

J. Kane

MIDLAND

List QUESTIONS asked of CPCo during
FSAR & 50.54 (f) Review

This information was used to respond to CPCo
interrogatory question no. 1^{thru 17} (dated Nov. 17, 1980)

This package contains questions before & after Dec' 6, 1979
(From ① dated Nov. 11, 1977 thru ①7 Oct. 14, 1980)

8408020038 840718
PDR FOIA
RICE84-96 PDR

Nov 11, 1977

Ltr. Boyd to S. Howard
Acceptance Review of FSAR

371-2

J Kane

①

- 371.6
(2.4) Provide additional information regarding the larger reservoirs in the Tittabawassee basin. For Sanford, Edenville, Smallwood, and Secord Dams, this information should include:
1. Detailed topographic maps of the reservoirs, showing their size, location, and drainage areas.
 2. Area-capacity curves for each reservoir, from normal water surface elevation to top of dam elevation.
 3. Dam cross-sections showing important elevations, composition, type of dam, and slopes.
 4. Tailwater rating curves for each dam.
 5. Spillway and outlet racing curves.
 6. River cross-sections downstream of each dam (from dam to dam and from Sanford Dam to the site) at approximately 1/2-mile intervals.
- 371.7
(2.4) Document that flooding of safety-related buildings or equipment does not occur due to runup on the service water pump structure to elevation 640.9 (your estimate of maximum runup due to 112-mph wind).
- 371.8
(2.4) Provide details of the intake and discharge structures for the service water system, including plans and cross-sections of both structures.

From D. Hood's Records

Feb. 24, 1978
Ltr. S. No. 10 to S. Howell
"Request for reliable information - PA 7362-1"

J. Kane (2)

362.0

GEOTECHNICAL ENGINEERING

362.1

(2.5.4.5.3)

Provide a summary of the results of field density tests for compaction and moisture control of structural fill beneath and adjacent to Category I structures.

362.2

(2.5.4.5.1)

Question 1 and the resulting discussion on page 8.00-1 included in Amendment Number 9 to your PSAR stated that all natural sands with relative densities less than 75% would be removed beneath all Class I structures and beneath non-Class I structures so sited that their failure could endanger the adjacent Class I structures. Discuss the methods employed in mapping and removing the sands having less than 75% relative density. Provide plan and sectional figures showing the areas where these materials were removed. Figure A9-2 of the PSAR which displays sub-surface profiles of Class I piping should be updated to show removal of sands of less than 75% relative density and be presented in the FSAR. Figure 2.5-21 of the FSAR shows loose sands beneath the Class I tanks although they were to have been removed. Explain this inconsistency, and provide proper documentation of as-built conditions.

362.3

(2.5.4.10.2.3)

Reference is made in section 2.5.4.10.2.3 to Table 2.5-14 for design values of passive pressure. The table number is incorrect and should read Table 2.5-15.

| From D. Hood's Records

362.4
(2.5.4.1.7)

Provide the results of all benchmark survey measurements taken during construction. Graphically, compare the measured results to predicted settlements. Provide a commitment and schedule to submit the results of future survey settlement measurements.

362.5
(2.5.6.4.2)

Provide gradation curves for the 12 inch thick crushed rock bedding layer beneath the riprap. Discuss the adequacy of the bedding material with respect to the requirements of a filter.

362.6
(2.5.6.5.3)

Provide figures showing the failure surfaces that resulted in the minimum computed factors of safety for all slope stability conditions studied.

.7
.5.6.5.4)

Paragraph four of section 2.5.6.5.4 states that the outer slope of cross-section I was used to simulate the plant area fill and a seismic coefficient of .12g was used. However, Table 2.5-20 indicates that cross-section G was used for this condition. Explain and correct this inconsistency.

362.8
(2.5.6.8)

Provide a detail of a typical piezometer as installed in the cooling pond dike. Also provide cross sections showing the development of the phreatic surface from initial piezometric head to full pond steady-state condition and a comparison to the phreatic surface assumed for the stability analysis of the steady-state condition.

J. Kane
③

JUN 20 1978

Docket Nos: 50-329
50-330

Consumers Power Company
ATTR: Mr. S. H. Howell
Vice President
212 West Michigan Avenue
Jackson, Michigan 49201

Gentlemen:

Distribution:

- NRC PDR
- Local PDR
- Docket File
- R. Boyd
- R. DeYoung
- D. Vassallo
- F. Williams
- S. Varga
- D. Hood
- M. Service
- R. Mattson
- D. Ross
- J. Knight
- R. Tedesco
- H. Denton
- V. Moore
- R. Vollmer
- M. Ernst
- R. Denise
- ELD
- IE (3)
- bcc:
- J. Buchanan, NSIC
- T. Abernathy, TIC
- ACRS (16)
- T. Cardone
- L. Reiter

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION ON GEOLOGICAL AND SEISMOLOGICAL MATTERS

We have reviewed your responses to our acceptance review questions by our Geosciences Branch, and find that additional information is required to continue our review of geologic and seismic aspects of the Midland site. These additional requests are listed in Enclosure 1.

We request your response to these first round requests by July 31, 1978. Please advise us within seven days after receipt of this letter if you will be unable to meet this date so that we may adjust our schedules accordingly.

Should you require clarification of these requests, do not hesitate to contact us.

Sincerely,

Original signed by:
S. A. Varga

Steven A. Varga, Chief
Light Water Reactors Branch No. 4
Division of Project Management

Enclosure:
As stated

cc: See next page

OFFICE	DPM:LWR #4	DPM:LWR #4			
SURNAME	DHood:tlb	SVarga			
DATE	6/19/78	6/1/78			

~~804625439~~ 1 p.
From D. Hood's Records

1

JUN 29 1978

361.0 Geosciences Branch

361.3 According to Section 3.7.1.1 you have increased the design response spectra shown in Figures 3.7.1 and 3.7.2 by 50% in the 0.2 to 0.6 second period range so as to account for differences between the "Housner developed" and "Newmark developed" design spectra. It appears to us that the corrected spectra would still fall below the Regulatory Guide 1.60 spectra anchored at 0.12g. This would be particularly evident for prestressed concrete structures where there is no difference in acceptable damping levels between that used in design and that indicated in Regulatory Guide 1.61 (i.e. 5%). Prepare comparative plots at different damping levels of the actual design time histories and Regulatory Guide 1.60 spectra anchored at similar reference accelerations. Discuss the differences and the adequacy of the present design with respect to Regulatory Guide 1.60 at all frequencies of interest.

361.4 You conclude that the Michigan Basin fits the Appendix A to 10 CFR Part 100 description of a tectonic province. Yet the basin is characterized by the same geologic structural features and has essentially the same geologic and tectonic history as the remainder of the Central Stable Region (Eardley, 1962).

- a) The Precambrian basement complex in the Michigan basin does not appear to be unique with respect to the surrounding region.
- b) The Precambrian crustal features, the Keweenaw rift zone (see Hinze and others, 1975, on the Mid-Michigan gravity anomaly associated with the Keweenaw rift zone) and Grenville Front,

transect the boundary of the basin.

- c) The subsidence and deposition in the basin occurred concurrently with subsidence, arching, and doming in other parts of the Central Stable Region during the Paleozoic.

Please provide information demonstrating the distinct characteristics of the Michigan basin which distinguish it from the Central Stable Region. Include geophysical and remote sensing data which may reflect structural characteristics of the Basin and adjoining portions of the Central Stable Region.

