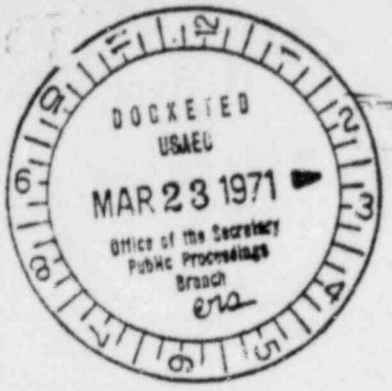


DOCKET NUMBER
PROD. & UTIL. FAC. 50-329,330

UNITED STATES OF AMERICA
ATOMIC ENERGY COMMISSION

In The Matter of
CONSUMERS POWER COMPANY
(MIDLAND PLANT UNITS 1 and 2

Docket Nos. 50-329
50-330

FIRST SET OF INTERROGATORIES
OF CERTAIN INTERVENORS
DIRECTED TO CONSUMERS POWER COMPANY

Pursuant to Part 2 of the Rules of Practice of the Atomic Energy Commission and the Atomic Safety and Licensing Board's Order permitting the serving of these interrogatories and requiring their answer, Intervenors request that the following interrogatories be answered fully in writing and under oath by one or more officers or employees of Consumers Power Company ("Applicant" or "you" or "your" or words of similar import) who has personal knowledge thereof or is the closest to having personal knowledge thereof. If the interrogatories are answered by more than one person, whether or not he verifies the answers, and whether or not he is an officer or employee of Applicant, such person's name and title should be set forth together with an identification of which interrogatories he is responsible for answering. Unless specifically set forth to the contrary, your answer shall be assumed to apply equally to

both of the proposed Midland Units. The Interrogatories below are to be considered your continuing obligation. Accordingly, after you have answered these Interrogatories, if additional information comes to your attention with respect to one or more of these Interrogatories or your answers thereto, then you are required to amend your answers to provide such additional information.

1. With respect to the Iodine Removal Spray System proposed to be installed in the proposed Midland Units, state in detail and separately each fact, calculation and assumption upon which you rely or intend to rely upon to support each fact, assumption or conclusion set forth in the Preliminary Safety Analysis Report ("PSAR") regarding such System which is not set forth in the PSAR. With respect to each such fact and assumption not set forth in the PSAR, and in addition to setting it forth, state the following:

(a) Its relative importance as a fact or an assumption regarding the efficiency of operation of the Iodine Removal Spray System; and

(b) Why such fact or assumption was not set forth in the PSAR.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such reference or attach a copy.

2. With respect to each experiment and its results relied upon in the PSAR to support or justify the design and effective operation of the Iodine Removal Spray System, state:

(a) The parameters of each such experiment and what specific factors inhering or governing each such experiment justify reliance in your opinion on such experiment regarding the Iodine Removal Spray Systems in the proposed Midland Units;

(b) What factors. if any, in each such experiment, if not inhering in the operation of the Iodine Removal Spray System in the proposed Midland

Units would prevent reliance, in your opinion, upon such experiment as supporting authority for the design and effective operation of the Iodine Removal Spray System. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such reference or attach a copy.

3. Give a detailed description of each Iodine Removal Spray System or part thereof engineeringly useable or actually in use, but not planned to be used in the proposed Midland Units. Include within your answer your reasons for discarding such other systems or parts thereof. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

4. Give a definition of gas film resistance as that term is used in Section 14.2.2.3.7 of the PSAR. In connection with your definition and the reliance in the PSAR upon the works of Taylor, Griffith, Ranz and Marshall, as recorded in footnotes 19 through 21 of said Section, state whether gas film resistance is the sole controlling factor in the transfer of elemental iodine into reactive solutions. Include within your answer whether or not the relied-upon assumptions contained in the works of Taylor, Griffith, Ranz and Marshall are constant or

variable and, if they vary, state in detail each differing variable, such as, for example, temperature, its relative significance to total and complete iodine removal, and how such variable factors affect or may affect your conclusions stated in the aforesaid Section of the PSAR. In connection with your answer, please quantify the relative significance of such variable factors regarding total and complete iodine removal by stating each such factor's absolute magnitude. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

5. With respect to your assumption set forth at pages 14-63a of the PSAR "that all the drops are spherical and have the same diameter," state the following:

(a) What is the variance of the diameter of the spray droplets for this particular system and the spray nozzles thereof;

(b) The optimum size of the diameter of the droplets for the most effective working of the Iodine Removal Spray System. In connection with this answer, state why you have assumed, (PSAR p. 14-63b), that 1,000 microns is apparently the most effective diameter size. If you rely upon any experiment, describe in detail each such experiment including each fact, calculation, assumption, and result thereof.

(c) Regarding the last sentence on page 14A-1 of the PSAR, state each fact, calculation and assumption which you believe supports your assertion that you are "confident" that the Iodine Removal Spray System will perform as predicted. In your answer do not merely refer to footnoted textual references, but rather state in detail the basis for your "confidence" in explanatory language. If you only rely upon what is contained in the PSAR, then please so state.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

6. State each condition under which the sodium thiosolphate-sodium hydroxide solution will be unable to retain iodine during the course of the use of the Iodine Removal Spray System. In connection with your answer stating each such condition, also set forth each of the variables involved, explaining each such variable in detail, including each such variable's time history throughout the period of a Maximum Hypothetical Accident (MHA) and thereafter during the time which the possibility of radiation release remains. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each

such other reference or attach a copy.

7. With reference to the relied-upon experiments referred to at page 14A-2 of the PSAR, state each fact, calculation and assumption which you rely upon to conclude that "5 per cent removable iodine" is a conservative value for use in the MHA analysis. If your answer relies wholly upon the results of said experiments and not upon any independent analysis, state what review or analysis was made of said experiments, and under what conditions, to conclude that the parameters of and factors inhering in the relied-upon experiments will be the same in the operation of the Iodine Removal Spray System in an MHA. If your answer also relies upon independent analysis, state in detail such analysis. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

8. State a definition of the term "dramatic" as it is used at page 14A-2 of the PSAR. In connection with your answer, state each fact, calculation and assumption, including but not limited to, all numerical values upon which you rely to support your assumption or conclusion that the removal rate of methyl iodine "is not dramatic." If, after answering this interrogatory, it is still your conclusion that the removal rate of methyl iodine is not dramatic, then state what steps were taken or which you contemplate taking to improve the efficiency of the removal rate of methyl iodine and if none were taken or are

contemplated, then also state whether, in your opinion, considering the safety of the public and its health and welfare, it is acceptable to subject the population, given an MHA, to the consequences of a less than efficient removal rate of methyl iodine as that term is used in the PSAR. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

9. With respect to the state of the art of iodine removal spray system and the system you have selected for use in the proposed Midland Units, state whether such systems have ever been tested under laboratory conditions which would be equivalent to an MHA. If your answer is yes, then describe in detail such testing and its results, including within your answer each fact, calculation and assumption of such testing. In connection with your answer, state whether you rely upon any assumptions or facts which were first developed subsequent to March 23, 1962, and if you do so rely, state in detail each such fact and assumption. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

10. State whether you are relying upon the efficiency of the Iodine Removal Spray System to permit siting on the proposed Midland Units in Midland in light of Technical Information Document 14884. In connection with your answer, state whether

if any critical assumptions set forth in the PSAR concerning your Iodine Removal Spray System are proven unsound or unfounded, then whether in your opinion you would be able to meet the siting criteria set forth in Technical Information Document 14884. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

11. With reference to the assumptions set forth in Technical Information Document 14844 only, state the geographic area of the exclusion area, low population zone and population of center distance required thereby for the proposed Midland Units. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of such other reference or attach a copy.

12. Assuming that your Iodine Removal Spray, Depressurization and Cooling Systems do not function during an MHA, calculate for an individual in each of the exclusion area, low population zone and population center distance as set forth in your PSAR the eight-hour, twenty-four-hour and thirty-day dose to the whole body or to an organ of the body which concentrates a specific radionuclide, as the case may be, for each radionuclide released during an MHA, and include within your calculation each fact and assumption upon which each such calculation is based. If in your answer you make reference to other than

textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of such other reference or attach a copy.

13. With reference to the dose for each radionuclide, as set forth in your answer to Interrogatory 12 above, state the consequences from a health standpoint to such individual who is subjected to such whole-body dose including but not limited to that individual's tendency to be more susceptible to cancer, leukemia or any other adverse physiological effect, and assuming the normal life span of such individual, state what effect, if any, such doses will have upon shortening his life span. Include within your answer each fact, calculation and assumption upon which you base your answer, including but not limited to, whether you are assuming that there is a linear relationship between radiation exposure and adverse physiological consequences. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of such other reference or attach a copy.

14. State whether the design of the Iodine Removal Spray System is complete as set forth in the PSAR or whether, in order to complete the design, you are contemplating, during the course of construction if a permit is issued, pursuing research and development to improve upon or complete the design Iodine Removal Spray System. If your answer is that you are contemplating such further research and development, then answer the following:

(a) The nature, character and specific details, including results intended, of such research and development, specifying the amount of funds to be allocated to such research and development, and the names and addresses of each person, firm and corporation who will participate in such research and development;

(b) Why it is your opinion, if it is, that such research and development can adequately be carried out prior to the granting of the construction permit.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of such other reference or attach a copy.

15. With reference to your Answer to Regulatory Staff Question 6.7 of Amendment No. 5 to the PSAR, as set forth at page 6.7-1 of the PSAR, state each fact, calculation and assumption for each of your conclusions separately regarding thermal stability, radiation stability, materials compatibility and iodine retention capability of the alkaline sodium thiosulphate spray solution. In your answer, also state in detail each fact, calculation and assumption relied upon and contained in the Thiosulphate Research and Development Program reported in BAW-10017 and attach a copy of such document. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the

text of such other reference or attach a copy.

16. State whether your Iodine Removal Spray System was designed solely with respect to the limits of 10 CFR Part 20 or whether your Iodine Removal Spray System, if operating according to design, will result in releases of iodine at levels lower than 10 CFR Part 20 permits. If your answer is that your Iodine Removal Spray System will result in releases at levels lower than permitted by 10 CFR Part 20, then state whether your system is designed so that release of iodine is as low as engineeringly possible and if not, why not. Also in connection with your answer, state whether in the course of designing your Iodine Removal Spray System you attempted to design a system to prevent releases of iodine at a specific level or at any level below the levels permitted by 10 CFR Part 20, or whether you chose as your goal the prevention of release of iodine under all situations at "essentially zero."*

17. With regard to the following two sentences set forth on page 5 of the Midland ACRS letter dated June 18, 1970:

> "Other problems related to large water reactors have been identified by the Regulatory Staff and the ACRS and cited in previous ACRS reports. The Committee believes that resolution of these items should apply equally to the Midland Plant Units 1 & 2."

state the following:

(a) Whether "other problems" are related to releases of iodine and/or an iodine removal system;

(b) If there are such related problems, state each of them and with respect to each one state what steps you intend to take or are taking to resolve these problems. Include within your answer whether it is possible to resolve such problems prior to the granting of a construction permit, and if it is so possible, then state why you have not done so; and

(c) What "other problems" these sentences refer to, other than problems related to releases of iodine and/or iodine removal system; and with respect to each such "other problems" state, separately for each one, what steps you intend to take or are taking to resolve such problems. Include within your answer whether it is possible to resolve these problems prior to the granting of the construction permit, and if it is so possible, then state why you have not done so.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

18. State each fact, calculation, and assumption which you rely upon to support your assumption that particulate aerosols found in a Loss of Coolant Accident ("LOCA") will be rapidly removed from the reactor building atmosphere. Include

within your answer a definition of "rapidly removed," including numerical values with respect to time. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

19. State your understanding of the phrase "properly engineered system" as it is used at page 14A-2 of the PSAR. Include within your answer each fact, calculation and assumption which you rely upon for your conclusion that the Iodine Removal Spray System can be classified as such a properly engineered system. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

20. With respect to the second paragraph at page 3-66 of the PSAR, state:

(a) Each fact, calculation and assumption to support your conclusion that ". . . internal components failure will not occur." Include detailed reference to experiments and their results, if any, which you contend support said conclusion, and also include what basis you rely upon to conclude that you can design a system to prevent internal components failure, if your design in this regard is not yet final or complete;

(b) What is the specific nature and magnitude of the "dynamic loadings" which you say will occur;

(c) Describe in specific detail, including numerical values, the "oscillating differential pressure across the core" which you say will result from dynamic loadings;

(d) Give a definition of "detailed design period;"

(e) State in specific detail the scope, outline and intended results of the evaluation contemplated and include within your answer whether such an evaluation should be made prior to the beginning of construction of the proposed Midland Units. If your answer is that such an evaluation is not a necessary safety precondition to construction, state why not and what in detail you will do if during construction your evaluation proves adverse to safety.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

21. With respect to your analysis of LOCA as set forth at page 3-66 of the PSAR, state each fact, calculation and assumption upon which you conclude that transient pressure oscillations are dampened out in approximately 0.5 seconds. Include within your answer all occurrences, incidents and variables, which are

controlling, as well as their time history and uncertainty. Also include within your answer a detailed statement of fuel clad maximum temperature, percentage expected fuel clad perforation and differential pressure fission product leakage, maximum bowing (i.e. degree of fuel rod and/or control rod distortion), and the variance of criticality which would occur during the approximately 0.5 seconds. Your answer and analysis regarding the aforesaid core conditions should be weighted with respect to each uncertainty, and each such uncertainty identified in specific detail. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

22. With respect to the pressure vessel safety analysis (Section 4.3.1.1.1 of the PSAR), state each fact, calculation and assumption, other than your apparent total reliance upon the ASME III Code, upon which it is concluded that the reactor vessel will maintain its integrity despite the potential for limited crack propagation due to thermal shock. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

23. State each fact, calculation and assumption, including the criterion and design philosophy or design basis upon which you conclude that "a system to mitigate the consequences of

a vessel failure due to thermal shock following a Loss of Coolant Accident is not justified." (PSAR p. 4-15) In addition:

(a) If your answer is based in whole or in part upon historical precedent, identify:

(1) Each document which refers or relates to or demonstrates this precedent;

(2) Each oral communication which refers or relates to or demonstrates this precedent and give, regarding each such communication, the date and place thereof, the identity (by name, address, by whom employed, with what group or organization affiliated and for whom acting) of each person involved therein, and the complete substance of what was said by and to each person.

