate Appendix B criteria with five different examples, were identified.
3. February 6-7, 1974, reports No. 50-329/74-03 and 50-330/74-03: A followup inspection at the licensee's corporate office, relative to the items identified during the September 1973 inspection (above) along with other followup.
4. June 16-17, 1975, report Nos. 50-329/75-05 and 50-330/75-05: Special inspection conducted at the licensee's corporate office to review the new corporate QA program manual.
5. August 9 through September 9, 1976, report Nos. 50-329/76-08 and 50-330/76-08: Special five-week inspection regarding QA program implementation on site primarily for rebar installation and other civil engineering work.
6. May 24-27, 1977, report Nos. 50-329/77-05 and 50-330/77-08: Special inspection conducted at the site by RIII, IE and RI personnel to examine the QA program implementation on site by Consumers Power Company and by Bechtel Corporation. Although five examples of noncompliance to Appendix B, Criterion V, were identified, the consensus of the inspectors involved was that the program and its implementation for Midland was considered to be adequate.

Although the licensee's Quality Assurance program has undergone a number of revisions to strengthen its provisions, no current concern exist regarding its adequacy. Their Topical QA Plan has been reviewed and accepted by NRR through revision 7. Implementation of the program has been and continues to be subject to further review with the mid-construction program review presently scheduled for March or April 1979.

Consumers Power Company expanded their QA/QC auditing and surveillance coverage to provide extensive overview inspection coverage. This began in 1975 with a commitment early in their experience with rebar installation problems and was further committed by the licensee in his letter of June 18, 1976, responding to report Nos. 50-329/76-04 and 50-330/76-04. This overview inspection activity by the licensee has been very effective as a supplement to the constructor's own program. Currently, this program is functioning across all significant activities at the site.

Enforcement History

Approximately 6 months after restart of construction activities (11 months after CP issuance) an inspection identified four noncompliance items regarding cadwelding activities. This resulted in a show cause order being issued on December 3, 1973. This enforcement action was aired publicly during hearings held by the Atomic Safety Licensing Board in May 1974. The hearing board issued its decision in September 1974

that concluded that construction could proceed with adequate assurance of quality.

Identification of reinforcing bar problems began in December of 1974 with the licensee reporting improper spacing of rebar in the Unit 2 containment wall. Further reinforcing bar spacing and/or omission of rebar was identified in August 1975 and again in May 1976 with the citations of 5 noncompliances in an inspection report. An IE:HQ notice of violation was issued regarding the citations in addition to the licensee issuing a stop work order. The licensee issued a response letter dated June 18, 1976 committing to 21 items of corrective action. A Bechtel prepared technical assessment for each instance of rebar deficiency was submitted to and review by IE:HQ who concluded that the structures involved will satisfy the SAR criteria and that the function of these structures will be maintained during all design conditions. The RIII office of NRC performed a special five week inspection to assess the corrective action implementation without further citation.

The licensee reported that two hoop tendon sheaths were omitted in concrete placements of Unit 2 containment wall in April 1977. An Immediate Action Letter was issued to the licensee on April 29, 1977 listing six items of licensee commitments to be completed. A special inspection was performed on May 24-27, 1977 with four NRC inspectors (1-HQ, 1-RI, and 2-RIII). Although five items of noncompliance were identified, it was the consensus of the inspectors that the QA/QC program in effect was adequate. The constructors nonconformance report provided an alternate method of installation for the tendon sheaths that was accepted.

The RIII office of inspection and enforcement instituted an augmented on site inspection coverage program during 1974, this program has continued in effect ever since and is still in effect. It is noted that the noncompliance history with this program is essentially the same as the history of other RIII facilities with a comparable status of construction. Further on site inspection augmentations was accomplished with the assignment of a full time resident inspector in August, 1978.

The noncompliance history for the Midland Project is provided in the following table.

ENFORCEMENT ACTIONS

Noncompliances

<u>Year</u>	<u># Total</u>	<u>Criteria (10 CFR 50 Appendix B)</u> <u>() Number of Occurrences</u>
1970	4	V, X, XI, XVI
1971-1972	0	Construction halted pending CP
1973	9	II V(5) XIII, XV, XVII
1974	3	V(2) XI
1975	0	
1976	10	V(4) X, XII, XV, XVI, XVII, XVIII
1977	5	V(5) 10 CFR 50.55(e) item
1978	11	V(4) VI(2), VII, IX(3), XVI

Criteria

II	QA Program
V	Instructions Procedures Drawing Control Work
VI	Document Control
VII	Control of Purchased Material
IX	Control of Special Processes
X	Inspection
XII	Control Measuring - Test Equipment
XIII	Handling - Storage
XV	Nonconforming Parts
XVI	Corrective Actions
XVII	QA Records
XVIII	Audits

