



1) ~~Hickels - by to Contract Folder~~

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DEPARTMENT OF THE ARMY

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

3) J. Kane

27 MAR 1981

REPLY TO  
ATTENTION OF

NCEED-T

SUBJECT: Interagency Agreement No. NRC-03-79-167, Review of the Applicant's Response to Nuclear Regulatory Commission Staff Interrogatories Regarding Midland Nuclear Plant.

U. S. Nuclear Regulatory Commission  
ATTN: Mr. George Lear, Chief  
Hydrologic & Geotechnical Engrs. Branch  
Division of Engineering  
Mail Stop, P-214  
Washington, DC 20555

1. As requested by the staff, we have reviewed the applicant's response to the NRC Interrogatories 1, 2 and 3, and the following are our review comments.

a. Since the applicant has not conducted consolidation tests on samples obtained from the surcharged area of the plant fill (Diesel Generator Building), there are no results available for review for the Interrogatories 1 and 2.

b. The applicant has indicated on page 3 of its response that the live load expected to be transferred to the foundation soil has been conservatively estimated to be 25% of the full design live load. In our opinion, the reduction of the design live load to 25% of its actual value for computation of settlement is not justified. We understand that dead loads of the equipment, piping etc. have been considered as part of the live load. These loads constitute a major part of the live load and are permanent in nature, therefore, no reduction factor should be applied for this part of the live load. A reduction factor may be applicable to the portion of the live loads such as moving loads (cranes, hoists, etc.) and their impacts. The applicant should separate the live loads in two groups (1) live loads which are permanent in nature (2) moving loads or loads that change positions more often and then apply a reduction factor to the moving load portion only. The portion of the live load in (1) should be considered in full in computation of settlements. Further, a reduction to 25% appears to be too high. The applicant should provide justification for such high percentage reduction.

2. In the last sentence on page 3 of the response, the applicant has stated that the live load portion (.8kps in stages V and VI) consists of the approximate full live load of the roof, intermediate floor and grade slab.

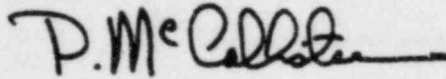
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27 MAR 1981

NCEED-T

SUBJECT: Interagency Agreement No. NRC-03-79-167, Review of the Applicant's Response to Nuclear Regulatory Commission Staff Interrogatories Regarding Midland Nuclear Plant.

It is our understanding the 0.8 kps has been obtained by deducting Stage V load on 16 January 1980 (2.2 kips) from Stage V load on 31 December 1981 (3.0 kips) of Table 4-1A. However, from the heading of Table 4-1A, it is clear that this table pertains to building load only, therefore, loads shown at various stages must be the dead load of the building only. The applicant should clarify this discrepancy.



P. McCALLISTER  
Chief, Engineering Division



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

J Kane

OCT 30 1981

MEMORANDUM FOR: Robert L. Tedesco, Assistant Director  
for Licensing  
Division of Licensing

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

FROM: Darl Hood, Project Manager  
Licensing Branch No. 4  
Division of Licensing

SUBJECT: REVISED HEARING SCHEDULES FOR MIDLAND

Background

On October 16, 1981, and following internal discussions with the Division of Engineering and (by telephone) me, OELD participated in a conference call with Consumer's legal representatives and the Licensing Board to discuss revised schedules for the Midland soils hearing. The instant hearing is directed to the CP level of information needed to determine the adequacy of proposed modifications to structures located on inadequately compacted fill. The revised schedule is requested by Consumers in order to better accommodate their immediate construction schedules (i.e., to address first certain limited remedial activities said to be critical to their construction needs) for which it is perceived that NRC staff concurrence is possible prior to the hearing start.

Problem Alert

The applicant considers the Auxiliary Building to be schedule critical. Because the remedial actions for the Service Water Structure and Auxiliary Building are quite similar (especially for initial preparations), the applicant proposes that the two reviews be combined where possible. The NRC staff agreed to review certain recent submittals made by Consumers and to indicate on October 30, 1981, just what construction activities are likely candidates. Two candidates identified during the discussion are (1) installation of the vertical access shafts for the Auxiliary Building and the Service Water Structure and (2) installation of a freeze wall within the deeper soil layers around the Auxiliary Building to serve as an underground dam during excavation beneath the structures.

It was agreed that the hearing for construction activities for which agreement could be reached on the Auxiliary Building and Service Water Structure would be held December 1 - 4, 1981. Hearing testimony would be filed November 16, 1981.

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It was also agreed that the next hearing session after that would be December 14 - 18, 1981, and would discuss (1) seismic models for the Auxiliary Building and Service Water Structure, (2) the Borated Water Storage Tanks, and (3) possibly the underground piping. Testimony is to be filed November 30, 1981. The hearing on the Diesel Generator Building is deferred to January 5 - 13, 1982, with testimony due December 21, 1981.

No further hearing sessions have been established at this time, but several subjects remain. These include permanent dewatering, structural analysis and crack modeling for all structures on fill. Considering the present technical status, it is quite likely that significant carryover from the December and January hearing sessions will occur.

Under the initial schedule, the hearing session was to be completed on December 18, 1981. Now, completion of the hearing sessions before the end of February 1982 appear unlikely. The OL SER, scheduled for issuance May 6, 1982, may be paced by issuance of the Board's decision.

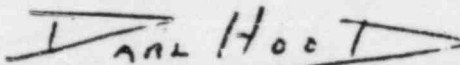
#### Problem

The NRC staff has not opposed the applicant's request to rearrange the hearing topics and schedules to accommodate the immediate construction impact concerns. The problem is that these immediate construction activities are merely preparatory to a larger construction step, namely actual construction of underpinning. At present, it would appear to be highly unlikely, both from a technical review status and from a legal status, that underpinning authorization by the staff can be granted by January 1, 1982, as needed by the applicant. The legal question involves whether staff concurrence can be granted while the matter is still before the Board, and whether underpinning constitutes a "significant hazards" consideration. The applicant's position is that 50.55(e) provides for continued construction and that structural foundations are not covered by principal architectural engineering criteria required by the CP.

If this larger step can not be taken in early 1982 as the applicant wishes, then our present redirection constitutes a "hurry up and wait" situation achieved at the expense of a longer hearing schedule and increased potential of impact to the OL review and SER issuance. The applicant intends to escalate its position that underpinning construction can and must begin January 1, 1982, to staff management.

Action

A realistic assessment of NRC staff limitations and capabilities to achieve and authorize underpinning of structures on January 1, 1982, is needed. The results of the assessment should be used to determine what course of action would lead to minimum delay in issuance of the OL SER.



Darl Hood, Project Manager  
Licensing Branch No. 4  
Division of Licensing

cc: H. Denton  
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Consumers  
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October 19, 1981

Mr Harold R Denton, Director  
Office of Nuclear Reactor Regulation  
US Nuclear Regulatory Commission  
Washington, DC 20555

MIDLAND PROJECT

DOCKET NOS 50-329, 50-330

NRC AUDIT OF SEISMIC AND STRUCTURAL DESIGN CALCULATIONS

FILE 0460.2, B3.0 SERIAL 14315

REFERENCES: (1) ASCHWENCER LETTER TO JWCOOK/LHCURTIS, DATED JULY 7, 1980  
(2) JWCOOK LETTER TO RLTEDESCO, SERIAL 10109, DATED  
NOVEMBER 26, 1980  
(3) DSHOOD NOTICE OF STRUCTURAL DESIGN AUDIT FOR MIDLAND,  
DATED MARCH 16, 1981

ENCLOSURES: (1) TEN-VOLUME SET "NRC STRUCTURAL TECHNICAL AUDIT"  
(2) ERRATA SHEETS FOR VOLUMES 2 AND 3 OF THE NRC AUDIT  
TEAM'S TEN-VOLUME SETS  
(3) FINAL REPORT ON NRC STRUCTURAL AUDIT OPEN ITEMS  
(4) DRAWINGS FOR THE DIESEL GENERATOR BUILDING

In the NRC's July 7, 1980 correspondence, Reference 1, we were advised of the Staff's intention to perform a seismic and structural design analysis audit of major safety-related structures as part of their review of the Midland application for operating licenses. The audit was subsequently held during the week of April 20-24, 1981 in Bechtel's Ann Arbor offices. In preparation for this audit, comprehensive written responses were prepared addressing the Staff's guideline questions forwarded by Reference 1. These guideline questions and our written responses were arranged into several bound ten-volume sets which were used by the NRC's audit team during the audit. At the conclusion of the audit five (5) ten-volume sets of the Midland structural audit questions and responses were presented to members of the NRC's review team to take with them.

As requested we are forwarding five (5) additional ten-volume sets to serve as the NRC's record copies. These complete sets (Enclosure 1) already contain the errata sheets of Enclosure 2 and the additional revisions contained in Enclosure 3. For those NRC audit team members who were provided with bound volume sets, we are forwarding copies of the errata sheets (Enclosure 2) which should be inserted into Volumes 2 and 3 of those 10-volume sets already in their possession. The errata sheets of Enclosure 2 have been reproduced on blue pages, except for the FSAR figures, to identify them as revisions.

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2 pp.

We are also forwarding five copies of Enclosure 3 which is the final report on the structural audit open items. This enclosure contains the listing of open items from the audit and identifies the actions being taken on these NRC concerns. Separate copies of Enclosure 3 are being forwarded directly to NRC audit team members because additional revisions to the bound ten-volume sets are contained in this final report.

During a discussion with the NRC Staff and its consultant, the Naval Surface Weapons Center, held on May 28, 1981, the NRC requested drawings of the diesel generator building to allow preparation of an independent mathematical model of the structure for dynamic analysis. By copy of this correspondence to the Naval Surface Weapons Center, we are forwarding two additional sets of the drawings and information identified in Enclosure 4. One set of Enclosure 4 drawings were previously forwarded directly to the Naval Surface Weapons Center on July 17, 1981. Included for use are the Blueprints C-1001 through C-1009 and A-350 through A-352 which detail the structural features of the diesel generator building. Also included are two sketches showing the mathematical model and locations and weights of major pieces of equipment in this structure.

We believe this completes the outstanding items from the NRC structural design audit. The ten-volume audit sets of Enclosure 1 are now in their final form and no further revisions will be made to this document. The resolution of any remaining more long-term issues which may relate to the NRC structural audit will be documented by FSAR revisions or in separate correspondence to the NRC.

*James W. Cook*

JWC/RLT/dsb

CC RJCook, Midland Resident Inspector, w/o  
 DFJudd, B&W, w/o  
 GHarstead, Harstead Engg Assoc, w/2, 3 -  
 PCHuang, Naval Surface Weapons Center, w/2, 3,4  
 DSHood, NRC, w/2, 3  
~~SEB, NRC, w/o~~  
 FRinaldi, NRC/SEB, w/2,3  
 HSingh, Army Corps of Engineers, w/2, 3

Copy mailed to CPG on 1/25/81  
Has typo corrections required

J. Kane  
Rec'd 1/26/81

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

NRC STAFF'S ANSWERS TO INTERROGATORIES FILED  
BY CONSUMERS POWER COMPANY

Interrogatory 1

Define "acceptance criteria," as that term is used at page 3 of the Order.

Answer

Acceptance criteria are the standards on which a judgement or decision is based. As used in the December 6, 1979 Order on Modification, the standards to be used by the licensee to make its judgment or decision that proposed remedial measures are acceptable was sought by the NRC for its review. This information was required to be submitted by the licensee in order for the NRC to determine whether there was reasonable assurance that the facility, as modified by the proposed remedial measures, can be constructed and operated without undue risk to the health and safety of the public.

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The NRC practice in performing radiological safety reviews is such that the term "acceptance criteria" has a wide meaning and it is this broader meaning that applies as the term is used within the Order. The NRC practice is to use a document entitled "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," NUREG-75/087, for the radiological safety review of applications for licenses of nuclear power plants such as the Midland Plant. Each section of the Standard Review Plan (SRP) is organized into four subsections, and one of these subsections is entitled "Acceptance Criteria". This subsection contains a statement of the purpose of the review and the technical basis for determining the acceptability of the design or the programs within the scope of the area of review of the SRP section. The technical bases consists of specific criteria such as NRC Regulatory Guides, General Design Criteria Codes and Standards, Branch Technical Positions, and other criteria. This subsection is further discussed in the first section of the Standard Review Plan, which is entitled "Introduction".

To illustrate the term "acceptance criteria," refer to SRP Section 2.5.4II, page 2.5.4-3 and Section 2.5.5II, page 2.5.5-1. SRP Section 2.5.4 is entitled "Stability of Subsurface Materials and Foundations," and SRP Section 2.5.5 is entitled "Stability of Slopes." From these examples it is seen that "acceptance criteria" for the pertinent geotechnical review areas would include, for each specific and important engineering feature, a thorough evaluation of the particular engineering aspect based on analyses of basic data that support all conclusions. These analyses and basic support data are required to allow the Staff to conduct independent analyses and reach

independent conclusions on whether reasonable assurance of plant safety exists.

Interrogatory 2

State which "of the Staff's requests were directed [as of or before December 6, 1979] to the determination and justification of acceptance criteria to be applied to various remedial measures taken" (Order at page 3) and which portion of each request was so directed.

Answer

Attached Table 2-1 lists Staff's requests that were directed to the determination and justification of acceptance criteria to be applied to various remedial measures taken and proposed by Consumers. As of December 6, 1979, the only remedial action that had been taken was the placement of the sand surcharge inside and around the Diesel Generator Building, which had reached the maximum height of 20 feet above final plant grade on April 7, 1979<sup>1/</sup> and which had been removed by August 31, 1979.<sup>2/</sup> The requests in Table 2-1 relevant to the remedial action for the Diesel Generator were Requests number 4, 5, 8, 12, 13, 14, 18, 19, 20, 21(c), 25, 26, 27, 28, 30, and 35.

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1/ S. Howell letter of April 30 1979 to J. Keppler, forwarding MCAR 24 Interim Report 5.

2/ S. Howell letter of November 2, 1979 to J. Keppler, forwarding MCAR 24 Interim Report 8.

In addition to the requests listed in Table 2-1, the Staff had previously submitted other requests to Consumers directed to the determination and justification of acceptance criteria to be applied to various remedial measures taken and proposed by Consumers. These requests are identified in Appendix A hereto. Seismic issues to be resolved are discussed in the answer to Interrogatory 11.

TABLE 2-1

<u>Staff's 5G.54(f) Request No.</u>	<u>Signatory/Date of Request Letter</u>	<u>Applicable Portion of Request</u>
4	H. Denton, 3/21/79	A11
5	"	A11
6	"	A11
8	"	First and third sentences
9	"	A11
10	"	A11
11	"	A11
12	"	A11
13	"	A11
14	"	A11
15	"	A11
16	"	A11
17	"	Third and fourth sentences
18	"	A11
19	"	Second and third sentences

<u>Staff's 50.54(f) Request No.</u>	<u>Signatory/Date of Request Letter</u>	<u>Applicable Portion<sup>1/</sup> of Request</u>
20	"	A11
21	"	Subparagraph (c)
24	L.S. Rubenstein, 11/19/79	A11
25	"	A11
26	"	A11
27	"	A11
28	"	A11
29	"	A11
30	"	A11
31	"	A11
34	"	A11
35	"	A11

NOTES:

<sup>1/</sup> Portion of Staff's request directed to the determination and justification of acceptance criteria to be applied to various remedial measures taken or proposed.

APPENDIX A

NRC REQUESTS PRIOR TO DECEMBER 6, 1979 OTHER THAN 50.54(f) REQUESTS

<u>Staff Request</u>	<u>Signatory/ Date of Request Letter</u>	<u>Applicable Portion<sup>1/</sup> of Request</u>
130.21	S. Varga, 12/11/78	A11
362.12	"	First sentence
362.13	"	All but last sentence

<u>Staff Request</u>	<u>Signatory/ Date of Request Letter</u>	<u>Applicable Portion<sup>1/</sup> of Request</u>
40.106	S. Varga, 1/18/79	All
130.23	"	All, with respect to Category I structures other than Containment.
130.24	"	All, with respect to Category I structures other than Containment.
362.14	"	All
362.15	"	All
362.16	"	All
362.17	"	All

NOTES:

1/ Portion of Staff's request directed to the determination and justification of acceptance criteria to be applied to various remedial measures taken and proposed.

Interrogatory 3

State and explain the reasons why "such [acceptance criteria], coupled with the details of the remedial action, are necessary for the Staff to evaluate the technical adequacy and proper implementation of the proposed action." (Order at page 3.)

Answer

Technical adequacy and proper implementation are two of the principal ingredients necessary to the Staff conclusion regarding reasonable assurance as to whether the facility as proposed to be modified can be constructed and

operated without undue risk to the health and safety of the public. The licensee's criteria, as defined in response to Interrogatory 1, and the specific details of the remedial action constitute the basis of review from which such conclusions by the Staff are derived.

Interrogatory 4

State and explain the basis for the statement, at page 3 of the Order, that "the information provided by the licensee fails to provide such criteria." (Acceptance criteria.) (Order at page 3.)