(b) If your answer is based in whole or in part upon financial, economic or engineering factors, identify:

(1) Each document which refers or relates to or demonstrates each such factor;

(2) Each oral communication which refers or relates to or which demonstrates each such factor and give, regarding each such communication, the date and place thereof, the identity (by name, address, by whom

employed, with what group or organization affiliated and for whom acting) of each person involved therein, and the complete substance of what was said by and to each person.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

24. With respect to page 4-15 of the PSAR, state what quantitative and calculated influence the fact of proximate population density has on engineering safety systems contained in or proposed to be contained in the proposed Midland Units. Include within your answer what population density would have to be present, in your opinion, for you to change the proposed site, and also include within your answer the differences, if any, between your term, "proximate population density" and each of the terms, "low population zone" and "population center distance" as they are used in Technical Information Document 14844. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

25. Regarding the design and performance of the pressure vessel as described in the PSAR Sections 3.2.2.1.7, 4.3.1, 4.3.1.1 and 4.3.9.1.1, and the possibility of adding systems to assure continued core cooling, state in detail:

(a) What information is expected to become "available in the future to demonstrate" the necessity of such a system;

(b) What information, if available, do you consider would require such a system;

(c) Why, if such a system will add to the integrity or safety of the engineering safeguards, you have failed to propose the inclusion of such a system now;

(d) If you were required or future information made it desirable to include such a system, then how would you design such a system; and

(e) What provisions are you adding to the building and systems designs to permit the addition, if desirable, of such a system.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

26. With regard to a LOCA, state in detail the sequence of events which would be required for the timely insertion of the control rods, and include within your answer each controlling factor and its uncertainty regarding such timely insertion. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference and attach a copy of each such other reference.

27. With regard to Section 14.1.2.8.2 of the PSAR, calculate in the same manner and detail as required by Interrogatory 13 the doses following the release of secondary system steam to the atmosphere. Your answer should be based upon the highest possible release of radionuclides and should also include the manner or method by which you conclude that such releases are the highest possible. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

28. State why you have not included within the PSAR the design or proposed design to vent and contain releases of iodine to the atmosphere in the event of a blackout release as defined in Section 14.7.2.8.2 of the PSAR. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

29. With regard to Section 14.1.2.9.2 of the PSAR, calculate in the same manner and detail as required by Interrogatory 12 the doses following a steam line failure accident. Your answer should be based upon the highest possible release of radionuclides and should also include the manner or method by which you conclude that such releases are the highest possible. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth com-

pletely the text of each such other reference or attach a copy.

30. Describe in detail what systems, if any, are proposed to minimize or prevent release of radionuclides to the atmosphere in the event of a steam line failure accident and in the event of a fuel handling accident. If no systems are proposed, then state why not. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely each such other reference and attach a copy of each such other reference.

31. With regard to Section 14.2.2.1.2 of the PSAR, calculate in the same manner and detail as required by Interrogatory 12 the doses following a fuel handling accident. Your answer should be based upon the highest possible release of radionuclides and should also include the manner or method by which you conclude that such releases are the highest possible. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

32. With regard to the accident discussed in Section 14.2.2.2.1 of the PSAR, state each fact, calculation and assumption upon which you conclude that the maximum hole size resulting from a rod ejection is approximately 1.75 inches. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

33. With respect to a LOCA, state each fact, calculation and assumption of test No. 546 (LOFT semiscale blowdown tests) upon which you rely to conclude that such test and its results support your conclusion as to the presumed effectiveness of the emergency core cooling system. Include within your answer sufficient detailed description of said test, its unknowns and uncertainties so that one can objectively determine whether said test has any application to the proposed Midland Units, and also state whether any other tests were made or are planned to be made related to the purpose or purposes for which said test No. 546 was made. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

34. With respect to a LOCA, state under what conditions control rod insertion could be prevented or delayed by higher-than-normal core pressure during blowdown. For the spectrum of possible delay times, determine:

(a) The maximum clad temperature;

(b) The maximum fuel center line temperature; and

(c) The percentage of clad perforations considering pressure (internal and external) and also considering temperature factors, unless such temperature factors are set forth in (a) and (b) above.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

35. Describe in detail the following with respect to the ability of the emergency core cooling system to prevent all of the possible consequences resulting from a LOCA:

(a) What experiments with geometries, if any, representative of the reactor coolant system, have been conducted and how do they relate to analytical models and/or other related experiments:

(b) What experiments, if any, have been performed to provide detailed information on fluid conditions within a geometry representative of the reactor coolant system;

(c) What experimental data has been obtained precisely to predict heat transfer coefficients from parallel pin arrays that extend over the range of fuel-pin geometries and coolant conditions that exist during blowdown;

(d) What experimental data is there to prove that no significant delay of the fuel rod wetting process will occur with regard to the gravity core flooding system; and

(e) What testing at high temperatures and at

degenerated conditions have been conducted with respect to experimental verification of core cooling techniques.

Include within your answer the results and each fact, calculation and assumption of your analysis thereof, insofar as it relates to the proposed Midland Units, of each such experiment or experimental data. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

36. With respect to a LOCA, what are the effects of a delayed addition of emergency cooling water to the core on the Zircaloy steam reaction. Include within your detailed answer, a description of each computer and experimental analysis, specifying each fact, calculation and assumption thereof, upon which you base your conclusion. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

37. Describe in detail what analysis and/or experiments, if any, including a description of their results and specific application to the proposed Midland Units, have been made with regard to the following:

(a) The temperature at which the Zircaloy - clad, UO_2 - pellet fuel rods begin to collapse;

(b) The effects of the fuel-clad interactions on the collapse process;

(c) The effects of clad-steam reaction on the collapse process.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

38. State what analysis and/or experiments, if any, including a description of their results and specific application to the proposed Midland Units, have been made with regard to the nature of the attack of molten UO_2-Zr-ZrO_2 mixtures upon steel surfaces, including the additional effects, if any, of water in such a reaction. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

39. State what analysis and/or experiments, if any, including a description of their results and specific application to the proposed Midland Units, have been made to demonstrate the effects of dumping large quantities of molten UO_2 (containing quantities of dissolved Zircaloy and steel and their oxidation products) (hereafter in these interrogatories called molten mass) into water pools. If all the facts, calculations and assumptions upon which you rely are not presented in the PSAR, in addition to setting them forth, state with respect to each such fact, calculation and assumption the following:

(a) Its relative importance regarding the maximum possible exposure of radiation to the population;

(b) Why such fact, calculation or assumption was not set forth in the PSAR.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

40. State what analysis and/or experiments, if any, including a description of their results and specific application to the proposed Midland Units, have been made regarding the long-term behavior of molten mass in contact with water. If all the facts, calculations and assumptions upon which you rely are not presented in the PSAR, in addition to setting them forth, state with respect to each such fact, calculation and assumption the following:

(a) Its relative importance regarding the maximum possible exposure of radiation to the population;

(b) Why such fact, calculation or assumption was not set forth in the PSAR.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

41. State what analysis and/or experiments, if any,

including a description of their results and specific application to the proposed Midland Units, have been completed regarding the nature and rate of attack of molten mass on concrete surfaces and what degree of violence is produced as the water content of the concrete is released. If all the facts, calculations and assumptions upon which you rely are not presented in the PSAR, in addition to setting them forth, state with respect to each such fact, calculation and assumption the following:

(a) Its relative importance regarding the maximum possible exposure of radiation to the population;

(b) Why such fact, calculation and assumption was not set forth in the PSAR.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

42. With respect to the radioactive waste analysis of Section 11 of the PSAR, give an estimate, specifying each fact, calculation and assumption thereof, during normal operation of the proposed Midland Units of the following:

(a) The quantity of each of the principal radionuclides expected to be released annually to unrestricted areas in liquid effluents;

(b) The quantity of each of the principal radionuclides of the gases, halides and particulates

expected to be released annually to unrestricted areas in gaseous effluents;

(c) The range of maximum potential annual radiation doses to individuals and suitable samples of population groups in Midland and surrounding population areas or centers resulting from these releases; and

(d) The quantitative percentage contribution to the total present background dose of the dose or doses set forth in (c) above.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

43. With respect to the testing procedure described in the Answer to Question 6.10 in Amendment No. 5 to the PSAR, state whether this testing procedure will be adequate for unknown variables over the entire plant life. If your answer is yes, state each category of variables, including their uncertainty which you have considered in your answer, as well as each fact, calculation and assumption which leads you to conclude affirmatively. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

44. With regard to the analysis of a LOCA and the

effectiveness of the emergency core cooling system, state each fact, calculation and assumption upon which are based the use in the PSAR analysis of the computer codes PRIT, SLUMP and FLASH and what uncertainties, if any, are inherent in their use in this analysis. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

45. With respect to Section 14.2.2.3.7 of the PSAR, state each fact, calculation and assumption upon which the values of Table 14-10a have been determined. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

46. With respect to reactor building leakage during an MHA, as analyzed in the PSAR, state each fact, calculation and assumption upon which it is determined that leakage from the reactor building is assumed to be .1 percent by weight of the free volume for the first 24-hour period and .05 percent for each 24-hour period beyond the first 24-hour period following a loss of coolant accident. Your answer should include a consideration of all possible variables and uncertainties and an identification of each such variable and uncertainty. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely

the text of each such other reference or attach a copy.

47. Set forth in detail each fact, calculation and assumption by which Figure 14-64 of the PSAR was obtained. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

48. With respect to Section 14.2.2.4.2 of the PSAR, set forth each fact, assumption or procedure, if any, which differs from the facts, assumptions or procedures outlined in Technical Information Document 14844 and how and upon what basis you support or intend to support the use of or reliance upon such different facts, assumptions or procedures. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

49. With respect to each condition affecting the integrity of each part of the primary coolant system in the event of a LOCA, state the following:

(a) The predicted design for:

(1) Static loads;

(2) Dynamic loads;

(3) Cyclic loads; and

(b) The applicable stress vs. frequency curves.

State if your answer to any of the above would be different after each successive ten-year period of operation of the

proposed Midland Units, if a permit issues, throughout a forty-year period. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

50. With respect to the cold leg rupture for rupture sizes down to approximately 4 in. (0.087 ft.^{2}) in diameter, state each analysis, including each fact, calculation and assumption thereof, that "show that the system pressure will decrease below 600 psig . . ." (PSAR p. 14-51), so that the core flooding tanks will begin discharging into the reactor vessel. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

51. With respect to the cold leg rupture for rupture sizes below 4 in. (0.087 ft.^{2}) state each analysis, including each fact, calculation and assumption thereof, upon which you conclude (PSAR p. 14-51) that it would be possible to hold above 600 psig for a "period of time." Include within your answer a definition of "period of time" as you use that term. Also include within your answer in detail each fact, calculation and assumption which you contend verifies that both core heat transfer and coolant area and primary containment integrating will be maintained under the circumstances of a cold leg rupture for rupture sizes below 4 in. (0.087 ft.^{2}). If in your answer

you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely each such other reference or attach a copy.

