UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

January 8, 1970

Consumers Power Company
212 West Michigan Avenue
Jackson, Michigan 49201

THIS DOCUMENT CONTAINS
POOR QUALITY PAGES

Attention: Mr. Robert D. Allen
Senior Vice President

Gentlemen:

In meetings with you on December 5, 1969, and December 16, 1969, we noted several areas where the additional information provided in Amendment 5 to your Midland Plant application is not completely responsive to our questions, or where we need additional information to complete our review. We have indicated the specific information required in the enclosure to this letter. The questions are numbered in continuation of the system established in Enclosure A to our September 26, 1969, letter.

Since the enclosure was already in preparation when we received your Amendment 6 on December 31, 1969, some of the information requested may already have been provided in that Amendment. We have chosen to send you the enclosure without waiting for our evaluation of Amendment 6, so that you will not be delayed unnecessarily in responding to those questions not answered in the recent amendment.

I wish to reiterate our statements in Enclosure B to our September 26, 1969 letter, regarding the onsite meteorological program, hydrogen purging, and the Cadweld splice sampling program. Our views on the actions needed to resolve these areas have not changed.

Based on the information submitted in the PSAR and the first five amendments, we would conclude that design of the onsite emergency power system is unnecessarily complex. This complexity jeopardizes the independence of redundant power sources and increases the vulnerability to single failures.

Sincerely,

Peter A. Morris

Peter A. Morris, Director
Division of Reactor Licensing

Enclosure:
List of Addl. Info. Required

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ENCLOSURE

LIST OF ADDITIONAL INFORMATION REQUIRED

1.0 GENERAL

1.7 You have indicated in Amendment No. 5 of the application that activity in the process steam exported to the Dow Chemical Corporation will be determined by the measurement of the nitrogen-13 activity. Identify the source of nitrogen-13 and list the concentrations anticipated in both the primary system and in the secondary system when operating with a 1 gpm primary to secondary leakage rate. State all assumptions and constants used deriving this value, including transit times, cross sections, removal mechanisms, and partition factors. Provide a summary of applicable experimental data which indicates that monitoring the nitrogen-13 activity would prove an acceptable means of determining the gross activity levels in the steam.

1.8 Indicate which portions of the makeup and purification system shown on Figure 9-2 of the PSAR as amended are designed to Class I seismic criteria.

2.0 SITE

2.8 You have indicated in Amendment 5 that the exclusion area will include a small portion of the Dow Chemical Company plant. State if Consumers Power Company has the authority to determine all activities including exclusion or removal of personnel and property from the exclusion area.

2.9 Amplify your response to Section 2.2 of Amendment 5 to discuss the extent of erosion of the cooling pond dike which would be expected to result from the probable maximum flood and the consequences of such erosion.

2.10 We understand from oral statements made at our meeting of December 5, 1969, that the activity in the cooling pond will be limited to the 10 CFR 20 Appendix B Table 2 Column 2 values. Confirm this understanding. If the cooling pond were operated continuously with activity levels corresponding to Table 2, Column 2, of Appendix B to 10 CFR 20, what amount of Cs-137 would settle to the bottom of the pond throughout plant life? Estimate the potential Cs-137 and tritium concentrations in the aquifers and at the nearest wells in both aquifers at the end of plant life.

2.11 Section 2.4 of Amendment 5 did not include the data and methods of analyses requested in Question 2.4 of Enclosure A to our letter dated September 26, 1969. This information is needed to complete our evaluation.

2.12 As requested in Question 2.7 of Enclosure A to our September 26, letter, provide the (1) location and (2) the use of wells using the sand aquifer as a source of water. State the means by which all onsite wells will be capped. Provide information concerning the relative permeability of the soil (1) into the sand aquifer and (2) into the artesian aquifer under the entire reservoir. Justify the permeability estimates with onsite experimental data. Indicate the depth and thickness of the aquiclude under the reservior.

2.13 Your answer to Question 5 of our October 28 letter is not responsive Fxplain how the response spectra selected relate to the physical characteristics and the geophysical properties of the site.

2.14 In Section 5.1.11 of Amendment 5, you have stated that certain Class I components or piping will be founded or placed on the upper, loose sands. Justify the placement of Class I equipment on the loose sands considering densification from vibratory loading. Discuss the possibility and significance of relative differential settlement between structures or components.