Summary and Conclusions

Since the start of construction Midland has experienced some significant problems resulting in enforcement action. In evaluating these problems they have occurred in clumps: (1) in September 1970 relative to improper placement, sampling and testing of concrete and failure of QA/QC to act on identified deficiencies; (2) in September 1973 relative to drawing control and lack of or inadequate procedures for control of design and procurement activities at the Bechtel Engineering offices; (3) in November 1973 relative to inadequate training, procedures and inspection of cadweld activities; (4) in April, May and June 1976 resulting from a series of RIII in-depth QA inspections and meetings to identify underlying causes of weakness in the Midland QA program implementation relative to embedments. (The noncompliance items identified involved inadequate quality inspection, corrective action, procedures and documentation, all primarily concerned with installation of reinforcement steel); (5) in April 1977 relative to tendon sheath omissions; and (6) in August 1978 concerning plant soil foundations and excessive settlement of the Diesel Generator Building.

Following each of these problem periods (excluding the last which is still under investigation), the licensee has been responsive and has taken extensive action to evaluate and correct the problem and to upgrade his QA program and QA/QC staff. The most effective of these licensee actions has been an overview program which has been steadily expanded to cover almost all safety related activities.

The evaluation both by the licensee and IE of the structures and equipment affected by these problems (again except the last) has established that they fully meet design requirements.

Since 1974 these problems have either been identified by the licensee's quality program or provided direction to our inspectors.

Looking at the underlying causes of these problems two common threads emerge: (1) Consumers Power historically has tended to over rely on Bechtel, and (2) insensitivity on the part of both Bechtel and Consumers Power to recognize the significance of isolated events or failure to adequately evaluate possible generic application of these events either of which would have led to early identification and avoidance of the problem including the last on plant fill and diesel generator building settlement.

Notwithstanding the above, it is our conclusion that the problems experienced are not indicative of a broadbreakdown in the overall quality assurance program. Admittedly, deficiencies have occurred which should have been identified earlier by quality control personnel, but the licensee's program has been effective in the ultimate identification and subsequent correction of these deficiencies. While we cannot dismiss the possibility that problems may have gone undetected by the licensee's overall quality assurance program, our inspection program has not identified significant problems overlooked by the licensee --- and this inspection effort has utilized many different inspectors.

The RIII project inspectors believe that continuation of: (1) resident site coverage, (2) the licensee overview program including its recent expansion into engineering design/review activities, and (3) a continuing inspection program by regional inspectors will provide adequate assurance that construction will be performed in accordance with requirements and that any significant errors and deficiencies will be identified and corrected.



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

Attachment 3

October 18, 1979

MEMORANDUM FOR: R. C. Knop
D. W. Hayes
D. H. Danielson
K. Naidu
G. Maxwell
W. Hansen
P. Barrett
R. Cook
T. Vandel
F. Jablonski
E. Lee
G. Gallagher
K. Ward
I. Yin

FROM: G. Fiorelli, Chief, Reactor Construction and
Engineering Support Branch

SUBJECT: MIDLAND CONSTRUCTION STATUS REPORT AS OF
OCTOBER 1, 1979

The attached report was finalized based on your feedback requested in my memo of October 5, 1979. If you still feel adjustments are necessary please contact me. If you consider the report characterizes your current assessment of the Midland project, please concur and pass it along promptly.

G. Fiorelli, Chief
Reactor Construction and
Engineering Support Branch

Enclosure: As stated

cc: J. G. Keppler

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MIDLAND SUMMARY REPORT UPDATE

Facility Data

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12/10/76	CP revised Midland QA program accepted by NRR
2/28/77	Unit 2 bulge of containment liner discovered by licensee
4/19/77	Tendon sheath omissions of Unit 1 reported
4/29/77	LAL issued relative to tendon sheath placement errors
5/5/77	Management meeting at CP Corporate Office relative to LAL regarding tendon sheath problem

5/24/77	Special inspection by RIII, RI and HQ personnel to determine adequacy of QA program implementation at Midland site.
- 6/75 - 7/77	Series of meetings and letters between CP and NRR on applicability of Regulatory Guides to Midland. Commitments by CP to the guides was responsive.
7/24/78	Construction resident inspection assigned.
8/21/78	Measurements by Bechtel indicate excessive settlement of Diesel Generator Building. Officially reported to RIII on September 7, 1978.
12/78 - 1/79	Special investigation/inspection conducted at Midland sites, Bechtel Ann Arbor Engineering offices and at CP corporate offices relative to Midland plant fill and Diesel Generator building settlement problem.
2/7/79	Corporate meeting between RIII and CPC to discuss project status and future inspection activities. CPC informed construction performance on track with exception of diesel/fill problem.
2/23/79	Meeting held in RIII with Consumers Power to discuss diesel generator building and plant area fill problems.
3/5/79	Meeting held with CPC to discuss diesel generator building and plant area fill problems.
3/21/79	10 CFR 50.54 request for information regarding plant fill sent to CPC by NRR.
5/5/79	Congressman Albosta and aides visited Midland site to discuss TMI effect on Midland.
5/8-11/7	Mid-QA inspection conducted.