Answer

The reply to Interrogatory 6(d) identifies which of the licensee's responses the Staff found to be inadequate as of December 6, 1979, and the response to Interrogatory 6(f) explains why. The responses were inadequate, in part, because they did not provide the acceptance criteria, as defined in the response to Interrogatory 1, which the Staff requires for its radiological safety review. Consider, for example, 50.54(f) Request 4 which on March 21, 1979 in part asked (1) what criteria the licensee would use to judge the acceptability of fill, structures, and utilities upon conclusion of the preload program, (2) what extent of residual settlement would be permitted, and (3) the basis for the limit. The licensee's most recent reply prior to December 6, 1979 (Revision 3 to Amendment 72 dated September 13, 1979) stated that the criteria and the extent to which residual settlements would

be permitted would be provided by December 1979.<sup>3/</sup> Therefore, the licensee's reply did not include acceptance criteria and the Staff considered the response to be inadequate and the matter remains unresolved. For further examples, refer to the response to Interrogatory 6(f).

Interrogatory 5

State with particularity each item of information the Staff requested up and until December 6, 1979 with regard to acceptance criteria.

Answer

The items of information the Staff requested up and until December 6, 1979 with regard to acceptance criteria are given in the reply to Interrogatory 2.

Interrogatory 6

With regard to each item of information identified in response to Interrogatory 5, state: (a) the identity of the request; (b) whether Consumers responded to that request; (c) the identity of the communication that the Staff considered Consumers response to the request; (d) whether the Staff considered the response adequate; (e) the identity of the communication by which the Staff communicated its position as to the adequacy or inadequacy of the response; (f) the basis for the Staff's position regarding

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<sup>3/</sup> The licensee's response was ultimately submitted February 28, 1980 by Amendment 74; or about 10 months after the full surcharge for the Diesel Generator Building had been placed and 6 months after the surcharge had been completely removed.

adequacy or inadequacy of Consumers response; and (g) the Staff personnel responsible for determining whether Consumers' response was adequate or inadequate.

Answer

With regard to each item of information identified in response to Interrogatory 5 (which in turn refers to the answer to Interrogatory 2), Table 6-1 responds to parts (a), (b), (c), (d), (e) and (g) of Interrogatory 6. Answers to parts (e) and (f) of Interrogatory 6 follow.

For those requests shown in Table 6-1 to be issued before December 6, 1979, but for which replies were initially made after December 6, 1979, refer to the answer to Interrogatory 8.

Similar information for requests identified in Appendix A is provided by Appendix B.

Regarding part (e) of Interrogatory 6, the means by which the Staff communicated its position as to the inadequacy of the licensee's response was primarily by the issuance of additional questions on the same subject. These followup requests are listed in Table 6-1. For example, 50.54(f) Request 35 specifically indicated the response to previous Request 5 was unacceptable. It is not Staff practice to indicate acceptable responses to licensees, except by separate request on a case-by-case basis. Such indication of acceptance is typically left for issuance of the Staff's safety evaluation report for those responses which are of significance to that report.



The basis for the Staff position of inadequacy shown by part (f) of Interrogatory 6 is that the licensee's response failed to meet the Staff's acceptance criteria as defined in response to Interrogatory 1. Specific reasons for failing are given below, and typically include not being fully responsive to the Staff's requests or insufficient submittal of basic data to support the conclusions or positions submitted by the licensee.

Consumer's responses to 50.54(f) Requests 4, 5, 6, 12 and 21(c) were inadequate because of missing information or data or the responses raised additional questions. The portions of these requests which were inadequate are identified by the followup requests listed under Column 6(e) of Table 6-1.

The response to 50.54(f) Request 13 is inadequate because Consumers has not completed its analysis of the Category I structures affected by the settlement factoring in the effects of settlement (ie., cracks, modeling changes, and material properties changes). Consumers acknowledges the continuing nature of their studies in their answer to Request 13.

The response to 50.54(f) Request 14 is inadequate because Consumers has not completed its analysis of the Category I structures affected by the settlement, factoring in the effects of the settlement (ie. cracks, modeling changes, material properties changes). Consumers has provided some information on the cracks present in most Category I structures, but has not determined the related load and the related changes to analytical models and material properties. In addition Consumers has not determined if the cracks will continue to propagate.

The response to 50.54(f) Request 15 is inadequate because Consumers has not acknowledged the fact that differential settlement as used in the load

Combinations is not a self-limiting effect. In addition we have not accepted the proposed fixes.

The response to 50.54(f) Request 16, although responsive, is of a nature that additional work by Consumers is required for an acceptable reply.

50.54(f) Request 17 asked how code-allowable conditions of underground Category I piping will be assured throughout plant life. The reply contained no commitment to use the 3.0Sc limit of part NC-3652.3 of Section III of the ASME Code, Division I. However, the response, in Table 17-2, did indicate that the Code calculations were used. The response provided a comparison of the ASME Code limit to the calculated pipe stresses resulting from settlement. From the response, it was not clear whether this response to the Code was for illustrative purposes only, or whether it was intended to represent Consumer's criteria. The reply provided no acceptance criteria for inclusion of future settlement of buried piping over the life of the plant. Also, no criteria was provided for cases where the allowable stresses were exceeded.

50.54(f) Request 18 asked for an identification and description of evaluations of seismic Category I piping to assure that it could withstand increased differential settlement between buildings, within the same building, or within the piping systems itself without exceeding code-allowable stress criteria. Request 18 also asked for the licensee's plans to assure compliance with code allowable stress criteria throughout the life of the plant. The response for seismic Category I piping between structures makes

a general reference to applicable codes, but provides no indication as to which codes or as to what specific acceptance criteria the piping is to meet. Therefore, more specific criteria as to the stress limits to be used are required.

50.54(f) Request 20 asked for acceptance criteria required to define acceptable loads or components and supports produced by pipe deformations due to settlement. The reply defined no acceptance criteria, but only stated that the loads on components were within the allowables. The reply provides no acceptance criteria as to when flanged joints will be disassembled and the methods for determining nozzle loads. Acceptance criteria for the allowable differential settlement for the 2-inch and smaller diesel generator fuel oil lines was not addressed.

As noted in Appendix B, the response to Staff Request 40.106 was considered to be inadequate. The response was in conflict with the response to Request 20. Specifically, the response to Request 20 indicated that a stress analysis for the diesel generator fuel oil lines was unnecessary because of the inherent flexibility of small piping (1 1/2" to 2" diameter); whereas the response to Request 40.106 indicates an extensive program for monitoring and analysis of this same piping would be performed. Consumers position needs to be clarified.

For reasons indicated by followup Requests 25 and 26, the response to Request 130.21 as noted in Appendix B was inadequate. Consumers did not complete the answer to this question to our satisfaction. Consumer's response referred to other 10 CFR 50.54 requests and responses. The evaluations of Category I structures have not been performed to our satisfaction.

The applicant has not justified in full the proposed fixes and has not provided a detailed evaluation of its analysis and design.

The response to Request 130.23 as noted in Appendix B was inadequate because the current criteria requires the use of ACI 349 as supplemented by Regulatory Guide 1.142. In addition the effects of the settlement (i.e., cracks, change in modeling, change in material properties) need to be factored in the analysis and design of these Category I structures. Furthermore, the answer addressed only the internal structures to the containment building and the auxiliary building but deferred any consideration for other Category I structures.

The response to Request 130.24 as noted in Appendix B was inadequate because Consumers did not complete its evaluation of all Category I structures for the effect of the use of Regulatory Guides 1.60 and 1.61 in place of its proposed seismic response spectra and related damping values. The effect of settlement should be factored into Consumer's reevaluation.

Certain Consumer's responses were indicated to be inadequate. Consumer's responses to Requests 362.13, 362.14 and 362.16 were inadequate because the Staff concern raised in these "21" questions were not to be fully resolved until Consumers complete field and laboratory work. Ultimately these issues have been pursued by the Staff in subsequent 50.54(f) requests as identified in Appendix B.

The portions of the response to Request 362.17 which deal with predicted settlement are similar to the above in that field work had to be completed before the issue could be resolved. The portion of the response pertaining to induced vertical stresses versus depth was unresponsive in providing needed specific data and results.

TABLE 6-1

Identity of 50.54 (f) Request	Whether Consumer Responded as of 12/6/79	Response Identification as of 12/6/79	Staff's Consideration of Response Adequacy as of 12/6/79	Follow-up Requests	Responsible Staff Personnel
6 (a)	6 (b)	6 (c)	6 (d)	6 (e)	6 (g)
4	Yes	Rev. 3, 9/13/79, Responses to NRC Requests Regarding Plant Fill	Inadequate	27, 40	L. Heller & D. Gillen
5	Yes	Rev. 0, 4/24/79, Responses to NRC Requests Regarding Plant Fill	Inadequate	35, 37	L. Heller & D. Gillen
6	Yes	Rev. 3, 9/13/79, Responses to NRC Requests Regarding Plant Fill	Inadequate	31, 33, 43	L. Heller & D. Gillen
8	Yes	Rev. 0, 4/24/79 Responses to NRC Requests Regarding Plant Fill	Adequate		H. Balujian L. Heller D. Gillen
9	Yes	Rev. 0, 4/24/79, Responses to NRC Requests Regarding Plant Fill	Response referred to Question 12	Refer to Request ]2	L. Heller & D. Gillen
10	Yes	Rev. 0, 4/24/79 Responses to NRC Requests Regarding Plant Fill	Response referred to Question 12	Refer to Request ]2	L. Heller & D. Gillen
11	Yes	Rev. 0, 4/24/79 Responses to NRC Requests Regarding Plant Fill	Adequate		L. Heller & D. Gillen

TABLE 6-1

Identity of 50.54 (f) Request	Whether Consumer Responded as of 12/6/79	Response Identification as of 12/6/79	Staff's Consideration of Response Adequacy as of 12/6/79	Follow-up Requests	Responsible Staff Personnel	
6 (a)	6 (b)	6 (c)	6 (d)	6 (e)	6 (g)	
12	Yes	Rev. 3, 9/13/79, Responses to NRC Requests Regarding Plant Fill	Inadequate	38,39,41,42,43, 44,45,46,47,48	L. Heller & D. Gillen	
13	Yes	Rev. 1, 5/31/79 Responses to NRC Requests Regarding Plant Fill	Inadequate	25,48	R. Lipinski F. Rinaldi F. Schauer	
-15-	14	Yes	Rev. 3, 9/13/79 Responses to NRC Requests Regarding Plant Fill	Inadequate	25, 28, 29	R. Lipinski F. Rinaldi F. Schauer
15	Yes	Rev. 3, 9/13/79 Responses to NRC Requests Regarding Plant Fill	Inadequate	25, 26	R. Lipinski F. Rinaldi F. Schauer	
16	Yes	Rev. 0, 4/24/79 Responses to NRC Requests Regarding Plant Fill	Responsive but additional work by Consumers required to resolve	34	L. Heller & D. Gillen	
17	Yes	Rev. 2, 7/9/79, Responses to NRC Requests Regarding Plant Fill	Inadequate	45 <u>1/</u>	R. Stephens A. Cappucci	
18	Yes	Rev. 0, 4/24/79, Responses to NRC Requests Regarding Plant Fill	Inadequate	<u>1/</u>	R. Stephens A. Cappucci	

TABLE 6-1

Identity of 50.54 (f) Request	Whether Consumer Responded as of 12/6/79	Response Identification as of 12/6/79	Staff's Consideration of Response Adequacy as of 12/6, 79	Follow-up Requests	Responsible Staff Personnel
6 (a)	6 (b)	6 (c)	6 (d)	6 (e)	6 (g)
19	Yes	Rev. 0, 4/24/79, Responses to NRC Requests Regarding Plant Fill	Not determined (and presently under review)	<u>1/</u>	R. Stephens A. Cappucci
20	Yes	Rev. 2, 7/9/79, Responses to NRC Requests Regarding Plant Fill	Inadequate (and presently under review)	<u>1/</u>	R. Stephens A. Cappucci
21(c)	Yes	Rev. 0, 4/24/79, Responses to NRC Requests Regarding Plant Fill	Responsive but Inadequate	35,37,40	L. Heller J. Kane D. Gillen
24 through 31	No (after 12/6/79)				
34,35	No (after 12/6/79)				

## Notes:

1/ See Enclosure 3 to "Summary of January 16, 1980 Meeting on Supplemental Requests Regarding Plant Fill," dated February 4, 1980.

APPENDIX B

Identity of Request	Whether Consumer Responded as of 12/6/79	Communication Identification as of 12/6/79	Staff's Consideration of Response Adequacy as of 12/6/79	Follow-up Request	Responsible Staff Personnel
6 (a)	6 (b)	6 (c)	6 (d)	6 (e)	6 (g)
362.12	Yes	FSAR Rev. 24, 9/79, Responses to NRC Questions	Adequate		L. Heller D. Gillen
362.13	Yes	FSAR Rev. 20, 4/79, Responses to NRC Questions	Inadequate	4,5,7,9,12,13,14	L. Heller D. Gillen
362.14	Postponed	FSAR Rev. 24, 9/79, Responses to NRC Questions	Inadequate. Response postponed to future date.	9,10,12,15	L. Heller D. Gillen
362.15	Yes	FSAR Rev. 24, 9/79, Responses to NRC Questions	Adequate		L. Heller D. Gillen
362.16	Yes	FSAR Responses to NRC Questions	Responsive but submittal of needed revised settlement analysis postponed to future	4,12	L. Heller D. Gillen
362.17	Yes	FSAR Rev. 24, 9/79,	Inadequate	4,8,14	L. Heller D. Gillen
130.21	Yes	FSAR Rev. 24, 9/79, Responses to NRC Questions	Inadequate	25,26	R. Lipinski F. Rinaldi F. Schauer



## APPENDIX B

- 2 -

Identity of Request	Whether Consumer Responded as of 12/6/79	Communication Identification as of 12/6/79	Staff's Consideration of Response Adequacy as of 12/6/79	Follow-up Request	Responsible Staff Personnel
6 (a)	6 (b)	6 (c)	6 (d)	6 (e)	6 (g)
(?) 130.23	Yes	FSAR Rev. 24, 9/79, Responses to NRC Questions	Inadequate	25,26	R. Lipinski ? F. Rinaldi F. Schauer
(?) 130.24	Yes	FSAR Rev. 24, 9/79, Responses to NRC Questions	Inadequate	25,26	R. Lipinski ? F. Rinaldi F. Schauer
40.106	Yes	FSAR Rev. 24, 9/79 Responses to NRC Questions	Inadequate (clarification required)	20	H. Balujian R. Stephens A. Cappucci

Interrogatory 7

State with particularity each item of information the Staff requested after December 6, 1979 with regard to acceptance criteria.

Answer

This answer is provided by Table 7-1 attached.

TABLE 7-1

<u>Staff's Request No.</u>	<u>Signatory/Date of Request Communication</u>	<u>Applicable Portion of Request</u>
36, 37, 38	A. Schwencer, June 30, 1980	A11
39 through 48	A. Schwencer, August 4, 1980	A11
49 through 53	R. Tedesco, August 27, 1980	A11
Enclosure 3 to "Summary of January 16, 1980 Meeting on Supplemental Requests Regarding Plant Fill", 2/4/80	Darl S. Hood, February 4, 1980	Items 1-8
NRC Staff Interroga- tories to Consumers Power Company, November 26, 1980	W. D. Paton November 26, 1980	Interrogatories 1-9
NRC Staff Interroga- tories to Consumers Power Company, January 2, 1981	W. D. Paton January 2, 1981	Interrogatories 1,10,11,15 and 16

Interrogatory 8

With regard to each item of information identified in response to Interrogatory 7, state: (a) the identity of the request; (b) whether Consumers responded to that request; (c) the identity of the communication that the Staff considered Consumers response to the request; (d) whether the Staff considered the response adequate; (e) the identity of the communication by which the Staff communicated its position as to the adequacy or inadequacy of the response; (f) the basis for the Staff's position regarding adequacy or inadequacy of Consumers response; and (g) the Staff personnel responsible for determining whether Consumers' response was adequate or inadequate.

Answer

This answer is provided in Table 8-1. Additionally, Table 8-1 includes items of information the Staff requested before December 6, 1979 with regard to acceptance criteria, but for which the initial reply by Consumers had not been submitted as of December 6, 1979.

Regarding part (f) of Interrogatory 8, it is not Staff practice to indicate acceptable responses to licensees, except by separate request considered by the Staff on a case-by-case basis. Such indication of acceptance is the function of the Staff's safety evaluation report for those responses which are of significance to that report. The means most frequently used by the Staff to communicate its position regarding inadequate responses during the course of the safety review is by issuance of additional questions on the same subject. Such followup requests are listed in Table 8-1.

Parts (d) and (g) of 50.54(f) Request 24 involved review by both geotechnical and hydrologic engineering disciplines. The parts of Response 24 indicated to be inadequate were the subject of followup requests or an NRC interrogatory to Consumers identified in column 8(e) of Table 8-1. These followup matters provide the basis for the conclusion regarding inadequacy by the Staff.

The response to 50.54(f) Request 25 is responsive to our request but is not complete. Consumers does not address the effects of the cracks on the load combinations, the rationale to the proposed fixes for Category I structures, the modeling to be used in the analyses, the justification for material properties used in the analyses and design and a comparison of the results with suitable acceptance criteria.

The response to 50.54(f) Response 26 is inadequate because Consumers has not considered the effects of settlement in its analysis of the Category I structures. Consumers states that the effects of differential settlement on Category I structures utilizing corrective measures are negligible while they propose further investigations for the Diesel Generator Building. We feel that the effects of differential settlement (i.e., cracks, modeling changes, material properties changes) needs to be considered for all Category I structures founded fully or partially on the fill material.