52. State in detail, including each fact, calculation and assumption thereof, the result of each probability study made regarding rupture or failure in any form or mode of the proposed pressure vessel. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

53. With respect to the maximum thermal output (KW/ft) and the maximum fuel burnup (MWd/MTU), state in detail each experiment and analysis, including each fact, calculation and assumption thereof, which you contend supports the ability to achieve such output and burnup without exceeding fuel integrity. Your answer should include, although should not be limited to, irradiation temperature and pressure effects for each static, dynamic and cyclic condition for Zirconiun cladding, both as an individual instance and as an accumulative history. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

54. With respect to stress and strain design criterion for fuel assemblies at the most severe abnormal and the most severe normal conditions, state for each such condition and for

each component as well as for each of the integrated parts of that component, each instance in which such stress and strain will be relieved, in your opinion, by small deformations of the material of which it is fabricated. Also state for each such instance the accumulated history of cyclic loadings. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

55. With respect to the added effects of irradiation to clad stress levels, state each fact, calculation and assumption upon which you rely to support the statement at page 3-76 of the PSAR that a "3:1 margin on stress is more than enough to account for decreased stress rupture due to irradiation." If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

56. Describe in detail each test mentioned at page 3-79 of the PSAR which you contend demonstrates a clad collapsing pressure in excess of 4,000 psi. at expansion void maximum temperature. Also state the following:

(a) By whom and for whom these tests were performed and when they were performed;

(b) Each fact, calculation and assumption upon which it is contended that each of such tests apply to the Midland fuel cladding

under maximum burnup and linear heat rate separately in a LOCA and in the most severe normal operating conditions. Include within your answer how you arrive at your opinion as to the most severe operating condition.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

57. Describe in detail each test or experiment mentioned at page 3-79 of the PSAR which you contend demonstrates that the clad meets the long-time (creep-collapse) requirement. Also state the following:

(a) By whom and for whom these tests were performed and when they were performed;

(b) Each fact, calculation and assumption upon which it is contended that each of such tests apply to the Midland fuel cladding under maximum burnup and linear heat rate separately in a LOCA and in the most severe normal operating conditions. Include within your answer how you arrive at your opinion as to the most severe operating condition.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

58. Describe in detail each test or experiment mentioned at page 3-79 of the PSAR which you contend demonstrates that rods can be safely operated to the point where total permanent strain is 1-1/2 percent or higher in the temperature range applicable to PWR cladding. Also state the following:

(a) By whom and for whom these tests were performed and when they were performed;

(b) Each fact, calculation and assumption upon which it is contended that each of such tests apply to the Midland fuel cladding under maximum burnup and linear heat rate separately in a LOCA and in the most severe normal operating conditions. Include within your answer how you arrive at your opinion as to the most severe operating condition.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

59. State and describe in detail each of the experiments, including each of their facts, calculations and assumptions, mentioned at page 3-80 of the PSAR which "you contend supports the various individual design parameters and operating conditions up to and perhaps beyond the maximum design burnup of 55.000 MWd/MTU." If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR,

then set forth completely the text of each such other reference or attach a copy.

60. Describe in detail, including each fact, calculation and assumption, each test or experiment which will be performed in the B & W High Burnup Irradiation Program as set forth at page 3-80 of the PSAR. Include within your answer a schedule for completion of these tests and a description of procedure which will be followed in incorporating the results of these tests into the final design. Your answer should also include a detailed description of the quality assurance program to be followed in this procedure. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

61. Describe in detail, including each fact, calculation and assumption, each test or experiment which has been performed or will be performed as part of the "Fuel swelling studies at B & W" as stated on page 3-82 of your PSAR. State in detail how the results of each such test or experiment relate to burnup, heating rate, fuel density, grain size and clad restraint and how such results indicate the effects of fuel swelling. Include within your answer a description in detail of the reports of the post-irradiation examination, including but not limited to, the investigation of dimensional changes, the metallographic examination of fuel and cladding

and fission gas release correlations. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

62. With respect to the statement that "the effect of Zircaloy creep on the amount of fuel rod growth due to fuel swelling has been investigated," state and describe in detail each test and experiment, including each fact, calculation and assumption thereof, which describes your investigation and which you contend supports the results or intended use of your investigation. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

63. With respect to the effect of a Departure from Nucleate Boiling upon the side of a fuel rod adjacent to a guide tube as described at page 3-86 of the PSAR, state and describe in detail each test and experiment, including each fact, calculation and assumption thereof, upon which you contend that "insufficient strength would be available to generate a force of sufficient magnitude to cause a significant deflection of the guide tube." If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

64. With respect to the flow-induced vibratory

amplitude for the fuel assembly and fuel rod, described at page 3-86 of the PSAR, state and describe in detail each test and experiment, including each fact, calculation and assumption thereof, which will be performed at the Control Rod Drive Line Facility (CRDL) of the B & W Research Center, Alliance, Ohio, to ascertain said amplitude. Also state in detail each source which will produce oscillations in the system and its resonant frequency. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

65. State and describe in detail each test and experiment, including each fact, calculation and assumption thereof, which has been performed, is being performed or will be performed to demonstrate the overall mechanical performance of the fuel assembly as it is stated to be at page 3-86 of the PSAR. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

66. With respect to the control rod drive mechanism ("CRDM") described on page 3-89 of the PSAR, describe in detail, including each fact, calculation and assumption, what "extensive analytical, developmental, design, test and manufacturing experience" has been attained. Also present a detailed description

of the operating history of CRDM's relied upon by you listing and describing in detail all cases of malfunctions, including within your description, an analysis of the changes, if any, and reasons therefor, made in the design or operation of said mechanism as a result of said malfunction disclosed by said operating history. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

67. State and describe in detail each test and experiment, including each fact, calculation and assumption thereof, performed in the research and development program for fuel assembly heat transfer and fluid flow "applicable to the design of the reference reactor" as stated in Section 3.3.2.2 at page 3-101 of the PSAR. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

68. With respect to each test and experiment mentioned in Section 3.3.2.2 of the PSAR, for which "the results of these tests will be applied to the final thermal design of the reactor and the specification of operating limits," state and describe in detail each such test, experiment and analysis, specifying each fact and calculation and assumption thereof. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the

text of each such other reference or attach a copy.

69. With respect to the tests mentioned in Sections 3.3.2.2.1 and 3.3.2.2.2 of the PSAR, describe in detail each such test, specifying each fact, calculation and assumption thereof. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

70. With respect to the conclusion on page 3-98, Section 3.2.4.3.5 of the PSAR that "wear of the guide tubes and the CRA will not be of concern," state and describe in detail each experiment, test, fact, calculation and assumption upon which you have arrived at this conclusion. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

71. With respect to the fuel rod cladding tests described in Section 3.3.3.3.1 at page 3-104 of the PSAR, state each fact, calculation and assumption by which you conclude that these tests and/or experiments relate and are applicable to the proposed Midland Units. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

72. Describe in detail each test and experiment,

specifying each fact, calculation and assumption thereof, which will be performed to "determine the structural characteristics of the fuel assembly which are pertinent to loadings resulting from normal operation, handling, earthquake and accident conditions" for the fuel assembly structural components as stated in Section 3.3.3.3.2 on page 3-105 of the PSAR. Also include within your answer each fact, calculation and assumption upon which you contend that each of the above tests apply to the proposed Midland Units. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

73. With respect to the statement in Section 3.3.3.3.3 on page 3-105 of the PSAR, state each experiment, test, fact, calculation and assumption upon which you conclude that "the information is essential for advancement of the art, but is not considered critical in the sense that all of the programs must be completed to insure safe operation." Also state what you mean by "essential for advancement of the art, but not . . . critical . . ." to safety. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

74. With respect to the statement in Section 3.3.3.4.1 on page 3-106 of the PSAR, state each experiment and test,

specifying each fact, calculation and assumption thereof, upon which you conclude that "material compatibility and structural design of these components will be adequate for the life of the mechanism." If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

75. With respect to the internal vent valve discussed in Section 3.3.4 at page 3-109 of the PSAR, state what, if any, relative motion of the vent valve to its seat existed in the vibration test. State at what frequency the motion occurred. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

76. Describe in detail each test, including each fact, calculation and assumption thereof, mentioned at page 12-2 of Amendment No. 8 of the PSAR which will be conducted to determine decontamination factors for each radionuclide on each piece of equipment which will be encountered by the process steam to be generated from the proposed Midland Units. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

77. With respect to item No. 12, pages 12-1 and 12-2

of Amendment No. 8 of the PSAR, describe in detail each piece of the machinery, its use and location, whether contained or to be contained in a Dow Chemical Company ("Dow") or Consumers Power facility, which come in contact with the process steam proposed to be generated from the proposed Midland Units. For each such piece of machinery describe in detail the expected rates of decontamination of each of the available radionuclides, their equilibrium concentration and the total radiation source each machine could become. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

78. With respect to item No. 12, pages 12-1 and 12-2 of Amendment No. 8 of the PSAR, describe in detail all products and/or uses of the process steam which may cause the beholder and/or user to be exposed to radiation originating in whole or in part from the process steam. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

79. With respect to the control rods' freedom of motion discussed at page 3-85 of the PSAR, state and describe in detail each test, experiment and analysis, specifying each fact, calculation and assumption thereof, which you rely upon to conclude that control rods' freedom of motion will be assured

throughout the service life of the reactors of the proposed Midland Units. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

80. With respect to the answer to ACRS Question 2.1, Amendment No. 5, page 2.1-5 of the PSAR, state where the maximum dose to man is expected to occur and state each fact and assumption used in your determination, stating the magnitude in rems per year. Include within your answer the exact location of the inner ring in your environmental surveillance plan. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

81. With respect to the answer to ACRS Question 2.2, Amendment No. 5, page 2.2-1, state the maximum and minimum temperatures of the cooling pond for both operating and shutdown conditions, specifying each fact, calculation and assumption thereof, including but not limited to all heat transfer assumptions. Also state the minimum and maximum temperatures of the cooling pond water which will be released to the Tittabawassee River, stating each fact, calculation and assumption upon which you base your answer. If in your answer you make reference to other than textual (exclusive of footnote)

matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

82. With respect to the answer Item B to ACRS Question 3.1, Amendment No. 5, Appendix at page 3.1-1 of the Appendix to the PSAR, describe in detail how and in what fashion the accumulation fatigue techniques will be incorporated into the design of the fuel clad. State each fact, calculation and assumption upon which you support your analysis, including but not limited to responses to all normal and abnormal cyclic conditions. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

83. With respect to the answer Item C to ACRS Question 3.1, Amendment No. 5, Appendix page 3.1-101 of the Appendix to the PSAR, describe in detail each fact, calculation and assumption upon which it is asserted that it is reasonable to conclude that "the value 1 percent is well below the lowest failure strain." If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

84. With respect to the answer Item D to ACRS Question 3.1, Amendment No. 5, Appendix page 3.1-101 of the Appendix to the PSAR, describe in detail each fact, calculation and assumption upon which it is concluded that the reference

W. J. O'Donnell and B. F. Langer, "Fatigue Design Basis for Zircaloy Components," Nuclear Science and Engineering 20, 1-1/2 (1964) supports the conclusion that the design requirements will be adequate to prevent gross cladding collapse. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

85. Describe in detail each fact, calculation and assumption upon which is based the conclusion at page 3.6-1 of Amendment No. 5 to the PSAR that "seismic exitation for Midland may be more severe than that discussed in BAW-10008-Part 2, it is not expected to cause structural criteria to be exceeded." Set forth all relevant portions of BAW-10008-Part 2 and in addition, if in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

86. With respect to the statement of the results of the comparison set forth at page 3.6-2 of Amendment No. 6 to your PSAR of the analog model and methods stated in BAW-10008 with the LOFT semiscal test results, describe in detail each such comparison, specifying each fact, calculation and assumption thereof. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other

reference or attach a copy.

87. With respect to your proposed system to continue core cooling in the event of a vessel failure, as described at pages 4.8-1 and 4.8-2 of Amendment No. 5 to the PSAR, describe in detail each fact, calculation and assumption upon which is based the assumption that:

(a) "rupture of the reactor vessel is assumed to occur at 10 minutes;"

(b) "the problem relating to steam bubble formation does not increase in severity as long as the reactor vessel cavity is full at the time the vessel failure occurs;" and

(c) "addition of nozzles to the reactor coolant outlet piping no longer appears necessary."

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

88. With respect to the possibility of occurrence of thermal shock during normal operation of the proposed reactors as a result of injection of cold water to the reactor primary system from the core flooding system, describe in detail each fact, calculation and assumption upon which it is concluded that the as yet incomplete failure analysis contained in the PSAR of the core flooding system will demonstrate that no

single active component failure will allow cooling water to inadvertently reach the hot primary system metal. State when the proposed failure analysis will be completed. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

89. With respect to the consequences of inadvertent addition of the core flooding water to the core, describe in detail each incident and the time of occurrence of all factors, including but not limited to component failures and emergency system activation, specifying each fact, calculation and assumption thereof, which mitigate and propagate the worst possible chain of events describing such chain of events, including but not limited to primary vessel rupture. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

90. With respect to allowable leak rates during operation, which is stated at page 4.13-1 of Amendment No. 5 to the PSAR will first be established during preparation of the technical specifications which will be submitted with the Final Safety Analysis Report, describe in detail each fact, calculation and assumption concerning the leakage detection systems available, their sensitivity, availability of power,

makeup system capability and radiological consequences resulting from such leakage which presumably will form part or all of the basis for said technical specifications. If you are unable to answer this question at this time, state why and when you will be able to answer it. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

91. What is the minimum primary system break size for which (1) the reactor cavity and (2) the reactor building will not maintain structural integrity. Describe in detail each fact, calculation and assumption upon which you base your answer. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

92. Describe in detail the basis for your belief, specifying each fact, calculation and assumption thereof, of the adequacy of the volume of water in the borated water storage tank to provide continued cooling to both proposed Midland Units in the event of a simultaneous LOCA and a primary vessel fracture. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

93. With respect to the conclusion of the adequacy of the proposed Iodine Removal Spray System, describe in detail each fact, assumption and calculation by which it is concluded that the Sprayco Model 1713A has demonstrated its ability to generate iodine removing spray. Set forth relevant portions of ORNL-4374 and if in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

94. With respect to the conditions within the reactor building following a LOCA, describe in detail the procedure, referred to at page 6.11-1 of Amendment No. 5 to the PSAR, which will be employed for sampling the recirculation water during the long-term mode of core cooling to monitor boron concentration. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference and attach a copy of each such other reference.