Significant Major Events

Past Problems

1. Cadweld Splicing Problem and Show Cause Order

A routine inspection, conducted on November 6-8, 1973, as a result of intervenor information, identified eleven examples of four noncompliance items relative to rebar Cadwelding operations. These items were summarized as: (1) untrained Cadweld inspectors; (2) rejectable Cadwelds accepted by QC inspectors; (3) records inadequate to establish cadwelds met requirements; and (4) inadequate procedures.

As a result, the licensee stopped work on cadweld operations on November 9, 1973 which in turn stopped rebar installation and concrete placement work. The licensee agreed not to resume work until the NRC reviewed and accepted their corrective action. However, Show Cause Order was issued on December 3, 1973, suspending Cadwelding operations. On December 6-7, 1973, RIII and HQ personnel conducted a special inspection and determined that construction activity could be resumed in a manner consistent with quality criteria. The Show Cause Order was modified on December 17, 1973, allowing resumption of Cadwelding operations based on the inspection results.

The licensee answered the Show Cause Order on December 29, 1973, committing to revise and improve the QA manuals and procedures and make QA/QC personnel changes.

Prehearing conferences were held on March 28 and May 30, 1974, and the hearing began on July 16, 1974. On September 25, 1974, the Hearing Board found that the licensee was implementing its QA program in compliance with regulations and that construction should not be stopped.

2. Rebar Omission/Placements Errors Leading to IAL

Initial identification and report of rebar nonconformances occurred during an NRC inspection conducted on December 11-13, 1974. The licensee informed the inspector that an audit, had identified rebar spacing problems at elevations 642' - 7" to 652' - 9" of Unit 2 containment. This item was subsequently reported per 10 CFR 50.55(e) and was identified as a item of noncompliance in reports Nos. 50-329/74-11 and 50-330/74-11.

Additional rebar deviations and omissions were identified in March and August 1975 and in April, May and June 1976. Inspection report Nos. 50-329/76-04 and 50-330/76-04 identified five noncompliance items regarding reinforcement steel deficiencies.

Licensee response dated June 18, 1976, listed 21 separate items (commitments) for corrective action. A June 24, 1976 letter provided a plan of action schedule for implementing the 21 items. The licensee suspended concrete placement work until the items addressed in licensee's June 24 letter were resolved or implemented. This commitment was documented in a RIII letter to the licensee dated June 25, 1976. Although not stamped as an IAL, in-house memos referred to it as such.

Rebar installation and concrete placement activities were satisfactorily resumed in early July 1976, following completion of the items and verification by RIII.

Additional action taken is as follows:

a. By the NRC

- (1) Assignment of an inspector full-time onsite for five weeks to observe civil work in progress.
- (2) IE management meetings with the licensee at their corporate offices
- (3) Inspection and evaluation by Headquarters personnel

b. By the Licensee

- (1) June 18, 1976 letter committing to 21 items of corrective action.
- (2) Establishment of an overview inspection program to provide 100% reinspection of embedments by the licensee following acceptance by the contractor QC personnel.

c. By the Contractor

- (1) Personnel changes and retraining of personnel.
- (2) Prepared technical evaluation for acceptability of each identified construction deficiency.
- (3) Improvement in their QA/QC program coverage of civil work (this was imposed by the licensee).

3. Tendon Sheath Placement Errors and Resulting Immediate Action Letter (IAL)

On April 19, 1977, the licensee reported, as a Part 50, Section 50.55(e) item, the inadvertent omission of two hoop tendon sheaths

from a Unit 1 containment concrete placement at elevation 703' - 7" due to having already poured concrete in an area where the tendons were to be directed under a steam line. The tendons were subsequently rerouted in the next higher concrete lift.

An IAL was issued to the licensee on April 29, 1977, which spelled out six licensee commitments for correction which included: (1) repairs and cause corrective action; (2) expansion of the licensee's QC overview program; (3) revisions to procedures and training of construction and inspection personnel.

