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 THE ATOMIC ENERGY COMMISSION
AND THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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 representatives, members and/or employees of the Atomic Energy Commission ("AEC" or "Staff") and the Advisory Committee on Reactor Safeguards ("ACRS") as the case may be 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 all of the answers, state such person's name and title together with an identification of which interrogatories each such person is

G

responsible for answering. Each of your answers shall be considered, unless otherwise specifically set forth as having equal application to each of the proposed Midland Units 1 and 2. The Interrogatories below are to be considered your continuing obligation. Accordingly, during the pendency of this proceeding, if additional information comes to your attention with respect to one or more of these Interrogatories after you have answered these Interrogatories, then you are required to amend your answers to provide such additional information.

The words "Safety Evaluation," as used in these Interrogatories, refer to the Safety Evaluation Report prepared under the auspices of and proposed to be submitted into this hearing by the Regulatory Staff of the Atomic Energy Commission. Unless otherwise set forth, the words "you" or "yours" (or words of similar import) shall refer to the Atomic Energy Commission, or any of its divisions, or the Regulatory Staff or the ACRS, as the case may be.

1.- 232. You have received a set of Interrogatories addressed to the applicant, Consumers Power Company. Those Interrogatories were designed to ascertain information which forms the basis for various opinions or conclusions or assertions contained within the Preliminary Safety Analysis Report for the proposed Midland Units ("PSAR"). Presumably you already have considered and have been privy to such information

in the course of your Safety Evaluation of the proposed Midland Units or, alternatively, you have not found it necessary to consider such information in your Safety Evaluation. Accordingly, with respect to each Interrogatory asked of Applicant, if in your analysis resulting in your Safety Evaluation you have considered the information which is called for by each such Interrogatory, then answer that Interrogatory as if specifically asked of you; alternatively, if any such Interrogatory calls for information which you have not considered in your Safety Evaluation, then you do not have to answer such Interrogatory, but in such case with respect to such Interrogatory and the information it calls for, state:

(a) Does the Interrogatory and its answer relate to information which must be considered in evaluating safety aspects of a reactor and the proposed Midland Units; and

(b) Why did you not consider such information in the course of your Safety Evaluation.

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

233. Assuming the occurrence at the site of the proposed Midland Units of a full scale accident as examined in WASH-740 for a single unit of the size of either of the proposed Midland Units, and describing in detail, each fact, calculation and assumption upon which you base your answer, state conservatively the following:

(a) How much land would be contaminated and for how long a period of time;

(b) How much property damage, in dollars, would occur;

(c) How many pregnant women might be exposed to more than half a rem of radiation, if the accident occurred in each of the years 1980, 1990 and 2000 considering population projections for each of such years;

(d) How many people might be exposed to at least 25 rems of radiation if the accident occurred in each of the years 1980, 1990 and 2000, considering population projections for each of such years;

(e) How many cancer and leukemia deaths might one such accident cause;

(f) Approximately how many genetic deaths and retarded children could result in later generations from one such accident;

(G) Approximately how many extra cases of coronary heart disease and schizophrenia could result from one such accident.

What differences would there be to your answers if the accident occurred and the proposed Midland Units were 100 or more feet underground. Also state whether these calculations have ever been made for this docket number or another docket number with similar circumstances and, if not, why not. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

234. With respect to the substance and contents of the letter dated November 12, 1969, addressed to Chairman Seaborg by Joseph Hendrie of the Advisory Committee on Reactor Safeguards, within which Mr. Hendrie called attention to the existence of "urgent need for additional research and development" in safety features of the reactors already going into production, describe in detail, stating each fact, calculation and assumption, what are such needed safety features and whether they are contemplated to be a part of the proposed Midland Units. If they are not, state why not, including whether you agree with the remarks of Mr. Hendrie. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR,

or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

235. With respect to each ACRS committee or subcommittee meeting, and each ACRS meeting with Applicant, all with respect to the proposed Midland Units, and whether or not listed in Appendix A to the Staff Safety Evaluation Report, state the following:

(a) The names and titles of persons at each such meeting; and

(b) The dates and substance of what transpired at each such meeting.

Your answer may refer to a document or letter on file at the AEC Public Document Room if it fully sets forth all the information requested for one or more such meetings. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

236. With respect to the letter (and its contents) mentioned as Item 8 in Appendix A of the Safety Evaluation, describe the content of each conversation, document, letter and communication which prompted the writing or resulted from the receipt of said letter. If in your answer you make reference

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

237. State the name of each consulting firm, individual and agency who was requested by you to analyze the proposed Midland Units. For each such consulting firm, individual and agency state what area or problem of the proposed Midland Units it analyzed and what the results were. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

