

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

CEA:DIS:LIC-80.02.25

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

RELATED CORRESPONDENCE

METROPOLITAN EDISON COMPANY

(Three Mile Island, Unit 1)

Docket No. 50-289  
(Restart?)

FIRST SET OF CHESAPEAKE ENERGY ALLIANCE INTERROGATORIES TO LICENSEE

Intervenor, Chesapeake Energy Alliance (CEA), hereby submits the following first set of interrogatories to Licensee (LIC). In light of CEA's lack of financial resources, and its distance from LIC's Discovery Rooms and NRC's Public Document Rooms, CEA requests that when LIC's answer makes reference to any document, or relevant portions of a document, that is not more than five (5) pages in length, a copy of that document be attached to LIC's answer. CEA also requests that whenever a document is referenced in an answer, the relevant page numbers and/or sections in that document be identified. Furthermore, CEA requests that when a document referred to in a LIC answer is one that has been served on CEA, that an asterisk (\*) be placed beside the reference. For definitions of the terms 'document' and 'identify', CEA hereby adopts the definitions applied by LIC in its 'First Set of Interrogatories to Intervenor Chesapeake Energy Alliance, Inc.' (80.01.18). 'Probability' is defined below, at 8.

CEA requests that the attached interrogatories be answered fully, in writing, and under oath, by any member's of LIC's staff who has personal knowledge thereof. The answer to each interrogatory should contain the name(s) and identification of the person(s) supplying the answer, and whether or not he/she has verified the answer. Whenever a full and complete answer can not be furnished at this time, provide as full a draft as is possible of LIC's answer, indicating those specific aspects of the answer that can not be provided, and give a brief explanation as to why the full answer can not be provided at this time. Also, indicate the approximate time that a full answer can be expected.

Interrogatories (Numbered according to the contention)

- 5-1 Summarize and explain LIC's position on the contention. Identify any and all documents relied on by LIC in reaching that position.
- 5-2 Identify those aspects of the contention that LIC considers to be matters of controversy. For each such aspect, summarize briefly the opposing positions on the controversy as perceived by LIC. Identify and summarize any and all documents in support of either position.
- 5-3 Identify and briefly summarize any and all documents known to LIC that would tend to provide evidence and/or support for this contention.
- 5-4 Identify any and all persons that LIC intends to have testify on this contention; state the qualifications of each person; and present a summary of the testimony that person is expected to provide.
- 5-5 Identify any and all present or former members of LIC staff who dissent from the overall LIC position on this contention, and for each such person, provide a summary of his/her dissenting position on the contention.