A special QA program inspection was conducted in early May 1977. The inspection team was made up of personnel from RI, RIII and HQ. Although five items of noncompliance were identified, it was the consensus of the inspectors that the licensee's program was an acceptable program.

The licensee issued it's final report on August 12, 1977. Final review onsite was conducted and documented in report No. 50-329/77-08.

Current Problems

1. The licensee informed the RIII office on September 8, 1978, per requirements of 10 CFR 50.55(e) that settlement of the diesel generator foundations and structures were greater than expected.

Fill material in this area was placed between 1975 and 1977, with construction starting on the diesel generator building in mid-1977. Review of the results of the RIII investigation/inspection into the plant fill/Diesel Generator Building settlement problem indicate many events occurred between late 1973 and early 1978 which should have alerted Bechtel and the licensee to the pending problem. These events included nonconformance reports, audit findings, field memos to engineering and problems with the administration building fill which caused modification and replacement of the already poured footing and replacement of the fill material with lean concrete.

Causes of the excessive settlement include: (1) inadequate placement method - unqualified compaction equipment and excessive lift thickness; (2) inadequate testing of the soil material; (3) inadequate QC inspection procedures; (4) unqualified quality control inspectors and field engineers; (5) over reliance on inadequate test results.

The proposed remedial work and corrective action are as follows:

- (1) Diesel Generator Building - apply surcharge load in and around building to preconsolidate the foundation material. Continue to monitor soil response to predict long-term settlement.
- (2) Service Water Pump Structure - Install piles to hard glacial till to support that portion of the structure founded on plant fill material.
- (3) Tank Farm - Fill has been determined to be suitable for the support of Borated Water Storage Tanks. Tanks are to be constructed and hydro tested while monitoring soil response to confirm support of structures.
- (4) Diesel Oil Tanks - No remedial measure; backfill is considered adequate.
- (5) Underground Facilities - No remedial work is anticipated with regards to buried piping.
- (6) Auxiliary Building and F. W. Isolation Valve Pits - Installed a number of caissons to glacial till material and replace soil material with concrete material under valve pits.
- (7) Dewatering System - Installed site dewatering system to provide assurance against soil liquidification during a seismic event

The above remedial measures were proposed to the NRC staff on July 18, 1979. No endorsement of the proposed actions have been issued to the licensee to date. The licensee is proceeding with the above plans.

The NRC activities, to date, include:

- a. Lead technical responsibility and program review was transferred to NRR from IE by memo dated November 17, 1978.
- b. Site meeting on December 3-4, 1978, between NRR, IE, Consumers Power and Bechtel to discuss the plant fill problem and proposed corrective action related to the Diesel Generator Building settlement.
- c. RIII conducted an investigation/inspection relative to the plant fill and Diesel Generator Building settlement. Findings are contained in Report 50-329/78-20; 330/78-20 dated March 1979.
- d. NRC/Consumers Power Company/Bechtel meetings held in RIII office to discuss finding of investigation/inspection of site settlement (February 23, 1979 and March 5, 1979).

- e. NRC issue of 10 CFR 50.54(f) regarding plant fill dated March 21, 1979.
- f. Several inspections of Midland site settlement have been performed.

The Constructor/Designer activities include:

- a. Issued NCR-1482 (August 21, 1978)
- b. Issued Management Corrective Action Report (MCAR) No. 24 (September 7, 1978)
- c. Prepared a proposed corrective action option regarding placement of sand overburden surcharge to accelerate and achieve proper compaction of diesel generator building sub-soils.
- d. Issued 10 CFR 50.55(e) interim report number 1 dated September 29, 1978.
- e. Issued interim report No. 2 dated November 7, 1978.
- f. Issued interim report No. 3 dated June 5, 1979.
- g. Issued interim report No. 4 dated February 23, 1979
- h. Issued interim report No. 5 dated April 30, 1979
- i. Responded to NRC 10 CFR 50.54(f) request for information onsite settlement dated April 24, 1979. Subsequent revision 1 dated May 31, 1979, revision 2 dated July 9, 1979 and revision 3 dated September 13, 1979.
- j. Meeting with NRC to discuss site settlement causes and proposed resolution and corrective action taken dated July 18, 1979. Information discussed at this meeting is documented in letter from CPCo to NRC dated August 10, 1979.
- k. Issued interim report No. 6 dated August 10, 1979
- l. Issued interim report No. 7 dated September 5, 1979

2. Review of Quality Documentation to Establish Acceptability of Equipment

The adequacy of engineering evaluation of quality documentation (test reports, etc.) to determine if the documentation establishes that the equipment meets specification and environmental requirements is of concern. The licensee, on November 13, 1978, issued a construction deficiency report (10 CFR 50.55(e)) relative to this matter. An interim report dated November 18, 1978 was received

and stated Consumers Power was pursuing this matter not only for Bechtel procured equipment but also for NSS supplied equipment.