The response to 50.54(f) Response 28 is inadequate because Consumers does not address the concerns identified in our followup requests 25,28 and 29. Consumers provides additional information on crack mapping but does not address analytical considerations.

The response to 50.54(f) Response 29 is inadequate because the effects of the cracks have not been satisfactorily included in the analysis. However, Consumers attempted to identify the cracks in these inaccessible areas. The Staff feels that the effect of the structural cracks in the Category I structures should be considered in the re-analysis of these structures.

The response to 50.54(f) Response 30 will be adequate if Consumers classifies the duct banks as Category I structures with no requirement for maintaining a pressure boundary for the cables within those ducts.

The response to Request 31 was considered to be inadequate for the reasons identified by followup Request 43.

With regard to the response to 50.54(f) Request 34, the buckling stresses due to earth loads, vehicular and railroad traffic, are based on uniform soil properties. From the pipe profiles, it is apparent that this is not the case.

The responses to 50.54(f) Requests 35 and 37 are inadequate for the reasons stated in A. Schwencer's letter of June 30, 1980 and in "Summary of Appeals Meeting of August 29, 1980 Regarding Additional Explorations and Testing of Midland Plant Fill," February 10, 1981.

Items 1 through 8 on an enclosure to a summary of a 1/16/81 meeting are responded to by Consumers answers to Requests 17 and 34. In regard to the response to Request 17, the criteria does not consider the buckling or crippling stresses due to high bending stresses in the large diameter thin wall piping. Also, there was not sufficient information as to the total piping involved, the proximity of the non-profiled to the profiled piping,

the percentage of piping profiled or soil characteristics in the area of concern. Due to the changes in slope of some of the profiled piping, it would appear that soil characteristics vary.

Again with regard to 50.54(f) Request 17, the rate of change of slope or the radius of curvature determines the bending stress more than the overall deflection. This request was made on that basis. If a satisfactory allowable stress and strain criteria is presented with an acceptable stress analysis, the criteria for the change in piping curvature would not be required. The response to Request 34 was previously discussed.

TABLE 8-1

Identity of Request	Whether Consumers Responded after 12/6/79	Response Identification Reviewed by Staff	Staff's Consideration of Response Adequacy as of 2/24/81	Follow-up Requests or Communications	Responsible Staff Personnel
8(a)	8(b)	8(c)	8(d)	8(e)	8(g)
24(a)	Yes	Rev. 6, 4/80 Rev. 6, 4/80 Responses to NRC Requests Regarding Plant Fill	Inadequate	47,48,49, 52	R. Gonzales R. Lipinski
24(b)	Yes	Responses to NRC Requests Regarding Plant Fill	Inadequate	42,47,48, 49,50,51, 52,53, NRC Interrogatories 16 to Consumers dated 1/2/81	R. Gonzales Corps of Engr.
24(c)	Yes	Rev. 6, 4/80 Responses to NRC Requests Regarding Plant Fill	Inadequate	47,49	R. Gonzales
24(d)	Yes	Rev. 6, 4/80 Responses to NRC Requests Regarding Plant Fill	Adequate		R. Gonzales



Table 8-1

Identity of Request	Whether Consumers Responded after 12/6/79	Response Identification Reviewed by Staff	Staff's Consideration of Response Adequacy as of 2/24/81	Follow-up Requests or Communications	Responsible Staff Personnel
8(a)	8(b)	8(c)	8(d)	8(e)	8(g)
24(d)	Yes	Rev. 5, 2/80 Responses to NRC Requests Regarding Plant Fill	Adequate		Corps of Engr.; J. Kane
24(e)	Yes	Rev. 6, 4/80, Responses to NRC Requests Regarding Plant Fill	Adequate		R. Gonzales
24(f)	Yes	Rev. 6, 4/80, Responses to NRC Requests Regarding Plant Fill	Adequate		R. Gonzales
24(g)	Yes	Rev. 6, 4/80, Responses to NRC Requests Regarding Plant Fill	Adequate	36,42,47	R. Gonzales
24(g)	Yes	Rev. 5, 2/80, Responses to NRC Requests Regarding Plant Fill	Inadequate	36,47	Corps of Engr; J. Kane
24(h)	Yes	Rev. 6, 4/80, Responses to NRC Requests Regarding Plant Fill	Adequate		R. Gonzales

Table 8-1

Identity of Request	Whether Consumers Responded after 12/6/79	Response Identification Reviewed by Staff	Staff's Consideration of Response Adequacy as of 2/24/81	Follow-up Requests or Communications	Responsible Staff Personnel
8(a)	8(b)	8(c)	8(d)	8(e)	8(g)
24(i)	Yes	Rev. 6, 4/80, Responses to NRC Requests Regarding Plant Fill	Adequate		R. Gonzales
25	Yes	Rev. 10, 11/80, Responses to NRC Requests Regarding Plant Fill	Inadequate	NRC Interrogatories 1-9 to Consumers, 11/26/80	F. Rinaldi
26	Yes	Rev. 5, 2/80, Responses to NRC Requests Regarding Plant Fill	Inadequate	NRC Interrogatories 1-9 to Consumers, 11/26/80	F. Rinaldi
27	Yes	Rev. 5, 2/80, Responses to NRC Requests Regarding Plant Fill	Adequate		Corps of Engr; J. Kane
28	Yes	Rev. 5, 2/80, Responses to NRC Requests Regarding Plant Fill	Inadequate	NRC Interrogatories 1-9 to Consumers, 11/26/80	F. Rinaldi

Table 8-1

Identity of Request	Whether Consumers Responded after 12/6/79	Response Identification Reviewed by Staff	Staff's Consideration of Response Adequacy as of 2/24/81	Follow-up Requests or Communications	Responsible Staff Personnel
8(a)	8(b)	8(c)	8(d)	8(e)	8(g)
29	Yes	Rev. 5, 2/80, Responses to NRC Requests Regarding Plant Fill	Inadequate	NRC Interrogatories 1-9 to Consumers, 11/26/80	F. Rinaldi
30	Yes	Rev. 8, 8/80, Responses to NRC Requests Regarding Plant Fill	Adequate		F. Rinaldi
31	Yes	Rev. 5, 2/80, Responses to NRC Requests Regarding Plant Fill	Inadequate	43	Corps. of Engr; J. Kane
34	Yes	Rev. 5, 2/80, Responses to NRC Requests Regarding Plant Fill	Inadequate		A. Cappucci
35	Yes	Rev. 9, 9/80, Responses to NRC Requests Regarding Plant Fill	Inadequate	37,40	Corps. of Engr; J. Kane

Table 8-1

Identity of Request	Whether Consumers Responded after 12/6/79	Response Identification Reviewed by Staff	Staff's Consideration of Response Adequacy as of 2/24/81	Follow-up Requests or Communications	Responsible Staff Personnel
8(a)	8(b)	8(c)	8(d)	8(e)	8(g)
36	Yes	Rev. 9, 9/80 Responses to NRC Request Regarding Plant Fill	Adequate		Corps of Engr; J. Kane
37	Yes	Sept. 14, 1980 Report - Discussion of Applicant's Position	Inadequate	Tedesco letter to Cook 11/10/80	Corps of Engr; J. Kane
38	Yes	Rev. 9, 9/80 Responses to NRC Request Regarding Plant Fill	Adequate		Corps of Engr; J. Kane
39	Yes	Rev. 10, 11/80 Responses to NRC Request Regarding Plant Fill	Under review	To be determined	Corps. of Engr; J. Kane
40	Yes	Rev. 10, 11/80 Responses to NRC Request Regarding Plant Fill	Under review	To be determined	Corps of Engr; J. Kane

Table 8-1

Identity of Request	Whether Consumers Responded after 12/6/79	Response Identification Reviewed by Staff	Staff's Consideration of Response Adequacy as of 2/24/81	Follow-up Requests or Communications	Responsible Staff Personnel
8(a)	8(b)	8(c)	8(d)	8(e)	8(g)
41	Yes	Rev. 10, 11/80 Responses to NRC Request Regarding Plant Fill	Under review	To be determined	Corps of Engr; J. Kane
42	Yes	Rev. 10, 11/80 Responses to NRC Request Regarding Plant Fill	Under review	To be determined	Corps of Engr; J. Kane
43	Yes	Rev. 10, 11/80 Responses to NRC Request Regarding Plant Fill	Under review	To be determined	Corps of Engr; J. Kane
44	Yes	Rev. 10, 11/80 Responses to NRC Request Regarding Plant Fill	Under review	To be determined	Corps of Engr; J. Kane
45	Yes	Rev. 10, 11/80 Responses to NRC Request Regarding Plant Fill	Under review	To be determined	Corps of Engr; J. Kane
46	Yes	Rev. 10, 11/80 Responses to NRC Request Regarding Plant Fill	Under review	To be determined	Corps of Engr; J. Kane

Table 8-1

Identity of Request	Whether Consumers Responded after 12/6/79	Response Identification Reviewed by Staff	Staff's Consideration of Response Adequacy as of 2/24/81	Follow-up Requests or Communications	Responsible Staff Personnel
8(a)	8(b)	8(c)	8(d)	8(e)	8(g)
47	Yes	Rev. 10, 11/80 Responses to NRC Request Regarding Plant Fill	Under review	To be determined	Corps of Engr; J. Kane
48	Yes	Rev. 10, 11/80 Responses to NRC Request Regarding Plant Fill	Under review	To be determined	Corps. of Engr; J. Kane
49a	Yes	Rev. 10, 11/80 Responses to NRC Requests Regarding Plant Fill	Under review	Interrogatory 16 to Consumers dated 1/2/81	R. Gonzales
49b	Yes	Rev. 10, 11/80 Responses to NRC Requests Regarding Plant Fill	Under review	Interrogatory 16 to Consumers dated 1/2/81	R. Gonzales
49c	Yes	Rev. 10, 11/80 Responses to NRC Requests Regarding Plant Fill	Under review	To be determined	R. Gonales
50	Yes	Rev. 10, 11/80 Responses to NRC Requests Regarding Plant Fill	Adequate		R. Gonzales

Table 8-1

Identity of Request	Whether Consumers Responded after 12/6/79	Response Identification Reviewed by Staff	Staff's Consideration of Response Adequacy as of 2/24/81	Follow-up Requests or Communications	Responsible Staff Personnel
8(a)	8(b)	8(c)	8(d)	8(e)	8(g)
51	Yes	Rev. 10, 11/80 Responses to NRC Requests Regarding Plant Fill	Under review	Interrogatory 15 to Consumers dated 1/2/81	R. Gonzales
52	Yes	Rev. 10, 11/80 Responses to NRC Requests Regarding Plant Fill	Under review	To be determined	R. Gonzales
53	Yes	Rev. 10, 11/80 Responses to NRC Requests Regarding Plant Fill	Under review	To be determined	R. Gonzales
Items 1-3 of Enclosure 3 to Summary of 1/16/80 meeting, 2/4/80	Yes	17, revision 5; 34, revision 5	Inadequate Inadequate	Conference Call of 9/8/80 <sup>1/</sup> Conference Call of 9/8/80 <sup>1/</sup>	A. Cappucci A. Cappucci

-32-

<sup>1/</sup> W. P. Chen Exhibit 7, Oral Deposition of January 21, 1981.

Table 8-1

Identity of Request	Whether Consumers Responded after 12/6/79	Response Identification Reviewed by Staff	Staff's Consideration of Response Adequacy as of 2/24/81	Follow-up Requests or Communications	Responsible Staff Personnel
8(a)	8(b)	8(c)	8(d)	8(e)	8(g)
Item 4 of Enclosure 3 to Summary of 1/16/80 Meeting, 2/4/80	No	17, revision 5	Inadequate	Conference Call of 9/8/80 <sup>1/</sup>	A. Cappucci
Items 5-8 of Enclosure 3 to Summary of 1/16/80 meeting, 2/4/80	Yes	17, revision 5	Inadequate	Conference Call of 9/8/80 <sup>1/</sup>	A. Cappucci
NRC Interrogatories to Consumers 1-9, November 26, 1980	Not yet	None	Not received	None	F. Rinaldi
NRC Interrogatories to Consumers 1/2/81:					



Table 8-1

Identity of Request	Whether Consumers Responded after 12/6/79	Response Identification Reviewed by Staff	Staff's Consideration of Response Adequacy as of 2/24/81	Follow-up Requests or Communications	Responsible Staff Personnel
8(a)	8(b)	8(c)	8(d)	8(e)	8(g)
Interr. 1	Not Yet	None	Not received	None	A. Cappucci
Interr. 10,11	Not Yet	None	Not received	None	J. Kane D. Hood
Interr. 15,16	Not yet	None	Not received	None	R. Gonzales

Interrogatory 9

Excluding the information provided in response to interrogatory 5, state with particularity each item of information the Staff felt was necessary, as of December 6, 1979, for Consumers to provide in order for the Staff to have concluded that "the safety issues associated with remedial action taken or planned to be taken by the licensee to correct the soil deficiencies will be resolved." (Order at page 3).

Answer

As of December 6, 1979 the Staff had determined that, because the Licensee had failed to supply certain acceptance criteria, it could not conclude that the safety issues associated with remedial action taken or planned to be taken to correct the soil deficiencies would be resolved. The Staff had not determined, as of December 6, 1979 "each item of information the Staff felt was necessary, as of December 6, 1979 for Consumers to provide in order for the Staff to have concluded that the safety issues associated with remedial action taken or planned to be taken by the licensee to correct the soil deficiencies will be resolved' Order at page 3." See also discussion of need for seismological information in answer to Interrogatory 11.

The information the Staff felt was necessary, as of December 6, 1979 was essentially that identified in answer to Interrogatories 2 and 5, including Appendix A, relative to acceptance criteria. It should be noted, however, that prior to December 6, 1979, the full extent of the plant fill settlement problem was unknown and was under review. For example, 50.54(f) Request 12 from H. Denton letter of March 21, 1979 asked for documentation

of the condition of the soils under all safety related structures and utilities founded on plant fill or natural lacustrine deposits. This same request asked for discussions of measures to be taken if foundation materials are found to be deficient. Consumers' response to Request 12 (initially on April 24, 1979 and subsequently by Revision 1 on May 31, 1979, Revision 2 on July 9, 1979, and Revision 3 on September 13, 1979) provided information which the Staff found not to be fully responsive and, therefore, unacceptable. The basis for the Staff's conclusion on acceptability is illustrated by the issuance of followup requests which seek to have Consumers provide its design and criteria in sufficient detail to enable the Staff to conclude whether there is reasonable assurance of plant safety considering those modifications. An example of this problem is illustrated by the issuance of Requests 41 and 42 by the Staff's letter of August 4, 1980 in which the Staff's geotechnical consultant, the U.S. Army Corps of Engineers, continue to seek basic information and data not previously provided in Consumers responses regarding the fixes proposed for the Service Water Intake Structure and the Auxiliary Building which the Staff needs to reach a conclusion on the acceptability of plant repairs.

Certain items of information, in addition to that provided in response to interrogatories 2 and 5 were probably<sup>4/</sup> felt to be needed by the Staff

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4/ The initial staff reviewer in the Mechanical Engineering Branch (MEB), Mr. R. Stephens, is no longer employed with the NRC. The items identified reflect the opinion or recollection of the subsequent and present MEB Staff reviewed, Mr. A. Cappucci, from earlier personal discussions and notes. It is not known how or whether any of these possible needs may have been conveyed to Consumers.

prior to December 6, 1979 with respect to underground piping and associated components. The items are that:

- (a) All the seismic Category I piping be profiled.
- (b) Remedial action be specified for the case in which stresses due to settlement should approach or exceed Code allowable values.
- (c) Details as to the calculational methods and assumptions for determining stresses due to settlement and other combined loads be provided for review.
- (d) Results of the stress analysis of nozzle loads be submitted.
- (e) A suitable monitoring program be established to monitor future settlement for the life of the plant.
- (f) Future settlements be included in the planned stress analyses.

Interrogatory 10

For each item of information set forth in response to interrogatory 9, state (a) whether the Staff had requested Consumers to provide such information; (b) the identity of each request by the Staff to Consumers; (c) the identity of the communication that the Staff considered Consumers' response to the request; (d) whether Consumers' response was deemed adequate by the Staff; (e) the identity of the communication by which the Staff's evaluation of Consumers' response was communicated to Consumers; (f) the basis for the Staff's position regarding adequacy or inadequacy of Consumers' response; and (g) the Staff personnel responsible for determining whether Consumers' response was adequate or inadequate.

Answer

See answer to Interrogatory 9. Because the information the Staff felt was necessary as of December 6, 1979 was essentially that identified in answer to Interrogatories 2 and 5, the answer to interrogatory 10 is essentially provided by the answers to Interrogatory 6, including Appendix B, and by that part of Interrogatory 8 relevant to indicated Requests 24 through 35.

With respect to certain items of information (a) through (f) identified in the answer to Interrogatory 9 with respect to underground piping and associated components, the answer to Interrogatory 10 is provided by Table 10-1. The answer to Interrogatory 10(f) follows.

- (a) The criteria for selection of the piping to be profiled appears to be based on the soils in the same proximity as being homogeneous. There appears to be insufficient evidence that this is the case.
- (b) The response to 50.54(f) Request 17 stated that the stresses due to settlement would be well below the code allowable values as indicated in Table 17-2 of that response. Therefore, it was indicated that remedial action was not planned by Consumers. This is not adequate because (1) not all seismic Category 1 piping was profiled, (2) future settlements had not been predicted, and (3) the results of the surcharge program had not been established.
- (e) The response to 50.54(f) Request 18 in July 1979 indicated no plans for a monitoring program if the settlements remain within the predicted range. It was not clear as to the time frame and methods for verifying the predicted ranges.