238. With respect to the technical evaluation of the preliminary design of the proposed Midland Units which was done by the Division of Reactor Licensing, state for each segment or part of the proposed preliminary design the name of the individual or individuals who performed the evaluation, a description of his or their evaluation and when the evaluation was done. In addition, describe the content of each conversation, document, letter and communication which was part of or related to each such evaluation. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter

in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

239. With respect to Applicant's request for and the later approval of an exemption pursuant to 10 CFR 50.12 from the provisions of 10 CFR 50.10 (b) to permit construction of portions of the substructure of the auxiliary building, and the tendon galleries and foundation for the containment structures, prior to the issuance of a construction permit, state what factors, if any, relating to site suitability were considered in granting the aforesaid exemption. If your answer is that there were no such considerations, then state whether the aforesaid exemption was granted only upon consideration of "the design of the applicable portions of the plant" as has been stated at page 3 of the Safety Evaluation. Describe the content of each conversation, document, letter and communication which initiated, was part of, and resulted in the granting of the aforesaid exemption. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

240. With respect to the statement "The consequences of these transients will be calculated again when detailed plant design information is available to verify that these transients are within the capabilities of the reactor control

and protection systems," at page 59 of the Safety Evaluation, state each fact and assumption which supports your belief that a complete analysis of the final design insofar as transient stability is concerned, is not an important safety factor to be considered completely prior to any recommendation approving the proposed Midland Units. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

241. With respect to your statement at page 60 of the Staff Safety Evaluation that "Based on our evaluation of the information submitted by the Applicant and our evaluations of other pressurized water reactor designs at the operating license stage," describe in detail the evaluations of these other pressurized water reactor designs insofar as you contend such evaluations relate to the proposed Midland Units. Include within your answer the name of each pressurized water reactor you have relied upon and whether you have relied upon anything in Compliance Division Inspection Reports regarding such other reactors and if you have, then list the dates of such inspection reports. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

242. With respect to the statement at page 60 of the Safety Evaluation that "the consequences of these accidents can be controlled by limiting the permissible primary and secondary coolant system radioactivity concentrations," state:

(a) What is lowest level of possible accidental dose which is contemplated by controlling the limiting of activity as aforesaid;

(b) What level of activity concentration will achieve the dose set forth in (a) above; and

(c) Can such levels be lower than set forth in (b) and if so state why, if it is true, you do not intend to seek to impose such lower levels.

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, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

243. Describe what participation, if any, you have had in connection with a trip in 1970 by certain persons, later to become members of Intervenor Midlear Nuclear Committee, to Oak Ridge, Tennessee. If in your answer you make reference to other than textual (exclusive of footnote) matter in the

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

244. With respect to the refueling accident described at page 61 of the Staff Safety Evaluation, describe in detail each fact, calculation and assumption by which you have determined that resultant calculated doses will be 250 rem to the thyroid and 8 rem to the whole body at the site boundary and 90 rem to the thyroid and 3 rem to the whole body at the outer boundary of the low population zone. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

245. With respect to the potential offsite consequences resulting from a rod ejection accident, describe in detail each fact, calculation and assumption by which you have determined (page 63 of the Safety Evaluation) that the calculated two-hour site boundary doses will be 180 rem to the thyroid and 1 rem to the whole body and that the calculated course of the accident doses at the outer boundary of the low population zone will be 70 rem to the thyroid and 1 rem to the whole body. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference

to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

246. With respect to the potential offsite consequences resulting from a LOCA, describe in detail each fact, calculation and assumption upon which you state at page 65 of the Staff Safety Evaluation that potential doses at the site boundary for a two-hour period will be 270 rem to the thyroid and 4 rem to the whole body and that potential doses to the low population zone for a 30-day period will be 90 rem to the thyroid and 3 rem to the whole body. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

247. With respect to your analysis of the Dow emergency plan, which you refer to at page 70 of the Staff Safety Evaluation, describe in detail each fact, calculation and assumption by which you conclude that the dose that might be received by an employee standing one mile from the reactor during 35-minute and one-hour periods following a design basis LOCA would be, respectively, 55 rem to the thyroid and 75 rem to the thyroid. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter

in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

248. Describe in detail each fact, calculation and assumption upon which you conclude that the population center distance determined under 10 CFR Part 100 is or would be 1 1/3 miles. Also explain why the term "population center distance" does not appear in the PSAR. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

249. With respect to the possible subsidence as stated at page 12 of the Safety Evaluation, what point or points of the proposed Midland Units' Class I structures would experience the maximum stress? In addition, what would be the maximum stress in each of the following given such a subsidence:

(a) Pressure vessel;

(b) Containment structure; and

(c) Primary coolant piping.