95. With respect to the answers to ACRS Question 6.17, set forth at pages 6.17-2 and 6.17-3 of Amendment No. 7 to the PSAR, describe in detail each test and experiment specifying each fact, calculation and assumption thereof, upon which is based such answer. In addition, for each described test and description, provide the following:

(a) When, by whom and for whom these tests were performed (or will be performed); and

(b) The basis and procedure by which the results of said tests will be incorporated in the final design and operation procedure of the proposed Midland Units.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

96. With respect to the answer to ACRS Question 7.7, set forth at pages 7.7-1 and 7.7-2 of Amendment No. 5 to the PSAR, give a more detailed description of each test which has been performed and its results or which will be performed regarding equipment which has been or will be tested at the Palisades Plant. State what alternatives for testing you have planned in the event such tests not yet performed cannot be performed at the Palisades Plant. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

97. With respect to the answer to ACRS Question 7.12, set forth at page 7.12-1 of Amendment No. 5 to the PSAR, describe in detail "the data available from similar core configurations of comparable size" which will be evaluated "to verify or disqualify" the stated reliance upon "out-of-core" instrumentation "for safe and reliable spatial power indication upon the core." Include within your answer your analysis of such data, if

already analyzed, specifying each fact, calculation and assumption thereof. If your analysis is not yet complete, state why not and when you propose to complete such analysis. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

98. With respect to the answer to ACRS Question 7.20, set forth at page 7.20-1 of Amendment No. 11 to the PSAR, describe in detail each fact, calculation and assumption upon which it is concluded that a diverse backup to the low reactor coolant system pressure trip will be provided by either the void shutdown mechanism or the power/flow comparator. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

99. Describe separately and in detail each consequence, specifying each fact, calculation and assumption thereof, resulting from (a) inadvertently opening the single valve between supply lines of proposed Midland Units 1 and 2 and (b) inadvertently opening the valve between the main steam headers of proposed Midland Unit 1 and Midland Unit 2 when the Units are operating at different power levels. DO NOT consider an answer complete by stating as was done in response to an identical question by ACRS that such conditions are administratively impossible to occur. However, regarding said

response to ACRS, state in detail the administrative procedure referred to and analyze each possible inadvertent malperformance of such procedure. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

100. Describe in detail the proposed location and design of the proposed process steam lines and state what industry or other codes, if any, shall be adhered to in their design construction. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

101. For each radionuclide which will be deposited and/or concentrated in the cooling pond water, state your estimate of its maximum and normal levels, in curies per milliliter, of deposit and/or concentration both for normal and abnormal operating conditions of the proposed reactors. Describe in detail the method which you employ to determine these estimates. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

102. Describe in detail each fact, calculation and assumption which forms the basis for the conclusion that "pond

seepage is estimated to make a negligible contribution to the plant radwaste discharge to the Tittabawassee River" (page 11.2-1 of Amendment No. 6 to the PSAR). If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

103. With respect to operation of the proposed Midland Units, when makeup water cannot be taken from the Tittabawassee due to low flow conditions, describe in detail the evaluations which form the basis for the limits on liquid radwaste release which would be employed. Assume in your answer that makeup water cannot be taken for a period of 100 consecutive days. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

104. With respect to the occurrence of a radwaste system failure, state:

(a) What are each of the possible modes of failure (e.g. missile generation and tank fracture) for this system which would result in a release of the radioactive contents;

(b) With respect to each such possible mode described in (a) above, state in detail

what safety measures will be taken; and

(c) Separately, in the event of such a failure due to each possible mode described in (a) above, state what procedures will be followed to limit exposure to the population from the radioactive releases and to contain them.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

105. Describe in detail each consequence, specifying each fact, calculation and assumption thereof, of an inadvertent control rod removal when all reactor coolant pumps are not operating (i.e., startup accident when coolant pumps are not operating), regardless of whether you believe such a circumstance possible. Your answer should include but is not limited to a description of clad damage which could result if adequate cooling is unavailable to remove energy generated by the transient. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

106. With respect to the answer to ACRS Question 13.3.7 set forth at page 13.3.7-1 of Amendment No. 5 to the PSAR, describe in detail each development and refinement of the turbine which "prohibits specific missile parameters at

this time." State when these parameters will be designated. In addition, when the final critical structure design is complete, what changes, if any, in the "developments and refinements" of the proposed turbine would result in inadequacy of the aforesaid design. Set forth all relevant portions of G. E. Report TR67AL211 "An Analysis of Turbine Missiles Resulting from Last Stage Wheel Failure" and, in addition, if in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

107. With respect to each consequence of a spent fuel element cask falling into the fuel pool storage pool, describe in detail each fact, calculation and assumption upon which it is concluded (page 13.4.1-1 or Amendment No. 5 to the PSAR) that in the event of such an accident "some seepage from the pool liner might occur; however, no permanently open crack which could significantly affect the water retaining capability of the pool is expected." In addition, assuming that a significant crack does occur in the aforesaid accident, describe in detail the following:

(a) All equipment which could suffer flood damage and the severity and extent of such damage; and

(b) All damage to stored fuel rods resulting from loss of water to the fuel

storage pond and the consequences of such damage, specifying each fact, calculation and assumption thereof.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

108. With respect to the answer to ACRS Question 13.6.3, set forth at page 13.6.3-1 of Amendment No. 8 to the PSAR, in the event of venting, state what the resultant dose would be from the radiation source of the charcoal filters in the hydrogen vent system for each radionuclide separately for an individual at the boundary of each of the exclusion area, the low population zone and the population center separately for eight-hour, twenty-four-hour and thirty-day periods in the same manner and detail as is required by Interrogatory Number 12. Repeat these calculations assuming no reactor building spray system iodine removal previous to venting. Describe in detail each fact, calculation and assumption upon which you base your entire answer. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

109. With respect to the answer to ACRS Question 13.6.3, set forth at page 13.6.3-1 of Amendment No. 8 to the PSAR, in the event of venting, state what the resultant dose would be from the radiation source of the charcoal filters in

the auxiliary building exhaust system separately for an individual at the boundary of each of the exclusion area, the low population zone and the population center separately for eight-hour, twenty-four-hour and thirty-day periods. Repeat these calculations assuming no reactor building spray system iodine removal previous to venting. Describe in detail each fact, calculation and assumption upon which you base your entire answer. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

110. With respect to the answer to ACRS Question 13.7.1.2, set forth at page 13.7.1.2-1 of Amendment No. 5 to the PSAR, describe in detail each test and experiment, specifying each fact, calculation and assumption thereof, upon which it is concluded that the paint on internal walls and structures within the reactor building will have the ability to withstand the environmental factors existing following a LOCA, including but not limited to temperature, humidity, pressure and radiation field. Include within your answer a description of those tests upon which it is concluded "that a negligible amount of hydrogen is evolved" from the paint. Also include within your answer the experimental or factual basis for the conclusion that the aforesaid tests truly represent conditions which would inhere at the proposed Midland Units in a LOCA.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

111. With respect to the answer to ACRS Question 13.7.2.1, set forth at page 13.7.2.1-1 of Amendment No. 5 to the PSAR, describe in detail each fact, calculation and assumption respecting the experimental work performed by B & W which it is contended shows that if clad temperatures were to get as high as 2300° F. prior to being quenched, the fuel cladding would still maintain its strength and structural integrity. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

112. With respect to the occurrence of release of hydrogen within the reactor building following an MHA, describe in detail the basis for, including each fact, calculation and assumption thereof, of the following determinations and conclusions in the PSAR.

(a) The sources and quantities of hydrogen release;

(b) The assertion that venting would start at about 880 hours; and

(c) The calculation of the additional low population zone dose due to venting.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

113. With respect to the conditions and assumptions of Item No. 3 set forth at pages 3-1 and 3-2 of Amendment No. 5 to the PSAR, describe in detail each fact, calculation and assumption forming the basis for the determination of the two-hour thyroid dose. Explain the difference between the calculations as set forth in Section 14.2.2.4.1 of the PSAR and those of the ACRS partly recorded Item No. 3 at page 3-1 of the PSAR. For each disagreement between the two calculations, state which yields the most conservative result. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

114. With respect to the proposed effort, as set forth at page 8-1 of Amendment No. 6 to the PSAR, to arrive at the most optimum condition of hydrogen buildup control, describe in detail each method, other than the one presently proposed and whose adequacy is being questioned by the ACRS, which is proposed to be investigated. Describe in detail the proposed investigation with particular emphasis as to each such alternative method's application to the proposed Midland Units and its relative and comparative feasibility of capacity,

reliability and safety, describing in detail each fact, calculation and assumption thereof. In addition, provide the following:

(a) Name(s) of the organization(s) performing the aforesaid investigation;

(b) The date the aforesaid investigation will be complete;

(c) A complete description of what changes in the design or construction of the proposed Midland Units would be required to install a system for each of the alternate methods and a statement whether you intend to complete your investigation prior to construction so that all safety options remain open;

(d) A complete description of the operation of each of the systems contemplated in (c) above during a LOCA; and

(e) For operation of each of the systems contemplated in (c) above and during a LOCA, what exclusion area, low population zone and population center distance dose would be incurred by an individual separately at the boundary of such area, zone and center separately for eight-hour, twenty-four-hour and thirty-day periods, in the same manner and detail as is required by Interrogatory number 12.

(f) For operation of each of the systems contemplated in (c) above during an MHA, and neglecting the effect of the Iodine Removal Spray System and the Pressure Suppression System, what exclusion area, low population zone, and population center distance dose would be incurred by an individual separately at the boundary of such area, zone, and center separately for eight-hour, twenty-four-hour, and thirty-day periods, in the same manner and detail as is required by Interrogatory number 12.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

115. Describe in detail all qualifications established or proposed to be established for reactor operators, including but not limited to such operators' technical qualifications. In addition, describe in detail what psychological tests or mental examinations, if any, are proposed to be used to determine the mental and emotional stability of reactor operators at the time of their hiring and thereafter throughout their employment. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

116. With respect to possible accidents caused by operator error, describe in detail each such possible operator

error, including those which are either accidental or deliberate, and the damage to the reactor and safety systems resulting therefrom. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

117. Describe in detail each sequence of operator control error which when done deliberately would result in damage to the proposed reactor and/or safety systems. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

118. Upon what basis have you determined that it is appropriate for a shift supervisor, whose primary function is the production of electricity, to have complete decision-making responsibility for emergency action? Include within your answer why you believe emergency decisions should not be made by personnel who are knowledgeable in nuclear safety, nuclear engineering, and health physics, and who do not have production responsibility, as a primary or sole responsibility. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

119. Is it your opinion that reactor coolant pump seals will have a higher leakage rate as they wear throughout their useful life. State each fact, calculation, and assump-

tion upon which you base your answer. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

120. If there were a malfunction in the seal coolant pressure system, what amount of reactor water, if any, would leak out. State each fact, calculation, and assumption upon which you base your answer. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

121. With respect to the proposed hydrostatic testing, as set forth in Section 9 of the PSAR, will you be able to determine possible hydrogen leaks; what determination regarding hydrogen leaks and what plans do you have with respect to hydrostatic testing after the auxiliary and emergency system has been in use for a period of time. State each fact, calculation, and assumption upon which you base your answer. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

122. Is it your opinion that during a LOCA high surface temperatures in the concrete shield and low temperatures at the cooling coil surface will not create significant stresses in the shield so as to violate the integrity of the concrete shield. State each fact, calculation, and assumption

upon which you base your answer. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

123. Is it your opinion that during a LOCA service water will become contaminated with fission products resulting from the operation of your auxiliary and emergency systems. If your answer is "no," then state each fact, calculation, and assumption upon which you base your answer. If your answer is "yes," give a detailed statement of the contribution of such fission products which will contaminate the service water and what radiological hazards, if any, does such contamination present, including what procedure you will take to mitigate such hazards and dispose of the contaminated service water without creating additional radiological hazards. Include within your answer each fact, calculation, and assumption which forms the basis for your answer to this part of this Interrogatory. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

124. Describe in detail what procedure is proposed to be followed to dispose of spilled fuel in the fuel transfer canal after handling a failed fuel container or as a result of a fuel-handling accident. State each fact, calculation, and

assumption upon which you base your answer. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