(f) The response to 50.54(f) Request 17 provided no information on settlements over plant lifetime. The response to 50.54(f) Request 18 was adequate. The response to 50.54(f) Request 19 provided no information as to the predicted deformations.

Interrogatory 11

Excluding the information provided in response to interrogatory 7, state with particularity each item of information the Staff feels, as of the date of answering this interrogatory, is necessary for Consumers to provide in order for the Staff to conclude that "the safety issues associated with remedial action taken or planned to be taken by the licensee to correct the soil deficiencies will be resolved." (Order at page 3.)

Answer

The Staff has not completed its review of information submitted by Licensee relative to the proposed remedial actions. It is therefore impossible to delineate "with particularity each item of information the Staff feels, as of the date of answering this interrogatory, is necessary for Consumers to provide in order for the Staff to conclude that 'the safety issues associated with remedial action taken or planned be taken by the licensee to correct the soil deficiencies will be resolved.'" (Order at page 3.)"

TABLE 10-1

Item from Interr. 9	Whether Staff Requested Information 10(a)	Identity of Request 10(b)	Response Identification 10(c)	Staff's Consideration of Response Adequacy 10(d)	How Position Conveyed to Consumers 10(e)	Responsible Staff Personnel (10(g))
9(a)	Yes	50.54(f) Request 17, Denton 3/21/79	50.54(f) Request 17, Rev. 2, 7/79, Responses to NRC Requests Regarding Plant Fill	Inadequate	Unknown	R. Stephens A. Cappucci
9(b)	Yes Request 17 Denton 3/21/79	50.54(f) Request 17, Rev. 2, 7/79, Responses to NRC Requests Regarding Plant Fill	50.54(f) Re-	Inadequate	Unknown	R. Stephens
9(b)	Yes	50.54(f) Request 17 Denton 3/21/79	50.54(f) Request 17, Rev. 2, 7/79, Responses to NRC Requests Regarding Plant Fill	Inadequate	Unknown	R. Stephens A. Cappucci
9(c)	No	None	None	Not applicable	Not applic-	R. Stephens A. Cappucci
9(d)	No	None	None	Not applicable	Not applic- able	R. Stephens A. Cappucci

TABLE 10-1

Item from Interr. 9	Whether Staff Requested Information 10(a)	Identity of Request 10(b)	Response Identification 10(c)	Staff's Consideration of Response Adequacy 10(d)	How Position Conveyed to Consumers 10(e)	Responsible Staff Personnel 10(g)
9(e)	Yes	50.54(f) Request 18	50.54(f) Request 18, Rev. 2, 7/79, Responses to NRC Requests Regarding Plant Fill	Inadequate	Unknown	R. Stephens A. Cappucci
9(f)	Yes	50.54(f) Requests 17, 18 and 19	50.54(f) Requests 17, 18 and 19, Rev. 2, 7/79, Responses to NRC Requests Regarding Plant Fill	Inadequate	Unknown	R. Stephens A. Cappucci



To illustrate this inability, consider two recent occurrences: (1) On January 21, 1981, Consumers submitted a potentially reportable 50.55(e) report advising of an error in the 1977 computer model used for the seismic analyses of the Control Tower and the main portion of the Auxiliary Building. Pending further analysis by Consumers, it is not possible for the NRC to assess the ability of the Control Tower to assume the additional load resulting from the bridged support scheme proposed for the Electrical Penetration Area; (2) Consumers has also indicated that additional cracking of the concrete ring base of the Borated Water Storage Tank has occurred during the full scale load test. The Staff is presently awaiting Consumers' assessment of this occurrence. It should also be noted that resolution of the matter of establishing appropriate seismological input, as discussed in the Staff's letter of October 14, 1980 and in a December 22, 1980 "Summary of December 5, 1980 Meeting on Seismic Input Parameters," is deemed to be relevant to the staff conclusion that the safety issues associated with remedial action taken or planned will be resolved.

The information needed by the staff for its review of the remedial actions is essentially that identified in response to interrogatories 2, 6, 7 and 8, plus Appendices A and B, with respect to acceptance criteria for those response items indicated to be inadequate. In Table 6-1 and Appendix A, the indication of response adequacy by the staff is with respect to December 6, 1979. However, the present staff position may be ascertained from the indicated disposition of the associated follow-up questions. The occurrences and seismic matter discussed in Interrogatory 11 also needs to be satisfactorily resolved.

With regard to underground piping, and excluding the information needed from interrogatory 7, the following information is needed:

- (a) A final stress analysis of the seismic Category I piping.
- (b) An explanation for some of the relatively rapid changes in some of the piping profiles and the magnitude of the loads which cause these changes.
- (c) The actual and predicted clearances at end of plant life of seismic Category I piping at building penetrations.
- (d) The loads and stresses on the piping at their termination points (anchors, equipment, larger pipe, etc.). (e) From the January 20, 1981 meeting, provide method and basis for normalizing the profile data prior to performing the stress analysis and use of 3-inch future settlement data. If a non-linear analysis is to be performed, provide the analysis methodology with a summary of the results. Include a presentation of the margin to the Code allowable value for settlement only and the same for the margin to failure considering all primary and secondary stresses.

Interrogatory 12

For each item of information set forth in response to interrogatory 11 state: (a) whether the Staff had requested Consumers to provide such information; (b) the identity of each request by the Staff to Consumers; (c) the identity of the communication that the Staff considered Consumers' response; (d) whether Consumers' response was deemed adequate by the Staff; (e) the identity of the communication by which the Staff's evaluation of Consumers'

TABLE 12-1

TABLE 12-1

Interr. 11 Item	Whether Staff Requested Consumers 12(a)	Request Identifi- cation 12(b)	Response Identity 12(c)	Adequacy Disposition 12(d)	How Disp. Communi- cated to Consumers (12(e))	Responsible Staff Personnel (12(f))
11a	Yes	Tedesco letter 10/20/80	Cook letter 11/14/80 with encl.	Inadequate	Conference call 1/14/81	A. Cappucci J. Brammer
11 b,c & d	Yes	Meeting of 1/20/81	No response	No response	No response	A. Cappucci J. Brammer
11e	In progress	Not Abplicable	None	Not appl.	Not app.	A. Cappucci J. Brammer

response was communicated to Consumers; (f) the basis for the Staff's position regarding adequacy or inadequacy of Consumers' response; and (g) the Staff personnel responsible for determining whether Consumers' response was adequate or inadequate.

Answer

See answer to Interrogatory 11. With respect to the information needed with respect to underground piping, see Table 12-1.

With respect to the adequacy of item 11a on Table 12-1, the Bechtel stress analysis appeared to be unconservative and did not give a true representation of the actual stress in piping. There were questions as to which profiles were used and the justification for the boundary conditions assumed. An ETEC stress analysis demonstrated much higher stresses than those in the Bechtel report. At the 1/20/81 meeting Bechtel stated that subsequent analyses had shown higher stresses for some lines.

Interrogatories 13 through 16. See separate objections filed by the Staff.

Interrogatory 17

Explain and provide the basis for the statement at page 2 of the Order that "This statement is material in that this portion of the FSAR would have been found unacceptable without further Staff analysis and questions if the Staff had known that Category I structures had been placed in fact on random fill rather than controlled compacted cohesive fill as stated in the FSAR."

Answer

Information submitted as part of an application for licenses in accordance with 10 CFR 50.30 is "material" if that information would or could have an influence upon a safety conclusion of the NRR Staff. A material statement which is false is of concern if it could have resulted in an improper finding or a less probing analysis by the NRR Staff. As described on page 2 and Appendix B of the Order, had the NRR Staff relied upon the statement in FSAR Section 2.5.4.5.3 which states that "all fill and backfill were placed according to Table 2.5-9", it would or could have erroneously concluded that the fills and backfill placed for the support of structures and the Diesel Generator Building consisted of "clay" (Table 2.5-9 under "Soil Types") or "Controlled compacted cohesive fill" (Table 2.5-14 under "Supporting Soils") which had been compacted, as a minimum, to 95% of ASTM D 1557-66 T modified to get 20,000 foot-pounds of compactive energy per cubic foot of soil (see Table 2.5-9 under "Compaction Criteria"). The reality of the situation is that the fills and backfills beneath the structures and the Diesel Generator Building are not "clay" or a "controlled compacted cohesive fill", but consist of a heterogeneous mixture of sand, clay, silt and lean concrete, and the minimum compaction criteria implied as having been achieved by the quoted statement from FSAR Section 2.5.4.5.3 was not achieved. Therefore, a conclusion by the Staff that the fills and backfills were of a different type or had been compacted to known minimum standards would have been erroneous and would or could contribute to or preclude a more probing analysis or further questioning. Based upon the FSAR information, the Staff would or could have concluded that the structure was adequately supported, that it

would not experience detrimental settlement, that its foundations would remain stable under both static and earthquake loading, and that the fill properties would be at least equal to design values provided in the PSAR. The Staff's conclusion would have been relevant to the NRC findings pursuant to 10 CFR 50.57 (3) for issuance of operating licenses and would have contributed to a finding that there is reasonable assurance that the activities authorized by the operating license can be conducted without endangering the health and safety of the public.

Darl Hood, being duly sworn, states that to the best of his knowledge and belief the above information and the answers to the above interrogatories are true and correct.

Darl Hood  
Darl Hood

Subscribed and sworn to before me  
this 25<sup>th</sup> day of February, 1981.

Juanita T. Cowen

Notary Public  
My Commission Expires: \_\_\_\_\_

JUANITA T. COWEN  
NOTARY PUBLIC STATE OF MARYLAND  
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These records are filed

in a folder labeled

"NRC Testimony - Stomiris

Contention No. 2" maintained

by Joseph Kane.

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 Plant Units 1 and 2) )

NRC STAFF TESTIMONY OF DARL HOOD, JOSEPH KANE,  
FRANK RINALDI AND EUGENE GALLAGHER ON STAMIRIS CONTENTION 2

Q.1. Please state your names and positions with the NRC.

A. My name is Darl Hood. I am a Senior Project Manager in the Division of Licensing, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission.

*Added corrections on pg 18*

My name is Joseph Kane. I am a Principal Geotechnical Engineer within the Hydrologic and Geotechnical Engineering Branch, Division of Engineering, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission.

My name is Frank Rinaldi. I am a Senior Structural Engineer in the Structural Engineering Branch, Division of Engineering, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission.

My name is Eugene Gallagher. I am a civil engineer with the U.S. Nuclear Regulatory Commission. Since February 1981, I have been assigned to the Reactor Engineering Branch, Division of Resident and Regional Reactor Inspection, Office of Inspection and Enforcement. Prior to February 1981, I was a reactor inspector assigned to the Region III, Reactor Construction and Engineering Support Branch, Office of Inspection and Enforcement.

Previously  
covered  
by  
Gallagher

Q.2. Have you prepared a statement of professional qualifications?

A. *A portion of Attachment 1*  
Yes. Copies of these statements are found in Attachment 1. ←

Q.3. Please state the duration and nature of your responsibilities with respect to the Midland Plant, Units 1 and 2?

A. I, Darl Hood, am the Project Manager for the Midland Plant application for operating licenses. I have served in that position from August 29, 1977, when the application for operating licenses was tendered to the NRC for acceptance review, up to the present time. My responsibilities include management of the Staff's environmental and radiological safety reviews. I am responsible for the responses to Stamiris Contention 2(a), (d), (e) <sup>dropped</sup> and supplementary Items 1, 6, 10 and 12.

I, Eugene Gallagher, was assigned to the Midland Plant (among others) from October 1978 until January 1981. Since October

of 1978, I have spent approximately 1 year of effort performing inspections, reviewing quality control records and procedures, observing work activities, reviewing Consumers Power Company's (hereafter CPC or Applicant) response to 50.54(f) questions 1 and 23, and attending meetings and presentations by CPC and Bechtel regarding the soil settlement matter of the Midland Plant. I am responsible for the response to Stamiris Contention 2(c).

I, Joseph Kane, have served since November 1979 as the technical monitor for the Midland portion of an interagency contractual agreement between the NRC and the U.S. Army Corps of Engineers, Detroit District (hereafter the Corps). By this contract the Corps has been assisting the NRC Staff in the safety review of the Midland Project in the field of geotechnical engineering. In addition to, and as a consequence of, my serving as contract technical monitor, I have become directly involved in the assessment of the adequacy of the remedial measures which have been proposed by CPC to correct the plant fill settlement problem. I am responsible for the responses to Items 2, 3, 4, 5, 7, 8, 9 and 11 of Stamiris' supplement to Contention 2.

~~I, Frank Rinaldi, have served since February 1980 as the technical monitor for the Midland portion of an interagency contractual agreement between the NRC and the Naval Service Weapons Center (hereafter NSWC). By this contract the NSWC has been assisting the NRC Staff in the safety review of the Midland Project~~

~~in the field of structural engineering. In addition to, and as a consequence of, my serving as contract technical monitor, I have become directly involved in the assessment of the adequacy of the remedial measures which have been proposed by CPC to correct the plant fill settlement problem. I am responsible for the response to Item 4 of Stamiris' supplement to Contention 2.~~

Q.4. Please state the purpose of this testimony.

A. The purpose of this testimony is to address Stamiris Contention 2 as stated in the Appendix to "Prehearing Conference Order Ruling on Contentions and on Consolidation of Proceedings (October 24, 1980)," and as supplemented by Ms. Stamiris in "Intervenor Answer to Applicant's Interrogatories, 4/20/81."

~~This testimony does not address Stamiris Contention 2(b) since the parties agreed that discussion of Contention 2(b) would be postponed to the August portion of the hearing.~~

Leave in

Stamiris Contention 2 reads as follows:

Consumers Power Company's financial and time schedule pressures have directly and adversely affected resolution of soil settlement issues, which constitutes a compromise of applicable health and safety regulations as demonstrated by:

- a) the admission (in response to §50.54(f) question #1 requesting identification of deficiencies which contributed to soil settlement problems) that the FSAR was submitted early due to forecasted OL intervention, before some of the material required to be included was available;

Hood

- b) the choice of remedial actions being based in part on expediency, as noted in Consumers Power Company consultant R. B. Peck's statement of 8-10-79; Not yet responded to by NRC copy provided to OSLD
- c) the practice of substituting materials for those originally specified for "commercial reasons" (NCR QF203) or expediency, as in the use of concrete in electrical duct banks (p. 23 Keppler Report)\*; Gallagher
- d) continued work on the diesel generator building while unresolved safety issues existed, which precluded thorough consideration of Option 2 - Removal and Replacement Plan; and Hood
- e) the failure to freely comply with NRC testing requests to further evaluate soil settlements remediation, inasmuch as such programs are not allowed time for in the new completion schedule presented July 29, 1980. Hood

April 20, 1981 Supplement to Contention 2

Further examples of the effect of financial and time pressures on soil settlement issues:

Examples	Effect on soil settlement issues	
Peck pg. 2 1. 11/7/78 Bechtel action item: "proceed with preparations for preload as rapidly as possible"	1. Root causes not adeq. investigated. Organizational deficiencies not eliminated prior to proceeding with remediation	Hood pg. 12 & 13
Peck pgs. 3 & 4 2. 11/7/78 decision to fill pond "immediately, because the amount of river water available for filling is restricted"	2. Affected piezometric measurements during preload	Kane pg. 13 & 14
Peck pg. 4 3. 11/7/78 "5 month period is available in the schedule for preloading"	3. The surcharge was removed at the end of this 5 months despite lack of NRC satisfaction that secondary consolidation was assured	Kane pgs. 15, 16

\* March 22, 1979 Keppler Investigation Report conducted by Region III, Dec. 78-Jan. 79.

4. Failure to grout gaps prior to cutting of duct banks, failure to cut condensate lines when first suggested, failure to break up mudmat at DGB

5. Choice to continue construction of DGB

6. Early FSAR submittal and inadequate review of FSAR

7. Failure to reconstruct geometry of area prior to fill placement, failure to await NRC approval before proceeding with Preload, selection of "least costly feasible alternative" for DGB.

8. Failure to excavate loose sands as committed to in PSAR

9. Installation of preload instrumentation was subject to time pressure assoc. with frost protection considerations

10. Appeals to NRC to consider financial plight and schedule deadlines as in Seismic Deferral Motion

11. Depth and breadth of surcharge limited by practical consideration of DGB, Turbine B. structures

12. Changes to design (DGB foundation), material, or procedural specifications without proper approval

4. Resulted in additional stresses to DGB which could have been avoided

5. Eliminated practical consideration of Removal & Replacement Option

6. Precluded early detection of inconsistencies which could have prevented some of the s.s. problems

7. Varying degrees of caution and conservatism were foregone in favor of cost and schedule advantages

8. Contributed to inadequacy of subsoils

9. Expenditures for preload instrumentation (CJD 11/1/78 memo) prior to formal adoption of preload = premature commitment

10. If granted, would affect seismic--soil settlement standards

11. Afforded less than optimum conditions for surcharge

12. Contributed to settlement or stress problems and allowed conflicts to go unnoticed as preventative indicators

Kane & Rinaldi  
pgs. 16, 17, 18 & 19

Kane pg. 19

Hood pg. 20

Kane pg. 21

Kane pg. 22

Kane pg. 21

Hood pg. 22

Kane pg. 21

Hood pg. 23

Q.5 What is the NRC Staff response to Stamiris Contention 2(a)?