3. Source Inspection to Confirm Conformance to Specifications

The adequacy of equipment acceptance inspection by Bechtel shop inspectors has been the subject of several noncompliance/nonconformance report. Consumers Power has put heavy reliance on the creditability of the Bechtel vendor inspection program to insure that only quality equipment has been sent to the site. However, the referenced nonconformance reports raise questions that the Bechtel vendor inspection program may not be effectively working in all disciplines for supplied equipment. Some significant examples are as follows:

- (1) Decay heat removal pump being received with inadequate radiography. The pumps were returned to the vendor for re-radiography and repair. The pumps were returned to the site with one pump assembled backwards. This pump was again shipped to the vendor for reassembly. CPCo witnessed a portion of this reassembly and noted in their audit that some questionable techniques for establishing reference geometry were employed by the vendor. The pumps had been shop inspected by Bechtel.
- (2) Containment personnel air lock hatches were received and installed with vendor supplied structural weld geometry which does not agree with manufacturing drawings. The personnel air lock doors had been vendor inspected.
- (3) Containment electrical penetrations were received and installed with approximately 25% of the vendor installed terminations showing blatant signs of inadequate crimping. These penetrations were shop inspected by 3 or 4 Bechtel supplier quality representatives (vendor inspectors).
- (4) 350 MCM, 3 phase power cable was received and installed in some safety related circuits with water being emitted from one phase.
- (5) A primary coolant pump casing was received and installed without all the threads in one casing stud hole being intact. The casings were vendor inspected by both Bechtel and B&W.

Additional IE inspections will be conducted to determine if CP has thoroughly completed an overview of the Bechtel shop inspector's function and that equipment already purchased has been reviewed to confirm it meets requirements.

4. "Q" List Equipment

- There have been instances wherein safety related construction components and their installation activities have not ~~been~~ identified on the "Q" list.

This shortcoming could have affected the quality of work performed during fabrication due to the absence of quality controls identified with "Q" list items. Examples of non-"Q" list activities identified which should be "Q" listed include:

Cable Trays

Components of Heating and Ventilation System

The licensee will be advised to review past as well as future construction activities to confirm that they were properly defined as "Q" list work or components.

5. Management Controls

- a. Throughout the construction period CPCo has identified some of the problems that have occurred and reported them under the requirements of 10 CFR 50.55(e). Management has demonstrated an openness by promptly identifying these problems. However, CPCo has on repeated occasions not reviewed problems to the depth required for full and timely resolution. Examples are:

Rebar omissions (1974)

Tendon sheath location error (1977)

Diesel generator building settlement (1978)

Containment personnel access hatches (1978)

In each of the cases listed above the NRC in its investigation has determined that the problem was of greater significance than first reported or the problem was more generic than identified by CPCo.

This incomplete wringing out of problems identified has been discussed with CPCo on numerous occasions in connection with CPCo's management of the Midland project.

- b. There have been many cases wherein nonconformances have been identified, reviewed and accepted "as is." The extent of review given by the licensee prior to resolving problems is currently in progress. In one case dealing with the repair of airlock hatches, a determination was made that an incomplete engineering review was given the matter.

Inspection History

The construction inspection program for Midland Units 1 and 2 is approximately 60% complete. This is consistent with status of construction of the two units. (Unit 1 - 54%; Unit 2 - 61%). The licensee's QA program has repeatedly been subject to in-depth review by IE inspectors. The following highlight these inspections.

1. July 23-26, and August 8-10, 1973, inspection report Nos. 50-329/73-06 and 50-330/73-06: A detailed review was conducted relative to the implementation of the Consumers Power Company's QA manual and Bechtel Corporation's QA program for design activities at the Bechtel Ann Arbor office. The identified concerns were reported as discrepancies relative to the Part 50, Appendix B, criteria requirements.