361.5

The basis for your definition of the safe shutdown earthquake rests upon the acceptance of the Michigan Basin as a separate tectonic province. The staff has been reluctant to accept subdivision of the Central Stable Region into smaller tectonic provinces. Provide additional information such as a comparative analysis of historic and instrumental seismicity that would permit acceptance of a lower reference acceleration than that normally used for the Central Stable Region (0.20g). Include in your analysis all those events listed in "Seismic Disturbances in Michigan" Circular 14, Geological Survey Division, Department of Natural Resources, State of Michigan (1977) or provide a rationale for their exclusion. The analysis should compare the seismicity of the region within 200 miles of the site with other similar sized areas in the Central Stable Region.

JUN 20 1978

REFERENCES FOR GEOSCIENCES REQUEST (361.0)

1. Docekal, J. (1970) Earthquakes of Stable Interior, with Emphasis on the Midcontinent. Ph.D. Dissertation, University of Nebraska.
2. Hinze, W. J., R. L. Kellogg, and N. W. O'Hara (1975). Geophysical Studies of Basement Geology of Southern Peninsula of Michigan, American Association of Petroleum Geologists Bulletin Vol. 59 pp 1562-1584.
3. Eardley, A. J. 1962, Structural Geology of North America, Harper and Row, New York, NY.

Aug. 30, 1978
Ltr. S. Varga to S. Hood
Supplemental Requests for AOS 362-1 Information

J. Kane
④

5. J

GEOTECHNICAL ENGINEERING

362.9
(2.5.4)

The response to request 362.4 is insufficient. Table 2.5-14A shows the structural settlement measurements available to date. Provide the reasons for the lack of survey data at benchmark numbers A-3 and 4, C-2, 3, 4, 5, 6 and 7, and T-2, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 and 15. In section 2.5.4.13.1 of the FSAR, reference is made to Figure 2.5-78. The figure number is in error and should be corrected.

362.10
(2.5.4)

The SER on the PSAR stated that continued surveillance for subsidence should be maintained throughout the life of the plant. Provide in Section 2.5.4.13 of the FSAR a discussion on the scope and details of the subsidence monitoring program. Include a commitment to monitor subsidence throughout the life of the plant, and indicate the proposed survey frequency. Submit all subsidence data measured since installation of the benchmarks.

From D. Hood's Files

Dec. 11, 1978

J. Kane

Ltr. S. Varga to S. Howell
"Staff Positions & Requests for Additional Information (Part 1)"

130-1

(5)

130.0 STRUCTURAL ENGINEERING BRANCH

- 130.21 Provide an evaluation of the ability of those seismic Category I
(3.8) structures which are located upon backfill and which are
(2.5) experiencing settlement in excess of that predicted, to
withstand appropriate loading combinations, including SSE,
throughout plant life. Describe how stresses associated with
differential settlement of the structural foundations and
any corrective preloading activities have been or will be
factored into these evaluations. Also provide a comparison
of the stresses predicted due to settlement to those allowable
stresses permitted by the ACI Code.

From D. Hood's Files

362.0 GEOTECHNICAL ENGINEERING

362.11 The March 15, 1969 report by Dames & Moore for foundation investigation
(2.5) and preliminary exploration for borrow materials which is included
in your PSAR provided final foundation design criteria, including:

- "d) Recommended foundation type and estimated total settlement for the auxiliary building which is located between the two reactor buildings. Its structure and foundation will be separate from those of the adjacent three buildings to allow for possible differential settlement which must not exceed 3/4 inch." [Emphasis added]

The June 28, 1968 report by Dames & Moore on this same subject also states their understanding that the maximum allowable differential settlement between the radwaste building and the adjacent reactor containment building is 3/4 inch.

Provide documentation that this maximum differential settlement between buildings has not and will not be exceeded throughout plant life.

362.12 Describe your preloading program which is planned to further consolidate
.5.4) backfill material underneath the Diesel Generator Building. Include your schedule for these activities.

362.13 Provide your program for reassessing the properties of the backfill
(2.5.4) materials after completion of the preloading program of request 362-12. This program should differentiate between:

1. Areas affected by the vertical conduits in the Diesel Generator Building area, and
2. Areas not affected by the conduits.

Also, provide your program for confirming the dynamic characteristics of the fill materials used in seismic analyses of supported structures. Include your schedule for this program.

Jan. 18, 1979

J. Kane

(6)

Ltr. S. Varga to S. Howell

"Staff Positions & Requests for Add'l. Information (Part 3)"
130-1

130.0 Structural Engineering Branch

130.22 (3.8.1) The answer to request 130.17 is not acceptable. For the containment, we require that you evaluate the structure at critical locations (base mat, intermediate floor level and at the springing line) to determine that the use of ACI 359 Code in conjunction with SRP 3.8.1 would result in adequate safety margins for these structures. For this assessment, actual material properties may be used, if properly justified.

130.23 (3.8.3) The answer to request 130.16 is not acceptable. For critical sections of Seismic Category I concrete structures (base mat, an intermediate elevation and an upper elevation) both inside and outside containment, we require that you provide an assessment as to the extent to which these structures can meet the requirements of current ACI 318 Code in conjunction with SRP 3.8.3 and 3.8.4. This assessment is necessary in order to justify the conclusion that adequate margins of safety exist for these structures using current Codes. For this assessment, actual material properties may be used if properly justified.

130.24 (3.7) The answer to request 130.18 is not acceptable. Provide for all seismic Category I Structures, the same type of curves as those presented for the containment (FSAR Figures 3.7-66 and 67). Also, for all Seismic Category I Structures, including the containment, compare the floor response spectra computed at critical locations using your original seismic input and method and those outlined in Regulatory Guides 1.60, 1.61, and 1.92. Assess the safety significance of any difference resulting from the comparison.

362.0

GEOTECHNICAL ENGINEERING362.14
(2.5.4.10.3)

In the light of the large settlements of the plant area fill that have occurred and the fact that the unconstructed portion of the service water intake structure is intended to be founded in the plant area fill, what measures will be taken to avoid the possibility of excessive settlements of this structure?

362.15
(2.5.4.5)

Provide a detailed list of changes that have occurred in the compaction control specifications. Begin with what is specified in the FSAR and proceed to those specifications that are applicable at present, giving the dates and justification for all changes. Include in the listing any changes in types of fill material required for different areas, methods of compaction control, required degree of compaction, allowable moisture content variations and lift thickness.

362.16
(2.5.4)

Provide a copy of the Midland settlement study by P. K. Chen entitled "Settlement Evaluation for Plant Area."

362.17
(2.5.4.10.3)

It is our understanding that the estimated settlement values for the diesel generator building shown in Figure 2.5-48 are based on the building having a mat foundation. If this is so, provide settlement calculations and ultimate settlement values based on the design foundation configuration as presented in section 3.8.5.1.3 of the FSAR.

Feb. 14, 1977

J. Kane

(7)

Staff Positions & Requests for Additional
Information (Part 4) 361-1

Ltr. S. Vargin to S. Howell

361.0 GEOSCIENCES BRANCH

361.6
(3.7) In your response to Question 361.3 you show that the design capacity shear force (Figure 3.7-66) and the design capacity bending moment (Figure 3.7-67) for the containment are greater than the shear force and bending moment that would result from ground motion based upon the Regulatory Guide 1.60 Spectrum anchored at 0.12g. Is it your position that all Seismic Category I structures and components have been designed to withstand ground motion associated with Regulatory Guide Spectrum anchored at 0.12g? Explain your answer.