Hickey

Peck  
pg. 5

A. First, the statement which Contention 2(a) calls an "admission" is found in the third paragraph of CPC's response to 50.54(f) Request 1, Part b (page 1-2 of Responses to NRC Requests Regarding Plant Fill). That full paragraph which is a part of the Applicant's explanation regarding contradictions between the PSAR and the FSAR reads as follows:

The Midland FSAR was submitted to the NRC at an earlier point in the project schedule than would have normally occurred in order to provide additional time for the operating license hearings due to the forecasted intervention. Consequently, some of the material required to be included in the FSAR was not available at the time of its initial submittal, or was supplied based upon preliminary design information. As the design and construction continued, the appropriate sections of the FSAR were revised or updated to include the necessary information.

- Hood

Second, a portion of the application for operating licenses, namely the FSAR, was tendered by CPC on August 29, 1977. The NRC performed an acceptance review pursuant to Section 2.101 of 10 CFR Part 2, and by letter dated November 11, 1977 advised the Applicant that the tendered FSAR was sufficiently complete based upon all of the information filed, taken as a whole. The Midland FSAR was docketed on November 18, 1977. The remainder of the application, namely the Environmental Report, was tendered March 1, 1978 and docketed April 14, 1978.

Third, the original schedule approved by NRC in December 1977 was based upon a projected fuel load date of October 1, 1980 for Unit 2. The major licensing milestones scheduled for the FSAR review were:



FSAR docketed	11/18/77
Safety Evaluation Report (SER) issued	3/30/79
ACRS Meeting	5/10/79
Supplement to SER issued	7/13/79
Start OL hearing	8/13/79
End OL hearing	7/15/80
Decision	10/1/80

It is not unusual for the Staff to initiate review of an FSAR without inclusion of all the material which will ultimately be required for completion of that review. Moreover, the difficulty associated with certain statements made in the FSAR was not a matter of information excluded from the early versions of the FSAR, but rather a matter of their accuracy.

Hood

A decision by the NRC to docket an FSAR and the establishment of review schedules are administrative matters for which the NRC's goal is to provide for completion of the licensing review consistent with the construction schedule. With respect to the Applicant's statement that "some of the material required to be included in the FSAR....was supplied based upon preliminary design information," the obligation of the Applicant to provide accurate information under oath or affirmation pursuant to Section 50.30 to 10 CFR Part 50 is by no means waived by these administrative matters, regardless of when they occur. Similarly, the quality assurance requirements of Appendix B to 10 CFR Part 50 which are applicable to the FSAR apply irrespective of any time table.

For these reasons, the early submittal of the FSAR provides no justification for the deficiencies associated with soil settlement problems, nor does it constitute a compromise of applicable health and safety regulations.

Hood

Q.6. What is the NRC Staff response to Stamiris Contention 2(c)?

A. NCR QF 203 (Attachment 2) identifies three instances where user test reports for granular soil material did not meet specification gradation limits.

(1) User Test Report 0630: the acceptance gradation limits for material passing the  $\frac{1}{2}$ " sieve were 75-90%; the user test report showed 94% passing. This deviation was "accepted as is" based on engineering review of the actual gradation of the material supplied.

Gallagher

(2) User Test Report 1036: the acceptance gradation limits for material passing the  $\frac{1}{2}$ " sieve were 75-90%; the user test showed 91%. This deviation was rejected based on an engineering review and material was not permitted to be used in "Q" areas, but the material was permitted to be used in non-"Q" areas.

(3) User Test Report 0836: the acceptance gradation limits for material passing the #200 sieve were 12% - 20%; the user test showed 11%. The reason given for the 12% - 20% acceptance

criteria was for "commerical reasons" since the supplier could supply material within these limits. The specification, however, permitted material to be within 7 - 20%. Therefore, the acceptance criteria or the user test report was more restrictive than the specification requirements.

In all three cases the in-process corrective action was acceptable based on a review of the facts. These three nonconforming conditions did not adversely or directly affect resolution of the soil settlement issue.

Regarding the use of concrete for "expediency" in the electrical duct banks area the following should be considered. Based on the IE investigation the lean concrete material in itself was not a matter of concern. The matter of concern was that the design controls did not verify if the substitution of concrete in this area would affect the design basis of the structure (i.e. interface between the electrical duct banks and the Diesel Generator Building settlement). The IE investigation found that the design interface and consideration between electrical and civil was not adequate to assure the necessary tolerance between the duct banks and the structure to provide free movements when settlements occurred. The question of expediency was not the issue in IE investigation report 78-20, but rather the issue was the adequacy of the design coordination.

Gallagher

Mr. Dicener's suggestion for streamlining presentation of testimony

Mr. Hood

Q.7 A What is the NRC Staff response to Stamiris Contention 2(d)?

A. The Staff does not agree that continued work on the Diesel Generator Building foreclosed consideration of the removal and replacement option as a viable alternative. Indeed, that option remains viable today should that option prove necessary. As noted in the Applicant's response to 50.54(f) Request 21, the continuation of building construction would contribute to the additional costs for implementing the removal and replacement option in the event the elected preload plan should fail to provide acceptable results. Such financial matters undertaken at the Applicant's own risk would not deter the NRC from requiring an acceptable solution in the event of unacceptable results from the option implemented.

Hood

Q.8. What is the NRC Staff response to Stamiris' Contention 2(e)?

~~A. The "new completion schedule" referred to in Contention 2(e) was presented by CPC during the meeting of the NRC's Caseload Forecast Panel in Midland, Michigan on July 29, 1980, to assess the construction completion schedule for Midland Plant, Units 1 and 2. The new estimate for completion of Unit 2 was July 1983, and for Unit 1 was December 1983. The corresponding dates for commercial operation were December 1983 and July 1984 (steam operation), respectively.~~

Dropped by Stamiris by letter

Hood

The Staff assumes that the "NRC testing requests" stated in Contention 2(e) refer to the June 30, 1980, Staff request (Request 37) for additional borings and laboratory analyses.

The NRC Staff knows of no basis for Stamiris' statement that the new completion schedule does not allow time for testing programs to further evaluate soil settlement remediation. Furthermore, it cannot recall any such statement by the Applicant at the July 29, 1980, meeting nor at any other time. Rather, it is the Staff's understanding that the results of laboratory analyses of the borings as requested by NRC and the Corps, will be provided beginning in mid-June 1981. This timetable is compatible with the completion schedule as presented July 29, 1980.

Hood

Q.9. What is the NRC Staff response to Item 1 in Stamiris' supplement to Contention 2?

A. The "11/7/78 Bechtel action item" cited in Item 1 of Stamiris' supplement to Contention 2 refers to "Meeting Notes No. 882" of Mr. B. C. McConnel of Bechtel for a November 7, 1978 meeting between CPC, Bechtel and Bechtel's consultants. The meeting notes are located at Tab-12, Volume 4 of "Responses to NRC Requests Regarding Plant Fill" (Attachment 3). The action item appears to result from the discussion at page 2 of the meeting notes indicating that a 5-month period was available in the schedule, and that Dr. Peck

Hood

recommended proceeding with the instrumentation and preload as rapidly as possible.

Ms. Stamiris is correct that matters of relevance to the quality assurance program, which include investigations as to the root causes of the soil settlement and reviews of organizational structures for potential deficiencies, were not completed as of November 7, 1978, nor prior to proceeding with the preload program for the Diesel Generator Building. The Staff had expressed a similar concern during the meeting of December 4, 1978, as noted at the end of the "Summary of December 4, 1978, Meeting on Structural Settlement," January 12, 1979:

The staff also stated that while attention to remedial action is important, determination of the exact cause is also quite important for verifying the adequacy of the remedial action, assessing the extent of the matter relative to other structures, and in precluding repetition of such matters in the future.

The Staff's 50-54(f) Request 1 which was issued March 21, 1979, also noted the Staff's concern that such quality assurance reviews be performed. This was followed by 50.54(f) Request 23 on September 11, 1979. The Staff's concern for quality assurance was a significant factor in the NRC's decision to issue the December 6, 1979 Order Modifying Construction Permits.

Q.10. What is the NRC Staff response to Item 2 in Stamiris' supplement to Contention 2?

Hood

Kane

A. The Staff agrees with Stamiris Contention 2, Item 2, to the extent that CPC's decision to fill the cooling pond "immediately, because of the amount of river water available for filling is restricted," did affect the piezometric measurements during pre-loading. This statement was made in the November 7, 1978, Meeting Notes referred to in the preceding response. (Attachment 3). The coincident effects on piezometric monitoring caused by seepage still developing from the raised pond and also due to the development of excess pore water pressures under the surcharge loading were identified by the Staff (Attachment 4) and its consultants, the Corps, as being an important reason for not being able to fully accept CPC's conclusion on the effectiveness of the surcharge program. To overcome this problem, the NRC has attempted to have the effectiveness of the surcharge program verified by requiring the additional borings and laboratory testing for the Diesel Generator Building foundation soils.

Check Peck testimony pg. 3 & 4

June 30 ltr. from NRC to CPC on boring request pg. 2

Kane

The Staff would agree that time schedule pressures did compel CPC to accept less than the best sequence in the pond raising-surcharge placement operations and therefore, these pressures may have adversely affected resolution of the soil settlement issues.

refer to Attachment 3, pg. 2  
CPC indicates best sequence was to place pre-load then quickly raise pond

Peck

Q.11. What is the NRC Staff response to Item 3 in Stamiris' supplement to Contention 2?

Kane

A. The Staff agrees with Stamiris that the minutes of the meeting held November 7, 1978, between CPC, Bechtel and Bechtel's consultants does indicate "a 5-month period is available in the schedule for preloading." The Staff also agrees with the Stamiris contention that the surcharge was removed without NRC being satisfied that secondary consolidation was assured. The Staff acknowledges, however, that CPC did notify the NRC of its intention to remove the surcharge fill prior to actually removing it.

Attachment 3  
p. 2

Check  
Peck's  
pg. 4  
Testimony

The reasons the Staff was not satisfied with the effectiveness of the surcharge program can be traced to CPC's former practice of not identifying the criteria that would be acceptable to the NRC Staff in advance of completing the remedial action. CPC's practice and the resulting difficulty that it presented to the Staff is illustrated in the following paragraph taken from the "Summary of July 18, 1979, Meeting on Soil Deficiencies at the Midland Plant Site" (Attachment 5): Top of pg. 2

Kane

The staff noted that the response to its 10 CFR 50.54 requests for acceptance criteria for remedial actions (e.g., questions 4, 6, etc.) had not resulted in identification of criteria in advance of the remedial action. Rather the reply notes that the criteria will be determined during or after the remedial action. The staff stated that this approach by the applicant does not provide for timely staff feedback at the outset, but rather the staff must await results of the program to determine what acceptance criteria were used and if they are acceptable. Thus, the remedial action is being conducted entirely at the applicant's own risk.

Attachment 5  
pg. 2 @ top



The Staff's conclusions as to whether secondary consolidation had been reached due to the surcharge program and as to the effectiveness of the surcharge program awaits receipt and review of the results of additional borings and laboratory testing as discussed in response to Question 10.

Kane

Q.12. What is the NRC Staff response to Item 4 in Stamiris' supplement to Contention 2?

A. The matters of grouting gaps prior to cutting duct banks and breaking up the mudmat were considered at a meeting between CPC, Bechtel and Bechtel's consultants as reflected in "Meeting Notes No. 882." (Attachment 3) These notes at page 3, paragraph 6, state:

Page 3  
No. 882  
testimony

The duct banks which appear to be restraining the building settlement should be isolated from the building as necessary. The building construction should continue, thereby providing more weight on the foundations. Any gaps between the footing and the mudmat would require grouting. The grouting would not be necessary prior to preload. It was pointed out that from a safety and a building distress point of view, it would be advisable to grout existing gaps prior to releasing duct banks. It was also suggested that the mudmat be broken up prior to preload.

Kane  
Rinaldi

Similarly, in the trip report by CPC (Attachment 5) for this same November 7, 1978, meeting, the following account of the above discussion is given at page 3:

The question of grouting the gaps between the footing and the soil was discussed. Dr. Peck and Dr. Hendron did not feel the grouting of the gap between the footing and soil was necessary prior to preload. However, discussion continued and it was concluded that Bechtel would grout any gaps between the footing and soil after the preload had been removed. It was suggested by the consultants that the mudmat be broken up prior to preload application and that early grouting may also be beneficial in relieving some building stress.

Attachment 6  
p. 3

With respect to the condensate lines, the Staff was advised by 50.55(e) Interim Report #4 to Management Corrective Action Report 24 dated February 16, 1979, and forwarded by cover letter dated February 23, 1979, of the preloading progress and that the two condensate lines had been cut. Interim Report #4, at page 5, stated:

Not addressed  
by WPC  
on 7-22

Kane  
& Rinaldi

2. Preload Operation

Preloading of the Diesel Generator Building is continuing. As of February 2, 1979, the granular fill material for the preload has been placed to the elevations shown in Figure 4.

3. Cutting of the Condensate Pipelines

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

The Staff is unable to conclude that grouting the gaps prior to isolating the duct banks would have been the better approach to preloading. There are advantages and disadvantages associated with either decision--to grout or not to grout. The decision not to grout likely allowed some immediate stress relief in bay areas 3

and 4 when the duct banks were released. On the other hand, it is uncertain as to the extent that beneficial reduction in additional stresses to other portions of the Diesel Generator Building would have resulted had grouting been performed prior to cutting away the duct bank.

With the benefit of hindsight, it would appear that initially not grouting and a more gradual lowering of the structure after release from the duct banks would have been preferable, rather than the actual abrupt release of the structure. Such an approach would have permitted a more gradual redistribution of loading to the Diesel Generator Building's foundation. Grouting then might still have been necessary following the initial relief of stresses in order to result in more uniform future settlement and to avoid the inducement of possible additional stresses in other portions of the Diesel Generator Building.

It is the Staff's understanding that the condensate lines were actually cut. Therefore, these unconnected lines were apparently not a cause of additional stresses to the Diesel Generator Building.

With regard to not breaking up the mudmat beneath the Diesel Generator Building, it is likely this decision lessened the stresses imposed during surcharging since the structure foundation was stiffer and better able to span any soft soil areas that may have existed. There is a trade off, however, in that not breaking up the mudmat

Addresses F.  
Rinaldi's comment

3rd line

Kane &  
Rinaldi

6th line in  
2nd par.

last line

Not addressed  
by CACo  
10 of 7/22

reduced the effectiveness of the surcharge in consolidating the softer foundation soils which were being bridged by the structures foundation and mudmat. If in the future during plant operation, new or extended cracking of the wall footings and mudmat were to occur, redistribution of loading pressures could result and possibly lead to additional settlement.

Kane & Rinaldi

The Staff therefore concludes that CPC's failure to act listed in Item 4 did not adversely effect resolution of the soil settlement issues.

Q.13. What is the NRC Staff response to Item 5 in Stamiris' supplement to Contention 2?

A. This Contention is essentially the same as Stamiris Contention 2(d) addressed in response to Question 7 of this testimony. In summary, CPC's decision to continue construction of the Diesel Generator Building does make it more difficult and costly to select the removal and replacement option, but it does not eliminate this option. The Staff views this decision by CPC as evidence of its willingness to proceed at its own risk; it does not view CPC's decision as having an adverse effect on resolution of the soil settlement problem.

Kane

Q.14. What is the NRC staff response to Item 6 in Stamiris' supplement to Contention 2?

Hood

A. Had the FSAR been tendered as late as August 1978 instead of August 1977, little or no detection of inconsistencies would have occurred during this interval with respect to soil settlement problems. The basis for this position is the following statement by the Applicant in response to 50.54(f) Request 1, page 1-3 of "Responses to NRC Requests Regarding Plant Fill," Volume 1:

Through the above procedures and actions, the FSAR and project design documents are constantly being reviewed and compared against each other. When inconsistencies are identified, they are corrected. However, there are some sections of the FSAR that are essentially inactive (e.g., the FSAR section relates to items for which the design, procurement, and construction phases have been completed and there have been no recent document changes or NRC questions to prompt a review of the section).

Prior to the identification and investigation of the Diesel Generator Building settlement starting in August 1978, FSAR Section 2.5 and Subsection 3.8.5 (which were the areas of contradictions in the PSAR and FSAR as described by I&E during the meetings of February 23 and March 5, 1979) were considered inactive. All of the major plant backfill operations were completed, no significant revisions to the related civil specifications or calculations were made, and only two NRC questions were received at that time. These two NRC questions were related to Section 2.5 and dealt with the seismicity of the Michigan region.

Hood

Q.15. What is the NRC Staff response to Items 7, 9 and 11 of Stamiris' supplement to Contention 2?

A. The Staff is uncertain as to the meaning of "reconstruct geometry of area" in the beginning of Item 7 and therefore the Staff cannot respond to this aspect of the Contention. The Staff views

Kane

the intent of supplemental Items 7, 9, and 11 of Stamiris Contention 2 as questions on the adequacy and conservativeness of the selected preloading solution to remedy the plant fill settlement problem of the Diesel Generator Building. The Staff recognizes that decisions and actions by CPC are naturally affected by cost and schedule considerations. The Staff does not feel that these competing concerns are irreconcilable, but rather the Staff attempts to recognize the needs of applicants while exercising its regulatory responsibility through firmly insisting upon acceptable margins of safety and assurances that provide for protection of the health and safety of the public. The Staff therefore concludes that the examples listed in Items 7, 9 and 11 have not adversely affected resolution of the soil settlement issue.