2.15 Page 12.0-2 of Amendment 5 states that the factor of safety for the 3.5:1 slope in the event of the design basis earthquake "is expected to be at least 1.1." Provide the bases for your conclusion that a factor of safety of 1.1 is sufficient. Indicate if static and dynamic stability analyses will be made for all permanent slopes assuming the most adverse conditions at the site and conservative properties for the materials involved. Provide the results of these stability analyses for review, and indicate the locations of the slopes analyzed.

2.16 Provide all "C" series boring logs, some of which are shown in Figure No. A9-1 in Amendment No. 5.

2.17 Discuss the effects of brine and salt removal from beneath the plant site. Include:

(1) The length of time this extraction operation has existed and its anticipated future.

(2) The approximate volume of salt that has been or will be removed from the geologic formations beneath the site.

(3) A description of the salt beds being leached.

(4) A map showing the locations of the extraction and recharge wells with respect to the plant structures and appurtenances.

3.0 REACTOR DESIGN

3.7 Expand your response to question 3.5 of our September 26 letter to indicate which modal responses (e.g., deflections, accelerations, stresses) will be combined in determining seismic loadings. If modal responses other than stresses are combined, discuss the procedure for determining the stresses.

3.8 State the stress which corresponds to the 2/3 S_u limit at the design temperature condition for all materials to be used in the reactor internals structure. Discuss the methods by which this stress is determined. If the stress is determined by testing, discuss the specimen material history, the selection of the specimen, and the data reduction methods; if by reference to standard data, discuss the sources of the data, the temperature adjustment procedures, etc. State if this stress is determined on an elastic basis. Provide the strain limits which have been established for these materials at this stress limit.

4.0 REACTOR COOLANT SYSTEM DESIGN

4.17 Discuss the bases for (1) the selection of the interfaces between USASI B31.7 Class I and Class II piping, and (2) the definition of reactor coolant boundary stated in Figure 4.1 of Amendment No. 5. Explain how it can be assured that the high degree of system integrity required for the reactor coolant pressure boundary is provided if a change in classification from USASI B31.7 Class I to Class II is made at the upstream side of check valves which cannot be tested to confirm operability.

4.18 Amplify Section 4.2 of Amendment 5 to indicate if (1) an independent check of the methods by which, or the criteria to which the vendor will determine the seismic qualification of Class I mechanical equipment will be performed, (2) the seismic qualification of equipment will include all the electrical, hydraulic and pneumatic safety features, and (3) consideration will be given to the possibility of amplified responses in the input spectra for light and flexible auxiliary equipment. Provide a description of the response spectrum method to be used for Class I piping and equipment, including equations.

5.0 STRUCTURAL DESIGN

5.1.20 As stated in Section 5.1.8 of Amendment 5, the reactor cavity is designed for 250 psi, the pressure which would result from a 3 square foot break in the reactor coolant piping. Show the margin provided in the design by indicating the pressure and corresponding break size at which loss of structural integrity would be anticipated.

5.1.21 In your response to Item 6 of Enclosure B to our September 26 letter, you indicate that you intend to apply the means found most suitable in achieving a level of leak tightness integrity which meets the intent of pressurized weld channels. Discuss those provisions in detail.

5.1.22 Clarify the discussion presented on the tornado design of the containment and other Class I structures in Section 5.1.4 of Amendment No. 5, as follows:

1. Discuss how the safety margin of 1.7, especially as it relates to general Class I structures, compensates for using load factors less than those used for wind loadings in ACI 318-63.

2. Does the term "flexural compressive stress of concrete shall not exceed $0.85f_c$" include axial as well as flexural compressive stress?

5.1.23 Expand Section 5.1.5 of Amendment 5 to indicate whether or not porous concrete will be placed between the waterproofing membrane and the foundation slab. Show how seismic shears will be handled at the base of the foundation slab.

5.1.24 Amplify Section 5.1.6 of Amendment 5 to indicate the method whereby data from the accelerograph will be related to the aavisability of continued operation of the plant.

5.1.25 From oral discussions at our meeting of December 5, 1969, we understand you will provide the detailed information requested in question 5.1.9 of Enclosure A to our September 26, 1969 letter when it is developed in a final form, but sufficiently prior to fabrication or erection in order to permit it to be reviewed and approved. Confirm this understanding.