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- 5-6 Identify the critical or central parameters of this contention as it is perceived and understood by LIC, and briefly summarize LIC's position on, and evaluation of the importance of, each such parameter.
- 5-7 Provide a complete and accurate description of the present storage of radioactive water from the TMI-2 accident, specifying where all that water is being stored, and providing an estimate of the radioactivity levels (by isotope) of the water.
- 5-8 Provide a detailed description of the proposed methods for decontaminating the radioactive water from TMI-2. Identify and describe any and all documents, based on actual previous operating experience with those methods, that demonstrate that the proposed clean-up methods are both effective and free from risk.
- 5-9 Describe in detail any and all evidence that demonstrates that the EPICOR-II system being used for decontaminating TMI-2 intermediate level radioactive water has operated less effectively or safely than LIC had projected. Describe the present expected schedule for decontaminating the intermediate level water with EPICOR-II, and compare that schedule with the schedule initially projected by LIC. Provide full justification for any revisions that have been made in the schedule. Identify any and all documents relied on in the answer to this interrogatory.
- 5-10 Describe the expected schedule for decontaminating the high level water presently in the TMI-2 containment building. Also provide an estimated overall schedule for the completion of all the major steps in the TMI-2 clean-up.
- 5-11 Identify and describe any and all accident scenarios at TMI-2 during the clean-up that could generate additional quantities of radioactive waste water; describe the probabilities of each such accident scenario, demonstrating the basis and justification for these probability estimates; for each such accident scenario, estimate the quantity of radioactive waste water generated and the levels of radioactivity of the water, describing the mechanism by which the radioactive waste water will be generated; and for each such accident, identify the available storage space that would be used for the waste water. during clean-up
- 5-12 Identify and describe any and all potential accidents at TMI-2 that might impact on the operation of TMI-1, including but not limited to those accidents that would require site evacuation of Three Mile Island; for each such accident, describe the probability of its occurrence, showing the basis and justification for the probability estimate; for each such accident, describe the impact it would have on the operation of TMI-1; identify any and all documents and persons relied on in identifying the accident scenarios and estimating the probabilities of each accident.
- 6-1 Answer the interrogatories 5-1 through 5-6 as they apply to paragraph 6-1 thru 6-6
- 6-7 Identify the rate, in gallons per minute, at which radioactive water is being discharged, or is leaking, from the primary coolant system of TMI-2. Describe the source and location of each such leak or discharge in the primary coolant system; for each leak/discharge, describe in detail the measures that are being planned or implemented to correct the leak/discharge. Identify any and all documents and persons relied on to answer this interrogatory.
- 6-8 Identify and describe the probabilities of any further leaks from the TMI-2 primary coolant system, with particular reference to any possible corrosion of seals, and/or embrittlement of valves, and/or embrittlement or corrosion of pipes; provide justification and basis for the estimates of probabilities of leaks from corrosion and embrittlement, citing any and all documents and research pertaining to embrittlement and corrosion under continued exposure to radiation as prevail

- in the primary coolant system of TMI-2, and identifying the author(s), and their professional qualifications, of the cited documents. Identify and describe the measures that are being taken or planned to reduce or eliminate the probability of such corrosion or embrittlement.
- 6-9 Identify, and estimate the probabilities of, any and all leaks from the TMI-2 containment building, with particular reference to any possible corrosion and/or embrittlement caused by the radioactive water in the containment building. Identify the basis and justification for the probability estimates, citing any and all documents relied on. Identify and describe the measures that are being planned or implemented to prevent such corrosion or embrittlement.
- 6-10 Identify any and all sequences of events at TMI-2 that could result in substantial loss of reactor coolant. Distinguish between those sequences that are predicated on operator error and those that are predicated on equipment and/or instrumentation error or malfunction. Estimate the probabilities of each such sequence, showing the basis and justification for each such probability estimate.
- 6-11 Describe any and all presently unused storage tanks that are available to receive major additional quantities of radioactive water from TMI-2 if needed, giving the capacity of all such storage tanks. If any storage tanks presently assigned to TMI-1 could be required to hold such radioactive water, describe the mechanism by which the radioactive water could be transferred from TMI-2 to TMI-1 in an emergency.
- 7-1 thru 7-6 Answer the interrogatories 5-1 through 5-6 as they apply to contention 7.
- 7-7 Specify and describe in detail any and all potential radioactive pathways for which the monitoring provisions described in the TMI-1 Restart Report and reviewed in the NRC Status Report would be incapable of discriminating between TMI-1 and TMI-2 effluents.
- 7-8 Specify and describe in detail any and all sequences of events at either TMI-1 or TMI-2 that could lead to a breakdown of the ability to distinguish between the radioactive effluents of TMI-1 and TMI-2. For each such sequence of events, describe the estimated probability of its occurrence, and the basis and justification for deriving the probability estimate.
- 8-1 thru 8-6 Answer the interrogatories 5-1 through 5-6 as they apply to contention 8.
- 8-7 Identify, and provide a detailed summary of, any and all documents that have been prepared or commissioned by or for LIC concerning its management strength and capability. For each such document, identify the author(s) and their professional qualifications.
- 8-8 Identify any and all aspects of LIC's management capability, in respect of which LIC, NRC, or any other party has uncovered evidence of inadequacy or deficiency. For each such aspect, describe in detail what measures have been taken, or are planned, to remedy the inadequacy or deficiency, providing a full and complete justification as to how LIC can demonstrate that the remedial action will indeed correct the management inadequacy or deficiency that has been identified.
- 8-9 Identify, and provide a detailed summary of, any and all documents pertaining to any investigation of the perceptions and attitudes of LIC's employees (Present and