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, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

250. Describe in detail what analysis, specifying each fact, calculation and assumption thereof, was made by you concerning the probable maximum flood and its possible consequences to the proposed plant. During the period of construction of the proposed Midland Units and during your review of the Applicant's calculation of the probable maximum flood level, what changes can or are contemplated to be incorporated into the design to insure integrity of the proposed Midland Units, if error is found in flood calculations. Also, state why you wait until construction of the proposed Midland Units is under way to "review the Applicant's calculation" and to assure yourself that "the calculational techniques have been properly employed." If in your you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

251. With respect to your statement on page 15 of the Safety Evaluation that "gamma activity of samples of fish and other aquatic life" will be taken "monthly, when possible," describe in detail when it will be possible and when it will not be possible to take such samples. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set

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

252. Describe in detail including each fact, calculation and assumption, the statistical significance which will govern the interpretation of the results for each of the following series of tests in the pre-operation environmental radiation survey program as outlined at page 14 of the Staff Safety Evaluation:

(a) Six air particulate samples weekly;

(b) Six measurements weekly of radioactive iodine activity in the air;

(c) Three measurements monthly of the gross beta activity of the waters of the Tittabawassee River and Chippewa River;

(d) Three measurements monthly of the tritium content of the waters of Tittabawassee and Chippewa Rivers; and

(e) Nine measurements monthly, when possible, of the gamma activity of samples of fish and other aquatic life.

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

253. State in detail, including each fact, calculation and assumption by which you conclude relative to the number, type and location of the sampling stations and the analyses performed that the radiation survey program for the proposed Midland Units will provide a valid basis for evaluating the radiological impact of the plant on the environs by comparing the future levels of radioactivity with preoperational levels. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

254. Describe in detail each fact and factor determined from the review of the Oconee Nuclear Station Units 1, 2 and 3 and the subsequent review of the Babcock and Wilcox Topical Reports which formed a part or basis for your conclusion that based on such reviews (in whole or in part) the Midland plant design is acceptable with regard to core physics, core thermal, core hydraulic, and core mechanical design. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

255. Describe in detail each "Improved means for prompt detection of fuel clad failure" which you say in the

Staff Evaluation is under development within the industry. What percentage of leaking fuel rods can the presently considered process radiation monitor detect? What increase in coolant activity, as the system is presently designed, can occur without being detected. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

256. Describe in detail the substance of your review and analysis stating each fact, calculation and assumption thereof, of the reactor coolant system which you made to determine the adequacy of the design of the proposed Midland Units to withstand normal loads of mechanical, hydraulic and thermal origin, plus anticipated seismic loads from the operational basis earthquake. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

257. Describe in detail the substance of your review and analysis, stating each fact, calculation and assumption thereof, of the codes, the plans for design and fabrication and the quality specified for the reactor vessels and coolant piping which formed all or part of the basis for your conclusion that

said items are acceptable. Include within your answer whether "acceptable" indicates minimum or maximum compliance with a given standard. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

258. Describe in detail the substance of your review and analysis, stating each fact, calculation and assumption thereof upon which you conclude as stated at page 22 of the Staff Safety Evaluation that all internal components will be designed to withstand the loads which will result from a combined design basis earthquake and LOCA. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

259. Describe in detail the contents of your evaluation, stating each fact, calculation and assumption thereof, upon which you conclude that the missile penetration formulae and missile protection criteria proposed by the Applicant are consistant with established practices and AEC criteria and are acceptable. Include within your answer a description of and reference to said "established practices," a reference to

"AEC criteria," and a definition of the word "acceptable" as you use it. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

260. Define the word "acceptable" in terms of minimum and maximum compliance with given criteria or standards as you use that word throughout the Safety Evaluation. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

261. State in detail each fact, calculation, and assumption upon which you base your belief (page 25 of the Staff Safety Evaluation) that the ASME Code for the In-Service Inspection of Nuclear Reactor Coolant System (N-45) is equivalent to Section XI of the ASME Boiler and Pressure Vessel Code. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

262. With respect to Class I (Seismic) Structures,

describe in detail each fact, calculation, and assumption, upon which you conclude that the loading criteria proposed by Applicant is consistent with established practices and acceptable as stated on page 26 of the Staff Safety Evaluation. Include within your answer a description of and reference to said established practices. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

263. State in detail, your review and analysis, stating each fact, calculation, and assumption thereof, of the Applicant's considerations of potential interaction between Class I (Seismic) and Class II (Seismic) components and structures during seismic excitation to assure that failure of a Class I (Seismic) structure or component would not damage a Class I (Seismic) item. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

264. Describe in detail each test or experiment, specifying each fact, calculation and assumption thereof, which you do or intend to rely upon to assert, if you do, that the containment structure as designed of the proposed Midland Units will be able to withstand temperature and pressure

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

265. What are each of the "uncertainties" in the calculated peak in the containment structure during a LOCA as you so state at page 28 of the Staff Safety Evaluation. Also state what steps you and Applicant are taking or proposing to take to resolve each such uncertainty and what relationship, if any, the non-resolution of each such uncertainty has to the safety of the proposed Midland Units. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

266. Describe in detail each fact, calculation and assumption, upon which you conclude at page 29 of the Staff Safety Evaluation that "these materials and specifications are consistent with current design practice and are acceptable." Include within your answer a description of and reference to said current design practice. If in your answer you make reference to other than textual (exclusive of footnote) matter in