5.1.26 Clarify (1) whether the loading combination $D+L+T_A+R+E'$ on page 5.1.9-2 of Amendment 5 is within code allowable stress values as implied at the beginning of the section on this page, and (2) what "time-dependent solution" will be employed as noted on the bottom of page 5.1.9-2.

5.1.27 Clarify whether "mathematically" analyzed, as used in Section 5.1.12 of Amendment 5, means "dynamically" analyzed.

5.1.28 It is implied in Section 5.1.2 of Amendment 5 that some Class I items maybe located in Class II structures. Discuss how these items will be protected from possible damage through the collapse of a Class II structure in the event of an earthquake or tornado. If protective structures are employed, indicate how their loading is determined.

5.2.20 Expand Section 5.2.1 of Amendment 5 to indicate how the modulus of elasticity and Poisson's ratio of the soils were used in the determination of the soil spring constants. Present the test data on which these constants are based and discuss how variations in these constants are accounted for in the seismic analysis.

5.2.21 Amplify Section 5.2.2 of Amendment 5 by indicating how the damping value of 5% was established and what it represents. Discuss the adequacy of the methods used to compute the depth of "composite damping." Since it appears that the internal structure is responding significantly in the third mode, discuss the conservatism associated with the use of a damping value of 5%, rather than 2%.

5.2.22 In Section 5.2.3 of Amendment 5, you indicate that the time-history model requested in Enclosure A to our September 26 letter will be supplied upon its selection. It is necessary that we review this prior to fabrication or erection. When will this informatin be submitted?

5.2.23 Amplify Section 5.2.5 of Amendment 5 by discussing the adequacy of the use of a 1.05 load factor on dead load when designing for tension under overturning conditions.

5.2.24 Expand Section 5.2.6 of Amendment 5 by specifying the damping values to be used for rocking or translation of the structures.

5.2.25 Expand Section 5.2.9 of Amendment 5 to cover net compression or tension.

5.2.26 Expand Section 5.2.15 of Amendment 5 to cover accidental torsion in accordance with the Uniform Building Code requirements.

5.2.27 Amplify Section 5.2.19 of Amendment 5 to indicate when a detailed stress analysis of the prestressed anchor block elements will be provided for our review.

6.0 ENGINEERED SAFETY FEATURES

6.13 State the design temperature and pressures for all portions of the emergency core cooling system.

6.14 In the event of failure of the sump recirculation line, you have indicated in Amendment No. 5 that 50,000 gallons could spill from the system in the 1.5 minutes required to isolate the break. Indicate if this flooding could affect the other independent train of emergency core cooling equipment. Evaluate the radiological consequences of this break indicating your assumptions concerning meteorology, fission product source, spray effectiveness, partition factors, and filter efficiency.

6.15 Describe the tests proposed to qualify equipment which must operate in the post-loss-of-coolant-accident environment. Include pressure, temperature, humidity, and radiation effects as requested in question 7.15 of Enclosure A of our September 26 letter. Include all the information requested required in question 1.1 of Enclosure A to our September 26, 1969 letter.

6.16 Your response to Item 7 of Enclosure B to our September 26 letter indicates that the containment sump line isolation valve is located in a water-tight compartment. Discuss the design of this compartment. Indicate design leakage, the effect of the lower sump level on available NPSH, and the design pressure and temperature of the compartment. Discuss the methods used in the construction of this compartment, and state the manner in which it will be sealed. Discuss the radiological consequences of a failure in the sump suction line upstream of the isolation valve, listing all assumptions used.

6.17 As indicated to you at our meeting of December 5, 1969, we believe that additional research and development effort is necessary in the areas of the long term stability of sodium thiosulfate under post-accident conditions, the compatability of sodium thiosulfate with reactor materials, and the precipitation of sulfur from thiosulfate solutions. Indicate your plans for additional research and development effort in these areas. Your response should contain the information requested in question 1.1 of Enclosure A of our letter of September 26, 1969.

7.0 INSTRUMENTATION AND CONTROL

7.18 Your response to question 7.12 of Enclosure A to our September 26 letter did not address the means being provided to display the in-core detector information to the operator. We will need to know the manner inswhich this information will be displayed and your discussion of how this meets the operator's needs.

7.19 Question 7.16 of Enclosure A of our letter of September 26 requested you to provide a description and a discussion to substantiate the potential capability to bring the plant from hot standby to cold shutdown from outside the control room by altering instrumentation, controls, and equipment existing in the plant, if necessary. This information has not yet been received.