361.7
(2.5) You have not responded fully to Question 361.5. Provide a comparative quantitative analysis of the seismicity within 200 miles of the site and other similar sized areas in the Central Stable Region. The purpose of this analysis is to permit amore detailed evaluation of your contention that the Michigan Basin should be considered separate from the Central Stable Region.

50 54(f) Questions - No. 1 thru 22

J. Kane
Rec'd 5/2/80

MAR 21, 1979

(8)



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

NRC 50.54(f) QUESTIONS (Questions No. 1 thru 22)

MAR 21 1979

Docket Nos: 50-329
50-330

Mr. S. H. Howell
Vice President
Consumers Power Company
212 West Michigan Avenue
Jackson, Michigan 49201

Dear Mr. Howell:

SUBJECT: 10 CFR 50.54 REQUEST REGARDING PLANT FILL

At the meetings on February 23, 1979, and March 5, 1979 at the NRC Region III Office in Glen Ellyn, Illinois, the circumstances associated with settlement of the diesel generator building at the Midland facility were discussed. This discussion was part of the investigation being conducted by Region III. Representatives of the staff from headquarters attended the meeting on March 5, 1979. The staff stated that its concern is not limited to the narrow scope of the settlement of the diesel generator building but extends to the various buildings, utilities and other structures located in and on the plant area fill. In addition, the staff expressed concern with your quality assurance program.

Under the authority of Section 182 of the Atomic Energy Act of 1954, as amended, and Section 50.54(f) of 10 CFR Part 50, additional information is requested regarding the adequacy of the fill and your quality assurance program for the Midland site in order for the Commission to determine whether enforcement action such as license modification, suspension or revocation should be taken. Accordingly, please submit complete and adequate responses to the enclosed requests within thirty days after receipt of this letter. Your responses should be submitted by cover letter signed under oath or affirmation. In those cases in which a complete response must await the results of future activities, an interim reply should be given within thirty days addressing the adequacy of that activity to provide the basis for a suitable reply, and the associated schedules for that activity and reply.

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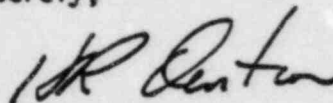
Mr. S. H. Howell
Consumers Power Company

- 2 -

MAR 21 1979

Should you desire clarifications or other discussions of the enclosed requests, please contact our Division of Project Management.

Sincerely,



Harold R. Denton, Director
Office of Nuclear Reactor Regulation

Enclosure:
Requests for Additional
Information

cc: See next page

Consumers Power Company

MAR 21 1979

ccs:

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ENCLOSURE

Requests for Additional Information

Regarding Plant Backfill Settlement

1. Your quality assurance (QA) program, which falls under the provisions of 10 CFR 50, Appendix B, was applicable to the technical information that went into the PSAR and FSAR and the design and construction of the diesel generator building. In our view, the unusual settlement problem at the site points to an apparent lack of implementation of certain QA program requirements. Therefore, provide the following:
 - (a) Identify those quality assurance deficiencies that contributed to this problem, the possibilities of these deficiencies being of a generic nature and affecting other areas of the facility, and describe the corrective actions you have taken to preclude these deficiencies from happening in the future;
 - (b) What assurance exists that the apparent areas of contradictions in the PSAR and FSAR as described by I&E during the meetings of February 23, and March 5, 1979, do not exist in other sections of the PSAR and FSAR dealing with matters other than fill?
 - (c) Investigate other activities not associated with the fill, but important to safety for other systems, components, and structures of the Midland facility, to determine if quality assurance deficiencies exist in view of the apparent breakdown of certain quality assurance controls; identify those items investigated and the results of your investigation;
 - (d) Considering the results of your investigation in item (c) above, describe your position as to the overall effectiveness of your QA program for the design and construction of the Midland plant.
2. Discuss the consideration given to, and estimate the cost of, grouting any natural lacustrine deposits (sands) upon which safety related structures are founded.
3. During the meeting on March 5, 1979, you stated that on August 21, 1978, construction survey data indicated a settlement approaching the maximum value given in FSAR Figure 2.5-48. However, your response to staff request 362.12 by FSAR Revision 18 states, "In July 1978, the settlement of the diesel generator building exceeded the anticipated values shown in FSAR Figure 2.5-48." Clarify this apparent inconsistency.

Response
Ref 38

Hawell Ltr to
Denton

Dated April 24, 1979

4. Specify and justify the acceptance criteria which you will use to judge the acceptability of the fill, structures and utilities upon conclusion of the preload program. Compare these criteria with that to which the material was to have been compacted by the original requirements set forth in the PSAR. The response should consider all areas where preloading is either planned or in progress (i.e., diesel generator building, borated water storage tanks, diesel fuel oil storage tanks, Unit 1 transformer, condensate storage tanks, and others still under evaluation). Describe how conformance to these criteria will result in assurance that unacceptable residual settlements can not reasonably be expected to occur over the life of the plant. For each such area, state the extent of residual settlement which will be permitted and the basis for each limit.
5. To what extent will additional borings and measurements be taken after completion of preloading programs to ascertain that the material has been compacted to the original requirements set forth in the PSAR?
6. You propose to fill the borated water storage tanks and measure the resulting structure settlements.
 - (a) On what basis do you conclude a surcharge no greater than the tank loading will achieve compaction to the extent intended by the criteria stated in the PSAR? What assurance is provided by the technique that residual settlement for the life of the plant will not be excessive?
 - (b) A similar procedure is proposed for other tanks, including the diesel fuel oil storage tanks, and should also be addressed.
 - (c) The borated water storage tanks have not yet been constructed and are to be located upon questionable plant fill of varying quality. Provide justification why these safety related tanks should be constructed prior to assuring the foundation material is suitable for supporting these tanks for the life of the plant. For example, can the tanks be removed with reasonable effort without significant impact?
7. Describe in detail how you will determine the adequacy of the electrical duct banks in view of the previous loading caused by contact of the diesel generator building foundation with these banks. Describe corrective measures which may be taken in the event of unacceptable results.
8. What tolerance is placed upon the alignment of the diesel generators and upon what is this limit based? How will the present differential settlement of the diesel generator pedestals be corrected? Discuss the extent

and rate of residual settlement of the diesel generator pedestals predicted over the life of the plant. In view of the variability of the foundation material indicated by Bechtel's Interim Report 4 to MCAR 24 which was forwarded by your letter of February 23, 1979, how can long term differential settlement be predicted with sufficient confidence to assure reliable startup and operation of the diesel generators when needed? What surveillance program (and inspection frequency) for the pedestals do you intend to conduct to assure detection of misalignment before these limits can be reached? What corrective action, and the basis therefor, do you propose if these limits should be approached?