Kane

Further, with respect to supplemental Item 11 which claims that the depth and breadth of surcharge was limited by practical consideration of the Diesel Generator Building and Turbine Building and that this afforded less than optimum conditions for surcharge, the Staff believes the significant issue here should be, not whether optimum conditions existed, but whether acceptable results were achieved by the surcharge program as executed. In this regard, the results of additional borings and laboratory testing requested by the Staff and the Corps are to be provided for review in the near future. The assessment of these results by the Staff and the Corps will be the subject of later testimony in this hearing.

Peck  
Testimony  
Pg. 5



Q. 16. What is the NRC Staff response to Item 8 in Stamiris' supplement to Contention 2?

A. In February 1978 the NRC in its review of the Midland FSAR forwarded Request 362.2 which sought documentation of the method CPC used to remove the loose natural sands (sands with less than 75% relative density) from the foundations of safety related structures as CPC committed to do in the PSAR. In subsequent submittals in response to NRC Request 362.2, CPC provided the results of boring explorations which had been drilled in August and September of 1978 and additional explorations in 1979. The date when these borings were drilled occur after the site area fill had been placed. These late results and evaluation of the boring information which CPC has documented did not indicate the presence of loose natural sands beneath safety related structures. Based on these facts, the Staff is unable to conclude that CPC failed to excavate loose natural sands as committed to in the PSAR or that this failure contributed to the inadequacy of the subsoils.

Kane

Q.17. What is the NRC Staff response to Item 10 in Stamiris' supplement to Contention 2?

A. The resolution of the "Seismic Deferral Motion" was achieved consistent with the NRC Staff's needs as expressed at the prehearing conference of April 27, 1981. No compromise of applicable health and safety regulations is associated with this resolution.

Hood

Q.18. What is the NRC Staff response to Item 12 in Stamiris' supplement to Contention 2?

A. Ms. Stamiris is correct that these manifestations of the breakdown in quality assurance existed prior to December 6, 1979. Such matters were the subject of the NRC Staff Motion for Summary Disposition on the Issue of Quality Assurance Implementation Prior to December 6, 1979. However, as other Staff testimony demonstrates, the quality assurance program now satisfies all required NRC criteria; further, as a result of revisions in the quality assurance program, the improved implementation of the program, and other factors discussed in testimony submitted by James G. Keppler, the NRC now has reasonable assurance that quality assurance and quality control programs will be appropriately implemented with respect to future soils construction activities including remedial actions taken as a result of inadequate soil placement.

Hood



DARL S. HOOD

OFFICE OF NUCLEAR REACTOR REGULATION  
U.S. NUCLEAR REGULATORY COMMISSION

PROFESSIONAL QUALIFICATIONS

I am a Senior Project Manager in the Division of Licensing, Office of Nuclear Reactor Regulation. I am responsible for managing licensing activities by the Commission with respect to Midland Plant, Units 1 and 2.

I have served in the position of Project Manager with the Commission since August 1976. This position provides for the managing of radiological safety reviews of applications for licenses and authorization to construct or operate light water nuclear power plants. As of April 1980, the position also provides for the managing of the environmental reviews of such applications. I assumed responsibility for Midland Plant, Units 1 and 2, when the application for operating licenses was tendered in August 1977. Other nuclear plants for which I have previously served in this capacity are the standardization design of Westinghouse which is designated RESAR-414 (Docket STN50-572), Catawaba Nuclear Station, Units 1 and 2 (Dockets 50-413 and 50-414), and River Bend Station, Units 1 and 2 (Dockets 50-458 and 50-459).

Between June 1969 and August 1976 I held two sequential positions within the Nuclear Power Systems Division of Combustion Engineering, Inc. (C-E) at Windsor, Connecticut. After March, 1973, I was Assistant Project Manager for the Duke Power Project. This position provided assistance in directing all efforts by C-E to design, fabricate, purchase and license the nuclear steam supply systems, reactor core, and associated auxiliary systems for Cherokee Units 1, 2 & 3 and Thomas L. Perkins Units 1, 2 & 3. The position assured that all aspects of the contracts were met and that safe and reliable systems were provided to the required schedule and at a reasonable profit to C-E. I assisted Duke Power in preparing the Preliminary Safety Analysis Report (PSAR) and provided for all C-E licensing support for these units. I also provided coordination of all other nuclear plants referencing the C-E Standard Safety Analysis Report to assure compatibility with C-E standard reference design. Until March, 1973, I was a Project Engineer in C-E's Safety and Licensing Department and was responsible for licensing of nuclear power plants. I coordinated the preparation of the Millstone Unit 2 PSAR and FSAR and the Calvert Cliffs Units 1 & 2 FSAR and interfaced with NRC, the utility, architect engineer and all C-E functional departments on licensing support matters. I ensured that NRC criteria, standards, and guides were incorporated into the nuclear steam supply system design.

Between August 1966 and June 1969, I was a Nuclear Safety and Radiation Analysis Engineer in the Nuclear Safety Unit, Nuclear Division of the Martin Marietta Corporation at Baltimore, Maryland. The purpose of this position was to perform hazard evaluations for nuclear power sources applied in space missions. My primary duty was to determine public exposure to radiation for malfunctions occurring during the intended mission. I also determined means by which the hazard potential for nuclear space systems could be mitigated to the extent that nuclear safety criteria were met. I conducted research with regards to the development of suitable criteria for permissible exposure levels and their probabilities, taking into account the dependence of acceptable risk on the benefit to be derived. My primary assignment was with the SNAP 29 (Systems for Nuclear Auxiliary Power) project. My evaluations of this nuclear power source included the formulation and application of computerized models for the transport of fuel released at high altitudes, in deep ocean and in shallow waters. I derived models for these release areas to incorporate the activity into human food chains and determined the expected ingestion dose, the number of people involved and the exposure probabilities. Inhalation dose was determined for radioactive fallout from the high-altitude release.

Between February 1965 and August 1966 I was a Nuclear Quality Control Engineer within the Electric Boat Division of General Dynamics at Groton, Connecticut. The purpose of this position was to provide control of quality for naval reactor systems, components, and shielding during the construction or overhaul of submarines by this shipyard. My primary area of responsibility was shielding. Duties included establishing procedures for the inspection of fabrication and installation of lead and polyethylene shielding, and resolving problems in complying with these or other shielding procedures. The position required a knowledge of nuclear theory, SSW systems design, Bureau of Ships contract and design requirements, non-destructive testing techniques, and quality control requirements.

Between November 1963 and February 1965, I was an Aeronautical Engineer for Nuclear Propulsion and Power at the George C. Marshall Space Flight Center, National Aeronautics and Space Administration in Huntsville, Alabama. I performed investigations of the nature and magnitude of the nuclear radiation environment, shielding systems and safety systems associated with proposed nuclear space vehicles for candidate space missions.

Between November 1963 and college graduation in 1962, I held various positions including chief of a missile electronics training unit at Redstone Arsenal, Alabama; student at the U.S. Army Signal Officer's Orientation Course at Fort Gordon, Georgia; and Marine Engineer for ordinance and special weapons within the Design Division of the Norfolk Naval Shipyard, Portsmouth, Virginia.

I received a Bachelor of Science Degree in Nuclear Engineering from North Carolina State University in 1962. I am a member of the Health Physics Society.

PROFESSIONAL QUALIFICATIONS AND EXPERIENCE

NAME: Joseph D. Kane

ADDRESS: 7421 Miller Fall Road  
Derwood, MD 20855

EDUCATION: B.S. Civil Engineering 1961  
Villanova University  
M.S. Civil Engineering 1973  
Villanova University  
Post-degree studies, Soils and Foundation Engineering  
University of California 1972  
University of Maryland 1978

PROFESSIONAL REGISTRATION:

Registered Professional Engineer (1966) - Pennsylvania 12032E

PROFESSIONAL SOCIETY:

American Society of Civil Engineers

EMPLOYMENT POSITIONS:

February 1980 - Present	Principal Geotechnical Engineer U.S. Nuclear Regulatory Commission
May 1977 - February 1980	Geotechnical Engineer U.S. Nuclear Regulatory Commission
October 1975 - May 1977	Soils Engineer U.S. Nuclear Regulatory Commission
August 1973 - October 1975	Supervisory Civil Engineer Chief, Soils Design Section U.S. Army Corps of Engineers Philadelphia District
January 1963 - August 1973	Civil Engineer Soils Design Section U.S. Army Corps of Engineers Philadelphia District
January 1962 - January 1963	Design Engineer McCormick - Taylor Associates Philadelphia, Pa.

PROFESSIONAL EXPERIENCE SUMMARY:

1975 to Present

In NRC Division of Engineering, Geotechnical Engineering Section, Mr. Kane has specialized in soil mechanics and foundation engineering. Experiences in this position have included the following:

- a. Evaluation of the foundation adequacy of proposed sites for nuclear facilities with respect to design and operational safety. This work has included evaluation of geotechnical, soils and rock mechanics, foundation and earthquake engineering related aspects. The results of this review effort are summarized in a safety evaluation report for each of the proposed facilities which have included nuclear power plants, nuclear fuel reprocessing plants and uranium mill tailings waste systems.
- b. Serving as a technical adviser for soil and foundation engineering related aspects in the development of regulatory guides, acceptance and performance criteria that are intended to assure construction and operational safety of nuclear facilities.
- c. Serving as a technical representative for the Office of Nuclear Reactor Regulation on the NRC Advisory Group concerned with federal dam safety.
- d. Serving as an instructor for the Office of State Programs in the training of state personnel who are responsible for construction and operational inspections of uranium mill tailings embankment retention systems.

1963 to 1975

During this period Mr. Kane was employed with the U.S. Army Corps of Engineers, Philadelphia District and attained the position, Chief, Soils Design Section, Foundations and Materials Branch, in 1973. Professional experiences with the Corps of Engineers have included the following:

- a. The embankment and foundation design of four large multi-purpose earth and rockfill dams with appurtenant structures (spillways, inlet and outlet structures, control towers, flood protection facilities, etc.). Responsibilities ranged from the initial planning of

subsurface investigations to select the most feasible sites through all design stages which were culminated in the final preparation of construction plans and specifications. This work included planning and evaluation of laboratory testing programs, studies on slope stability, seepage control and dewatering systems, settlement, bearing capacity, liquefaction, embankment safety instrumentation and slope protection.

- b. Served as a technical consultant to field offices charged with construction inspections for assuring completion of structures in compliance with design analysis and contract specifications. Participated in the development of needed modifications during construction whenever significant changed site conditions were uncovered.
- c. Directed the efforts of engineers in the Soils Design Section in other fields of civil work projects that included the embankment and foundation design of levees, waterfront pile supported structures and disposal basins for the retention of hydraulic dredge waste.

1962 to 1963

Served as design and project engineer for private consulting firm. This work included the design of large federally funded highways, a race track and various structures constructed to provide a Pennsylvania State park marina.

Frank Rinaldi, P.E.  
Structural Engineering Branch  
Division of Engineering  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulation Commission

My name is Frank Rinaldi. I presently reside at 5506 Beech Ridge Drive, Fairfax, Virginia, 22030 and I am employed as a Senior Structural Engineer in the Structural Engineering Branch, Division of Engineering, Office of Nuclear Reactor Regulation, Washington, D.C., 20555.

Professional Qualifications

I received a B.S. degree in Civil Engineering from the City College of New York (1966) and a M.S. degree in Civil Engineering from Maryland University (1974).

I am a registered Professional Engineer in the Commonwealth of Virginia (1972).

I am a member of the Main Committee of the ACI-ASME Committee on Concrete Pressure Components for Nuclear Service (Concrete Reactor Vessels and Containments).

I have been employed by the NRC, Structural Engineering Branch since 1974 as a Senior Structural Engineer. My duties include development of design criteria for nuclear structures and participation in the formulation of safety criteria. Duties also involve safety-related review of structural and seismic design criteria (Safety Analysis Report & Topical Reports) for power systems and the evaluation of nuclear containment structures, reactor vessels and other structures and components.

The following is a summary of my previous professional experience:

1971-1974 U.S. Atomic Energy Commission

Fuel Fabrication and Transportation Branch  
(Structural Engineer)

1970-1971 Naval Facilities Engineering Command-Division of Research  
Development and Testing and Evaluation (General Engineer).

1968-1971 Naval Facilities Engineering Command-Electronics Facilities  
Support Branch (Structural Engineer).

1966-1968 Naval Facilities Engineering Command-Chesapeake Division  
(Civil Engineer).

EUGENE J. GALLAGHER

OFFICE OF INSPECTION AND ENFORCEMENT  
U.S. NUCLEAR REGULATORY COMMISSION

PROFESSIONAL QUALIFICATIONS

I am a Civil Engineer in the Division of Resident and Regional Reactor Inspection, Reactor Engineering Branch, Office of Inspection and Enforcement.

I received a Bachelor of Engineering Degree in Civil Engineering from Villanova University in 1973 and a Master of Science Degree in Civil/Structural Engineering from Polytechnical Institute of New York in 1974. I am a registered Professional Engineer in the States of Illinois (#37328), Florida (#29114) and Louisiana (#16376). I am a member of the American Society of Civil Engineers, American Concrete Institute and Tau Beta Pi National Engineering Honor Society.

In my present work at the NRC, I provide technical assistance in the area of civil engineering to Regional offices and resident inspectors with particular emphasis on the design and construction of reinforced and prestressed concrete structures, foundations, structural steel buildings and in structural testing and surveillance. In addition, I provide technical input for the development and interpretation of industry codes, standards and regulatory requirements relating to inspection activities.

From 1973 to 1981 I was a member of the NRC Region 3 inspection staff responsible for the inspections of civil engineering aspects of plants under construction and in operation. This included the inspection of laboratory and field testing of concrete, steel and soils materials, earth embankments and dams, material sources, piping systems and reinforced and prestressed concrete structures. In addition, a review of management controls and quality assurance programs were performed at plants under construction. I participated in approximately 90 inspections of reactor facilities.

Prior to joining the NRC Staff I was employed by EBASCO Services, Inc. in New York City from 1973 to 1978. I performed designs of reinforced concrete and steel structures, design of hydraulic and water supply systems and preparation of specifications for construction. From 1976 to 1978, I was the civil resident engineer at the Waterford 3 Nuclear Plant site responsible for providing technical assistance to construction.

During 1972 and 1973 I was employed by Valley Forge Laboratory in Devon, PA performing inspection and testing on concrete, steel and soil materials.



ADDITIONAL NRC TRAINING

Fundamentals of Inspection, NRC, February 1973 (40 hours)  
BWR Fundamentals Course, NRC, March 1973 (40 hours)  
Concrete Technology and Codes, Portland Cement Assoc., May 1978 (80  
hours)  
Quality Assurance Course, NRC, August 1973 (40 hours)  
Nondestructive Examination and Codes, Rockwell Int'l., August 1978 (120  
hours)  
PWR Fundamentals Course, NRC, November 1973 (40 hours)  
Welding Metallurgy, Ohio State University, September 1980 (80 hours)



Attachment to NCR No QF-203

Nonconformance Description and Supporting Details:

Project Quality Control Instruction R-1.00, "Material Receiving Instruction" Section 5.2 of Revision 3 and Section 5.1 of Revision 5 states in part, "Requirements for the sampling and testing and the acceptance criteria reference documents shall be noted on the applicable IR" and Section 5.4 of Revision 3 and 5.3 of Revision 5 states, "Review any required user's test data reports to verify that they have been satisfactorily completed".

Part A

QCIR No. R-1.00-1560 for Zone 4A Fine Backfill references User's Test Report No. 0630 and the acceptance criteria as:

<u>Sieve Size</u>	<u>% Passing</u>
1"	100
3/4"	90-100
1/2"	75-90
3/8"	60-85
#200	7-15

Contrary to the above, User's Test Report No. 0630 references 75-100% passing as the acceptance criteria for the 1/2" sieve, consequently 94% passed the 1/2" sieve and it was accepted when actually it failed.

Part B

QCIR No. R-1.00-2105 for Zone 4A Fine Backfill references User's Test Report No. 1036 and the acceptance criteria as:

<u>Sieve Size</u>	<u>% Passing</u>
1"	100
3/4"	90-100
1/2"	75-90
3/8"	60-85
#200	7-15

Contrary to the above, User's Test Report No. 1036 indicated 81% passing the 1/2" sieve and accepted, this should have indicated 91% passing the 1/2" sieve and failed.

Attachment to NCR No QF-203

Nonconformance Description and Supporting Details: (Contd)

Part C

QCIR No. R-1.00-1836 for Zone 4A Fine Backfill references User's Test Report No. 0836 and the acceptance criteria as:

<u>Sieve Size</u>	<u>Z Passing</u>
1"	100
3/4"	90-100
1/2"	75-90
3/8"	60-85
#200	12-20

Contrary to the above, User's Test Report No. 0836 had 11% passing the #200 sieve and it was accepted.

Recommended Corrective Action:

Part A & B

1. Present these findings to Bechtel Project Engineering so Project Engineering can determine what additional tests, reviews, etc. are needed to justify the material these tests represent. Have Project Engineering determine the acceptability of the material these failing tests represent.
2. Determine the underlying cause(s) for these discrepancies and take corrective action to preclude repetition in other areas.