125. With respect to the discussion of radioactive wastes in Section 11 of the PSAR, why is no removal assumed for Cesium (Cs), Molybdenum (Mo), and Yttrium (Y) in the continuous reactor coolant purification system while at the same time there is assumed 99 percent removal of these isotopes from the coolant bleed for boron removal. State each fact, calculation, and assumption upon which you base your answer. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

126. Regarding the procedures for the removal of radioactive wastes and the generation of processed steam for Dow, as described in Section 11 of the PSAR, answer the following, specifying each fact, conclusion, and assumption upon which you base your answer:

(a) Could the start-up expansion coolant be sent to a holding tank and reused;

(b) Could the start-up delution coolant be sent to a holding tank and reused;

(c) Could the drainage from both the start-up expansion and start-up delution

coolant systems be sent to a holding tank and reused;

(d) What is the procedure for accomplishing delution of the shim bleed;

(e) How many insoluble tertiary heat exchanger units are provided for in the high pressure steam section and how many of these are out of service under normal high pressure steam-load to Dow;

(f) How many insoluble tertiary heat exchanger units are provided for in the low pressure steam section and how many of these are out of service under normal low pressure steam-load to Dow;

(g) What is the normal gross gamma range in the tertiary steam supply system and at what gamma level will the tertiary steam supply system be shut down? Include within your answer to this sub-paragraph a statement of the specific procedures to be followed to accomplish this result; and

(h) Specify each isotope and its level of radioactive concentration which is expected to be in the discharge monitor tanks and controlled discharge. At what

level of radioactive concentration would you propose, if at all, to reprocess such radioactive waste.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

127. With respect to a steam line failure accident (Section 13 of the PSAR) what assurances are there, assumed or procedural, that there will not be human error in the operations of closing the steam isolation valves; assuming it is incorrect to assert that there will not be human error in such a circumstance, state what consequences will result if, in a steam line failure accident, there is a failure in the operations of closing the steam isolation valves. State each fact, calculation, and assumption upon which you base your answer. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

128. Regarding the effect, if any, which chemical release(s) pursuant to a chemical accident at Dow's Midland facilities could have upon the proposed Midland Units, what procedures are proposed or are to be proposed to protect from, and prevent against, gaseous corrosion products from affecting an electrical contact, electrical wiring, etc., contained within all of the safety systems. State each fact, calculation,

and assumption upon which you base your answer. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

129. With respect to the statement in Section 12 of the PSAR that facility changes of a minor nature which do not affect nuclear safety will be permitted after approval by the Plant Superintendent, state the following:

(a) A definition of, including several representative examples, "changes of a minor nature which do not affect nuclear safety" as you use that term;

(b) What qualifications will your Plant Superintendent have, in terms of nuclear engineering and radiological protection, so that he will be able to make a judgment on: (1) what is a change of a minor nature, and (2) what change, whether minor or not, will not affect nuclear safety;

(c) Will such decisions of the Plant Superintendent be reviewed by anyone, and if so, state who that person will be, his position and his background in terms of nuclear engineering and radiological protection;

(d) Will the Atomic Energy Commission Compliance Staff be advised of a facility change

if it is, in the opinion of your Plant Superintendent, of a minor nature which does not affect nuclear safety.*

130. With respect to the comment at page 10 of the Michigan Drilling Company Letter and Report dated March 13, 1968 that "foundations would be subject to a slight amount of settlement which would be within tolerable limits, providing the foundations can be suitably reinforced to make them quite rigid," state the following:

(a) Do you intend to follow the recommendations of the Michigan Drilling Company;

(b) If you do not intend to follow its recommendation, state why not; and

(c) If you do intend to follow its recommendation, state how and in what manner you intend to "suitably reinforce" the foundations and whether or not you have begun to require Bechtel to begin a redesign to accommodate such recommendation.*

131. With respect to the letter and report dated January 27, 1967 by Dames and Moore, Consultants in Applied Earth Sciences, and that letter's assumption that the proposed Midland Units "will be constructed by Dow for Dow" answer the following:

(a) Did Dames and Moore see a substantially final PSAR prior to the submission of

their recommendation and if not, why not;

(b) If such information was provided to Dames and Moore, why is it that their recommendation is based upon the assumption that the plant will be constructed by Dow for Dow; and

(c) Should Dames and Moore be required to resubmit its report and recommendation based upon an awareness that the site was chosen for a nuclear plant to be built by Applicant for the generation of electricity in its franchise area, and, if not, why not.*

132. With respect to the answer appearing at page 12.2-1 of Amendment No. 5 to the PSAR, answer the following:

(a) What possible acts of industrial sabotage which could occur have you considered in the formulating of your procedures to prevent industrial sabotage;

(b) Have you experienced industrial sabotage in any of your facilities, whether nuclear or otherwise, which give you experience in the formulation of preventive measures;

(c) Have you made any studies with respect to industrial sabotage generally to determine

whether your procedures are sufficient to prevent industrial sabotage and, if not, why not; and

(d) State what consequences you believe could possibly occur for other than simple acts of industrial sabotage.*

133. In connection with the quality assurance and quality control plans and procedures as set forth in Appendix 1B of the PSAR, (the words "quality assurance" or similar words used in any of these interrogatories are intended to include all aspects thereof, including quality control) state whether you have relied upon the general criteria in Appendix B to P Part 50, Code of Federal Regulations. Also state whether you have relied upon the concepts and procedures specified in Atomic Energy Commission publications, Reactor Development Technology 2-2 and Reactor Development Technology 2-4, and, if not, why not. Include within your answer, if you did not follow the guidelines set forth in RDT 2-2 and RDT 2-4, whether it was because these guidelines are more restrictive than the ones you are planning to follow.*

134. State what discussions were had between you and/or Bechtel and/or Babcock & Wilcox and the Atomic Energy Commission, which the Regulatory Staff relies upon as support, in addition to the PSAR, as amended, for its conclusion (Safety Evaluation Rep. p. 73) that your quality assurance plan is acceptable.*

135. State whether you have relied in the drafting, formulating or approving of your quality assurance plan upon quality assurance plans used by you elsewhere or by any other licensee of the Atomic Energy Commission. If so, identify such other plans, the dates of their implementation and list the facilities to which they relate whether or not such facilities are licensed by the Atomic Energy Commission.*

136. State whether in formulating your quality assurance plan for the proposed Midland Units you have relied upon:

(a) Quality assurance plans prepared in whole or in part by Babcock & Wilcox for other than the proposed Midland Units; and

(b) Quality assurance plans prepared in whole or in part by Bechtel for other than the proposed Midland Units.

In connection with your answer, identify and describe such other relied-upon plans prepared in whole or in part by either Babcock & Wilcox or Bechtel, specifying which portions you accepted or rejected, stating reasons therefor.*

137. State separately for Bechtel and Babcock & Wilcox whether each of them was selected to work upon the proposed Midland Units because of their experience in the nuclear industry or because they happen to be the lowest bidder for such

work for the proposed Midland Units. If you relied upon experience at all, list and describe such experience and if with regard to Bechtel your answer is that you selected Bechtel because of its experience, did you include its experience in the construction of the Palisades Plant.*

138. State whether you ever considered retaining Combustion Engineering instead of Babcock & Wilcox and, if not, why not. If you did consider retaining Combustion Engineering, state why Combustion Engineering was rejected.*

139. State whether Babcock & Wilcox (either pursuant to your quality assurance plan or pursuant to your contractual relation with them) has the right to order a work stoppage during the construction, if any, of the proposed Midland Units for any reason and specifically for the reason that if in Babcock & Wilcox's judgment Bechtel is not following established rules and procedures during the construction. If Babcock & Wilcox does not have such a right, state why not generally and in light of the fact that such a right was given to Combustion Engineering in connection with your Palisades Plant.*

140. Give a reference to the PSAR as amended where it is demonstrated that documentation will be kept to determine ir detail the history of the construction of the proposed Midland Units during its course of construction. If such documentation is not to be kept and filed at the site of the proposed Units, state why not. Include within your answer whether

Babcock & Wilcox will maintain for the benefit of interested parties, including the Compliance Division of the Atomic Energy Commission, a so-called daily site log in the nature of the site log maintained by Combustion Engineering at the Palisades Plant site; and if your answer is no, then state why not.*

141. At page B-10 of your Appendix 1B to the PSAR, it is stated that Bechtel will maintain "significant deficiency reports" and "significant deficiency follow-up reports" but that such reports will be maintained as confidential information and not incorporated in project quality assurance files. State in detail the reasons for such a decision and include within your answer how, in the absence of such "confidential information," one can determine, after the fact, whether "deficiencies" were corrected. Also state whether the so-called "confidential information" or any other "deficiency" information will be kept from the Compliance Division of the Atomic Energy Commission.*

142. In the Midland quality assurance plan the role of Babcock & Wilcox during construction is described as essentially an advisor. If you do not agree with this statement, then state the basis for your disagreement and a description of the role of Babcock & Wilcox. In addition, state if it is true that Babcock & Wilcox will not have any enforceable contractual rights with respect to how Bechtel is installing Babcock & Wilcox's designed or purchased equipment. If your

answer is no, give a supporting reference to all relevant contracts. If your answer is yes, state whether Babcock & Wilcox has any contractual right in the event of deviant installation of such equipment to withdraw or retract from any warranties made by it with respect to such equipment.*

143. State whether it is your intention in accordance with Appendix B to Part 50 to retain responsibility for the establishment and execution of the quality assurance program. If your answer is yes, then state why Babcock & Wilcox is to be given, pursuant to your quality assurance program, the final prerogative to select all vendors with respect to the procurement of component parts for the nuclear steam supply system. Include within your answer whether such an arrangement is required by your contract between Babcock & Wilcox and yourself and, if so, set out all relative portions of such contract or attach a copy.*

144. What changes, if any, were made in either your quality assurance plan, your contractual relationships with Bechtel or your relationships with Babcock & Wilcox as a result of your experience in the construction and pending licensing of your Palisades Plant.*

145. List all competitors of Babcock & Wilcox whom you considered retaining to supply the nuclear steam supply system for your proposed Midland Units. Include within your answer a listing of all correspondence and draft documents,

if any, between yourself and each such other competitor and your reason for selecting Babcock & Wilcox over each such other competitor.*

146. List all competitors of Bechtel whom you considered retaining to erect the proposed Midland Units. Include within your answer a listing of all correspondence and draft documents, if any, between yourself and each such other competitor and your reason for selecting Bechtel over each such other competitor.*

147. State what special or unusual concessions, if any, in light of the custom and usage of the nuclear industry, were made by either Bechtel or Babcock & Wilcox to secure a contract with you for the proposed Midland Units.*

148. With respect to the requirement of Appendix B to Part 50 that assurance of quality requires management measures which provide that the individual or group assigned the responsibility for checking, auditing, inspecting or otherwise verifying that an activity has been correctly performed is independent of the individual or group directly responsible for performing the specific activity, identify the portions of the PSAR, as amended, or your quality assurance program, which provide for the meeting of this criteria.*

149. State whether your quality assurance plan is complete in its present form. If it is not, state why not, when it will be complete and identify specifically and in detail those portions which remain incomplete.*

150. A reading of your quality assurance plan indicates that back-up informational documents such as correspondence, etc., will not be maintained as part of your quality assurance documents and that you will only maintain conclusory type documents such as, for example, "Q" cards. If this is true, state why you have not included in your quality assurance program any requirement to retain documents which will be narrative in form, chronological in order and self-contained so that one can readily determine what alternative choices were available at any given point during construction of the proposed Midland Units and the reasons why a given course of conduct during such construction was selected. If your answer is that your quality assurance plan required the retention of such documents in such order, identify both the documents and those portions of your quality assurance plan where such requirement is set forth.*

151. Give a detailed analysis, description and explanation, including the purpose therefor, for the inclusion of the following sentence of Appendix 1B, page 8, to your PSAR, as amended: "The Bechtel job inspectors will contact CPCO-QA or designated alternates whenever . . . significant quality assurance problem occurs and normal procedural channels would require excessive time."*

152. With respect to your use of the term "field engineers/inspectors," at page B-4 of Appendix 1B to your PSAR,

state whether your quality assurance plan contemplates that the field engineers, responsible in whole or in part for performing a specific activity or supervision thereof, are also responsible for checking, auditing, inspecting or otherwise verifying that such activity has been correctly performed. If such a dual responsibility is not contemplated, then state the responsibilities of such field engineers/inspectors and how a field engineer/inspector differs separately from an inspector and from a field engineer.*

153. State the name of each individual and the name of each of their supporting teams and each of their respective duties and responsibilities from Applicant's, Dow's, Bechtel's and Babcock & Wilcox's organization who will be responsible for the implementation in any way of the Midland quality assurance plan. Include within your answer each such person's educational background, job experience and his experience, if any, in quality assurance programs in the nuclear industry.*