9. Based on the information provided in your Interim Report Number 4, it appears that the tests performed on the exploratory borings indicate soil properties that do not meet the original compaction criteria set forth in the PSAR and specification for soils work. Provide assurance that the soil under other Class I structures not accessible to exploratory boring meets the control compaction requirements.
10. You have stated that the fill is settling under its own weight. What assurance is provided that the fill has not and will not settle locally under structures with rigid mat foundations, such as portions of the auxiliary building or service water pump structure?
11. In view of the variations indicated by present borings, what assurance exists that vertical borings taken adjacent to structures are sufficiently representative of fill conditions under the structure?
12. Document the condition of soils under all safety related structures and utilities founded on plant area fill or natural lacustrine deposits. Based on the results of investigations, compare the properties and performance of existing foundation materials under all expected loading conditions with those which would have been attained using the criteria stated in the PSAR. If the foundation materials are found to be deficient, discuss measures that will be taken to upgrade them to criteria stated in the PSAR.

- Cracking
13. How has the lack of compaction and the increase in soil compressibility affected soil-structure interaction during seismic loading and therefore the seismic response spectra used in design?
 14. For all seismic Category I structures (including, but not limited to the diesel generator building) which are located on fill, provide the results of an evaluation showing which structure you predict may experience settlements in excess of that originally intended, and provide an evaluation of the ability of these structures to withstand the increased differential settlement. For the diesel generator building and/or any seismic Category I structure which exhibits cracking, evaluate the effects of the existing and/or anticipated cracks on the performance of the intended function of these buildings. The calculated stresses for seismic Category I structures at critical locations should be tabulated and compared to that of allowable stresses as stated in the appropriate ACI Codes.
 15. For all seismic Category I structures which are partially located on fill and partially located on glacial till or original soils, provide a detailed evaluation of the ability of these structures to withstand the differential settlement. The possibility of not having a contact surface between the structures and the fill, due to settlement occurring prior to or during a seismic event, should be considered over the life of the plant.
 16. Since the plant area fill is apparently settling under its own weight, what assurance exists that the fill has not and will not settle locally under piping in the fill, resulting in lack of continuous support and causing additional stress not accounted for in design?
 17. Identify and document the current condition of all seismic Category I piping founded in the plant area fill. Include all piping founded in the plant area fill whose failure could adversely impact safety related structures, foundations and/or equipment. Also, discuss how Code - allowable conditions will be assured throughout plant life. If any essential piping has now or should later approach Code - allowable stress criteria, or cannot be determined, what measures will you take to alleviate these conditions?
 18. For all seismic Category I piping and all piping whose failure could adversely impact safety-related structures and/or systems, whether buried or not, describe what evaluations you plan to conduct to assure that such piping can withstand the increased differential settlement between buildings, within the same building, or within the piping system itself without exceeding Code - allowable stress criteria. The potential influence due to differential seismic anchor movement should also be considered. Discuss what plans you have to assure compliance with Code - allowable stress criteria throughout the life of the plant.

19. The piping in fill under and in the vicinity of the diesel generator building could have deformations induced either prior to or during the preload program. What is the present status of any deformation in the piping and what ultimate deformations are predicted. If any deformations are or will be excessive, what actions are being or will be taken to correct the condition?
20. Provide assurance that the stress levels of all components (e.g., pumps, valves, vessels, supports) associated with seismic Category I piping systems that have been or will be exposed to increased settlement will be within their code-allowable stress limits. Also, provide assurance that deformations of active pumps and valves installed in such systems will be kept within limits for which component operability has been established.
21. Your letter of December 21, 1978, on the settlement of the diesel generator foundations and building advised us that the use of a preload to densify the existing fill material in place had been selected as the major corrective action plan. Bechtel's Interim Report 3 to MCAR 24 forwarded by your letter of January 5, 1979, identifies six alternative plans for corrective action, from which your soil consultants have advised that only two suitable options exist at that time (i.e., the preload option or the option to remove and replace the building and fill material). We require the following additional information regarding the basis for selection of these two options:

- (a) Provide a cost comparison of the two options. Include, by major items, an estimate of the cost of replacing each safety related structure and utility (e.g., piping, cables, etc.) located on or in the questionable plant area fill.

In the event the preload option should fail to provide acceptable results, what additional costs will have occurred which would not otherwise have resulted had the removal and replacement option been selected originally? Upon what items would these additional costs have been expended?

What savings will have occurred if the preload option provides acceptable results, compared to selection of the removal and replacement option? In what areas will these savings have occurred?

- (b) Provide a detailed comparison of the impact on construction completion between the two options. What schedule penalty is associated with an unacceptable result for the option selected?

- (c) Discuss for each option the probability of achieving the degree of compaction intended by the original requirements stated in the PSAR.
 - (d) What other significant factors influenced your selection?
22. The following information is required using the assumption that work is to stop on all activities related to construction of structures, systems and utilities affected by fill (whether such effect is either presently known or suspect), including any mechanical, electrical or civil activity involving a significant expenditure of funds:
- (a) Identify any schedule impacts on construction completion dates as a function of months of delay over a period of 24 months.
 - (b) Identify any capital costs of the delay and quantify them.
 - (c) Identify any other cost or schedule impacts associated with a halt or suspension of construction for a period of 3 months, 6 months, 9 months, 12 months, 18 months, and 24 months.
 - (d) Identify the principal construction activities which are to take place over the next 24 months, with particular reference to those activities associated with structures, systems, components and utilities affected by fill settlement, whether such settlement is either known or suspect.
 - (e) For those activities identified in response to item (d) above, identify each which is significant in terms of weight addition to structures founded totally or partly on or in fill.
 - (f) Identify all alternative solutions associated with the plant area fill settlement which would be foreclosed by continuation of any of the above activities.

MAR 22, 1977

J Kane

From S. Varga to S. Howell

(1)

Staff Positions & Request for Addtl. Information (Part 5)

-3-

371.13
(2.4)
(16.0)
RSP

Our requirements regarding silting of the emergency pond were specified by our Safety Evaluation Report on Midland issued November 12, 1970. You are required to monitor for silting in the emergency pond and if necessary, to dredge it periodically. Neither the FSAR Technical Specification on the Ultimate Heat Sink nor Section 2.4 of the FSAR contain sufficient information on your proposed monitoring and maintenance program.

It is our position that you commit to, and describe your program for, the following:

1. Assure that the volume of the Emergency Cooling Water Reservoir (ECWR) is maintained at no less than 272 acre-feet.
2. Assure that the bottom of the Service Water Intake Channel is maintained clear of sediment or other obstruction.
3. Assure that the ECWR side slopes are maintained as designed (i.e., a horizontal to vertical ratio of 5:1).

From D. Hecht's Records

Note D. Hood to S. Burger
March 30, 1979
Status of Midland FEAR Review

J. Keene

(10)

GEOLOGY AND SEISMOLOGY

1. Tectonic Province - Reference Acceleration

The applicant has proposed a reference acceleration value of 0.12g based upon the plants being located in the Michigan Basin Tectonic Province. There does not appear to be sufficient evidence to warrant separation of this region from the larger Central Stable Region tectonic province. We have requested (Q 361.4 and Q 361.5) a comparative analysis based upon geology and seismicity that would permit us to fully evaluate the acceptability of the proposed acceleration value. The analysis supplied by the applicant in Amendment 51 was insufficient and in our Q-2's we repeated Q 361.5 providing further clarification of the type of analysis we require to finalize our position (Q 361.7). The applicant will reply in April 1979.