- former) of its management capability and practice. Include both documents that are specifically concerned with LIC's management of the TMI-2 accident, as well as those concerned with LIC's overall management capability and practice. For each such document, identify the author(s) and their qualifications.
- 8-10 Has LIC conducted, or caused to be conducted, any systematic investigation(s) into the attitudes towards, and perceptions of, LIC by persons who have left the employment of LIC since March 28, 1979? If so, provide a detailed summary of the conclusions of such investigation(s), and identify and describe the professional qualifications of the persons conducting such an investigation. If no such investigation has been conducted by, or for, LIC, provide a thorough justification as to why such investigation would not provide needed insight into LIC's management ability and practice.
- 8-11 Are the employees of LIC affiliated with any Labor Union(s)? If so, (a) identify the Union(s), describe the grievance process, and provide a summary of the grievances that have been filed since TMI-1 came on line, along with a summary of the disposition of those grievances; (b) identify and provide minutes of any meetings between union representatives and management; (c) if LIC's employees are not represented by Labor Union(s), describe in detail any formal or informal grievance procedure available to LIC employees to current management and/or safety problems; and provide a summary of the grievances that have been filed under this procedure.
- 9-1 Answer the interrogatories 5-1 through 5-6 as they apply to contention 9.  
through  
9-6
- 9-7 Identify, and provide a detailed summary of, any and all documents prepared or commissioned by or for LIC since March 28, 1979, concerning the adequacy of LIC's financial resources. For each such document, identify the author(s) and describe their professional qualifications.
- 9-8 Provide a summary of LIC's present financial status, with projections of income and expenditure for the next 12 months. Identify the principal assumptions incorporated in those projections, including the clean up costs for TMI-2, replacement power costs for TMI-1 and TMI-2, decisions of PAPUC and NJBPU concerning rates and rate base, and the estimated date of restart (if any) for TMI-1. Provide a detailed justification and basis for the assumptions.
- 9-9 Describe in detail any and all action LIC has taken, or plans to take, to remedy any financial weakness of LIC. In particular, describe in detail any proposed corporate reorganization plans that are being considered in order to remedy LIC's financial status, and demonstrate how such reorganization would in fact remedy LIC's financial status.
- 9-10 Describe the financial impact on LIC that would result if PAPUC were a) to revoke MET ED's standing as a public utility, b) to exclude TMI-1 from its rate base until such time, if any, that TMI-1 is permitted to restart. Describe in detail the effect on LIC's financial ability to operate TMI-1 that a) and b) above would have.
- 12-1 Answer the interrogatories 5-1 through 5-6 as they apply to contention 12.  
through  
12-6
- 12-7 Provide a detailed explanation of LIC's criteria for determining, from the realm



of possible accidents, which accidents fall within the design basis. If LIC's criteria is based on the assumption of single failure (of systems or components), provide a full and complete justification for so limiting design basis accidents, and for excluding design basis consideration of multiple failure accidents. If any assumptions are made concerning probabilities, provide full and complete documentation of the basis and justification for computing such probabilities. Identify all documents relied on, and for each such document, identify the principal authors, their professional qualifications, and relevant publications.