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

267. On page 34 of the Staff Safety Evaluation you state that "Prior to installation of equipment for the emergency core cooling system, we will require that the applicant verify the results of his analysis using more sophisticated multi-mode analytical techniques which represent the reactor coolant system by the use of several control volumes, rather than the two used in the present calculational technique." With respect to this statement, answer the following:

(a) Describe in detail what review and analysis, if any, including each fact, calculation and assumption thereof, was performed by you to evaluate the adequacy of the Emergency Core Cooling System (ECCS) and the adequacy of the analysis referred to and above quoted;

(b) Why such "more sophisticated multi-mode analytical techniques" were not required prior to your evaluation resulting in the proposal of a construction permit; and

(c) What necessary changes, if any, would such "more sophisticated multi-mode analytical techniques" indicate in either the operation

of ECCS or its design and what steps are you taking to assure that all design options remain open until after the more sophisticated verification has taken place.

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

268. At page 34 of the Staff Safety Evaluation, you state that "the code used in the verification of the performance of the emergency core cooling system will utilize the data available from the appropriate research and development programs". Describe in detail each fact and experimental and test result which will either add to or limit the application of the "code", and give a description of and reference to said appropriate research and development programs. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

269. Are there any facts, calculations and assumptions other than those cited in the Staff Safety Evaluation upon which you conclude that the applicant's preliminary design and

the analysis effort to be performed are acceptable as you have stated on page 34 of the Staff Safety Evaluation. If so, describe in detail each other such fact, calculation and assumption. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

270. Describe in detail each fact, calculation and assumption which formed a part of your review and analysis of the following proposed Midland Units' design limits:

(a) The ability to limit the peak clad temperature to well below the clad melting temperature;

(b) The ability to limit the full clad-water reaction to less than one percent of the total clad mass;

(c) The ability to terminate the clad temperature transient before the geometry necessary for cooling is lost, and before the clad is so embrittled as to fail upon quenching; and

(d) The ability to reduce the core temperature and then maintain core and coolant temperature levels in the subcooled condition until accicent recovery operations can be accomplished.

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

271. Describe in detail your review and analysis, stating each fact, calculation and assumption thereof, upon which you conclude that "the spray system [to be contained in the proposed Midland Units] will be designed in such a manner that adverse pH conditions cannot develop to the extent that they will significantly affect system performance", as stated at page 35 of the Safety Evaluation. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

272. Describe in detail each fact, calculation and assumption upon which you have predicted in your Safety Evaluation a "spray removal constant" of 2.5 $hours^{-1}$, as stated at page 35 of the Safety Evaluation. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

273. Describe in detail each fact, calculation and assumption, upon which you rely to conclude that the "Research and development effort" which "is being conducted on the long-term stability of the alkaline sodium thiosulfate solution under post-loss-of-coolant accident conditions, and on the material compatibility aspects of the spray solution with all exposed construction materials" (page 36 Safety Evaluation) will be equivalently related to conditions in the proposed Midland Units and will cover completely all conditions which are necessary for precise predictability. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

274. Describe in detail each fact, calculation and assumption, other than those set forth at page 36 of the Staff Safety Evaluation, upon which you conclude that Applicant's proposed iodine removal equipment is acceptable in view of the R & D program yet to be completed. In addition, since you conclude that offsite doses calculated using "conservative assumptions" are within 10 CFR 100 guidelines values, state if any consideration was given to make the offsite doses as low as engineeringly possible. If not, why not. If yes, explain in detail such consideration and if it resulted or will result in an essentially zero radioactive waste system or systems for

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

275. Describe in detail each fact, calculation, and assumption upon which you conclude that the capacity of the containment heat removal system proposed is "adequate" other than your statement that the "containment heat removal systems would cause the containment pressure to drop to a low value within the first day following a loss-of-coolant accident", as stated at page 37 of the Safety Evaluation. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

276. List each acceptable method for the control of hydrogen other than purging to prevent "additional" thyroid and whole body doses at the outer boundary of the low population zone, subsequent to a LOCA. Include within your answer what additional doses, if any, would result from each such alternate system and whether you intend to require that an acceptable alternate system must result in no such additional doses and if not, why not. If in your answer you make reference to other

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

277. With respect to the "protection system", (page 39, Safety Evaluation) state what other criteria was used by you to determine the acceptability of the the "protection system" when conformance to the General Design Criteria, as published in the Federal Register on July 11, 1969, and the Proposed IEEE Criteria for Nuclear Power Plant Protection Systems (IEEE279) dated August 1968, was not applicable. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

278. Describe in detail each fact calculation, and assumption upon which you conclude that the instrumentation systems which initiate and control the engineered safety features for the proposed Midland Units are "substantially the same as those proposed and found acceptable for the Three-Mile Island Unit 2 Plant. Include within your answer a description of such systems in said Three-Mile Plant sufficient to make a comparison and state also the relevance to this proceeding and your Staff Safety Report of making such a comparison.