Part C

1. An evaluation of this material is not needed because the acceptance criteria as given on QCIR No. R-1.00-1836 was 12-20% passing the No. 200 sieve. It should have been 7-20%, therefore, the test result of 11% is passing.
2. Determine the underlying cause(s) for QC not rejecting the Zone 4A Fine Backfill per the QCIR No. R-1.00-1836 acceptance criteria of 12-20% passing the No. 200 sieve. Review the interface between the material receiving QCE's and the test lab QCE's to determine if there is a breakdown in communicating the inspection criteria for materials being received. Take corrective action to preclude repetition.

Attachment to NCR No QF-203

<sup>1</sup> Corrective Action Taken:

Part A & B

1. NCR-1094 was written to identify the nonconforming material in Part A. Project Engineering dispositioned this material "Use-As-Is". NCR-1055 was written to identify the nonconforming material in Part B. Field Engineering has dispositioned this material "Reject For Q-Use". This material was only used in Non-Q Areas.
2. ~~The underlying cause of these conditions was improper review of the test reports by Quality Control. To prevent this condition from recurring, a training session was held with cognizant individuals in attendance.~~

Part C

1. Based on response given in Part A of letter O-1621 from J. Newgen to G. Richardson, it was necessary for Field Engineering to justify the more stringent requirements and the use of this material when it did not meet these requirements. The justification was given by Field Engineering.
2. The underlying cause of this condition was that the Civil QC Engineer identified the different gradation requirements on the QCIR and failed to bring it to the attention of the QC Receiving Engineer. To preclude repetition, the cognizant QC engineers in both disciplines were reminded that close interfacing is a necessity.

CONSUMERS POWER COMPANY  
**RECEIVED**  
FEB 1 1978

FIELD QUALITY ASSURANCE  
MIDLAND, MICHIGAN

Consumers Power Company  
P. O. Box 1963  
Midland, MI 48640

Attention: J. L. Corley

Bechtel Power Corporation

Post Office Box 2167  
Midland, Michigan 48640



January 31, 1978

JLC	
CRK	
MGW	
PKK	
GE	-2
TRE	

Job 7220 Midland Project  
CPCo NCR QF-203 Final  
GLR-01-78-040

Dear Mr. Corley:

Ref: 1) Letter J. Corley to G. Richardson, 216FQA77, dated 12/23/77

The following is in response to the above subject nonconformance report which identified problems on user tests for backfill material.

For the material identified in Part A of the subject finding, NCR-1094 was written. This NCR has been dispositioned by Project Engineering as Use-As-Is, and is now closed.

For the material identified in Part B of the subject finding, NCR-1055 was written. This NCR is closed as previously addressed in letter GLR-01-78-001.

For the material identified in Part C of the subject finding the field has provided justification as to why FMRs had stricter requirements than those given by Project Engineering. In letter ~~0-1621~~, dated 1/17/78, Field Engineering stated in part:

*0-1651 2/12/78*

The reason for specifying a 12-20% range of aggregate passing through a #200 sieve, when Specification C-210, Rev. 5 and Dwg. C-130, Rev. 6 allowed a range of 7-20%, was strictly for commercial reasons. The vendor said he had a supply of "12-20% material". When this material actually turned out to be 11%, it was still acceptable for use in accordance with our specification and drawing.

This concludes our action on the subject nonconformance report. Should you desire additional information, do not hesitate to bring it to my attention.

Very truly yours,

G. L. Richardson  
LEAD QUALITY ASSURANCE ENGINEER

GLR/JGH/sw

Bchtel Power Corporation

Interoffice Memorandum

To: G. L. Richardson

File No.

Job 7220 Midland Project  
FMR Preparation  
0-1651

Date: January 17, 1973

From: J. F. Newgen

Construction

Midland, MI

- References: 1) Ltr. Richardson to Newgen, GLR-12-77-532, dated 12-23-77 (I 8840)  
2) Ltr. Corley to Richardson, 216FQA77, dated 12-23-77

This memo is in response to reference 1 and is numbered similarly.

1. Our reason for specifying a 12-20% range of aggregate passing through a number 200 sieve, when Specification C-210, Rev. 5 allowed a range of 7-20%, was strictly for commercial reasons. The vendor said he had a supply of "12-20% material". When this material actually turned out to be 11%, it was still acceptable for use in accordance with our Specification. The only "error" was in dispositioning NCR QF-203 by revising the FMR, rather than noting to "use as is".
2. The intent of our previous response to blank signature blocks on FMR's CI-3171, Rev's 1 & 2, was to point out the following:
  - a. Revisions to FMR's for commercial purposes do not fall under the QA program.
  - b. Paragraph 3.10.2 of the IJI-1, Rev. 1 limits the necessity of the approval process of FMR revisions to those which address specification changes.
  - c. Commercial changes to FMR's are not governed by FPG-3.000.

3. We disagree that a generic problem currently exists in the approval completeness of FIR's. The PFE and APFE's have indicated the frequency of signature omission is negligible on "Q" FIR's. Those which have lacked signatures were returned when discovered.
4. The PFE and APFE's have intensified their surveillance of "Q" FIR's to assure the requirements of FPG-8.000 are implemented.

JFH/LFS/re

  
J. F. Newgen



# Bechtel Associates Professional Corporation

777 East Eisenhower Parkway  
Ann Arbor, Michigan

Mail Address P.O. Box 1000, Ann Arbor, Michigan 48106

Attachment 3

Kane

MEETING NOTES NO. 882

MIDLAND PLANT UNITS 1 & 2

CONSUMERS POWER COMPANY

BECHTEL JOB 7220

DATE: Tuesday, November 7, 1978  
PLACE: Champaign, Illinois  
SUBJECT: Settlement of the Midland Diesel Generator Building  
FILE: 0279, C-280, C-2640, C-2645

ATTENDEES:	<u>CONSULTANTS</u>	<u>CPCo</u>	<u>BECHTEL</u>
	J. Dunnicliff	T.C. Cooke	S. Afifi
	Dr. A. Hendron, Jr.	C.A. Hunt	J. Betts
	Dr. R. Peck	D.E. Horn	S. Blue
		R.M. Wheeler	W.R. Ferris
		D.E. Sibbald	Y.K. Lim
			A. Marshall
			P.A. Marcinez
			B.C. McConnel
			M.O. Rothwell
			N.W. Swanberg

PURPOSE: To obtain formal recommendations from the consultants.

## ITEMS DISCUSSED:

### 1. Background Information

Bechtel presented settlement data for the diesel generator building. The data indicated no significant change in the previous trends except for the eastern most diesel generator pedestal which experienced significant additional settlements during the past month of (approximately 1 inch at the N-W corner, 3/4 inch at the N-E corner and 0.4 inches at the other two corners). It was noted that the soil test pit was dug in this bay and some of the differential settlement could be attributed to the pit. The remaining boring data was consistent with previous boring information. The possible corrective actions previously discussed were reiterated:

- a. No corrective action taken except grouting under footings.
- b. Modify the present strip foundations for the walls to a continuous mat foundation for the entire building.

- c. Preload and consolidate the soil under the building.
- d. A combination of Items b and c above.
- e. Underpin the building to transmit loads directly to the undisturbed soil layer.
- f. Remove and replace fill.

2. Recommendations

Soil boring data substantiated the jobsite observations by Dr. Peck that the fill is settling under its own weight. There are only two suitable options to correct the situation:

- a. Remove fill and replace with denser material.
- b. Densify existing material in place.

Therefore, the preload option is suggested to consolidate the material in place. The soil data indicate a nonhomogenous fill. Therefore exact amount of preload and the consolidation duration cannot be estimated from the laboratory tests. To predict the amount and duration of the preload, instrumentation of the soil movement is needed.

It was indicated that a 5-month period is available in the schedule for preloading. Dr. Peck stated that it is likely that the settlement will occur rapidly once the preload is placed, but that the additional settlement could not be predicted with any accuracy at this time. A range of 6 to 18 inches was considered to be quite pessimistic. Dr. Peck recommended proceeding with the instrumentation and preload as rapidly as possible.

5 mo period  
Testimony  
Pg. 14

3. Other Options

The other options were briefly discussed. Options a and b would not stop the differential settlement and there would still be settlement of the underground utilities. The effects of the settlement may show up after several years, causing problems during plant operation. Underpinning (Option e) would only be necessary in case of structural distress after the preload had been completed. Underpinning prior to preload would not help the settlement of the soil under its own weight. It was not felt to be an adequate solution.

~~Underpinning~~

4. Pond Fill

The consultants suggested that the best sequence would be to place the preload and then raise quickly the cooling pond water level to its operating level. This sequence would allow the consolidation to occur as rapidly as possible. Otherwise, the additional water entering the soil voids will have to be forced back out, extending the consolidation duration. However, after further discussion it was agreed to by the consultants to proceed with filling of the pond immediately, because the amount of river water available for filling is restricted.

Pond raising  
Testimony  
Pg. 14

5. Bearing Capacity

The consensus was that there is no bearing capacity problem, static or dynamic. However, if justification, in addition to the monitoring data during preload, is required by the NRC, test pits may be dug to determine actual bearing capacity. Additional samples from borings after the preload are not recommended.

6. Suggested Activities

The highest priority is to install the soil monitoring devices. The soil anchors at several depths should go in first starting with the SE corner of the building and then the piezometers could be placed. The duct banks which appear to be restraining the building settlement should be isolated from the building as necessary. The building construction should continue, thereby providing more weight on the foundations. Any gaps between the footing and the mud mat would require grouting. The grouting would not be necessary prior to preload. It was pointed out that from a safety and a building distress point of view, it would be advisable to grout existing gaps prior to releasing duct banks. It was also suggested that the mud mat be broken up prior to preload.

Grouting Gaps  
Testimony  
19/16

7. Preload Details

The preload height should be about 20'-0", approximately equal to the depth of the material to be consolidated. Physical limits restrict the preload depth to approximately 23 feet. The preload rate is not critical and even distribution would be adequate. The preload should be stopped at 10 feet for about a week to watch the monitoring, and then increased to 15 and 20 feet as necessary. It was suggested that a 20-foot berm with a 30 degree slope be used around the building where possible. Frost protection for the area to be preloaded was considered appropriate if required by weather conditions.

8. Possible Cause

Consumer's asked the consultants for the cause of the excessive settlement. Dr. Hendron stated that there were in addition to nonuniform fill, erratic properties which may have been caused by too much variation in lift thicknesses. Dr. Peck said that the exact answer may be extremely difficult to determine. He added that material placed dry of optimum would later, with the presence of moisture, tend to soften the materials. He also added that refilling of excavations from existing fills tends to be less adequate than the original fill. He said large areas to be compacted are better than small areas and gave the example of the dike versus the Diesel Generator foundation area.

#### 9. Cooling Pond Dike

The opinion of the consultants was that it is not necessary to perform borings in the cooling pond dike. There is a possibility of hydraulic fracture. The monitoring information from the dike has shown no reason for concern. There has been no significant settlement since the 1-1/2-inch settlement in the southeast corner observed in early 1978. This is the best evidence that the dike is performing satisfactorily. There also has been a detailed visual inspection made on the dikes which indicates no evidence of problems.

#### 10. Liquefaction

There are some sand materials under the north side of the diesel generator building. The boring blow counts in some isolated zones indicate that the potential for liquefaction would have to be evaluated. Vibrofloatation is a possible solution for liquefaction problems if they exist.

#### 11. Proposed Instrumentation

The proposed instrumentation to be used to monitor the structure, soil, and utilities was discussed. The structure, including the generator pedestals, would be monitored by survey. Areas covered by preload would have rods encased by sleeves extending to a visible point. Four of the existing cracks in the concrete structure will be monitored by electronic strain gages. The existing fill will be monitored by 50 borros anchors. The anchors will be placed at three levels within the fill. There will also be some anchors placed outside of the preloaded area as settlement control. The borros anchors should be initially monitored on a daily basis. Settlement platforms will be used through the preload to monitor the top of ground. The pore water pressure will be monitored by 20 piezometer at approximately the same three levels, except that the sand length is to be shortened to approximately 2 feet.

The utilities under the structure (condensate and service water pipes) would be monitored by drag through settlement devices. The accuracy of data is anticipated to be  $\pm 1/4$  inch and a series of readings would have to be made to develop a base line. Inclometers were proposed to monitor the lateral movement of soil and utilities but the soil consultants felt that they were not needed.

#### 12. Slab at Elevation 634'-0"

The consultant suggested that grating be used inside the building instead of the compacted fill and slab to eliminate material placed above the foundation. The feasibility was to be investigated by Bechtel.

13. Other Structures

The other structures founded on plant fill will be discussed following the December 4, 1978, meeting with the NRC.

14. Contact with NRC

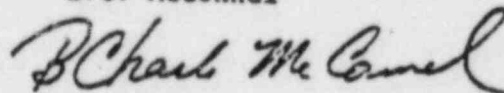
A call was placed to Mr. Hood and Mr. Heller of the NRC by Mr. Cooka of CPCo; Dr. Peck and Dr. Mendron, soils consultants; and Mr. Ferris of Bechtel informing them of our progress and to set up a jobsite visit on December 3, 1978, with a discussion the following day.

ACTION ITEMS:

- Bechtel 1. Proceed with preparations for preload as rapidly as possible.
- Bechtel 2. Evaluate the feasibility of using a grating floor at elevation 634'-0".
- Bechtel 3. Evaluate the potential for liquefaction. This item was resolved with the consultants at the November 18, 1978, meeting held in Urbana, Illinois.

BCM/js  
12/1/1

B.C. McConnel



Kane



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

JUN 30 1980

Docket Nos.: 50-329/330

Mr. J. W. Cook  
Vice President  
Consumers Power Company  
1945 West Parnall Road  
Jackson, Michigan 49201

Dear Mr. Cook:

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION REGARDING PLANT FILL

We have reviewed your responses to our requests of November 19, 1979 regarding the quality of plant fill, effects and remedial actions resulting therefrom. Our review is being performed with the assistance of the U. S. Army Corps of Engineers. We and they find that the results of additional explorations and laboratory testing identified in Enclosure 1 (Request 37) are needed to support required geotechnical engineering studies. Details on the extent of these studies will be provided shortly by separate correspondence. Enclosure 1 is provided in order that you may initiate planning of the required explorations in a timely manner. However we suggest you await receipt of these further details prior to physically beginning the explorations. Enclosure 1 (Footnote 4 of Table 37-1) also includes requests for advanced notification of the availability of certain samples.

As noted in our Request 37 of Enclosure 1, your position in previous responses to Requests 5 and 35 not to complete additional explorations, sampling and laboratory testing after preloading continues to be unacceptable to us. So that you might better understand our position, we offer the following observations:

- (1) The preload program as completed on the heterogeneous materials which were placed for the purpose of structural fill is not necessarily an improvement, nor does it necessarily produce foundation soils of more uniform engineering properties, compared to the soil performance which would have resulted if the material had been properly compacted to the original requirements established in the Midland PSAR.
- (2) To develop reasonable assurance of plant safety, the required studies are needed to serve as an independent verification of the predictions of future settlements and the conclusions of the preload program.

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Mr. J. W. Cook

- 2 -

JUN 30 1930

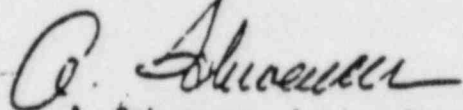
- (3) The required studies will permit an estimate of total and differential settlement for involved structures and systems following drawdown with the proposed permanent dewatering system.
- (4) Certain aspects of the preload program, such as the complication introduced by the simultaneous raising of the cooling pond reservoir, present difficulties in our full acceptance of your conclusion of the preload program.

Testimony  
Pg. 14

Enclosure 1 also includes other requests for information which we and the U. S. Army Corps of Engineers need to continue our review.

We would appreciate your response to Enclosure 1 at your earliest opportunity. A partial reply based upon data already available should be submitted rather than to await the results of new borings and tests contained in parts of Enclosure 1. Should you require clarifications of these requests and positions, please contact us.

Sincerely,



A. Schwencer, Acting Chief  
Licensing Branch No. 3  
Division of Licensing

Enclosure:  
As stated

cc: See next page

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cc: Commander, Naval Surface Weapons Center  
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White Oak  
Silver Spring, Maryland 20910

Mr. L. J. Auge, Manager  
Facility Design Engineering  
Energy Technology Engineering Center  
P. O. Box 1449  
Canoga, Park, California 91304

Mr. William Lawhead  
U. S. Corps of Engineers  
NCEED - T  
7th Floor  
477 Michigan Avenue  
Detroit, Michigan 48226

ADDITIONAL REQUESTS REGARDING PLANT FILL

36. We have reviewed your response to Request 24 and find that information from additional boring logs is needed.

Provide the boring logs for the following explorations:

- a. Pull down holes PD-1 thru PD-27 (35 holes that include 8A, 20A, 20B, 20C, 15A, 15B, 15C and 27A)
- b. LOW-1 thru LOW-14 (14 holes)
- c. TW-1 thru TW-5 and PZ-1 thru PZ-48 (55 holes)
- d. OW-1 thru OW-5 (5 holes)
- e. TEW-1 thru TEW-8 (8 holes)

The logs should include date and method of drilling, the type and location of samples attempted. Also provide the locations, boring logs and available test data of any exploration completed in 1979 and 1980 which has not yet been submitted.