2. Seismic Design Spectrum

The spectrum used by the applicant is less conservative than the Regulatory Guide 1.60 spectra. The NRC in a letter on June 8, 1978, found this spectrum acceptable based upon its combined use with damping values lower than those found in Regulatory Guide 1.61. Although this may be acceptable in general, it may not be the case when examined in detail. For example, there has been no change in acceptable damping values for prestressed concrete. We asked the applicant (Q 361.3) to discuss the differences and adequacy of the present design with respect to the Regulatory Guide 1.60 spectrum. The applicant responded with statements and plots showing that the design capacity shear forces and design capacity bending moment of the containment (prestressed concrete) is greater than could be expected from a ground motion based upon Regulatory Guide 1.60 Spectrum anchored at 0.12g. We then asked the applicant in Q-2 361.6 whether it is its position that all Category I structures

From D. Hood's Records

DPM:LWR#4

DPM

Light Water Reactor
Division

//

and components have been designed to withstand ground motion associated with the Regulatory Guide Spectrum. The applicant replied that this is not the case. This issue has been discussed with the SEB reviewer.

GEOTECHNICAL ENGINEERING SECTION

1. Settlement (2.5.4.10.3 and 2.5.4.13)
Reported settlement of the diesel generator building and other structures and utilities exceed predicted settlement values and has resulted in an extensive review of the problem and the proposed methods of fix. Our concerns are contained in a March 21, 1979 letter to the applicant. The matter is also a hearing issue. Staff manpower requirements to support this effort are excessive and a request for assistance has been submitted.

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2. Removal of Loose Sand (2.5.4.5)
We are evaluating the applicant's response to Q-1 362.2, requesting plans and cross sections showing areas where loose sands (less than 75% relative density) were removed.

3. Development of Phreatic Surface in Cooling Pond Embankment (2.5.6.5)
We are evaluating the applicant's response to Q-1 362.8, requesting cross sections through the embankment showing the observed development of the phreatic surface to the steady state condition and a comparison of the observed surface to that assumed for stability analyses.

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STRUCTURAL ENGINEERING BRANCH

1. Loading Combinations for Settling Seismic Category I Structures

Q 130.21, 130.17

We have requested the applicant to evaluate the effects of differential settlement for those seismic Category I structures located on plant area fill. The applicant states that the FSAR does not contain load combinations which address stresses due to differential settlement, and that sources are presently being researched for appropriate load combinations to be used and will be identified in April 1979. A stress evaluation of the diesel generator building is to be provided with the results of the preload program in July 1979. As further discussed in several related requests in a letter dated March 21, 1979, "10 CFR 50.54 Request Regarding Plant Fill," our concerns are not limited to the diesel generator building alone.

2. Adequacy of Containment Using ACI 359 Loads

Q 130.22, 130.17

The applicant has not yet completed some of the analyses to demonstrate adequate safety margins at critical locations of the containment when ACI 359 load combinations are used in conjunction with SRP 3.8.1. Remaining analyses will be submitted in March 1979. The OPTCON program used for these analyses will be described in March 1979.

3. Adequacy of Category I Structures to ACI-318 Code

Q 130.23, 130.16

The applicant will provide in March 1979 an evaluation of the ability of Category I concrete structures to meet ACI 318 Code requirements in conjunction with SRP 3.8.3 and SRP 3.8.4.

4. Floor Response Spectra (3.7)

Q 130.24, 130.18

We have asked the applicant to compare and assess the safety significance for all seismic Category I structures the differences between seismic shear and moment forces, floor response spectra, and deflections based upon the Midland methodology relative to that using RGs 1.60, 1.61 and 1.92. The applicant will respond in March 1979.

5. Piping Seismic Analysis (3.7, 3.9)

Q 130.25

The applicant references an earlier, unapproved version of a Bechtel topical report as the basis for seismic analysis of piping. We have required that the approved version be referenced or otherwise justified.



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

J Kane
P-100
12

Nov. 19 1979

Docket Nos: 50-219
and 50-330

Mr. S. H. Howell
Vice President
Consumers Power Company
212 West Michigan Avenue
Jackson, Michigan 49201

Dear Mr. Howell:

SUBJECT: SUPPLEMENTAL 10 CFR 50.54 REQUESTS REGARDING PLANT FILL

We have reviewed your responses to our requests of March 21, 1979 regarding plant fill settlement and effects at the Midland site, and have additional questions and positions on this matter. These questions and positions are contained in Enclosure 1. Additionally, we have recently acquired the services of consultants for this review and anticipate that they will have additional questions and positions in the near future.

We would appreciate your response to Enclosure 1 at your earliest opportunity. Should you desire clarification of these requests and positions, please contact us.

Sincerely,

Lester S. Rubenstein
Lester S. Rubenstein, Acting Chief
Light Water Reactors Branch No. 4
Division of Project Management

Enclosure:
As stated

cc:
See next page

~~79-121-100272~~

Consumers Power Company

ccs:

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Center
Canoga Park, California 91304

ENCLOSURE 1
SUPPLEMENTAL TO CFR 50.54 REQUESTS REGARDING PLANT FILL

24. Provide the following information regarding the permanent dewatering system:
- a. In your letter of August 10, 1979, you conclude that the dewatering system could be completely inoperable for one to two weeks before a significant rise in the water level within the dewatered area would occur. Provide the basis for this conclusion and document by pertinent analysis that this recovery time is sufficient to allow other forms of dewatering to be implemented before groundwater rises to an undesirable level. Define the maximum groundwater level that plant structures can tolerate before liquefaction becomes a problem, or before other structural distress occurs. Include in this discussion the affect of the water table upon the shear wave velocity for which a lower limit of 500 feet per second has been assumed in the response to question 13. State the basis for your assumption that the shear wave velocity will not become lower than 500 feet per second over the life of the plant and describe how this will be assured.
 - b. Provide all design bases for the dewatering system including the spacing and penetration of wells, and the rate at which water must be removed in order to maintain the groundwater level at the desired elevation.
 - c. You state that of the 200 to 300 deep wells in the system, only those required to maintain the groundwater at the desired level would be operated and the remainder would provide sufficient redundancy to prevent interruption of parts of the system. Provide the basis used to determine that 200 to 300 wells are required to maintain water levels at the desired elevation. Demonstrate that this system has the capability to survive natural phenomena design events, (floods, earthquakes, tornadoes) and the failure of non-safety related equipment including pipe breaks. Alternately, describe in detail your proposed monitoring program to detect system failure and describe your means of mitigation.
 - d. You state that the groundwater removed by the dewatering system will be monitored to assure that no fines are being removed from the soil. Describe in detail your monitoring methods and criteria, and discuss your intended mitigation effort if a problem is detected.
 - e. Retaining Walls have shown differential settlement between wall sections founded on original soil and those founded on plant fill. Your responses during our March 5, 1979 meeting (reported in J. Keppler's letter of March 15, 1979) noted that the seismic Category I retaining wall adjacent to the Service Water Pumphouse experienced a 0.25 inch differential settlement between retaining wall sections, and would continue to be monitored. Your response also indicated that the seismic Category II retaining walls adjacent to the intake structure had experienced an approximate 1.4 inch differential settlement and would continue to be monitored. Retaining walls are also located adjacent to the seismic Category II River Intake Structure. Document the current status of differential settlement for each of these walls. Indicate if, and if so, the extent to which credit (i.e., limited recharge flow) is claimed for these walls in determining the dewatering estimates. Document that the dewatering system has sufficient capacity to compensate for loss of these walls and discuss the subsequent recharge period for the site without such credit.