- 12-9 Identify any and all known documents that challenge LIC's justification for refusing to consider multiple failure accidents in developing design basis criteria for nuclear power plant operation. For each such document, identify the principal author(s), their professional qualifications, and relevant publications. Provide a brief, but detailed summary of the arguments advocated in each such document.
- 12-9 Specify, in numerical probability terms per operating reactor year, the probability of an accident below which probability the accident is not considered credible by LIC. Provide a full and complete justification for the LIC's selection of that probability level as the cutoff point for accident credibility. Identify any and all documents relied upon in this answer.
- 12-10 Describe in detail the process relied upon by LIC in computing the probability of any given accident sequence. Provide detailed and thorough justification for this computational method, paying particular attention to the respective determination of the role of human (operator) error as compared to roles of equipment and instrumentation information malfunction. For each of the above-identified three components of error (operator, equipment, and instrumentation-information) demonstrate the extent to which the assumed probabilities are based on past experience or on other estimates. Where past experience is used as a basis for probability estimates, state whether the estimate is based on past experience with identical reactors and control room designs to TMI-1; if not, state what methods are relied upon to take into the account the specific reactor and control room-dependent characteristics of TMI-1, as well as the quality and effectiveness of operator training and emergency procedures at TMI-1; if there is no such consideration of TMI-1 specific parameters of probability in determining accident probability, provide a full and thorough justification why such consideration is not needed. If estimates other than those based on past experience are utilized in calculating probabilities, provide a detailed justification and basis for those estimates.
- 12-11 Identify any and all experts who were relied upon in providing the answer to 12-10 above; for each expert provide name, address, phone number, and professional qualifications.
- 12-12 Identify and all documents that were relied upon in providing the answer to 12-10 above; for each document, provide author(s), and their professional qualifications.
- 12-13 In a document dated Jan 25, 1980 from Steven A. Varga to All Boards, in reference to Turbine cracking, it is stated that "...the probability values used... may have been too low and may be revised upwards." Identify any and all other circumstances known to LIC where the probability estimate of any equipment, instrumentation, or operator error or malfunction has had to be revised upwards by NRC or by any Licensee in the light of experience, research, or other new information. Provide, for comparison, identification of any and all circumstances in which such probability estimates have been revised downward in the light of experience, research, or other information. Do these data provide any evidence of an overall trend towards

higher or lower overall probabilities of errors, malfunctions, or transients? Provide justification for your conclusions.

- 12-14 A meeting was held on October 23, 1979 with representatives of the B&W owners' group, B&W, & Oak Ridge National Laboratory (ORNL) to discuss the "Integrated Control System Reliability Analysis" (BAW-1564) and questions raised of this Analysis by ORNL. Question 12 and the response are quoted below:

"Question 12 "Multiple failures are not treated although it is acknowledged by B&W that many failures are not annunciated and therefore may exist until other failures occur, resulting in effective multiple failures. It appears that multiple failure situations may have significant probability of occurrence. How is the omission of multiple failure considerations justified in the analysis? Might Fault Tree Analysis have been a better technique for addressing the concerns and producing the results requested?"

Response: B&W has identified transients that have occurred, in the Operating History Section. Therefore with respect to multiple failures the report has identified critical areas. Although this is true, an event tree of ICS may highlight other important multiple failures. This type analysis was considered to be too extensive for the time available.

(Summary of meeting, at 7, emphasis added)

- a) Answer fully and completely the two questions posed in Question 12 above.