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

279. With respect to the liquid waste disposal systems, describe in detail what systems are currently available which when used in conjunction with the presently proposed Midland Units Plant Waste System would result in essentially zero radioactive gaseous and liquid effluents. 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, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

280. Why are not all the wastes which are collected from the radioactive laboratory drains, building sumps, and decontamination shower drains vacuum degassed and sent to waste holdup tanks and then filtered, demineralized and evaporated, storing the demineralized water stored for later reuse. 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, or reference to other than textual (exclusive of

footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

281. With respect to the Applicant's estimated activity of the gaseous and liquid activities (as stated on page 50 of the Staff Safety Evaluation) which will be stored in the liquid waste holdup tanks proposed to be located inside the reactor containments, state the dose to an individual separately at the boundary of the exclusion area and low population zone separately for periods of two-hours, twenty-four-hours and thirty days. 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, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

282. Describe in detail each study that the Applicant is performing to find a means of preventing common mode failures in the reactor protection system from negating scram action and also each study that Applicant is performing to determine and evaluate the consequences of failure to scram in the event of anticipated transients. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation

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

283. Describe in detail each possible way of obtaining flexibility in the proposed Midland Units' engineering design with regard to (1) relief capacity of the primary systems and (2) diverse means of reducing reactivity in order to tolerate the consequences of a failure to scram during anticipated transients. Also state each condition with respect to the proposed Midland Plant design for which you would require modifications to the plant to make tolerable the consequences of failure to scram during these transients. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

284. Describe in detail your evaluation and analysis, stating each fact calculation, and assumption thereof, of the probability and consequences of "these types of events" as stated at page 45 of the Safety Evaluation which will provide the basis for further review of the proposed design of the systems regarding their ability to terminate or limit the consequences of such events. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then

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

285. State in detail each of the specific features for the installation of protection and emergency power systems for which Applicant will (if it will) develop more detailed criteria and procedures, all as recommended by the ACRS as stated at page 45 of the Staff Evaluation. Include within your answer when these will be developed and why you or ACRS is not requiring (if you or ACRS is not) development prior to a construction permit. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

286. What level of activity will cause the liquid effluent control valve to close, thus terminating release of liquid effluent to the Tittabawassee River (page 51 of the Safety Evaluation). Will there or can there be any conditions under which the operation of this liquid effluent control valve will be prevented to operate. Describe 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, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

287. With respect to your statement at page 52 of the Safety Evaluation that "there will be no significant hazard to drinking water supplies as a consequence of normal operation of the Midland Plant." Describe in detail each fact, calculation and assumption upon which you base your answer and give a definition of "normal operation" as you use that term. Also describe in detail each accident at or abnormal operation of the proposed plant which could result in potential danger to drinking water and what corrective action will be taken or is being planned to be taken for each of said circumstances. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

288. With respect to temporary storage of radioactive gases, what level of radioactive content is "high" and what level of radioactivity is a level acceptable for release, as stated at page 52 of the Safety Evaluation. 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, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

289. With respect to the Applicant's gaseous release rates as set forth at page 52 of the Safety Evaluation, what will be the maximum concentration at anytime (and not averaged over any period) of radionuclides at the site boundary. 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, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

290. Describe in detail each fact, calculation and assumption upon which you will establish the limit in the technical specifications for the proposed Midland Units at which discharge of gaseous effluent will be automatically terminated. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

291. Describe in detail the physical route by which solid radioactive wastes will be removed from the proposed Midland Units' site, and also state the name of the disposal firm and its location, where the solid wastes generated by the proposed Midland Units will be stored and have you accounted or prepared for such storage for waste to be generated over

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

292. Describe each fact, calculation and assumption of your review and analysis of the following systems of the proposed Midland Units pursuant to which you conclude that such systems will be adequate to perform their intended functions:

(a) The reactor coolant makeup and purification system;

(b) The chemical addition system;

(c) The decay heat removal system;

(d) The fuel pool cooling system;

(e) The shield cooling system;

(f) The component cooling system;

(g) The service water system;

(h) The auxiliary feedwater system;

(i) The fuel handling system;

(j) The instrument and service air system;

(k) The heating, ventilating and air-conditioning systems;

(l) The fire protection system;

(m) The condesate and feewater system for the stead generators; and

(n) The circulating water system.

In addition and for each of these systems describe each fact, calculation and assumption upon which you conclude that "the design bases for these systems are the same as those for other recently reviewed and approved PWR plants," and include within your answer a statement as to what relevance such other plants' systems have to this proceeding, e.g. were those systems and the systems for the proposed Midland Units:

(a) Manufactured by the same venors; and

(b) Constructed or installed pursuant to an identical quality assurance plan or program.

