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Docket Nos: 50-329
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,

Original signed by:

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

Enclosure:
As stated

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

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ENCLOSURE 1
SUPPLEMENTAL 10 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 occurr. 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 approxmiate 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 clamied 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 inplementing 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 earthquate? 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 bouyance 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.