154. What provision, if any, is contained in the Midland quality assurance plan or program in the event that Babcock & Wilcox does advise Bechtel and/or Consumers of any field conditions or actions which Babcock & Wilcox observes as not in compliance with Babcock & Wilcox's requirements? Does Bechtel and/or you, according to your understanding of the plan or program, have the final word on whether Babcock & Wilcox is correct in its advice? Include within your answer specific

reference to relevant portions, if any, of the Midland quality assurance plan as set forth in your PSAR.*

155. State what consideration was given, if any, in connection with the drafting or reconsideration of your quality assurance plan for the proposed Midland Units to the problems which arose during the construction of your Palisades Plant, including but not limited to the many criticisms of Bechtel's work performance by Combustion Engineering. State whether Bechtel insisted upon being free from any similar interference or overview from Babcock & Wilcox in connection with the construction of the proposed Midland Units.*

156. Identify and list all documents and correspondence between you and Bechtel, you and Babcock & Wilcox and between Babcock & Wilcox and Bechtel, copies of which were received by you, which refer, relate or deal with negotiation of the contracts, their execution and the contracts themselves existing between Babcock & Wilcox, Bechtel and you or any of them, relating to the proposed Midland Units. Attach to your answers a copy of all such contracts.*

157. State whether as part of the procedures of the Midland quality assurance plan, you are assured of not installing or purchasing any equipment, a similar one of which has been installed in or purchased for another nuclear plant with unsatisfactory results. If your answer is yes, state in detail what procedure you have set up to prevent such an

occurrence and give a specific reference to your PSAR, as amended, where such procedure is set forth. If your answer is no, state why such a procedure has not been included.*

158. What procedure, if any, has been set up to govern the conduct of your Midland quality assurance program if during the course of construction a problem arises or occurs which is not specifically covered by your quality assurance plan and program? Include within your answer a statement of what documentation, if any, you have planned or do contemplate to provide for in connection with such unforeseen circumstances, in the event they occur.*

159. Describe and attach a sample of each form or report you intend to use in connection with your quality assurance plan. Include a sample of each form or report to be used by Babcock & Wilcox, Bechtel and Dow, and state whether any other forms or reports, not yet in existence, are planned to be used and if so, describe each of them and state when they will be available.*

160. Do you intend to establish the quality assurance procedure for each of your significant vendors or do you intend to follow each such vendor's established practices? If the latter, what steps will you take to assure that such established procedures are sound and in accordance with Appendix B to Part 50.*

161. What steps have you taken or will you take to prevent instances of deviation from established procedure and

of faulty work performance from occurring at the proposed Midland Units site which occurred at the Palisades Plant site as a result of violations of established procedure by Bechtel as reflected in the Combustion Engineering site log for the Palisades Plant.*

162. Is the role which you will play in the Midland quality assurance plan more defined now than your role was defined at a similar point of time prior to the construction of the Palisades Plant. If not, state why not.*

163. State separately with respect to each category of Appendix B to Part 50, all sections, paragraphs and pages of the PSAR, as amended, which refer specifically to each such category. This question is intended to require you to state, for example, what portions of the PSAR, as amended, are directly responsive to, for example, category XII of Appendix B to Part 50. Include within your answer, a narrative explaining the basis of your answer.*

164. In Atomic Energy Commission publication "The Natural Radiation Environment" by Jacob Kastner (1968), it is stated at page 18:

> ". . . Before a reactor-powered electricity generating facility is constructed on a site, public relations people usually call in radiation safety officers (called health physicists in the United States) to make measurements of natural background."

With specific reference to Mr. Kastner's remarks as published by the Atomic Energy Commission and regarding the proposed Midland Units answer the following:

(a) Does there presently exist a survey of the natural radiation background in the area which will be affected by radiation releases of any magnitude from the proposed Midland Plants. If there is such a survey, then state the following:

(i) When was the survey taken;

(ii) The names and addresses of the persons, firms or corporations who participated in making the survey and analyzing its results.

(iii) The scientific procedure followed in connection with the survey;

(iv) The results of the survey in terms of total natural background of significant radionuclides in each significant geographic part of the total geographic area which was the subject of the survey, explaining in detail the reasons, if any, why the background radiation differed, if it did, from one geographic part to another in the total geographic area surveyed. Be sure to include in your answer the contribution to natural background from so-called man-made

radiation such as, for example, radioactive fallout and radiation from other possible sources.

(v) If any of your measurements vary at different times of the year, please state the differences and variances, and include within your answer the total annual dose due to natural and man-made radiation, in terms of rems, which a person will receive each year in the area surveyed prior to the construction of the proposed Midland Units. State what differences, if any, in dose which will be received by a person in different geographic parts of the geographic area surveyed on a yearly basis subsequent to the proposed Midland Units.

(b) If you have not made a survey of the natural background in anticipation of the construction of such proposed Midland Units, then answer the following:

(i) Why have you not made such a survey and include within your answer whether or not you think it important to have such a survey prior to the construction of the proposed Midland Units in order to

assess the effect, if any, upon persons living in the relevant area from the contribution to radiation dose from the proposed Midland Units.

(ii) Did you ever discuss with any person, firm, corporation or federal and state agency the possibility or desirability of making such a survey in connection with your decision to construct the proposed Midland Units. If not, why not. If yes, then provide:

(a) The names of such persons, firms, corporations or state or federal agencies;

(b) A listing of all correspondence had between them or among them which are in your possession or control;

(c) The dates of relevant conferences, conversations or discussions and the substance of each such conference, conversation or discussion.

(iii) The PSAR indicates that you intend to make such a survey prior to completion of the Unit. Does your study contemplate that if a certain level of background radiation is demonstrated that

you will modify your proposed Midland Units in some fashion or manner to account for that specific level and, if not, why not.

(iv) Is there any level of natural radiation background which would cast doubt upon your judgment to build the proposed Midland Units. Explain your answer.

(v) If there is no specific level of natural radiation background which would cause you to reconsider the construction of the proposed Midland Units, then of what significance is your proposed background radiation survey.

(c) Do you consider a survey of background radiation a necessary prerequisite to a decision to construct a nuclear power plant in a given area. If not, why not.

(d) Is it true that you intend to attempt to construct the proposed Midland Units without regard to the results, of whatever nature, of your proposed background radiation survey.

(e) Do you intend, subsequent to the initial background radiation survey, to continue to make background radiation surveys on a regular basis. If not, why not; if so, then state the following:

(i) The procedures you will use in making such surveys to the extent that they differ from the original survey in the PSAR.

(ii) What level of increase in natural background radiation, if any, would cause you:

(a) To curtail operations of the proposed Midland Units to account for such increase; and

(b) To cease operations of the proposed Midland Units to account for such increase.*

165. Have you informed the persons living in the Greater Tri-City area, the persons living in Midland, Michigan, your employees who will work for you in the proposed Midland Units, the employees who will work at Dow and Dow Corning in Midland, Michigan, or any of them, of the following:

(a) The amount of radiation each such person could receive from the proposed Midland Units;

(b) The amount of total radiation each such person could receive considering contributions to radiation from any source; and

(c) The possible consequences of danger of genetic and other diseases as a result of being exposed to radiation over a long period of time.

In connection with your answer, unless it is no, state in detail how you have accomplished informing the various persons listed herein of such information.*

166. Is it your position that there is absolutely no danger of any adverse effect over a 40-year period or any lesser period, to a person at the boundary of the proposed Midland Units as a result of being exposed on a continuing basis of radiation from your proposed Midland Plants. Would your answer be any different considering the present relevant natural background of radiation and, if not, would your answer be any different if the present natural background of radiation had any increase in its concentration. If you feel you cannot answer this question yes or no, then state your answer in detail and terms of probabilities, including within your answer each fact, calculation and assumption upon which you base such probabilities.*

167. With respect to the remarks of Jacob Kastner appearing at pages 11 and 12 of the 1968 Atomic Energy Commission publication "The Natural Radiation Environment" dealing with a safe amount of radiation or threshold of radiation insofar as genetic effects are concerned, as well as the entire question of determination of such "safe" level of radiation and particularly Mr. Kastner's remark that "However small the quantity of radiation absorbed mankind must be prepared to pay the price in a corresponding increase of the genetic loading" answer the following:

(a) Do you agree that any exposure to radiation, no matter how small, leads to the possibility of adverse effects of any kind upon human beings, other forms of animal life and plant and water life.

(b) What formula, if any, of which you are aware has been used by the Atomic Energy Commission or is being used by you to establish the cost, in terms of increase of genetic load, to the Greater Tri-City area as a result of the release of various forms of radioactivity due to the operation of the proposed Midland Units.

(c) Do you believe that there is no threshold for genetic effect of radiation. Be sure to include with this part of your answer each fact, calculation and assumption upon which you base your conclusion.

(d) What price in terms of the above quote from the aforesaid Atomic Energy Commission Publication in terms of genetic damage is considered acceptable by you to impose upon the public in return for increased generation of electricity or for the creation of the processed steam for Dow.*

168. What steps have you taken to inform persons living in the Greater Tri-City area as to how each such person can pro-

tect himself from receiving an overdose of radiation. What measures have you provided to determine whether any such person has or will receive an overdose of radiation, considering all radiation sources to which each such person will be exposed, and what steps have you taken to inform each such person how he would know if he had received an overdose of radiation at any given time from all sources. The phrase "overdose of radiation" is to be interpreted in this answer in two ways: first, it is to be assumed that an overdose of radiation is anything which at least doubles the natural background radiation; and second, an overdose of radiation also means more radiation than 170 millirems per year. Your answer should direct itself to answering the questions separately for each definition of overdose of radiation and should include all sources of radiation to which each such person will be exposed and not just that amount of radiation to be released from the proposed Midland Units, including but not limited to such things as periodic X-rays from dentists, doctors, etc.*

169. In connection with your operation of the proposed Midland Units, do you intend to constantly meter the amount of radiation, other than released from the proposed Midland Units, which the persons living in the Greater Tri-City area will receive and, if so, state in detail how and in what fashion.

Include within your answer whether you will attempt to require doctors, dentists and other health related facilities to keep a continuous record of patients' total exposure to radiation including but not limited to X-rays and background radiation from natural and man-made sources of radiation.*

170. Have you made any projections of the amount of down-time of the proposed Midland Units for any of the following categories:

(a) Normal maintenance;

(b) Fuel loading;

(c) Abnormal maintenance such as, for example, turbine and generator failure which result in the proposed Midland Units having outages for significant periods of time such as, for example, 30 days or more; and

(d) Involuntary shutdown due to accidents other than MHA's or LOCA's such as described in Section 14 of the PSAR.

If you have not made such projections, state why not. If you have made such projections, then set them forth in detail including each fact, calculation and assumption upon which you have based your projection and include within your answer, although not meant in a limiting manner, the following:

(a) How will Dow be supplied with processed steam in each of the above events; and

(b) What amounts of financial loss, inability to market products and unemployment would be caused by each such shutdown and loss of ability to supply processed steam.*

171. In your contract with Dow concerning the construction of and the generation of electricity and processed steam from the proposed Midland Units, state the following:

(a) Is Dow contractually obligated to purchase such steam over a long period? If so, state the period and the method of payment; and

(b) If the proposed Midland Units at any time deviate significantly from its schedule, existing as of December 1, 1970, for building and construction, does your contract with Dow permit Dow to relieve themselves from any obligation to cooperate in the proposed venture of the proposed construction of the Midland Units and make whatever other arrangements it wishes for the purchase, if at all, of processed steam? If yes, then state in detail the rights and obligations of the parties with respect to such circumstances.*

172. Would the site for the proposed Midland Units have been your choice if it were not for the sale of processed steam to Dow? If your answer is yes, then state why you have made such a major point in connection with the proposed Midland

Units of the sale of processed steam to Dow. If your answer is no, then state each other site considered and whether you intend to change the site for the proposed Midland Units in the event Dow determines not to continue to cooperate, if it has that right, in the proposed Midland Units due to a significant deviation in the schedule of the building or construction of such units, existing as of December 1.*

173. Would it be economical in terms of generation of electricity for users other than Dow in your franchised territory, to build the proposed Midland Units at their present site if there were to be no sale of processed steam to Dow?*

174. Did you ever consider the possibility of fossil fuel plants with appropriate pollution controls instead of the proposed Midland Units? Explain your answer in detail and in light of your recent announcement to construct fossil fuel power plants to the north of Midland.*

175. What plans or projections are you aware of for selling or proposing to sell processed steam from the proposed Midland Units to other than Dow, whether or not such future user is presently situated in Midland, Michigan?*

176. Has any consideration of any kind been given to the adding of additional units to your proposed Midland nuclear power station. If any such consideration of any kind has been given, then state the following:

(a) Each fact and detail concerning additions to and expansions of the proposed Midland Units.

(b) The projected dates and projected costs of such expansions or additions.

