

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In The Matter Of)
COMMONWEALTH EDISON COMPANY)
(Dresden Stations, Units 2 & 3)

Docket Nos. 50-237-SP
50-249-SP

(Spent Fuel Pool
Modification)

SUPPLEMENTAL AFFIDAVIT OF RICHARD B. HUBBARD

CONCERNING

BOARD QUESTION 2 (UNRESOLVED SAFETY ISSUES)

STATE OF CALIFORNIA)
COUNTY OF SANTA CLARA)

ss.

RICHARD B. HUBBARD deposes and says under oath as follows:

I. INTRODUCTION

1. My name is Richard B. Hubbard. I am a Professional Quality Engineer licensed by the State of California, a technical consultant, and a founder (in 1976) and vice president of MHB Technical Associates, a corporation engaged in the business of technical consulting on energy and environmental issues and having its principal office at 1723 Hamilton Avenue, San Jose, California,

95125. I hold a B.S. in Electrical Engineering from the University of Arizona (1960) and an M.B.A. from the University of Santa Clara (1969). I have sixteen years' experience in nuclear power plant electronics, instrumentation, and controls, including eleven years' experience in responsible managerial positions in the Nuclear Instrumentation Department (1965-1971), Atomic Power Equipment Department (1971-1975), and Nuclear Energy Control and Instrumentation Department (1975-1976) of the General Electric Company. In addition to the training, experience, and qualifications summarized above, for the past four years I, along with my co-founders of MHB Technical Associates, have devoted nearly all of our professional attention to analyzing, evaluating, and consulting with regard to the technical, economic, and environmental aspects of unresolved safety-related issues concerning nuclear power plants, including (a) the more than 100 such issues which had been identified by the Nuclear Regulatory Commission even before the March 28, 1979, accident at Three Mile Island Unit 2 (TMI-2) and (b) the additional unresolved safety issues which have been identified as a result of TMI-2 and the various inquiries undertaken into that accident. My experience and qualifications are further described in Attachment 1 to my affidavit of March 17, 1981 in this proceeding entitled "Affidavit of Richard B. Hubbard Concerning Board Question 2 (Unresolved Safety Issues)." *

* Hereinafter referred to as "March 17 affidavit."

2. In preparing this affidavit, I have reviewed the April 27, 1981 affidavit of NRC (Staff) witness Karl Kniel* and the March 18, 1981 affidavit of Commonwealth Edison Company (Applicant) witness Robert Janecek.** In addition, in my capacity as a consultant to the State of Illinois, I attended both the November, 1980 and April, 1981 Atomic Safety And Licensing Board hearings on the proposed Dresden 2/3 spent fuel pool modification, and thus, I am familiar with the testimony presented in this proceeding.

II. STATEMENT OF CONTENTION

3. On January 26, 1981, the Atomic Safety and Licensing Board responsible for reviewing the proposed Dresden 2 and 3 spent fuel storage expansion application propounded Board Question 2 as follows:

"Based on a review and analysis of the various generic unresolved safety issues under continuing study, what relevance is there, if any, to the proposed spent fuel modification? Further, what is the potential health and safety implication of any relevant issues remaining unresolved."

The purpose of this affidavit is (a) to supplement the information set forth in my March 17, 1981 affidavit in which I identified thirty-four (34) generic unresolved safety issues and generic TMI issues that I believe are relevant to Board Question 2, and (b) to describe briefly why the 34 selected issues may impact public health and safety.

* Hereinafter referred to as "Kniel Affidavit."

** Hereinafter referred to as "Janecek Affidavit."

III. SUPPLEMENTAL INFORMATION

4. I hereby adopt the "Background" information and "Discussion of Selected Issues" set forth in my March 17, 1981 affidavit as my current opinion as to the list of generic unresolved safety issues which should be addressed in response to Board Question 2 for the reasons identified therein.* In summary, in my March 17, 1981 affidavit, I concluded that the thirty-four (34) generic unresolved safety issues and generic TMI issues identified therein were appropriate issues to be addressed in response to Board Question 2. Further, I concluded that these unresolved safety issues may be important to public health and safety, both singularly and cumulatively. Finally, I concluded that lists of generic safety issues have existed for many years; what is needed now are decisions by the Staff and a timely implementation of the selected solution by the Applicant. In the following portions of this affidavit, I will supplement the information provided in the March 17 affidavit.

5. Applicant witness Janecek states that the electrical equipment associated with the spent fuel pool cooling and clean-up systems is not considered safety-related and has not been environmentally qualified.** Staff witness Kniel draws similar conclusions.***

* The referenced March 17 affidavit was distributed to all parties in this proceeding by the State of Illinois on March 17, 1981.