7.20 In your design, safety injection initiation is provided by low reactor coolant pressure or high reactor building pressure. Initiation by either of these diverse signals, assuming failure of the other signal, will meet ECCS requirements. Since your analysis of the effectiveness of the safety injection system design takes credit for a reactor trip, explain the bases for your conclusion that similar diversity should not be provided to trip the reactor.

8.0 ELECTRICAL POWER

8.7 In your response to question 8.2, Part 1 of Enclosure A to our September 26, 1969 letter, you stated that a single 125 volt battery with charger is provided in each of the 345 kv and 138 kv switchyards. Further, you stated that these battery systems will be provided with manual switching to permit either battery to carry the full d-c load and to permit a spare charger to be connected to either battery or remain on standby. State whether these manual switch controls are located in the control room or locally in the switchyards and whether fault conditions are alarmed (annunicated) in the control room.

8.8 You stated in response to question 8.2, Part 2, that the second redundant source of offsite power is made available to the emergency buses by removing connector links between the generator and the main transformers. State and provide the basis for the time required to remove these links in order to make power available to the engineered safety features.

8.9 Your response to question 8.5 does not include the criterion stated in discussions with your representatives that the continuous rating of the selected diesel generator will be 10% greater than the automatically connected emergency loads. Confirm that this criterion will be used in the selection of the diesel generators.

8.10 Your response to question 8.6, Part 3, is incomplete in that the discussion of overload protection did not address the type of protection being provided for three-phase circuits.

9.0 AUXILIARY AND EMERGENCY SYSTEMS

9.6 Portions of the decay heat removal system are designed to seismic Class II criteria. Assuming the Class II equipment does not function in the event of an operational basis earthquake, discuss your ability to achieve cold shutdown to permit an evaluation of damages incurred.

9.7 In Section 9.5 of Amendment No. 5 to the application, you have indicated that failure of seismic Class II structures and components of the fire protection system will result in release of water which may prevent functioning of some seismic Class I components. Indicate which Class I components or structures may be prevented from functioning by such a failure, and discuss the adequacy of the design should such failure occur.

10.0 STEAM AND POWER CONVERSION EQUIPMENT

10.4 Supply an expanded schematic drawing of that portion of the steam system containing the pressure reducing stations and the isolation valves in the steam lines to Dow Chemical Company. In addition, show the location of these valves on a layout drawing.

13.0 SAFETY ANALYSES

13.1.5 Discuss in detail your rationale for not including a pressurizer level trip including (1) the consequences of a startup accident without a level trip and with pressurizer level at off-normal positions, (2) the time required to fill the pressurizer from normal level and from the normal alarm level, and (3) the consequences of overfilling the pressurizer during operation. Indicate your proposed procedures regarding pressurizer level during startup, including rod testing, deborating, etc.

13.2.5 You have stated in the response to question 13.2.2 of Enclosure A of our letter of September 26, 1969, that the energy deposition in the core would be lower for a rod ejection accident than for a loss-of-coolant accident resulting from the same size primary system failure. Indicate the manner in which heat removal from the core would vary under these circumstances and state the maximum clad temperature experienced in both cases.

13.3.9 Analyze the steamline failure accident as requested in question 13.3.3 of Enclosure A of our September 26, 1969 letter, assuming that reactor trip is accompanied by a loss of offsite power.

13.3.10 In Section 13.3.5 of Amendment No. 5 to the PSAR you indicate that steam generator tube failure would be detected by measuring the activity level in the steamline. Indicate the method and sensitivity of this measurement.

13.5.3 Discuss the effect on the Midland Plant of toxic chemicals released as a result of failures at the Dow Chemical Company Plant for a range of meteorological conditions. Under some circumstances, it appears that the time available to alert the Midland Plant operators might be reduced significantly from that stated in Section 13.5.2 of Amendment 5, while the concentrations of toxic chemicals could remain above TLV limits.

13.5.4 Indicate the procedure that will be followed to evaluate proposed relocations or new construction on the Dow plant property. Discuss the means whereby such new construction would be evaluated for its effect on the Midland plant, and indicate the measures that would be taken to prevent a new hazard from occurrring from such new operation considering toxic, corrosive, and explosive hazards.

13.6.4 Expand your answer to question 13.6.2 of Enclosure A of our letter of September 26, 1969, to include the consequences of tornado missiles entering the fuel storage pool from the top (rather than thru the walls) and then dropping through the water onto the fuel.