- (12-14) b) Provide full and complete description as to any Fault Tree Analysis (FTA) that has been conducted or commissioned by or for LIC or B&W to remedy the omission of multiple failure considerations; provide a full justification for the scope of such FTA as has been conducted or commissioned. c) If no FTA has been conducted or commissioned pursuant to the above cited question, provide a full and complete justification as to why such FTA was not considered necessary. d) If the lack of available time is cited as one such justification, provide a full and complete explanation as to why the health and safety of the public would not be more reasonably protected by delaying restart of TMI-1 until there has been sufficient time to conduct such FTA as is required to eliminate or substantially reduce the probabilities of occurrence of multiple failure situations.
- 13-1 Answer the interrogatories 5-1 through 5-6 as they apply to contention 13.  
through  
13-6
- 13-7 Describe in detail any and all screening procedures, known to the LIC, to detect the development or existence of an operator 'mindset', wherein an operator is so conditioned on the basis of his experience, in conjunction with prevailing management and operating attitudes, to substantially rule out an interpretation of a sequence of alarms, adverse signals, and indications of abnormal transients, as indicative of a major accident with consequences of a partial or full core melt. If any psychological tests are so used as screening procedures, identify such tests, identify the author of the tests, and his/her qualifications and professional background, and summarize any research that has investigated whether the tests provide an accurate indication of the existence of such an operator 'mindset'.
- 13-8 Describe in detail any screening procedures that will be used by Licensee to detect the development or existence of an operator 'mindset' (as defined above). Summarize any research that has been conducted to evaluate the efficacy of such screening procedures, identifying the principal investigator(s), and providing their professional qualifications.
- 13-9 Identify any and all known research investigating the relationship between the development of operator 'mindset' and the frequency of alarms or indications of minor abnormal transients, and/or the frequency of false alarms or other false indications of abnormal transients. For each such research, identify the principal investigator(s), describe their professional qualifications, and summarize the findings of the research.
- 13-10 Identify and describe any and all studies that have been developed, commissioned, or planned by LIC into factors associated with the development of operator mindset. If no such studies have been prepared, commissioned, or planned by LIC, provide full and detailed justification why such studies are not considered to be necessary.
- 13-11 Describe in detail any and all communication and dialog that has taken place between LIC and professionals with experience and research into operator mindset in situations analogous to nuclear power plant control rooms, for example, personnel in the NASA Aviation Psychology program. If no such communication and dialog has taken place, provide a thorough justification as to why that has not been considered necessary or valuable.
- 13-12 a) Does LIC maintain full and complete records of any and all alarms that have been displayed on the control rooms of TMI-1 and TMI-2? If so, identify any and all documents recording the occurrence and frequency of such alarms and whether such

alarms are false alarms. If not, provide a full justification as to why such documentation is not maintained. b) Has LIC conducted or caused to be conducted any systematic analysis of the frequency and occurrence of alarms (including false alarms) that have been displayed on the TMI-1 and TMI-2 control panels? If so, identify, and provide a detailed summary of any and all documents describing such analyses. If not, provide a full justification as to why LIC considers such analysis is not necessary. c) If LIC has conducted such analyses, has LIC conducted, or caused to be conducted, any investigation into the relationship between the frequency of alarms, false alarms, and the development of operator 'mindset'.

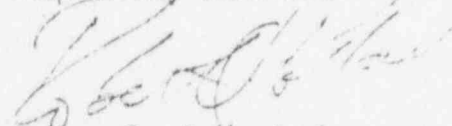
Definition

(estimate) of an event

'Probability': whenever CEA request that LIC furnish any probability/as part of its response to an interrogatory, that probability shall mean the best estimate of the probability of the occurrence of that event, and the following information describing that probability shall be furnished by LIC:

- a) The mean and standard deviation of the probability estimate, with the provision that if the distribution of the probability estimate is assumed to be over a logarithmic transformation, that the mean to be provided shall be the harmonic mean, and the standard deviation to be provided shall be the standard deviation of the logarithm of the probability estimates, and that this fact be noted.
- b) The 5% and 1% confidence limits for the probability estimate.
- c) A description of the assumed distribution of the probability estimate.
- d) The component parts of the probability estimate (if the estimate concerns multiple events, the probability estimates of each of the sub-events shall be furnished; if the estimate includes components of equipment malfunction, instrumentation-information error, and operator error, those component probability estimates shall be provided).
- e) If the probability estimate is based on actual experience, a description of the sample over which the estimate was obtained, and this description shall include the following information:
  - i) The total real time over which observations were taken.
  - ii) The context in which the observations were taken (whether the observations were taken in a laboratory context or in experimental or operating reactor(s)).
- f) If a probability estimate is based on a theoretical model, a brief description of the theoretical basis for the probability estimate shall be provided.

Respectfully submitted



Robert Q. Pollard, for  
CHESAPEAKE ENERGY ALLIANCE, INC.

Dated: February 25, 1980