Finally, list each such other recently reviewed and approved PWR plants together with each document which formed any basis for review and approval of such other PWR plants which relates in anyway to your approval or evaluation of the proposed Midland Units. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

293. Describe in detail each fact, calculation and assumption upon which you base your conclusion that the proposed Midland Units' cooling pond is sufficient to provide the cooling water needs of the plant for 100 days without drawing water from the Tittabawassee River. Include within your answer a statement of what are the expected maximum and

minimum temperatures of the cooling pond under normal conditions and throughout the period up to and including the 100 days that water cannot be drawn from the Tittabawassee River? If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

294. Describe in detail the expected composition of the dredging which will be taken periodically from the cooling pond, including but not limited to each expected radionuclide and its concentration. 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, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

295. Describe in detail each fact, calculation and assumption upon which you conclude (page 56 of the Safety Evaluation) that "an adequate supply of water will be available both to cool the plant during normal operation with low river flow and to reject plant heat following plant shutdown even in the event of failure of the dikes which contain the water

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

296. Describe in detail what will occur when the alarm that monitors the steam condensate from the intermediate heat exchanger is activated, as stated at page 57 of the Safety Evaluation. State each fact 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, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

297. Describe in detail each fact, calculation and assumption upon which you conclude that Applicant, through its operation and construction of the Big Rock Point Plant and construction of the Palisades Plant, (and your contact with relevant project personnel) demonstrated that it is technically qualified to design and construct or have designed and constructed the proposed Midland Units. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety

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

298. Describe in detail, stating each fact, calculation and assumption upon which you have concluded in your review and analysis that the Babcock & Wilcox Company and the Bechtel Corporation are technically qualified to design and construct the proposed Midland Units, including but not limited to each fact, calculation and assumption upon which you base your favorable acceptance of the following statements:

(a) the Babcock & Wilcox Company is currently engaged in the design, construction, and installation of 10 pressurized water nuclear steam supply systems;

(b) the operating experience of each plant for which Babcock & Wilcox Company has supplied the nuclear steam supply system;

(c) the Bechtel Company and Bechtel Corporation have been actively engaged in design and construction of 23 boiling water reactor and pressurized water reactor nuclear power plants.

If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your

Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

299. Separately for Applicant, Babcock & Wilson and Bechtel Corporation, state:

(a) Has it ever been cited or questioned by your Compliance Division or any of your divisions or any part of the AEC for a violation of AEC rules, regulations, established practices, or an AEC license or its technical specifications. If so, describe each such instance of citation or question and its disposition and what, if any, consideration each such instance was given in connection with your Safety Evaluation for the proposed Midland Units or your proposed issuance of a construction permit for the proposed Midland Units;

(b) Is there any established method, procedure or practice which it follows or is following which you would like amended, ceased or changed, as regards the design, construction or operation, if any, of the proposed Midland Units. If so, describe each one in detail.

If in your answer you make reference to other than textual

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

300. Explain in detail the basis of and reason for the statement, "During construction of the facility, the Division of Compliance will monitor the applicant's capabilities to assure that the applicant's expanding commitment to nuclear power does not dilute the technical support organization," which appears at page 68 of the Safety Evaluation. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

301. Describe in detail each fact, calculation and assumption upon which you have concluded that the "crew size may not be acceptable" and what additional information you will require from the applicant "regarding the ability of the proposed shift composition to safely handle both normal and abnormal conditions at the facility," all as set forth at page 68 of the Safety Evaluation. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set

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

302. Describe in detail each of the requirements for acceptability of an operator training program. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

303. Explain in detail your statement, "Babcock & Wilcox Company will have day to day responsibility for the nuclear steam supply system," which appears at page 72 of the Safety Evaluation. Include within your answer how such "day to day responsibility" affects Applicant's overall responsibility for the design and construction of the proposed Midland Units including quality assurance responsibility as set forth in Appendix B to Part 50 of AEC Regulations. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

304. Explain in detail your statement, "B & W will also audit the quality assurance programs of its suppliers as

appropriate," which appears at page 73 of the DRL Safety Evaluation. Define "appropriate" as it is used, including each standard and criteria. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

305. Describe in detail your review and analysis, stating each fact, calculation and assumption thereof, of the Babcock & Wilcox Company program which has been initiated to study fuel clad failure mechanisms associated with a loss-of-coolant accident that includes evaluation of existing data and "scoping" tests to obtain data on potential fuel clad failure mechanisms. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

306. Describe in detail your review and analysis, stating each fact, calculation and assumption thereof, of the analytical study of fuel clad failure mentioned at page 76 of the Safety Evaluation. Also state how this analytical study relates to the "evaluation of existing data

and scoping tests to obtain data on potential fuel clad failure mechanisms" as mentioned at page 75 of the Safety Evaluation. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

307. Describe in detail each fact, calculation and assumption which comprises "the further information" which has been obtained as stated by you at page 76 of the Safety Evaluation from the data of the Multipin tests and the FLECHT program (Full Length Emergency Cooling Heat Transfer Test), and also describe in detail how this data or "further information" will be used in conjunction with improved multi-mode analytical techniques to verify the performance of the emergency core cooling system. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