2. September 10-11, 1973 report Nos. 50-329/73-08 and 50-330/73-08: A detailed review of the Bechtel Power Corporation QA program for Midland was performed. Noncompliances involving three separate Appendix B criteria with five different examples, were identified.
3. February 6-7, 1974, report Nos. 50-329/74-03 and 50-330/74-03: A followup inspection at the licensee's corporate office, relative to the items identified during the September 1973 inspection (above) along with other followup.
4. June 16-17, 1975, report Nos. 50-329/75-05 and 50-330/75-05: Special inspection conducted at the licensee's corporate office to review the new corporate QA program manual.
5. August 9 through September 9, 1976, report Nos. 50-329/76-08 and 50-330/76-08: Special five-week inspection regarding QA program implementation onsite primarily for rebar installation and other civil engineering work.
6. May 24-27, 1977, report Nos. 50-329/77-05 and 50-330/77-08: Special inspection conducted at the site by RIII, IE AND RI personnel to examine the QA program implementation onsite by Consumers Power Company and by Bechtel Corporation. Although five examples of noncompliance to Appendix B, Criterion V, were identified, the consensus of the inspectors involved was that the program and its implementation for Midland was considered to be adequate.
7. May 8-11, 1979, a mid-construction QA inspection covering purchase control and inspection of received materials design control and site auditing and surveillance activities was conducted by a team of inspectors. While some items will require resolution, it was concluded the program was adequate.

The licensee's Quality Assurance program has undergone a number of revisions to strengthen it's provisions. The company has expanded it's QA/QC auditing and surveillance coverage to provide extensive overview inspection coverage. This was done in 1975 with a commitment early in their experience with rebar installation problems and was further committed by the licensee in his letter of June 18, 1976, responding to report Nos. 50-329/76-04 and 50-330/76-04. This overview inspection activity by the licensee has been a positive supplement to the constructor's own program, however, currently our inspectors perceive the overview activities cover a small percentage of the work in some disciplines. This has been brought to the licensee's attention who has responded with a revised overview plan. RIII inspectors are reviewing the plan as well as determining it's effectiveness through observation of construction work. A specific area brought to the attention of the licensee was the lack of overview in the instrumentation installation area. The licensee has responded to this matter with increased staff and this item is under review by RIII inspectors.

The RIII office of inspection and enforcement instituted an augmented onsite inspection coverage program during 1974, this program has continued in effect until the installation of the resident inspector in July 1978.

Enforcement History

a. Noncompliance Statistics

Year	Number of Noncompliances	Number of Inspections	Inspector Hours Onsite
1976	14	9	646
1977	5	12	648
1978	18	23	1180
*1979 to date	7	18	429

A resident inspector was assigned to the Midland site in July 1978. The onsite inspection hours shown above does not include his inspection time.

*Through August 1979

- b. An investigation of the current soils placement/diesel generator building settlement problem has revealed the existence of a material false statement. Issuance of a Civil Penalty is currently being contemplated.

Summary and Conclusions

Since the start of construction Midland has experienced some significant problems resulting in enforcement action. These actions are related (1) to improper placement, sampling and testing of concrete and failure of QA/QC to act on identified deficiencies in September 1970; (2) to drawing control and lack of or inadequate procedures for control of design and procurement activities at the Bechtel Engineering offices in September 1973; (3) to inadequate training, procedures and inspection of cadweld activities in November 1973; (4) to a series of RIII in-depth QA inspections and meetings which identified underlying causes of weakness in the Midland QA program implementation relative to embedments in April, May and June 1976. (The noncompliance items identified involved inadequate quality inspection, corrective action, procedures and documentation, all primarily concerned with installation of reinforcement steel); (5) to tendon sheath omissions in April 1977; and (6) to plant soil foundations and excessive settlement of the Diesel Generator Building relative to inadequate compacted soil and inspection activities in August 1978 through 1979.

Following each of these problem periods, the licensee has taken action to correct the problems and to upgrade his QA program and QA/QC staff. The most prominent action has been an overview program which has been steadily expanded to cover safety related activities.

The evaluation both by the licensee and IE of the structures and equipment affected by these problems (again except the last) has established that they fully meet design requirements.

- Looking at the underlying causes of these problems two common threads emerge: (1) utilities historically have tended to over rely on A-E's (in this case, Bechtel) and (2) insensitivity on the part of both Bechtel and Consumers Power to recognize the significance of isolated events or failure to adequately evaluate possible generic application of these events either of which would have led to early identification and avoidance of the problem.

Admittedly construction deficiencies have occurred which should have been identified earlier but the licensee's QA program has ultimately identified and subsequently, corrected or in process of correcting these deficiencies.

The RIII inspectors believe that continuation of (1) resident site coverage, (2) the licensee overview program, (3) the licensee's attention and resolution of identified problems in this report, (4) ceasing to permit work to continue when quality related problems are identified with construction activities and (5) a continuing inspection program by regional inspectors will provide adequate assurance that construction will be performed in accordance with requirements and that any significant errors and deficiencies will be identified and corrected.