(c) The name of each person, firm or corporation, including industrial concerns other than Dow, which you have communicated with or intend to communicate with in connection with such expansion or addition, including relevant dates and a listing and description of relevant documents; and

(d) List and describe each document in your possession or your control dealing with the financial and economic questions of the proposed Midland Units, not including scientific questions, which are in existence to date beginning with the day of the first discussion within your organization dealing with the constructing and operating of the proposed Midland Units.*

177. Was your agreement with Dow Chemical Company concerning the proposed Midland Units approved by the Michigan Public Service Commission. If not, why not, and include within your answer whether you sought approval from the Michigan Public Service Commission.*

178. Does your agreement or arrangement with Dow concerning the proposed Midland Units contemplate or involve ownership in any way of any of the proposed Midland Units or part or interest thereof by Dow or any company which is related by stockholdings to Dow.*

179. Will Dow or any of its personnel be involved in any decision to shut down or scram the proposed reactors in light of the fact that such shutdown or scram will prevent, for a period of time, the sale of processed steam to Dow. If not, state in detail what procedure or mechanism you have set up for insuring that a decision to shut down or scram the reactors or any decision in connection with the proposed Midland Units' operation will not be influenced in any way by the fact that Dow will be a major user of electricity and processed steam to be generated by the proposed Midland Units.*

180. Have you considered whether or not persons living or working in the Greater Tri-City area will become more susceptible to radiation danger or effects as a result of having been living or working in an industrial community such as Midland, Michigan, and having been exposed to pollutants of any kind over a long period, especially having been exposed to chemical and other toxic releases. Include within your answer whether you consider that radiation can be more or less harmful

to a person who has been subjected to such conditions as presently exist in Midland, Michigan due to the operation of all of Dow's facilities.*

181. Have you taken into consideration with respect to the building of your proposed Midland Units, surveys or studies, if any, regarding the risks of emphesema and lung diseases in the Midland, Michigan area compared to other geographic parts of the State of Michigan in which there is no chemical or industrial waste discharged. If you have not made any such surveys, state why not. If you have, then state the nature, extent and results of your considerations.*

182. Have you taken into consideration in connection with your proposed Midland Units the results of any surveys or studies in Midland and surrounding counties dealing with incidence of leukemia, cancer and other carcinogenous diseases. If not, state why not; and if you have, state the nature, extent and results of your considerations.*

183. State how much money has been spent or is planned to be spent separately by you and by Dow with respect to the promotion of the proposed Midland Units. For the purposes of this question, the term promotion is limited solely to efforts made to explain, influence or propagandize the public with respect to the need for and safe operation of the proposed Midland Units. Include within your answer whether you or Dow contributed

any funds in connection with the costs of a trip by certain persons, later to become members of intervenor Midland Nuclear Committee, to Oak Ridge, Tennessee, in 1970.*

184. State whether any officer or officers of Consumers Power was ever asked by an officer of Dow to contribute proportionately or to contribute any amount to the cost of the trip described in Interrogatory 183 above.*

185. State each reason upon which you based your decision made on or about November 8, 1970, to stop construction with respect to the proposed Midland Units. Include within your answer whether the halting of the construction was due solely to the impending resistance to quick approval of a construction permit or whether all of the considerations were due (a) to financial considerations, or (b) to adverse weather conditions for continuing construction.*

186. How many full-time research scientists do you employ who work solely on questions concerning nuclear power? In connection with your answer, state the name of each such research scientist, how long he has been with you and the area of his study.*

187. In terms of your last fiscal year, state what percentage of your net income was spent upon research and development separately for nuclear power and all other areas and then state what percentage of your net income for your last

fiscal year was spent, separately, for promotion of the use of electricity and for the promotion of the use of nuclear power. Answer the same questions based upon projections for your next fiscal year.*

188. Do you contend that radioactive emissions which synergize with air and water pollutants will not result in any adverse health consequences to persons living in or near the Greater Tri-City area. If your answer is yes, list what data you have compiled in connection with your determination, specifying each fact, calculation and assumption upon which you base your answer. State in your answer if you have considered each of the various pollutants emitted by industries in the Greater Tri-City area into the air and water. Also include within your answer separately for each chemical, radioactive and non-radioactive pollutant which you have considered, a detailed description, specifying each fact, calculation and assumption thereof, how any reaction, chemical or otherwise, may occur so as to:

(a) Increase the overall toxicity of each such pollutant;

(b) Produce other toxic substances; and

(c) Yield substance or substances which are transferrable through new pathways or at increased rates.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

189. In the PSAR's discussion of chemical accidents which might occur, did you consider any accident or the maximum accident possible involving train shipments of chemicals or any other products passing on the C&O railroad tracks which pass through the Dow plant and are adjacent or near to the site of the proposed plants. If not, why not. If you did so consider such train accidents, give a reference in the PSAR and if it is not in the PSAR, then set forth the accident analysis in detail specifying each fact, calculation and assumption thereof. Include within your answer what consideration was given, if any, to a combination accident involving such train shipments and chemicals stored or manufactured by Dow. Also set forth whether you have given or intend to give any special consideration to preventive procedures and safeguards regarding high combustible chemicals such as butane, in light of their combustibility and if yes, then describe such procedures and safeguards.*

190. What alternatives does Dow contemplate, to your knowledge, to provide itself with steam power in the event of inability at any time to receive or purchase processed steam from the proposed Midland Units. Include within your answer a discussion of each accident, either at Dow or your proposed

facilities, which could occur, subsequent to operation, if any, of the proposed Midland Units, from a total cessation of processed steam to Dow which would or might result in the cessation of such equipment as steam driven pumps and other storage and/or shipping equipment which rely upon steam for operation.*

191. In your PSAR it appears you have not used the term population center distance as that term is used in Technical Information Document 14844. Please explain why not.*

192. In the PSAR analysis of the exclusion area and low population zone have you analyzed the differing risk from radiation exposure during normal operation of the proposed Midland Units a person will bear depending upon where he is situated within such area and such zone depending upon atmospheric conditions which would cause uneven disbursement of radioactive emissions. If yes, give a reference and an explanation of the reference. If not, state why not and include within your answer how you would recreate your analysis of the exclusion area and low population zone so that it would reflect the fact that persons living in the prevailing wind directions should have a larger distance protection factor than persons not living in the prevailing wind directions. If in your answer you make reference to other than textual (exclusive of footnote) matter

in the PSAR, then set forth completely the text of each such other reference or attach a copy.

193. Have you informed the people of the Greater Tri-City area that their exposure to radiation will depend upon the direction from the proposed Midland Units they are living in and, if not, why not. If you have informed or intend to inform such people of this fact, state how and in what fashion you have done this or propose to do it.*

194. What is the basis for the statement at page 2a, figure No. 1, in your publication "Consumers Power Company and Nuclear Environment" that low levels of radiation are usually beneficial?*

195. Give a description of the safety analysis, if any, which is purported to have been made by Dow with respect to the proposed Midland Units. State who prepared the report and whether the results of said report were in any way included in the PSAR. When did you first decide to build a nuclear power plant. If this decision was made in or about 1959, describe each document which relates, refers to or demonstrates such decision and list each Board of Directors meeting which contains information concerning such a decision.*

196. With respect to the research work described at page 1-21 of your PSAR, describe in detail, including each fact, calculation and assumption thereof, each test which is the

subject of your statement that "the tests that have been completed, together with those that are under way, will provide an adequate amount of test data to verify the B&W analytical model". In addition, include within your answer the following:

(a) When, by whom and for whom have been or will these tests be performed;

(b) Have these tests been performed and will they be performed solely with respect to the proposed Midland Units. If not, state in detail how you are assured that the parameters of the tests will be equivalent to the circumstances existing at the proposed Midland Units;

(c) What procedure have you provided for to assure that changes, if any, in design and construction of the proposed Midland Units will be made, during construction of and prior to any hearing upon any operating license for the proposed Midland Units, if the results of the aforesaid tests should become available only after the issuance of a construction permit and such results require changes to then existing construction. Include within your answer what effect, if any, you will give, in your procedure, to the fact of construction.*

197. In the event an accident of reactor origin is of "sufficient magnitude to produce the necessity of evacuation of the area surrounding the Dow-Consumer area," as you have stated at page 2C-11 of the PSAR, who is responsible for making this decision and on what basis, written or oral, shall it be made? In addition, describe in detail the following:

(a) The working agreement which you state on page 2C-11 of the PSAR exists between the City of Midland and Dow Chemical Company; and

(b) The arrangements with state and local civil defense officials which you state on page 2C-11 of the PSAR you will make.*

198. Describe in detail the "Evacuation plans" which you state at page 2C-11 of the PSAR "are in existence" and which will cover "Midland Nuclear Plant Accidents and will cover evacuation routes to be taken away from the plant."*

199. Describe in detail the "Discussions" which "indicate no Dow Corning accident" could have a "possible effect on the Midland Nuclear Plant" as you have stated at page 2C-11 of the PSAR. Include within your answer whether you believe such effects impossible.*

200. State why you feel, if you do, that it is not necessary that your emergency plan and its implementation, as set forth on page 2C-12 of the PSAR, be the responsibility of

someone whose sole and full-time responsibility is the safety of the proposed Midland Units.*

201. Describe in detail what written and oral procedures will be established so that your proposed Shift Supervisor can decide within such limits or procedures that it has "become apparent that danger of plant origin might exist to persons at the site or to the neighboring population" and further, how you believe that implementation of an emergency plan can adequately be accomplished by delegating authority, in the absence of the Plant Superintendent, to the Assistant Plant Superintendent or in his absence to the Shift Supervisor who will, in the context of an emergency, "seek the advice of members of the plant technical staff." Include within your answer what background in terms of nuclear safety and health physics such "plant technical staff" members will possess.*

202. Do you have, or do you plan to incorporate within the design of your proposed Midland Units a means for remote monitoring of radiation? If yes, then describe the design and state when it will be completed.*

203. Describe in detail, stating each fact, calculation and assumption, the basis upon which you assert and accept that the "Officials of the City of Midland have indicated that the conveyance of automobile transporting the evacuated employees of the Dow and Dow Corning Companies to outside the City boundary could be accomplished within about one hour."*

204. Describe in detail, stating each fact, calculation and assumption, how each of the following coordinate so as to prevent the traffic congestion which "would make evacuation impossible" as stated on page 2C-30 of the PSAR:

(a) City Police;

(b) Dow Safety Services;

(c) City Fire Department;

(d) Dow Fire Department;

(e) Dow Corning Plant Protection;

(f) Civil Defense;

(g) Service Station; and

(h) State Police.*

205. With respect to your liquid waste treatment system, state the type and the name of the manufacturer of the filter demineralizers to be used in this system. State the reason for which you chose this specific demineralizer. If you have not as yet chosen a specific demineralizer, state why not and what standards and criteria you will follow.*

206. State and describe each emergency and/or evacuation plan you have used or relied upon in developing emergency and/or evacuation plans in connection with the proposed Midland Units.*

207. State and describe in detail how it will be determined when "the corrective action adequately covers the

existing circumstances" as you assert at page 2C-8 of the PSAR.*

208. With respect to the "site emergency plan" as mentioned on page 2C-8 of the PSAR, answer the following:

(a) Who is responsible for the development, reviewing and testing of the "site emergency plan";

(b) What is the content of the "detailed written instructions and indoctrination of the designated civil and Dow Chemical Company authorities";

(c) Who are the designated civil and Dow Chemical Company authorities and what are their respective positions within their own organizations; and

(d) Do you intend to cede authority to Dow to implement, if and when necessary, evacuation from Dow premises necessitated by an accident originating from the proposed Midland Units. If not, describe your role and its implementation in such a circumstance.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

209. Describe in detail what study or analysis, if any, you have performed to develop a failure tree and an ARRM reliability analysis model comparable to that done for the Commonwealth Edison Dresden Plant. If so, provide a copy and

indicate the probability of a LOCA for the Midland Units in light of such analysis. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

210. State if in your analysis of a LOCA and each other accident which would result in three percent of the fuel melting, if you considered the possibility of a steam explosion that could rupture the primary containment vessel. Describe in detail each fact, calculation and assumption upon which you base your answer. If you have not done such an analysis, then state why not. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

211. With respect to the sequence of events separately in an LOCA and MHA, describe the timing and procedure by which operators will be removed from the control room. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

212. Describe in detail what study or analysis, if any, has been completed or is in process or is planned to be done concerning the Tittabawassee fish population of largemouth bass, yellow perch, bluegills, carp, catfish and suckers

relative to the following:

(a) In what relative abundance these fish inhabit the Tittabawassee near the proposed Midland Plant site;

(b) For each aforesaid type of fish, state each chemical pollutant to which each said type of fish has been exposed, including its estimated concentration and in what organ has such concentration occurred; and

(c) For each aforesaid type of fish, state each of the possible radionuclides which are proposed to be released from the proposed Midland Units which may be concentrated by each such type of fish and in what organ or part thereof will this concentration take place and include within your answer to this part of this Interrogatory, what synergistic effect or tendency to increase physiological burden upon such fish might or would occur as a result of such fish's prior exposure to the chemical pollutants set forth in your answer to (a) of this Interrogatory.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

213. With respect to the tests and procedures mentioned in Section 4.2.5.2 of the PSAR, describe in detail the methods and procedures by which you will maintain cognizant inspection at B & W to assure that such tests and procedures will be performed as specified. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