308. Describe in detail your review and analysis, stating each fact, calculation and assumption thereof, of the experimental program which has been performed by Babcock

& Wilcox Company to verify the performance of the internal vent valve assemblies. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

309. Describe in detail your review and analysis, stating each fact, calculation and assumption thereof, of the Babcock & Wilcox Company tests on tube mockups of the once-through steam generator, including a statement of what considerations will be necessary to substantiate the acceptability of the design. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

310. Describe in detail your review and analysis, stating each fact, calculation and assumption thereof, of the Babcock & Wilcox Company test on the sodium thiosulfate stability under storage and accident conditions. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

311. Describe why substitution of charcoal filters for the reagent spray system will be acceptable considering the total engineered sofquart system, and state if the substitution would result in different doses to an individual resulting from an MHA and an LOCA. 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, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

312. Describe in detail your review and analysis, stating each fact, calculation and assumption thereof of the Babcock & Wilcox Company control rod drive test program to develop the roller-nut type drive and each area which you have identified to B & W where "more details of the tests' results should be addressed." If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

313. Describe in detail your review and analysis, stating each fact, calculation and assumption thereof of the

Babcock & Wilcox Company research development program for heat transfer and fluid flow investigations. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

314. Describe in detail each fact, calculation and assumption comprising the "matters" which you state at page 80 of the Safety Evaluation that you shall "review ... to assure that sufficient safety margin is available to prevent events which could cause departure from nucleate boiling and subsequent fuel failures." Include within your answer each standard and criteria which shall govern your review. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

315. Describe in detail your review and analysis, stating each fact, calculation and assumption thereof, of the analysis by the Babcock & Wilcox Company of the stresses and deflection of the reactor internals resulting from blowdown forces in a LOCA. If in your answer you make reference to

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

316. Describe in detail what aspects of a reactor system design must be completed or you insist upon being completed before the issuance of a construction permit. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

317. Describe in detail each fact, calculation and assumption which forms the basis for your determination that the estimated costs of production plant construction and the fuel requirements for the first core of each unit are reasonable. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

318. Identify and list each standard, objective and criteria pursuant to which you evaluated the PSAR and the design and proposed construction of the proposed Midland Units. State

whether any such standard, objective and criteria is different from those used in connection with evaluation or review or approval of any license or permit for each other PWR plant which you rely upon in any way in connection with the Midland Safety Evaluation. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

319. With respect to the statements that "Other problems related to large water reactors have been identified by the Regulatory Staff and the ACRS and cited in previous ACRS reports . . ." and "The Committee believes that resolution of these items should apply equally to the Midland Plant Units 1 & 2 . . .", which statements appear at page 97 of the Safety Evaluation, answer the following in detail:

(a) List and describe in detail each of these other problems and items;

(b) Set forth when each of these other problems and items were first identified in any ACRS letter or at any time by the Regulatory Staff, specifying each large water reactor as to which it related;

(c) From the time of the identification of each

such problem or item state what research has been done and what results have been obtained, if any, separately by the nuclear industry or any part thereof, and/or by the Atomic Energy Commission or sponsored by it to resolve these problems or items;

(d) With respect to each large water reactor as to which each such problem or item has been identified, state whether the problem or item was resolved (i) prior to construction and (ii) prior to operation of each such water reactor, and if not, why not;

(e) What research is proposed to be accomplished for each of the problems or items still unresolved generally and with specific reference to the proposed Midland Units. Include within your answer a schedule of when such research toward resolution of each such problem or item will be completed or is planned to be completed; and

(f) With respect to a letter by Joseph M. Hendrie dated the 12th day of November, 1969, to Glenn T. Seaborg, relevant portions of which are as follows:

"The Committee has been recently informed that overall reactor safety funding for FY 1970 and 1971 will be considerably below the AEC estimates of need for the water reactor safety research program, as well as for safety research on seismic effects . . . , and on environmental effects. As a consequence, many safety research activities have not been initiated, have been slowed, or have been terminated. The Committee reiterates its belief in the urgent need for additional research and development . . .. more effort should be devoted to gaining an understanding of modes and mechanisms of fuel failure, possible propagation of fuel failure, and generation of locally high pressures if hot fuel and coolant are mixed, and that effort should commence on gaining an understanding of the various mechanisms of potential importance in describing the course of events following partial or large scale core melting, either at power or in the . . . event of a loss-of-coolant accident."

state whether funding has been a delimiting factor

in the resolution of any of the aforesaid problems or items and if so, why the proliferation of nuclear plants and approval by you of the construction of the proposed Midland Units has taken precedence over the resolution (for funding reasons or otherwise) of each such problem or item denominated as a safety concern by the Regulatory Staff and the ACRS.