37.  
(RSP)

Your position in previous responses to Requests 5 and 35 not to complete additional explorations, sampling and laboratory testing following the preload program continues to be unacceptable. We require that you complete as a minimum, the exploration and testing program indicated by Table 37-1.

38. Discuss the foundation design for any seismic safety-related piping and conduit connected to or located under the Radwaste Building and Turbine Building where piping and conduit have been placed on plant fill.

Table 37-1

Request for Additional Explorations, Sampling and Testing

<u>Location</u> <sup>1/</sup>	<u>Depth</u> <sup>2/</sup>	<u>Sampling</u> <sup>3/</sup>	<u>Lab Testing</u> <sup>4/</sup>	<u>Anticipated Geotechnical Engineering Studies to be Required</u> <sup>6/</sup>
Diesel Generator Building (6 holes along perimeter)	Thru fill and a minimum of 5' into natural glacial till soils	Classify samples according to Unified Soils Classification System	For cohesive soils C-D (Consolidated-Drained) C-U (Consolidated-Undrained) Consolidation <sup>5/</sup>  For sands Drained Direct Shear on both loose & dense specimens  Relative Density	Bearing Capacity Settlement Piping Distortion
Auxiliary Building (2 holes)	Same as above	Same as above	Same as above except add U-U (Unconsolidated-Undrained for cohesive soils	Caisson Foundation Design (Vertical and Lateral Load Support)
Service Water Pump (1 hole) Structure and Retaining Walls (2 holes)	Same as above	Same as above	Same as above except consolidation testing would be limited to samples in retaining wall foundations.	Pile Foundation Design (Vertical and Lateral Load Support) Retaining Wall Stability & Settlement.
Cooling Pond Embankments (7 holes along perimeter)	Extend thru fill and a minimum of 5' into natural residual soils except hole no. 5 which should extend to bottom elevation of cooling pond.	Same as above	For cohesive soils C-D (Consolidated-Drained) C-U (Consolidated-Undrained) U-U (Unconsolidated-Undrained)	Slope Stability Fill compaction adequacy

NOTES: See page 2

Table 37-1 (continued)

## NOTES:

- 1/ See attached Figs. 37-1 and 37-2 for approximate boring location. Holes to be accurately located in the field to avoid obstructions, underground piping and conduits and slurry trench area.
- 2/ No boring is to be terminated in loose or soft soils.
- 3/ Continuous split spoon sampling using SPT is required. Holes are to be held open using either casing or hollow stem auger. Additional borings to obtain representative undisturbed samples for detailed laboratory testing should be located at the completion and elevation of the split spoon sampling program. The groundwater level should be recorded at the completion of drilling in all borings once the level has stabilized.
- 4/ Normal classification (e.g., gradation, Atterberg Limits) unit weight and moisture content testing to be performed on representative samples from each significant foundation layer. This column pertains to lab testing in addition to the above mentioned tests. It is requested that at least one week notice be provided to the NRC before opening undisturbed samples to permit on site visual observation by Corps of Engineer representative.
- 5/ The maximum load should be great enough to establish the straight-line portion of the void ratio-pressure curve.
- 6/ Details on the extent of geotechnical engineering studies to be completed using the results of field and lab testing work will be provided in a separate letter.

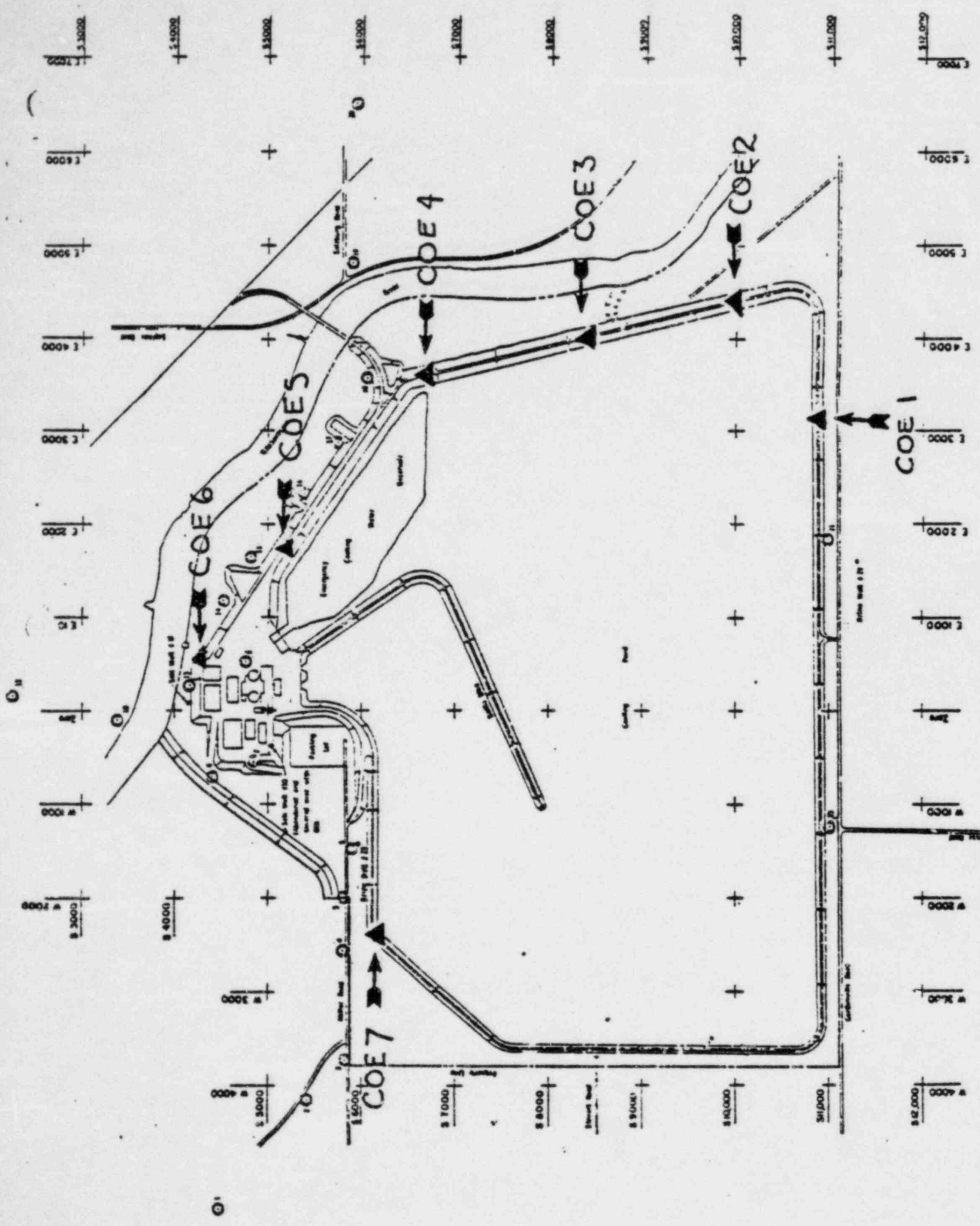


Figure 37-1

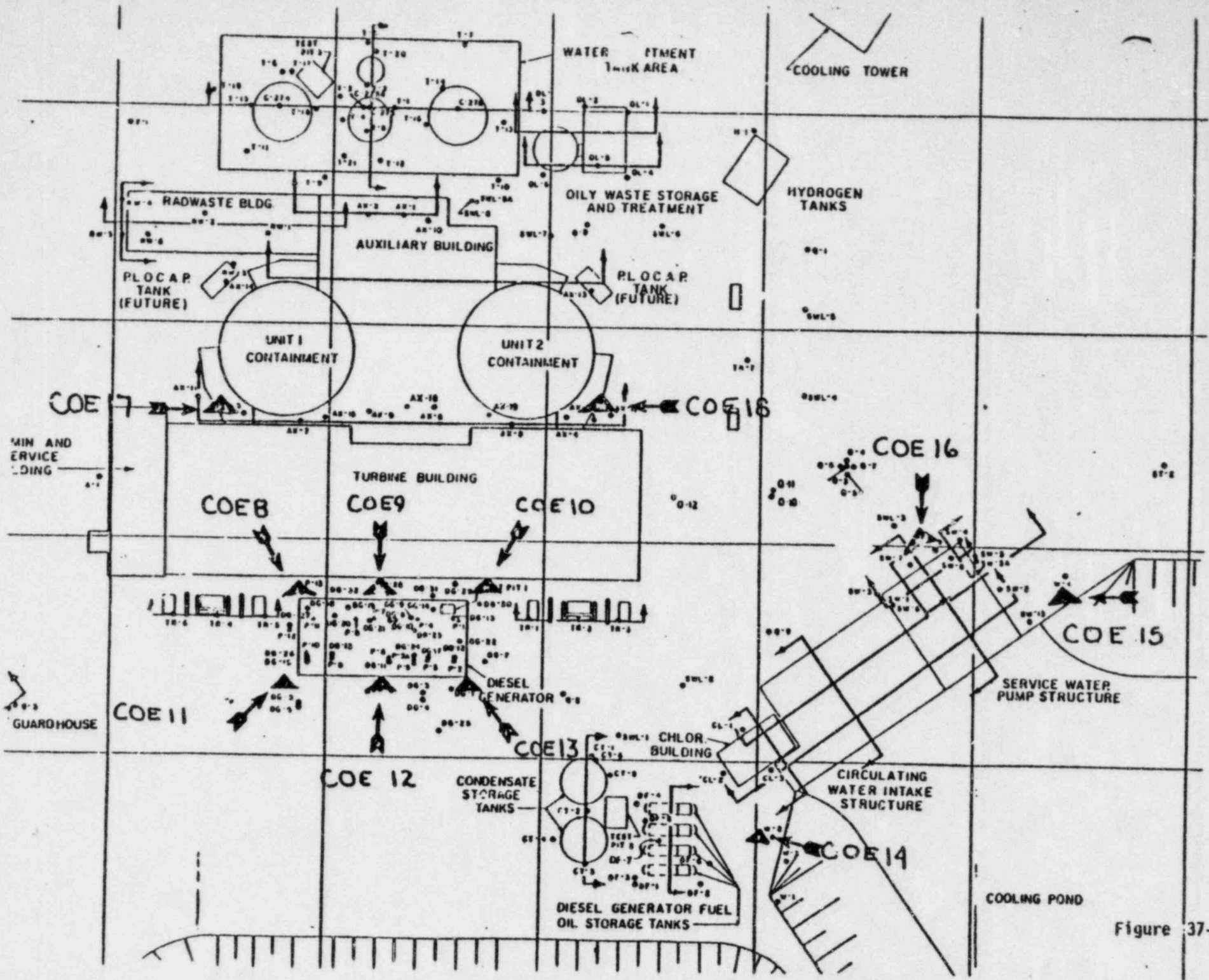


Figure 37-2



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

Attachment

5

Kane

OCT 16 1979

Docket Nos. 50-329  
and 50-330

APPLICANT: Consumers Power Company  
FACILITY: Midland Plant, Units 1 & 2  
SUBJECT: SUMMARY OF JULY 18, 1979 MEETING ON SOIL DEFICIENCIES AT THE  
MIDLAND PLANT SITE

On July 18, 1979, the NRC staff met in Bethesda, Maryland with Consumers Power Company and the Bechtel Corporation to discuss deficiencies in the fill used at the site for Midland Plant, Units 1 & 2. Also present were representatives of the ACRS staff. Meeting attendees are listed in Enclosure 1.

In response to NRC requests, the applicant has documented in detail the presentations given during this meeting. The presentations are contained in S. H. Howell's letter to J. G. Keppler dated August 10, 1979. In view of the August 10, 1979 letter, no summary of the presentations is contained herein. Rather, additional discussion consisting of comments and questions given during and following the presentations are summarized.

During the presentation regarding remedial work in progress or planned (item 3 of the presentations), the staff noted that underground piping from the borated water storage tanks and service water lines pass under railroad tracks, and that these and other piping are subject to loads due to construction cranes and other traffic. The staff requested the applicant to describe the design features and other measures which assure that such piping is not subjected to excessive loads. The applicant will respond at a later date.

The applicant noted that it is performing laboratory investigations of the stainless steel piping removed from the condensate storage tank. This underground piping was found to be heavily corroded. It was noted that the injection piping from BWST is of the same composition and is also unprotected from electro-chemical attack. The test-pits in the tank farm area which are being dug to investigate the effect of the air discharged from underground pneumatic lines was also described. Results will be reported shortly.

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OCT 16 1979

The staff noted that the response to its 10 CFR 50.54 requests for acceptance criteria for remedial actions (e.g., questions 4, 6, etc.) had not resulted in identification of criteria in advance of the remedial action. Rather the reply notes that the criteria will be determined during or after the remedial action. The staff stated that this approach by the applicant does not provide for timely staff feedback at the outset, but rather the staff must await results of the program to determine what acceptance criteria were used and if they are acceptable. Thus, the remedial action is being conducted entirely at the applicant's own risk.

Testimony  
pg 65

The applicant's presentation of the permanent site dewatering system (presentation item 3.3) noted that the system is not designed to seismic Category I requirements, but that the monitoring aspects of the system are safety grade. The NRC staff noted that acceptance criteria for the dewatering system are given in the Standard Review Plan (Section 2.4.13, Revision 1) and requested that the applicant address Branch Technical Position HMB/GSB 1, "Safety Related Permanent Dewatering Systems", Revision 1, attached thereto. The applicant will respond in the near future. The quality assurance plan for implementing the dewatering system will also be provided in future reports.

Bechtel described the structural and seismic analytical investigations being performed or planned for the affected structures (item 4 of the presentations). The staff noted that further review of the acceleration (g) value used for site design has been impacted by staff manpower restructuring for the TMI-2 investigations and that use of outside contractors for the Midland seismic review is presently being considered. The staff also noted that its present review indicates some areas of disagreement with the applicant's proposed loads combinations and design criteria for SSE and differential settlement, and with the treatment of cracks in structural walls. The staff will further document these and other positions at a later date.

Bechtel reported (item 7 of the presentations) the results of its investigations into the cause of insufficient compaction of the plant area fill, and identified five causes considered to be the most probable. The applicant noted its agreement with the Bechtel findings. Bechtel noted that personnel were not included as a most probable cause because its review of qualifications and experience of both Bechtel and US Testing personnel had shown presence of sufficient education, experience, and training to carry out the tasks assigned. The NRC staff noted that it disagrees with Bechtel's finding that personnel qualification was not a probable cause, and stated that further review of the basis for this Bechtel finding will be needed.

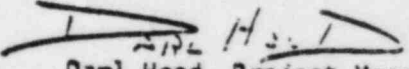
Staff comments regarding the QA/QC aspects (presentation item 3) were based upon the applicant's 10 CFR 50.54(f) responses to question 1 by letter of April 24, 1979:



OCT 16 1979

- (1) The applicant's response in item B.1 of Appendix I (page I-3) states its conclusion that "Specifications C-210 and C-211 provide sufficient criteria by which to ensure that the fill is adequately placed to prevent excessive settlement." The staff noted its disagreement with this statement. The staff noted, for example, that its I&E investigations show that the specifications did not require qualification of equipment used to compact material, the lift thicknesses permitted were excessive for adequate compaction, the moisture control was unclear and the compactive effort to develop 95% of compaction was internally in conflict within Specification C-210.
- (2) The applicant's response in item B.2 of Appendix I (page I-3) noted that letters, TWX's, telecons, and memoranda are often used to clarify the intent of the specifications, and that "it is possible" that in some situations the clarification provided through such methods may have modified the specification without formally changing the wording of the specifications. The staff commented that a more positive statement appears to be warranted based upon the findings of I&E. Numerous examples where telecons and memoranda were used to change the requirements of the specifications without revising the controlled document itself was cited in I&E Inspection Report No. 50-329/78-20 and 50-330/78-20. I&E found that not only did these memoranda change the requirements of the specifications, but in some instances, conflicted with previous engineering directives.
- (3) The staff noted that its review of QA aspects was continuing and that further requests for information would be issued.

At the conclusion of the presentations, the NRC staff noted that the information presented was significant to the present review, and requested that the applicant document and submit its presentations, including copies of the viewgraph slides used.

  
Darl Hood, Project Manager  
Light Water Reactors Branch No. 4  
Division of Project Management

Enclosure:  
As stated

cc: See next page

ENCLOSURE 1

ATTENDEES

July 18, 1979

Consumers Power Company

G. S. Keeley  
D. E. Horn  
T. Thiruveneadam  
T. C. Cooke

NRC:NRR

D. S. Hood  
D. M. Gillen  
R. E. Lipinski  
J. Gilray  
F. Schauer  
L. Heller  
L. S. Rubenstein

NRC:OELD

R. Hoefling

NRC:IE

D. W. Hayes  
G. Gallagher  
J. B. Henderson

ACRS

D. Zukor  
P. Tam

Bechtel\*

T. E. Johnson (BPC)  
P. A. Martinez (BPC)  
K. Wiedner (BPC)  
D. Riat (AA)  
W. R. Ferris (SF)  
H. Wahl (AA)  
A. B. Arnold (SF)  
B. Dhar (AA)  
F. J. Hsiu (AA)  
S. S. Afifi (AA)  
G. Richardson (BPC)  
A. J. Boos (BPC)  
J. R. Davie (G)

Bechtel Consultants

R. B. Peck  
R. Loughney  
C. H. Gould

- \* BPC = Bechtel Power Corporation
- AA = Ann Arbor, Michigan
- SF = San Francisco, Calif.
- G = Gaithersburg, Md.