** Janecek affidavit, p. 9.

*** Kniel affidavit, p. 10.

In contrast, during the November hearings, Staff witness Belke,* in Enclosure 1 of his testimony on Contention 2, provides a listing of equipment which the Applicant has assigned the highest safety classification, Class I, which includes the spent fuel storage pool filtering and cooling system. In addition, both Regulatory Guides 1.26 (Quality Group Classifications and Standards for Water, Steam, and Radioactive-Waste-Containing Components of Nuclear Power Plants) and 1.29 (Seismic Design Classification) designate the systems for cooling the spent fuel storage pool as safety-related. Further, the Staff, in Standard Review Plan, Section 3.2.2 (System Quality Group Classification) has designated the spent fuel cooling and clean-up system as important to safety for BWR plants. The failure of the Staff and Applicant to properly classify the spent fuel systems appears to be relevant in whole or part to Task Action Plan issues A-17, A-24, A-40, A-42, A-44, A-46, and A-47.**

6. By letter dated February 3, 1981, the Staff requested the Applicant, by May 15, to review the controls of the handling of heavy loads to determine the extent to which the guidelines of NUREG-0612 are presently satisfied at Dresden (NUREG-0612 provides the technical resolution of Task A-36). The CECO's response has not been received or reviewed by the Staff,***plus the Applicant

* Belke testimony, Enclosure 1, p. 5.

** Further, Staff acknowledges that the seismic design of the new spent fuel racks at Dresden is still under review (Kniel affidavit at p. 13).

*** Kniel affidavit, p. 12.

only cites a "preliminary" review and an anticipation that the detailed review will disclose no "major deficiencies." The CECO response and the NRC review for adequacy should be included in the record of this proceeding.

7. Task Action Plan issues A-17 and A-47 address the safety implications of multiple-failure accidents. In this affidavit, I will refer to these related deficiencies in accident and safety analysis---the lack of systems interaction analysis, the lack of multiple or "common-cause" failure analysis, and the tendency of the "single-failure criterion" to exclude a large number of potential accident-causing events*---as the "systems interaction issue." This issue became extremely significant after the TMI-2 accident, which itself involved not a single failure but rather a series of failures, or domino effect, which included both dependent and independent multiple failures. The Kemeny Commission found that "the accident at TMI-2 was a multiple-failure accident", ** as did the NRC's Special Inquiry Group.*** But "in the licensing process, applicants are only required to analyze 'single failure' accidents. They are not

* The Applicant acknowledges that the Dresden spent fuel pools and related systems do not meet the single-failure criterion, in that certain single passive failures of piping could defeat the operation of the spent fuel pool cooling system for an individual pool (Janecek, p. 30).

** Kemeny Report, p. 52.

*** Kemeny Report, p. 148.

required to analyze what happens when two systems fail independently of each other,"* nor to assess possible adverse interactions among systems. As a result, the Kemeny Commission called upon the NRC to emphasize:

"a systems engineering examination of overall plant design and performance, including interaction among major systems and increased attention to the possibility of multiple failure." **

The NRC's Special Inquiry Group also criticized the NRC's safety and accident analysis as inadequate,*** noting that "one of the obvious lessons" of TMI-2, "is the critical need for overall plant and systems analysis," and, with particular regard to the concentration of engineering design and analysis teams on single specialized systems, that "t here is as much or more of a chance that safety matters will 'fall in the cracks' between two or more highly proficient technical groups as there is for a safety error to be made in any of the specific groups."****

8. In addition, in late 1979, the NRC's Advisory Committee on Reactor Safeguards recommended an investigation at the Indian Point nuclear plant of the systems interaction issue as follows:

"Thus, uncovering the potential for interaction of nonconnected systems will usually require careful, in-situ examination of the physical plant. This examination must consider all features having the potential to damage safety systems, including the safety systems themselves. The physical

* Kemeny Report, pp. 19 to 20.

** Kemeny Report, p. 63.

*** Rogovin Report, pp. 148 to 151.

**** Rogovin Report, p. 119.

inspection of the plant could be approached by dividing the plant into 'compartments' following discernable structures--such as walls, ceilings, and floors with appraisable strengths and weaknesses. Doors, stairs, ventilation ducts, piping, and other penetrations would be evaluated for potential influence transport (fire, steam, hot air, etc.). Structures, which act as barriers to the flow of a damaging influence, would be assessed for the adequacy of their resistance to such influences.

"In each compartment the elements of the safety systems, including such extensions as instrument lines and power or control wiring should be identified on a 'train basis.' The physical vulnerability of the safety system elements to nonstandard conditions (temperature, pressure, water, spray, etc.) should be identified. The characteristics of such systems as influence generators under faulted conditions would have to be assessed if such system elements exist as redundant elements within the identified 'compartment' boundaries.

"The influence potential of all non-safety elements, including such items as sewer and drain lines, combustible gas transport and storage, compressors, and heavy-power circuits and transformers, within the given compartment should be assessed with respect to potential for damaging or disrupting (as with induced electrical noise) critical system(s) within the 'compartment' and the 'compartment' boundary itself.