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

320. There is no Interrogatory Number 320.

321. Describe in detail each problem or item other than those referred to in your answer to Interrogatory No. 89 above which are safety related and are not resolved because of lack of research by the nuclear industry, or by the Atomic Energy Commission or any part thereof for lack of funds or any other reason. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

322. Do genetic considerations or factors form any part or basis in establishing or reviewing FRC Radiation Guidelines or AEC regulations based in whole or in part thereon, and if so, what consideration, if any, was given by the former FRC and the AEC in establishing or reviewing such radiation guidelines and regulations to data concerning somatic risks from the Court-Brown and Doll study (1965) which indicated a steep increase in cancer risk from radiation exposure. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

323. Describe in detail what systems and methods of rad waste handling, if any, are under development to prevent operational and accidental release of Xenon, Krypton and other noble gases. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

324. Describe in detail what consideration, stating each fact, calculation and assumption thereof, was given to the possibility of building the proposed Midland Units underground including the cost thereof. If the possibility of placing

the Units underground was not considered, state why not. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

325. What limits are or will be imposed upon Dow expansion plans beyond which would require a review or evaluation of such expansion upon the safety of the proposed Midland Units. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

326. In the event that the present insurance policies proposed to be entered into by Applicant are not entered into or are cancelled by their terms, what steps do you propose to take, such as, for example, requiring Applicant to establish a sinking fund to account for third party liability losses as for which Applicant would be responsible in the event of a major accident during the design, construction or operating phase of the proposed Midland Units. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of

footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

327. Is it your opinion that the Applicant has described the principal architectural and engineering criteria for the design of the proposed Midland Units. If so, then list each such principal architectural and engineering criterion. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

328. Is it your opinion that the Applicant has identified the major features or components incorporated in the design of the proposed Midland Units for the protection of health and safety of the public. If it is, then list each such major feature or component. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

329. Is it your opinion that there are further technical or design informations which are required to complete a safety analysis of the proposed Midland Units. If so, then list and describe in detail all such further technical or

design information. In addition, state with respect to each such category of further technical or design information whether its completion can reasonably be left for later consideration and if it is your opinion that it can, then state each fact, calculation and assumption upon which you base your opinion. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

330. Is it your opinion that there are safety features or components with respect to the proposed Midland Units which require further research and development prior to design? If so, then describe each such safety feature or component and with respect to each one, state the following:

(a) Has the research and development adequately been described by the Applicant and, if so, provide a reference of such description; and

(b) If it has been described, has the Applicant identified a research and development program reasonably designed to resolve safety questions associated with such features and components and, if so, for each such safety feature or component with respect to its research and development

program, state each fact, calculation and assumption upon which you conclude that it is "reasonably designed to resolve any safety questions associated therewith."

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

331. Describe in detail what cooperative effort by the AEC, the nuclear industry and the utilities is in progress to improve the collection of data needed to evaluate the reliability and causes for failure of safety-related systems in nuclear plants. In addition, state whether such efforts have been or will be used with respect to the proposed Midland Units and whether the suggestions regarding the improvement of data collection set forth in the Report to the Atomic Energy Commission on the Reactor Licensing Program by an internal study group headed by Harold G. Mangelsdorf in June 1969, have been or are planned to be implemented as regards the proposed Midland Units. If in your answer you make reference to other than textual (exclusive of footnote) matter in the PSAR, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

33P. With respect to your review of the safety systems of the proposed Midland Units and other pressurized water reactors and the development of techniques for comparative and quantitative evaluation of risks which was suggested in the Report to the Atomic Energy Commission of the Reactor Licensing Program by the Internal Study Group headed by Harold G. Mangelsdorf in June 1969, describe in detail, stating each fact, calculation and assumption thereof, what you have done or plan to do concerning each of the following:

(a) Making comparisons among alternate safety systems in light of technological differences among pressurized water reactors concerning a system for a given purpose and their components;

(b) Making measurements of the relative protection provided against several postulated accidents to help decide which should receive the most attention;

(c) Deciding if the problems caused by additional complexity from adding a safety system outweigh the advantages of that system;

(d) Measuring on a uniform basis the relative gain in safety provided by an additional safety feature;

(e) Extrapolating from experience with small accidents to quantitative judgments regarding

potential serious accidents;

(f) Identifying potential failure modes;

(g) Developing information on failure rates of equipment and probabilities of postulated accidents; and

(h) Establishing levels of risk resulting from operation of nuclear power plants.

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

333. 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. 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, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

334. 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, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation,

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

335. 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. 337 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, or reference to other than textual (exclusive of footnote) matter in your Safety Evaluation, then set forth completely the text of each such reference or attach a copy.

336. Separately for Applicant, Dow Chemical Company, Dow-Corning Company or any subsidiary of Dow Chemical or Dow-Cornin Babcock & Wilcox Company and Bechtel Corporation, state if they have ever been cited for or investigated about a violation or

alleged violation, at any time, 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 their operations which are the subject of an Atomic Energy Commission license or other Atomic Energy Commission jurisdiction. 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 No. 337 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 or occurring at the proposed Midland Units.

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

337. 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

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

Dated: March 22, 1971.

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