- f. Estimate and provide the bases for the range of groundwater drawdown influence zones that will be created over the life of the plant. As a minimum, provide bases for estimates of pumping rates, drawdown curve analysis for each well with corresponding interference effects between all wells, and bases for estimate of total radius of influence.

Also, describe the effects, if any, that the system will have on the Tittabawassee River and surrounding water users.

- g. Demonstrate that the dewatering system conforms with Section 2.4.13 of the Standard Review Plan, including Branch Technical Position HMB/GSB 1.
- h. The plant blowdown to the cooling pond will contain chlorides, sulfates and other chemicals which may be carried with the recharge and, over an extended period, corrode underground piping, tanks and conduits or clog well screens, well filters and/or the surrounding soils. In addition to corrosion effects, this could reduce the efficiency of the well system and allow groundwater levels to rise to an unacceptable level. Provide an analysis of the effects which the cooling pond water chemical constituents will have on the dewatering system and upon underground metal components.
- i. We understand that a grout curtain or slurry wall is being considered as a component of the dewatering system. If this decision is implemented, provide the design basis for the spacing of grout holes which will assure that a continuous grout curtain is obtained. In addition provide actual performance data from other locations where grout curtains have been used, accompanied by an analysis demonstrating that this is an effective means of lowering groundwater levels at the Midland site.
25. As indicated in our previous questions, we have required that you investigate the soil properties of all areas containing seismic Category I structures in which the supporting medium will change or has been changed. On the basis of actual soil properties thus determined, a revised seismic analysis is to be conducted to account for the revised soil-structure interactions and the new structural responses. The structural response spectra are to be used to determine new seismic loads to be incorporated into a revised structural analysis of seismic Category I structures.

In this regard, we are presently revising relevant sections of the Standard Review Plan (SRP). The changes applicable to Midland 1 & 2 are summarized below. These sections, as modified or supplemented below, constitute an acceptable method for soil-structure analysis and should be used.

SRP Section 3.7.1, "Seismic Input"

- (1) Use of site dependent input design spectra is acceptable if the input spectra are consistent with SRP section 2.5.
- (2) Methods for implementing the soil-structure interaction analysis should include both the half space lumped spring and mass representation and the finite element approaches. Seismic Category I structures, systems and components should be designed to responses obtained by any one of the following methods:

- a) Envelope of results of the two methods;
 - b) Results of one method with conservative design consideration of impact from use of the other method; or
 - c) Combination of a and b with provision of adequate conservatism in design.
- (3) Consider the effects due to accidental torsional forces in design (as a minimum, the 5% times base dimension off-setting criteria will apply).

SRP Section 3.7.2, "Seismic System Analysis"

- (1) Delete Table 3.7.2-1, "Acceptable Methods for Soil-Structure Interaction Analysis" and use acceptance criteria noted above for SRP Section 3.7.1, subsections 2a, 2b and 2c of this request.
 - (2) Use Regulatory Guides 1.92 and 1.122.
26. Your proposed method for re-evaluation of seismic Category I structures founded partially or totally on fill is not acceptable as outlined in the response to Question 15. To provide the information required for our review, the structural analysis must be based upon criteria in Standard Review Plan section 3.8.4 and 3.8.5, or upon ACI 349 as supplemented by Regulatory Guide 1.142.
27. Your response to Question 4 states that the preliminary estimate for the residual settlement for the diesel generator building is of the order of one inch for the 40 year life of the plant.
- a) Does this settlement estimate include any contribution due to potential soil shakedown due to an earthquake? If not, what would be the total predicted settlement? In your response, describe your method of analysis of settlement, and clearly differentiate between the contribution of and methods for the static and shakedown conditions.
 - b) Quantify and describe the basis for the accuracy of your residual settlement estimate, including any adjustment to this estimate as may result from part a above. State the possible upper bound of the structural settlement and relate this value to that which will be used in your revised structural analyses.
28. Your response to Question 14 provides insufficient information regarding the cause(s) of the cracks in structures, significance of the extent of the crack, and crack consequences. We note, for example, that your investigations to date provide no clearly established relationship between reported settlement measurements and observed cracks, and that cracks have been noted in certain structures for which no significant differential settlement is reported. We require that you conduct a detailed and comprehensive study designed to answer these questions in a reliable and timely manner.

29. Your response to Question 14 notes that some areas (such as large areas of the auxiliary building) are marked as temporarily or permanently inaccessible. For all such seismic Category I structures and utilities, describe in detail how you plan to investigate whether cracks exist, and the extent and significance of such cracks.
30. You imply in your response to Question 7 that the electrical duct banks underneath the diesel generator building may not have been designed and/or constructed to seismic Category I requirements. Clarify whether this is indeed the case. If true, identify and justify all areas of non-compliance, and indicate on what basis you conclude that the availability of on-site power to safety and safety-related equipment is assured during and following a design basis earthquake. In this regard, we find that the occasional passing of a "rabbit" through the duct banks, as discussed in your response, provides no assurance as to the ability of the duct bank to withstand earthquakes. Provide an analysis of the duct banks using criteria applicable to seismic Category I structures. Your analysis and discussions should be based upon "as built" and "as is" conditions of the duct banks.
31. Your reply to question 6a does not provide the information requested. Your "full scale load test" proposed for the borated water storage tank fails to provide any margin to account for additional loadings on the tanks such as seismic forces, snow or ice packs, design and measurement uncertainties, etc. Your reply also fails to address the fact that the actual content of the tanks will be other than pure water. Consequently, the test, as currently proposed, will not produce conservative results and is unacceptable. Revise your proposed test to provide for worst case loadings or loading combinations, with allowances for uncertainties. Specify and describe the basis for the margins to be provided by the revised test. Also define your minimum test duration. Describe the extent and type of measurements to be taken after completion of the load test to ascertain actual material properties.
32. Describe in detail the temporary inter-connections between the borated water storage tanks you are considering for schedular purposes. We are concerned that such inter-connections, if inadvertently left in place after fuel loading would provide a potential mechanism for compromising the independence of the safety systems for Unit 1 and Unit 2. Include a discussion of any design features or procedures which will assure removal of any such inter-connections prior to loading fuel for the first operating unit.
33. Although not specified in your response to question 6b, we observed during a site visit on November 14, 1979 that the load test for the underground diesel fuel oil storage tanks had been terminated after about 6 months. Provide the basis for your decision not to pursue a test duration more representative of the 40 year plant lifetime. How far in advance of plant operation do you plan to fill the tanks with fuel oil? To what extent will buoyance forces on the tanks influence settlement relative to the surrounding fill?

34. Supplement your response to question 16 to address how underground seismic Category I piping and conduit are protected from excessive stress due to railroad tracks, construction cranes, and other such heavy vehicles during construction and operation.
35. We infer from your response to question 5 that additional exploration will not be performed after completion of the preloading program. This is unacceptable. We require that exploration, sampling and testing of soil samples be performed to determine the actual soil properties resulting from the preload program, including a determination of the relative compaction of the fill.