Concurrence:

Knop <i>[Signature]</i>	Hayes <i>[Signature]</i>	Danielson <i>[Signature]</i>	<i>[Signature]</i>	Maxwell <i>[Signature]</i>
Hansen <i>[Signature]</i>	Barrett <i>[Signature]</i>	Cook <i>[Signature]</i>	Vandel <i>[Signature]</i>	Jablonski <i>[Signature]</i>
Lee #2 <i>[Signature]</i>	Ward <i>[Signature]</i>	Yin <i>[Signature]</i>	Gallagher <i>[Signature]</i>	Fiorelli <i>[Signature]</i>



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

MAR 15 1979

Docket No. 50-329
Docket No. 50-330

Consumers Power Company
ATTN: Mr. Stephen H. Howell
Vice President
1945 West Parnall Road
Jackson, MI 49201

Gentlemen:

This refers to the meetings conducted on February 23, 1979, and March 5, 1979, between Consumers Power Company, Bechtel Corporation and NRC representatives held at the Region III office. Listing of attendees to the meetings are enclosed as Attachment No. 4. The meetings, conducted in connection with the investigation of the settlement of the Midland diesel generator building and plant area fill, represent a continuation of that effort.

A separate report of the investigation conducted during December 11-13, 18-20, 1978, and January 4-5, 9-11, 22-25, 1979, by Messrs. E. J. Gallagher, G. A. Phillip and G. F. Maxwell of this office will be issued in the near future.

During the meeting of February 23, 1979, the NRC summarized their preliminary investigation findings. These summary findings are provided in Attachment No. 1. That meeting was subsequently followed by a second meeting held on March 5, 1979, during which Consumers Power Company representatives responded to the preliminary investigation findings identified in Attachment No. 1. Those responses, which include a revised "Consumers Power Company Discussion of NRC Inspection Facts" report, are provided in Attachments No. 2 and No. 3.

Based on our investigation, review of your responses, as well as discussions during the March 5, 1979, meeting, our findings are as follows:

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MAR 15 1979

Consumers Power
Company

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- a. The quality assurance program for obtaining proper soil compaction of the Midland Site was deficient in a number of areas.
- b. Soil of the type used in the foundation of the diesel generator building is also located, to varying degrees, under other Class I structures and plant area piping.
- c. Several inaccurate statements are contained in the FSAR with respect to the soil foundations.

In addition to the above findings, we continue to be concerned with the following matters:

- a. Although you have stated that inadequate soil compaction contributed to the settlement of the D/G building, you have not determined what other factors contributed to the settlement.
- b. Because similar foundation materials were placed under other Class I structures, identified on page 3 of Attachment No. 3, we have concerns regarding the ability of the structures and components to fulfill their intended design functions under all required design bases for the life of the plant.
- c. We are concerned whether your current course of action on the settlement, which consists of preloading and consolidating the underlying supporting materials, will resolve the problem on a long term basis.

As you are aware, the March 5, 1979, meeting was concluded with your informing us that within two weeks you would provide additional soils exploratory information that might account for the differences between the fill supporting the diesel generator building and that of the other Class I structures. You also stated that in the event the available information is insufficient to demonstrate resolution of the settlement problem, a further course of action would be provided.

In that this matter is related to plant design, we are forwarding it to our NRC Headquarters staff for further review and evaluation. We will keep you informed of their action in this matter.


Consumers Power
Company

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MAR 15 1979

Based on a March 9, 1979, telephone conversation with a member of your staff who informed us that the report contains no proprietary information, this report will be placed in the NRC's Public Document Room.

Sincerely,


James G. Keppler
Director

Attachments:

1. NRC Presentation of Investigation Findings of the settlement of the Diesel Generator Building and Plant Area Fill dtd 2/23/79
2. Consumers Power Company Discussion of NRC Inspection Facts Resulting from the NRC Investigation of the Diesel Generator Building Settlement (revised 3/9/79)
3. Consumers Power Company Response to NRC Question on the Condition of Soils Under All Other Plant Areas dtd 3/5/79
4. Attendance List at 2/23/79 and 3/5/79 Meetings

cc w/attachments:

Central Files

Reproduction Unit NRC 20b

PDR

Local PDR

NSIC

TIC

Ronald Callen, Michigan Public
Service Commission

Dr. Wayne E. North

Myron M. Cherry, Chicago



Attachment 5

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

March 12, 1979

MEMORANDUM FOR: H. D. Thornburg, Director, Division of Reactor
Construction Inspection
Office of Inspection and Enforcement

FROM: James G. Keppler, Director

SUBJECT: MIDLAND DIESEL GENERATOR BUILDING AND PLANT AREA
FILL

Meetings on this subject were held on February 23, 1979 and March 5, 1979, between Consumers Power Company, Bechtel Corporation and NRC. These meetings were a continuation of the investigation conducted by our inspectors during December 11-13, 18-20, 1978 and January 4-5, 9-11, 22-25, 1979.