13.6.5 Explain the bases for the iodine source terms used for sizing the charcoal filters as stated in Section 13.6.3 of Amendment No. 5.

13.7.3.9 Provide additional information on the condensing heat transfer coefficient used in the COPATTA program. Discuss (1) the variation of the coefficient as a function of pressure, (2) scale-up from the Kawahara experimental cylinders to the large vertical surfaces of the reactor building, (3) the applicability of the "Modified Tagami" coefficient to horizontal surfaces, (4) the effect of surface roughness on the magnitude of the coefficient, and (5) the source of all data points on Figure 5 of your "Response to USAEC-DRL question 13.7.3.1, 13.7.3.2, and 13.7.3.3" submitted as a part of Amendment 5 to the application.

13.7.3.10 Identify the thermodynamic model used in the COPATTA code and compare it with that employed in the CONTEMPT code. Discuss in detail the assumptions regarding the splitting of superheated water into steam and saturated water.

THIS IS NOT A DUPE

Consumers Power Company
212 West Michigan Avenue
Jackson, Michigan 49201

Attention: Mr. Robert D. Allen
Senior Vice President

Gentlemen:

In meetings with you on December 5, 1969 and December 16, 1969, we discussed the additional information you provided in Amendment No. 5 to your Midland Plant application. We noted several areas where information thus far provided was not adequate to permit us to complete our review or where the answers are not responsive to the questions. The specific information required is indicated in the enclosure to this letter. The questions are numbered to maintain the numerical identification with subject areas established in Enclosure A to our September 26, 1969 letter.

We received Amendment 6 to your application on December 31, 1969. We have not yet evaluated this submittal but recognize that several of the items in this letter or the enclosure thereto are answered in whole or in part in Amendment 6. Please submit all necessary information required to provide full and complete answers to the concerns expressed in this letter.

Based on our review of the technical material provided in your PSAR and the first five amendments, a number of problem areas have been identified. I wish to reiterate our statements in Enclosure B to our September 26, 1969 letter regarding the onsite meteorological program, hydrogen purging, and the Cadweld splice sampling program. Our views on the actions needed to resolve these areas have not changed. Further, we wish to advise you that we have reached the following conclusions based on the information submitted in the PSAR and the first five amendments:

1. The design of the onsite emergency power system is unnecessarily complex. It is our judgment that this complexity jeopardizes the independence of redundant power sources and increases the vulnerability to single failures.

OFFICE ▶						
SURNAME ▶						
DATE ▶						

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2. The gaseous radioactive waste disposal system should be designed to seismic Class I criteria.

As indicated by your letter dated October 28, 1969, we require that the information concerning geologic studies made by others, as identified on page 4.0-1 of Amendment 5, bemmade a formal part of the application. This is necessary since a conclusion regarding the adequacy to the site cannot be made without reference to this data.

As you know, a meeting was held in Bethasda on October 30, 1969, between representatives of Consumers Power Company and the Division of Reactor Licensing to discuss the quality assurance program planned for the Midland Nuclear Plant. The additional information required for the completion of our review in this area was identified at this meeting. This should be submitted with your next amendment.

As I indicated in my September 18 letter, [illegible]ity to meet your scheduling requirements for the Midland Plant will depend in large measure on the adequacy and completeness of your application, as amended.

Sincerely,

Peter A. Morris, Director
Division of Reactor Licensing

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Distribution:
AEC Pub. Doc. Rm.
Docket File (2)
DR Reading
RL Reading
RPB-1 Reading
C. K. Beck
M. M. Mann
P. A. Morris
F. Schroeder
T. R. Wilson
R. S. Boyd
R. C. DeYoung (14)
CO (2)
D. R. Muller
J. A. Murphy
N. M. Blunt

OFFICE ▶	RL:RPB-1	RL:RPB-1	RL:RT	RL: RP	RL	RL
SURNAME ▶	JAMurphy/pf	DRMuller	RCDeYoung	RSBoyd	FSchroeder	PAMorris
DATE ▶	12/31/69	12/ /69	1/6/70	12/ /69	1/5/70	1/ /70

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We received Amendment 6 to your application on December 31, 1969. We have not yet evaluated this submittal but recognize that several of the items in this letter or the enclosure thereto are answered in whole or in part in Amendment 6. Please submit all necessary information required to provide full and complete answers to the concerns expressed in this letter.

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