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

Ref. 33 J Kane
11

SEP 11 1979

Docket Nos.: 50-329/330

Applicant to
respond Oct. 22, 1979.
PSH

Mr. S. H. Howell
Vice President
Consumers Power Company
212 West Michigan Avenue
Jackson, Michigan 49201

Dear Mr. Howell:

SUBJECT: REQUEST FOR ADDITIONAL QUALITY ASSURANCE INFORMATION

We have reviewed your response to question 1 of NRC's March 21, 1979 letter, "10 CFR 50.54 Request Regarding Plant Fill," and have some more questions regarding the QA program for the Midland project. These requests are contained in Enclosure 1. An earlier draft of Enclosure 1 provided the agenda for our meeting on September 5, 1979, with members of your staff and Bechtel. We request that you supplement your written responses to our letter of March 21, 1979, to include this additional information.

Also, our continuing review of the quality assurance program described in the FSAR for Midland Plant, Units 1 & 2 indicates the need for additional information in other areas. These are requested by Enclosure 2.

We would appreciate your responses to Enclosures 1 and 2 at your earliest opportunity. Should you desire clarification of these requests, please contact us.

Sincerely,

L. S. Rubenstein, Acting Chief
Light Water Reactors Branch No. 4
Division of Project Management

Enclosures:

1. Supplemental Requests for Soils Settlement QA Information
2. Requests Regarding Other QA Matters

cc w/enclosures:
See next page

~~7910020502~~ 7/1/80

Consumers Power Company

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SUPPLEMENTAL REQUEST FOR ADDITIONAL SOILS SETTLEMENT INFORMATION

23. We have reviewed your response to question 1 of our March 21, 1979 letter, "10 CFR 50.54 Request Regarding Plant Fill," including related amendments or supplements in your letters dated May 31, July 9, and August 10, 1979. We find that the information provided is not sufficient for completion of our review. Accordingly, provide the following additional information:
- (1) Your response to question 1a does not provide sufficient information relative to the root causes of the 13 deficiencies. In order to determine the acceptability of the corrective actions for the 13 deficiencies considering the possibility that these deficiencies are of a generic nature that could affect other areas of the facility, a more complete understanding of the root cause of each deficiency is necessary. Accordingly, provide a clearer description of the root causes of each of the 13 deficiencies, including a detailed discussion of the conditions that existed to allow these deficiencies and the changes that have been made to preclude the recurrence of such deficiencies. In this regard, if contributing causes are inadequate procedures, inspections, specification call outs, design reviews, audits, and/or technical direction, a clear and detailed description is necessary as to what allowed these conditions to exist and why.
 - (2) Regarding your response to question 1b:
 - a. The first seven paragraphs do not provide sufficient information to assure that contradictions do not continue to exist in the PSAR, FSAR, design documents, implementing procedures, and as-built conditions since the controls described in these seven paragraphs were in effect prior to the I&E findings reported in J. Keppler's letter of March 15, 1979. Modify your response to clearly describe the control revisions you have instituted to preclude design contradictions.
 - b. Items 1, 2, and 3 of the eighth paragraph describe the review and update of the PSAR commitment list, the review of the inactive sections of the FSAR, and the review of procedure EDP 4.22, "Preparation and Control of Safety Analysis Reports," without describing the extent of the review process or the qualifications of personnel involved in the review. Accordingly, describe what each of these reviews entails. Including the extent to which these reviews are verified, approved, and documented. Identify the organizational unit that is, or will be, involved in these reviews and the qualifications of the involved personnel.
 - c. Item 2 of the eighth paragraph states that a review of the remaining sections of the FSAR is not necessary, "... because of the ongoing review process described above." Describe your rationale for not reviewing these remaining sections of the FSAR when it appears that the original review of the FSAR was performed prior to issuance of the March 15, 1979 letter providing the I&E findings and prior to any corrective actions resulting therefrom.
 - d. Describe the extent of the audit to which you have committed in item 4 of the eighth paragraph.

- (3) Question 1c requested that other activities be investigated to determine whether programmatic quality assurance deficiencies exist in view of the apparent breakdown of certain quality assurance controls, and that the activities investigated and the results be identified. Your response addressed certain specifications and instructions that received a review of 1977; providing for more in-depth verification; increasing management audits from one to two per year; increasing the staff of Bechtel's QA engineers at the site from five to eight; instituting an overinspection program on certain Q-listed construction activities; assigning resident engineers at the site to aid in the interpretation of drawings and increasing their number from one to twenty-two; and initiating a trend analysis program.
- a. According to your response, most of these actions were initiated in 1977. Describe your rationale for assuming that these actions provide confidence that quality assurance deficiencies do not exist in other areas. In order to determine if other areas have deficiencies, work already accomplished in these areas should be investigated. This includes the review of completed documentation, including inspection results, to verify consistency with design and SAR requirements. Also, representative sample inspections of completed work would seem appropriate to determine the acceptability of this work. Accordingly, describe a program in detail to accomplish the above or provide rationale as to why it is not necessary.
 - b. Your use of generalized statements such as "the review of", "increased audits," "overinspection," "identifying trends," and "increase of staff" does not provide sufficient specificity regarding the detail and extent these actions will take place and the effect they will have in assuring other areas are not deficient. Accordingly, in each of these areas provide a clearer description of these actions relative to the full impact they will have in assuring an effective QA program and in sufficient detail to assure that other areas are not deficient. In those cases where credit is taken for actions already accomplished (such as reviews, inspections, and audits), provide a summary of the results of these actions such that the success or failure of the actions can be determined.
- (4) Considering the results of your investigation requested in our question 1c, question 1d asked that you describe your position as to the overall effectiveness of the QA program for the Midland Plant. Your overall assessment of the effectiveness of your program should be based on your revised response to our question 1c (see above question 23(3)). The results of this assessment, including a description of the scope and extent of the assessment effort and the identification and qualifications of the individuals involved in this assessment, should be reported to us.

Enclosure 2421.0 QUALITY ASSURANCE BRANCH421.5
(17.1)

The Bechtel alternatives for ANSI N45.2.12 Draft 4, Revision 1, November 1974, which are described in FSAR Section 17.1.1.16, do not provide a clear commitment of your intent to comply with this standard. We are unable to determine whether these alternatives are in lieu of compliance to ANSI N45.2.12 or are intended to supplement the guidance provided by ANSI N45.2.12. Although these alternatives have been accepted in Bechtel Topical Report, BQ-TOP-1, Revision 2-A, 7/77, they alone do not constitute measures for full compliance with ANSI N45.2.12. Therefore, provide a specific description clearly indicating your commitment to ANSI N45.2.12. Any exceptions, alternatives, or clarifications should be specifically identified and justified with sufficient supporting detail.

421.6
(17.1,
3A)

We have reviewed your exceptions in FSAR Section 17.1.1.13 for Revision 0 of Regulatory Guide 1.94, April 1975, which endorses ANSI N45.2.5-1974. Your position notes that the final mixing point for concrete may be at the batch plant stationary mixer or at the discharge chute of the truck mixer. While we generally agree that in-process strength testing may be conducted at the final mixing point, this position is contingent upon the establishment of an appropriate correlation test program. The 1974 version of ANSI N45.2.5 contained no guidance regarding correlation criteria and your FSAR does not discuss this item. Paragraph 6.11 of the 1978 version of the standard provides this guidance. Accordingly we require that you address the extent of conformance to paragraph 6.11 criteria, both in terms of concrete construction completed to date and for ongoing or future concrete work.