During the February 23, 1979 meeting we presented to Consumers Power Company our preliminary investigation findings, a copy of which was previously forwarded to you.

During the March 5, 1979 meeting Consumers Power Company provided their responses to those findings, copies of which are enclosed.

Our summary findings with regard to this matter are as follows:

1. The quality assurance program for obtaining proper soil compaction of the Midland site was deficient in a number of areas.
2. Soil of the type used in the foundation of the diesel generator building is also located, to varying degrees, under other Class I structures. Whereas excessive settlement has been observed with the diesel generator building, the settlement of other Class I structures has not exceeded predicted values.
3. Several incorrect statements are contained in the FSAR with respect to the soil foundation.

In addition to these findings, we have compiled a list of technical questions which bear on the resolution of this problem. These are enclosed for your use in working with NRR.

DUPE OF

8104/60341

March 12, 1979

As previously discussed with you, one of our concerns is related to why construction activities at the Midland site, which could be affected by a Class I structure settlement should be continued while the total cause of the diesel generator settlement has not yet been determined. During the meeting on March 5, 1979, this question was posed to the licensee. Their response was that continuing scheduled construction work would not compromise the committed evaluations or remedial actions nor make irrevocable any conditions which do not fully satisfy FSAR or licensing requirements. Based on this, they are willing to accept the risk of continued construction.

In that we have questioned the licensee's intent to continue construction, we consider that the matter also warrants examination by HQ. This examination we feel also involves NRR for the following reasons:

1. If one assumes the foundation settlement placement was in accordance with design, then the matter of design adequacy becomes questionable.
2. If one assumes foundation placement did not meet design specification, one must question acceptability of the soils condition under the affected structures. It should be pointed out again, that the type of soils placed under the diesel generator building were also the type placed under other Class I structures and associated pipes and utility lines.
3. In light of items a and b above, the matter of seismic design also becomes one of concern.
4. Because of the licensee's total evaluation of the specific cause for the diesel generator and plant area fill settlement is not yet complete, the question of FSAR design review and its acceptability may warrant further attention by NRR.

As an alternate approach to the issue, consideration should be given to an NRC Directive or Show Cause Order which could expedite the licensee's confirmation to the NRC that continued construction will not compromise the design function of the involved structures for the life-time of the plant. It may also expedite the licensee's investigation into the basic cause of the diesel generator settlement and its relationship (or absence) to other Class I structures.

H. D. Thornburg

- 3 -

March 12, 1979

We will continue to followup on this matter and keep you informed of new information.

for *Gen W. Roy*
James G. Keppler
Director

Enclosures:

As stated

MIDLAND QUESTIONS

1. The licensee has stated that the fill has settled under its own weight. What assurance is provided that the fill has not settled locally under:
 - a. Structures with rigid mat foundations as portions of the auxiliary building or service water pump structure.
 - b. Class I piping in the fill resulting in lack of continuous support causing additional stress not accounted for in design.
2. How has the lack of compaction and the increase in soil compressibility affected the seismic response spectra used in design and therefore, the soil-structure interaction during seismic loading?
3. After current preloading material is removed will additional borings be taken to ascertain that the material has been compacted to the original requirements set forth in the PSAR and construction license application?
4. Since the foundation material is variable as described in 50.55(e) interim report number 4, how can long term differential settlement be predicted to assure reliable startup of the D/G in the event of emergency?
5. What tolerance does the D/G manufacturer require on the alignment of the D/G for reliable operation and startup?
6. Preliminary information indicates that the piping in fill under and in the vicinity of the D/G building have gross deformations induced either prior to or during the preload program. What is the extent of the deformation. Is this deformation beyond predicted? If so, what plans are being taken to correct the condition?
7. The borated water storage tanks and diesel fuel oil tanks have not yet been constructed and are to be located in questionable plant fill of varying quality. Why should those Class I structures be constructed prior to assuring the foundation material is capable of supporting such structures for the plant life?

MIDLAND QUESTIONS

8. FSAR Figure 2.5-48 shows estimated ultimate settlements which
- indicate a differential settlement across individual mat foundation and within individual structures. Was this differential accounted for in the original design of the mat foundation and in the design of structural member within the structure. If not, what effect does this differential settlement have on additional stresses induced in the mat or in structure members such as slab-beam-column connections?
9. Based on the information provided in CPCo interim report number 4, it appears that the tests performed on the exploratory borings indicate soil properties that do not meet the original compaction criteria set forth in the PSAR and specification for soils work. What assurance is there that the soil under other Class I structures not accessible to exploratory boring meet the control compaction requirements?