"Special consideration would have to be given to the identification of convergency of safety functions into single compartments and the degree of convergency within the given space. The study of interactions between nonconnected systems would also have to include the possibility of non-visible interactions, such as the possibly adverse effect of failure of one buried pipe on a neighbor due to scouring. A study of plant drawings would be required in connection with this aspect. (emphasis added)*"

* ACRS letter to NRC, October 12, 1979

9. Finally, the NRC's Lessons Learned Task Force, after reviewing the TMI-2 accident scenario, formed the following conclusion regarding the potential for system interaction:

"The interactions between non-safety-grade and safety-grade equipment are numerous, varied and complex and have not been systematically evaluated. Even though there is a general requirement that failure of non-safety-grade equipment or structures should not initiate or aggravate an accident, there is no comprehensive and systematic demonstration that this has been accomplished...."*

They recommended that comprehensive studies of system interaction be conducted by all license applicants. They further recommend that these studies cover both safety and non-safety systems, under normal, transient, and accident conditions.

10. While the implications of these recommendations for nuclear safety regulation are significant, they do not represent a surprise to the Staff or Applicant. As evidenced by the information in my March 17 affidavit, the systems interaction issue has long been recognized as a high-priority, high-risk potential, unresolved safety issue. I believe a detailed plant-specific fault-tree/event-tree analysis of the Dresden 2 and 3 spent fuel pool, storage racks, and associated systems, as described in Tasks A-17 and A-47, is prudent and necessary to assess the potential safety improvements available through a reduction in potential system interactions by a careful

* NUREG-0585, TMI-2 Lessons Learned Task Force - Final Report, U.S. Nuclear Regulatory Commission, Washington, DC, October, 1979, page 3-3.

consideration of multiple-failures and the associated mechanisms.

11. Licensee Event Reports (LERs) provide evidence of safety incidents at operating plants. Appended as Attachment 1 to this affidavit is a listing of LERs for spent fuel systems which have occurred from 1969 to the present. Numerous examples of piping failures (A-42)* handling incidents (A-36), and maintenance and operator errors (A-17) are set forth. These LERs, and their relevance to unresolved safety issues, should be addressed by the Applicant and reviewed by the Staff.

12. The Staff, in NUREG-0705, states that 44 additional candidates for unresolved safety issue were identified, but were rejected based primarily on qualitative information.** Among the issues dismissed were the following TMI and ACRS issues which were identified in my March 17 affidavit as relevant to this proceeding: TMI Items I.D.1, I.F.1, I.F.2, and II.F.5, plus ACRS Item 37.*** Further, the Staff has not addressed issues A-28 and B-34 which the Applicant has concluded are relevant to this proceeding.**** For example, for Task A-28, is this the first and only proceeding in which the Staff has knowingly recommended licensing of storage racks in which bowed fuel could result in interferences during fuel

* The significance of piping failures is particularly relevant for the spent fuel pools because of the Applicant's admission that the systems do not meet the single failure criterion (Janacek, p. 30)

** NUREG-0705, p. 2.

*** NUREG-0705, pp. 6 to 8.

**** Janacek, p. 3.

assembly insertion and/or withdrawal. I conclude that the list of issues addressed by the Staff does not appear to be adequate.

13. Even for the limited issues identified by the Staff, the Staff has not yet prepared even Task Action Plans for the following issues relevant to this proceeding: Tasks A-46, A-47, and A-48.

14. The Staff and Applicant in their reviews of the unresolved issues address only the safety implications of individual issues. No attempt has been made by the Staff or Applicant to assess the safety impact of the cumulative risk resulting from the combination of known, but unresolved issues. This lack of a cumulative risk evaluation appears to be a significant omission.

IV. CONCLUSION

15. Based on the foregoing, I conclude that the Staff and Applicant have not adequately reviewed and analyzed the generic unresolved safety issues that are relevant to the proposed spent fuel modification. Therefore, I further conclude that the potential health and safety implications of these issues remaining unresolved, both singularly and cumulatively, have not been adequately evaluated.

I have read the foregoing and swear that it is true and accurate to the best of my knowledge.

May 5, 1981

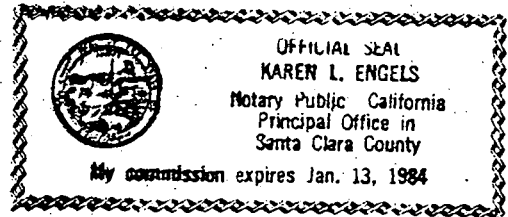
Richard B. Hubbard

RICHARD B. HUBBARD

Subscribed and sworn to before me this 5th day of May, 1981.

Karen L. Engels

NOTARY PUBLIC



My commission expires: 1-13-84

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CERTIFICATE OF SERVICE

I hereby certify that copies of the affidavit of Richard B. Hubbard in the above-captioned proceeding have been served on the following by deposit in the United States mail, first class, postage prepaid:

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