214. With respect to Sections 4.4.1.1 through 4.4.1.7 of the PSAR describe in detail each basis, stating each fact, calculation and assumption thereof, upon which you shall establish a schedule for the type and frequency of inspection during the detailed design of each item in said Sections. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

215. With respect to Section 4.5.1.3 of the PSAR, describe in detail each type, grade or species of material which will become part of the materials in the finished reactor coolant system and for each such material list the mechanical properties it must possess to be consistent with those specified in the design analysis. Also describe in detail the statistical evaluation and the statistical significance of such evaluation which was in your evaluation of the "qualification program". If in your answer you make reference to other than textual

(exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

216. With respect to each of the nondestructive tests mentioned at Section 4.5.1.2 of the PSAR, state the criterion for each possible test of each contemplated material, the conclusion of which shall result in either defect acceptance, rejection or repair for each such material. Include within your answer a statement concerning what organization having what responsibility will make a review to guarantee compliance with the results of such tests. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

217. With respect to each test and inspection mentioned in Section 4.5.2 of your PSAR, state and specify each acceptance standard. What organization having what responsibility determines acceptability and what review will be made to guarantee compliance therewith. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

218. With respect to the criteria as specified in Section 3.1.2.4.2 of the PSAR, answer the following:

(a) Describe in detail each test, experiment and analysis specifying each fact, calculation and assumption upon which you base your estimate of each material's fatigue life;

(b) With respect to your estimate of each material's fatigue life, specify in each case where each such material shall be used in the proposed reactor, and the basis upon which you conclude that the estimated fatigue life equivalently represents the conditions and fatigue life requirements of such use under normal and abnormal conditions; and

(c) Describe in detail, stating each fact, calculation and assumption, the basis upon which you conclude that a creep limit of 1% is conservative. Also describe in detail each test, experiment and analysis by which you will verify such criteria is conservative for each intended use.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

219. Describe in detail what methods are currently available for removing tritium from the liquid wastes of nuclear power plants. Has consideration been made to require such removal in the proposed Midland Units. If not, why not? If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

220. Describe in detail what instruments and/or procedures, if any, will be used to determine the meteorological

conditions existing during waste gas release. With respect to each typical type of weather condition in Midland specify, stating each fact, calculation and assumption thereof, what release procedure you will follow. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

221. Describe in detail the systems which you presently plan to include or for which you plan to do research and development so that such systems could be incorporated in the proposed Midland Units to monitor the effectiveness of the engineered safety features in mitigating a LOCA accident and to obtain continuous measurements indicative of the core situation during and subsequent to such an accident. Include within your answer, a discussion of consideration, if any, given or to be given to the following specific examples of such systems:

(a) Core-coolant-level instrumentation which senses differential pressure and/or thermal conductivity states within the core;

(b) Core temperature detectors which monitor core thermal-radiation;

(c) Temperature detectors on the proposed pressure vessel;

(d) Acoustical monitoring instrumentation;

(e) Heat-balance instrumentation on the heat exchangers of the engineered safety features;

(f) Containment radiation monitor with sufficient range to cover a release of the magnitude described in TID-14844; and

(g) Hydrogen concentration monitor to measure hydrogen concentration of the containment atmosphere to indicate occurrence of a metal-water reaction.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

222. With respect to the statement, "Material for the reactor internals bolting will be subjected to rigid quality control requirements to insure structural integrity," which appears at page 3-66 of the PSAR, describe in detail each such quality control criteria and state if you intend to use ultrasonic inspection, and if so, describe in detail the acceptance specifications. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

223. With respect to Table 3-16 of the PSAR, state what testing rate (speed of testing) was used by you in the

determination of yield strengths at 650° F. Does this rate agree with that established by the ASTM, if established, for design data accumulation and if not, why not. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

224. State whether you believe that your clad design is conservative because T/4 point test specimens are used for testing. Additionally, have you considered the possibility that a more conservative design could have been achieved by using center point specimens, and if so, why did you not use the center point specimens. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

225. State whether it is your intention to have established or whether it has ever been considered possible to have established an independent state or local health monitoring system installed or as a part of the proposed Midland Units to record radioactive releases. If not, why not. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

226. What would be the postulated exposure-time curve for persons living in the low population zone during an MHA if they are not evacuated. Describe in detail each fact, calculation and assumption upon which you base your answer. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

227. In the event of an MHA, describe in detail what decontamination methods would be used to decontaminate:

(a) The area surrounding the plant;

(b) The Dow Plant;

(c) The Dow Corning Plant;

(d) The City of Midland; and

(e) Other property which could possibly be affected, including within your answer a listing or description of such other property.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

228. State, regarding the proposed Midland Units, your opinion as to whether there will or will not be cracking, bulging, bowing, disintegration or other defamation of the fuel rods during blowdown, heating and cooling in a LOCA with

the emergency core cooling system operating, describing each fact, calculation, assumption and analysis upon which you base your opinion. Include within your answer whether the occurrence of any such cracking, bulging, bowing etc. will interfere with the effective operation of the emergency core cooling system, also including each fact, calculation, assumption and analysis upon which you base your answer. If your answer is that there will or might be interference with the emergency core cooling system, state whether there exists an alternate design of the emergency core cooling system or any other system to mitigate or prevent such interference. Also state each fact, calculation and assumption upon which you base your answer, and if such answer is based upon experimental data, describe in detail such experiments and the results thereof. Also state if such experiments were performed on a significant scale in which successful operation has been demonstrated. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

229. Describe in detail, stating each fact, calculation and assumption, what experimental verification supported by analysis you have obtained at all temperatures related to a LOCA to verify that the situation is controllable. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

230. Unless otherwise covered by your answers to these Interrogatories (and if so covered, specify the answers), state in detail the following:

(a) The names, titles and positions of each person whom you presently plan to call upon to introduce oral or written testimony upon your behalf in the course of the pending hearing;

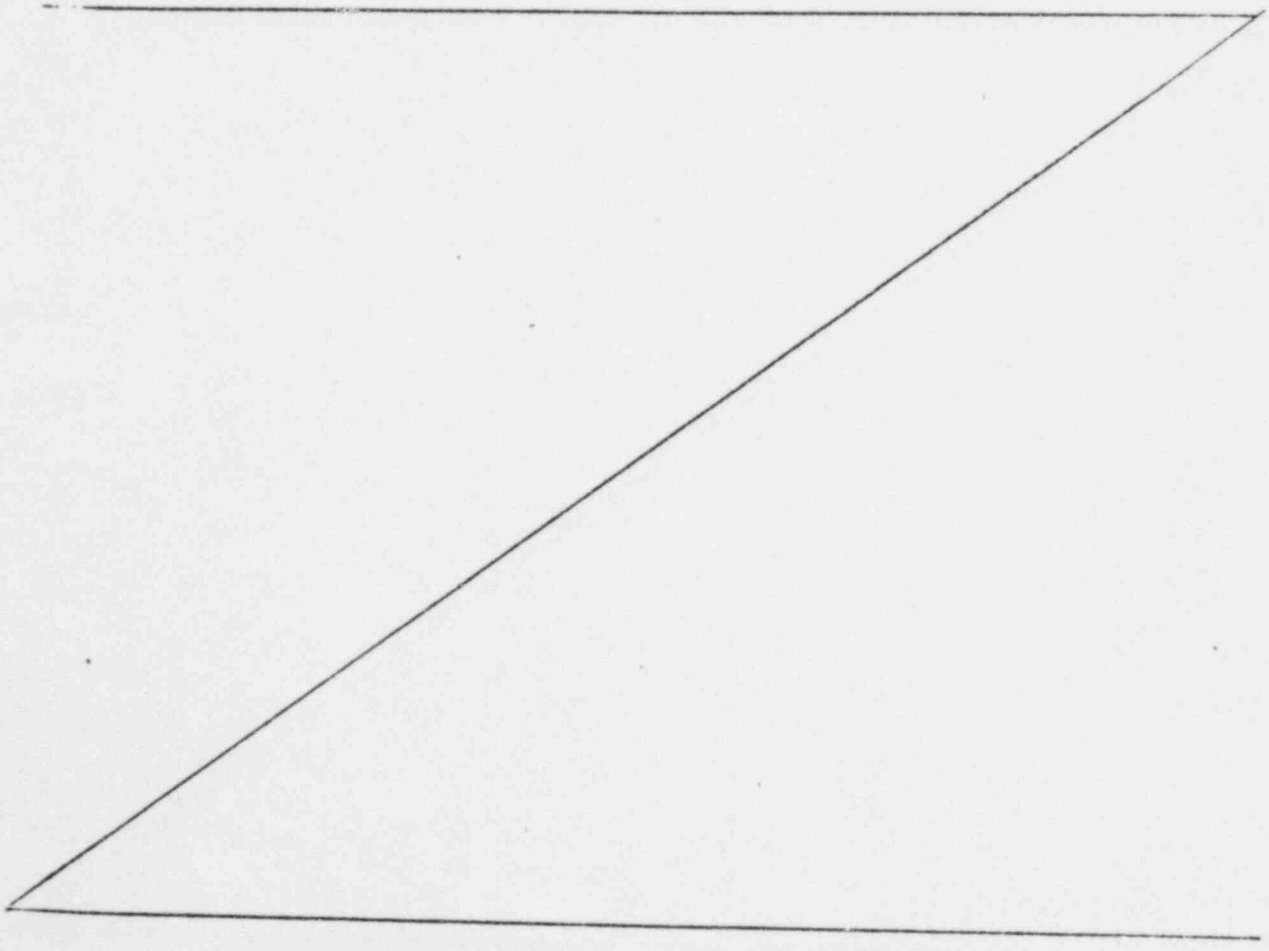
(b) The area or areas which will be the subject of each such person's testimony; and

(c) A description of each document or writing (as that term is defined in Interrogatory No. 232 below) which you intend to introduce in the course of the pending hearing in support of your position or positions.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

231. Have you ever been cited for or investigated about a violation or alleged violation by you of the Atomic Energy Act, any of its rules, regulations or orders, an Atomic Energy Commission license or any of its technical specifications or the rule, order, decree, regulation of any state or other federal agency or official having any manner of jurisdiction over any of your operations which are the subject of an Atomic Energy Commission license. If so, then:

(a) Describe in detail each instance of each such citation or investigation;



(b) List and identify in sufficient detail a description of each writing (as defined in Interrogatory 232 below) which is in your possession or control with respect to each such citation or investigation;

(c) State and describe the resolution, if any, of each such citation or investigation; and

(d) State what steps you have taken to prevent circumstances which led to each such citation or investigation from occurring again and occurring at the proposed Midland Units.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

232. List and describe in sufficient detail so that it can be identified, each document which is in your possession or under your control which relates to, refers to or concerns any of the following:

(a) Your participation in any way in the designing, constructing or operating of the proposed Midland Units;

(b) Your evaluation of the proposed Midland Units regarding its siting, its designing, its construction, its safety or its proposed operation;

(c) Financial aspects of the building, designing or constructing of the proposed Midland Units, including but not limited to the sale of processed steam, to anyone, for industrial purposes;

(d) Your decision to approve of a participation in any way in the designing, constructing or securing of a construction permit for the proposed Midland Units; and

(e) Any Interrogatory or answer to any Interrogatory filed herein.

As used within these Interrogatories, the word "writings" (or words of similar import) shall include all written, typed, printed and photostated matter, including photographs, duplicate originals, carbon copies, Thermofax copies, photostatic copies and other copies thereof, including drafts thereof, in your possession, custody or control, written, made, delivered or received at any time up to and including March 22, 1971, including, without limiting the generality of the definition, all correspondence, telegrams, memoranda, minutes of meetings, client memoranda, account cards, leases, documents of title, receipts, cancelled checks, bank statements, records of telephone calls, summaries of meetings, agreements, contracts and notes, whether formal or informal.

At your option, depending upon convenience to all other parties thereof, instead of answering this Interrogatory you may choose to follow either the suggestion made in a letter by Myron Cherry to all counsel dated March 8, 1971, or the more formal method of depositions under oath. If you do not so choose by notice to us within ten days after receipt of these Interrogatories, you shall be required to answer this Interrogatory.

Finally, this Interrogatory or any other alternative methods of identifying relevant writings are not intended to call for writings which are subject to a valid privilege; however, you shall be required to describe generally the writings as to which you may claim privilege in order that opportunity for argument thereon may be had.

Saginaw Valley Nuclear Study Group
Citizens Committee for the Environmental Protection of Michigan
Sierra Club
United Auto Workers of America
Trout Unlimited
West Michigan Environmental Action Council, Inc.
Environmental Law Society of the University of Michigan Law Students

By _____
Myron M. Cherry, their attorney

*Throughout these Interrogatories occasionally there was omitted a sentence intended to be inserted at the end of a

particular Interrogatory. Accordingly, throughout these Interrogatories, wherever an asterisk appears you are to assume that the following sentence ends each such Interrogatory:

> If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, then set forth completely the text of each such other reference or attach a copy.

Dated: March 22, 1971.