Discussed @ Jan 10, 1980 Meeting in Bethesda

J. Kune

See Summary of Jan 10, 1980 Meeting on
supplemental Request regarding
Plant #11

ENCLOSURE 3

13

COMMENTS ON 50.54(f) RESPONSES FOR MIDLAND (MEB)

1. GENERAL

A review of the Response to Questions 16-20 of the subject document indicates that the applicant proposes to impose the 3.0 S_e criterion of subparagraph NC-3652.3(b) of the ASME B&PVC, Section III and the 5% radial deformation limit of the AWWA. Additional criteria which address buckling of the piping should be imposed since neither of the two proposed criteria are based on this failure mode. Additionally, criteria compliance analyses should be based on maximum expected differential settlement over the life of the plant.

2. RESPONSE TO QUESTION 16, PAGE 16-1

The response addresses stresses based on representative pipes being profiled, i.e. on current local settlements. The response should be modified to include settlements over the life of the plant.

3. RESPONSE TO QUESTION 17, PAGE 17-1, PARA. 1

If all Seismic Category I piping is not to be profiled, criteria for selection of piping to be profiled should be documented.

4. RESPONSE TO QUESTION 17, PAGE 17-2, PARA. 2

The calculation assumes that the curvature is constant over the length of pipe. In general, this condition will not be met. Criteria for changes in curvature should be addressed.

5. RESPONSE TO QUESTION 17, PAGE 17-3, PARA. 2

If the settlement stresses are based on current profiles only, the analysis should be extended to include settlements over the life of the plant and effects of change in curvature (See item 3).

6. RESPONSE TO QUESTION 17

The question regarding measures to be taken to alleviate conditions if settlement stresses approach code allowables or cannot be determined has not been addressed.

7. RESPONSE TO QUESTION 18, PAGE 18-1, PARA. 2 & 3

It is not clear that most of the anticipated differential settlement will occur by the time of final closure (Para. 2). Provisions for effects of settlements occurring after final closure should be specified. The evaluations of Para. 3 addresses this issue partially.

8. RESPONSE TO QUESTION 18, PAGE 18-2, PARA. 2 & 3

Criteria for assessment of the flexibility of piping to accomodate more than the expected differential settlement should be specified.

9. RESPONSE TO QUESTION 19, PAGES 19-1 TO 19-3

The disposition of this response will be delayed pending receipt and review of evaluations based on the preload program (See last paragraph on Page 19-3).

10. RESPONSE TO QUESTION 20

The first paragraph of the response is acceptable. However, the remainder of the response requires clarification.



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

*Received J. Kline
April 7, 1980
14
5 enclosures
needs report
10 days
May 7*

Docket Nos.: 50-329/330

APR 1 1980

Mr. S. H. Howell
Vice President
Consumers Power Company
212 West Michigan Avenue
Jackson, Michigan 49201

Dear Mr. Howell:

SUBJECT: REQUEST FOR REPORTS, DRAWINGS AND OTHER INFORMATION REGARDING PLANT
FILL SETTLEMENT AND EFFECTS

As indicated in previous correspondence and our meeting with your staff on February 27 and 28, 1980, the NRC staff reviews of the adequacy of the backfill soils, settlement effects and associated remedial actions are proceeding with the support of three outside organizations or agencies: the U. S. Army Corps of Engineers, the U. S. Naval Surface Weapons Center, and the Energy Technology Engineering Center. In order that they may perform the independent assessments of these areas as we have requested, we and they require detailed reports and drawings on these matters.

Drawings

Our review of the "Drawing Summary" in Management Corrective Action Request 24 indicates that several of the 91 drawings listed in Interim Report 8 are not included with the compilation of reports forwarded by your letter of February 11, 1980 as the volume entitled "10 CFR 50.55(e), Interim Reports, Settlement of Diesel Generator Foundations and Building." Some of the drawings listed in the summary are noted to be replaced by other drawings, and overlaps in drawings occur with the successive updating of the list from one interim report to the next. Notwithstanding this replacement and overlap, some drawings are not provided. We request that you amend this volume to include all missing drawings and to provide an index table specifying the location of each drawing.

Reports

We request that you provide 40 copies of all reports, including meeting summaries and other written communications, with or by consultants who have performed investigations or tests or made recommendations regarding the supporting soils or remedial measures for structures and utilities located on or in questionable materials. An example of the reports needed is provided by Enclosure 1 which lists a few of the reports by Bechtel and

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Mr. S. H. Howell

-2-

APR 1 1980

by Bechtel's consultant, Goldberg-Zonino-Dunnicliff. The list is not intended to be complete nor to identify all consultants involved. Rather, it is intended to illustrate the level of technical detail needed. We request that you include our consultants for direct receipt of a set of these documents.

Other Information

We require information detailing the installation of each piezometer used to monitor pore water pressures during the surcharging program. This should include the type and actual elevations of the installed piezometers, the types of backfill material placed and their extent in the drilled hole.

We also require a description of the services to be performed by consultants R. B. Peck, A. J. Hendron, Jr., C. H. Gould and M. T. Davison. This description should identify the extent of the continued involvement of these consultants in overseeing the remedial construction operations and in evaluating the success of the completed fixes intended to provide stable foundations for the various structures.

We would appreciate receipt of the above documents, drawings and information within 20 days of receipt of this letter. Please advise us within 7 days if you will meet this schedule so that we may adjust our review schedules accordingly.

Sincerely,

L. S. Rubenstein

L. S. Rubenstein, Acting Chief
Light Water Reactors Branch No. 4
Division of Project Management

Enclosure:
List of Reports

cc w/enclosure:
See next page.

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ENCLOSURE 1

Sample Listing of Reports Needed by Staff's Consultants

I. Reports Prepared by Goldberg-Zonino-Dunnicliff

1. Report entitled "Test Pits 1, 2 & 3," dated Feb. 1980
File No. 2190 (Index C-79(Q)-20)
2. Report "Data Summary and Laboratory Procedures," dated Feb. 1980
(Index C-79(Q)-16)
3. Report "Consolidation Tests," dated Feb. 1980
(Index C-79Q-17)
4. Report "Strength Tests," dated Feb. 1980
(Index C-79Q-18)
5. Report "Miscellaneous Tests," dated Feb. 1980
(Index C-79Q-19)
6. "Soil Classification and Moisture Density Relation" dated Feb. 1980
(Index C-79(Q)-21)
7. "Diesel Generator Building Instrumentation," dated October 1979
(Index C-82(Q)-5)
8. "Aquaducer Hose Settlement Gage Instrumentation Manual"
(Index C-79(Q)-4)
9. "Report on Sondex Gages and Borros Anchors"
(Index C-82(Q)-8)
10. "Report on Sondex Gages and Borros Anchors"
(Index C-82(Q)-9)
11. "Procedure for Reading Sondex System"
(Index C-82(Q)-2)
12. "Procedure for Reading Modified Borros Anchors"
(Index C-82(Q)-3)

II. Bechtel Reports

13. "Test Pit 1 Data," dated Sept. 1979 (Index C-79(Q)-10)
14. "Test Pit 2 Data," dated Sept. 1979 (Index C-79(Q)-11)
15. "Test Pit 3 Data," dated Sept. 1979 (Index C-79(Q)-12)
16. "Test Pit 4 Data," dated Sept. 1979 (Index C-79(Q)-13)
17. "Plate Load Test PL-1," dated Sept. 1979 (Index C-79(Q)-14)
18. "Plate Load Test PL-2," dated Sept. 1979 (Index C-79(Q)-15)

19. "Qualification of Compaction Equipment"
20. "Tank Farm Investigation"