

Dated: 4/11/83

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In The Matter of)	
)	
COMMONWEALTH EDISON COMPANY)	Docket Nos. 50-454 OL
)	50-455 OL
(Byron Nuclear Power Station,)	
Units 1 & 2))	

SUMMARY OF TESTIMONY OF
J. L. McCLUSKEY AND T. J. HORST

Ms. McCluskey and Dr. Horst are presented as a panel. They are both Stone & Webster Engineering Company employees; Stone & Webster prepared Applicant's Evacuation Time Study for the Byron Station. Ms. McCluskey is the Evacuation Time Study Project Manager and Dr. Horst is the lead scientist on the Study. These witnesses address paragraphs 2(c), 2(e), and 2(k) of Intervenor's amended emergency planning contention.

The witnesses first describe their understanding of the purpose for the Evacuation Time Study noting its limitations. They next identify the assumptions that underlie the Study and explain that the Study quantitatively describes the relative significance of these assumptions. The testimony then discusses the manner in which the study analyzes peak transient populations and identifies the basis for the assumptions utilized regarding behavioral aspects of persons involved in a possible evacuation. Finally, the witnesses

explain the reason the Study assumes a 30% roadway capacity reduction factor utilized for adverse weather evacuation scenarios.

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TESTIMONY OF J. L. McCLUSKEY AND T. J. HORST
REGARDING BYRON STATION EVACUATION TIME STUDY

Q1. Ms. McCluskey, please state your full name, title and affiliation.

A1. My name is Jean L. McCluskey. I am employed as an Assistant Project Manager in the Management Systems Division of Stone & Webster Engineering Corporation.

Q2. Ms. McCluskey, please describe your educational and professional background.

A2. I received a Bachelor of Science degree in Civil Engineering in 1969 from Northeastern University and a Master of Urban Affairs in 1974 from Boston University. Since then, the continuing education courses I have taken include (1) Federal Emergency Management Agency, Staff College courses; (2) Federal Interagency Radiological Emergency Response Planning Course (1979); and (3) Industry/Business Emergency Planning (1980).

Since December 1981, I have been assigned to the Management Systems Division at Stone & Webster. In

that capacity my responsibilities have included serving as the Project Manager for the Byron Station Evacuation Time Estimation Study. As Project Manager my responsibilities included interfacing with Commonwealth Edison Company, overall direction of the project, monitoring the costs and progress of the project and assisting in responding to intervenors' contentions.

From July 1979 to December 1981, I was assigned to the Environmental Engineering Division of Stone & Webster. I was the Project Engineer on the revision of the State of Connecticut Radiological Emergency Response Plan. My responsibilities included the development of the plans for the State of Connecticut, and the Emergency Planning Zone Committees. I was also Environmental Engineer on projects related to the development of radiological emergency response plans for the states of Illinois and Maryland. My responsibilities included the development of plan formats, local community agencies' concepts of emergency operations and local resource assessment studies. Finally, while assigned to the Environmental Engineering Division, I was the Environmental Engineer on evacuation time studies for six nuclear facilities in Illinois, Kentucky and Ohio.

I have also been employed as an Environmental Engineer by Metcalf & Eddy (1976-1979 and 1969-1975), and by Exxon Co., U.S.A. (1975-1976).

Q3. Dr. Horst, please state your full name, title and

affiliation.

A3. My name is Thomas J. Horst. I am employed as a consultant in the Environmental Engineering Division of Stone & Webster Engineering Corporation.

Q4. Dr. Horst, please describe your educational and professional background.

A4. I received a Bachelor of Arts degree in General Science-Biology in 1969 from Alfred University, a Master of Science degree in Zoology from the State University of New York at Brockport, N. Y. in 1971, and a Doctorate of Philosophy in Biology from Kansas State University in 1974. A major emphasis of my studies was in applied statistics and mathematics.

I have been employed by Stone & Webster for nine years. During that period, I have worked on over 30 projects at Stone & Webster. My work on many of these projects involved the application of mathematical models to various environmental fields. Specifically, with respect to Evacuation Time Studies, I was involved in the development of Stone & Webster's approach to compliance with NUREG 0654, Appendix 4. I have also been involved in the development of a statistical analysis of public response times for the Calvert Cliffs Nuclear Power Station, the Zimmer Nuclear Power Station and, most recently, for the Byron Nuclear Power Station.

I belong to various professional societies and have written over 15 technical papers, mostly concerned

with the application of mathematical models to environmental problems. My most recent paper entitled "A Monte Carlo Methodology for Analyzing Environmental Uncertainties in Siting Energy Facilities," was written for the World Congress on System Simulation and Computation held in Montreal in 1982.

Q5. Dr. Horst, what are your responsibilities, with respect to the Byron Nuclear Power Station?

A5. I am the lead scientist on the Byron Evacuation Time Study. I have overall technical responsibility for the work done by Stone & Webster and I am the primary technical interface with the state and local agencies.

Q6. Ms. McCluskey and Dr. Horst, the remaining questions I will ask are addressed to both of you. If you do not adopt any of the following answers as part of your testimony, will you so state.

A6. Yes.

Q7. What is the scope of your testimony?

A7. This testimony responds to contentions 2c, 2e and 2k which challenge the adequacy of certain aspects of the "Evacuation Time Estimates Within the Plume Exposure Pathway Emergency Planning Zone for the Byron Nuclear Generating Station." The Study is attached to this testimony as Attachment 1.

Q8. Please describe your understanding of the purpose for conducting the Study.

A8. As stated at page 1-3 of the Study, its primary purpose is to analyze the feasibility of evacuation for the

Byron Plume Exposure Emergency Planning Zone. It is important to remember that the study is not an evacuation plan which would be implemented in an emergency. It is an assessment of representative time frames for the evacuation of various areas around the Byron Station for a range of seasonal, diurnal and weather conditions. It identifies the approximate time frames associated with evacuation based on a detailed consideration of roadway network and population distribution. It also identifies the assumptions upon which the time estimates are based. We anticipate that the Study will be useful to state and local emergency officials to assist them in determining the relative feasibility of evacuation as a protective action.

Q9. Does the Study identify the assumptions used in deriving the time estimates?

A9. Yes, to the extent the estimates are dependent upon assumptions, these assumptions are identified. Identifying assumptions allows for meaningful interpretation of the Study and an understanding of its applicability to a given situation.

Q10. Does the Study address the relative significance of alternative assumptions.

A10. First, it should be noted that, in a sense, the Study taken as a whole is a study of the relative significance of assumptions underlying the time estimates. The phrase "relative significance of alternative assumptions" is found on page 4-7 of NUREG 0654, Appendix 4. That

section identifies the following alternative assumptions: (1) normal versus adverse weather conditions; (2) day versus night; (3) weekday versus weekend; (4) peak transient versus off-peak transient; and (5) evacuation of adjacent sections versus nonevacuation. The relative significance of these assumptions is quantitatively summarized in Tables 1-1 and 1-2 of the Study. The significance of the alternative assumptions relative to time dependent traffic loading is discussed in Section 4.1.2 of the Study and illustrated in Figure 4-1. Thus, the Study addresses the relative significance of alternative assumptions.

Q11. Does the Study consider peak populations?

All. Yes, in two separate ways. First, the study considers summer and winter populations. Summer populations include transient populations resulting from recreational facilities in the area. Second, during our investigation we were informed that certain special events in the plume exposure EPZ could attract significant numbers of additional transients. These special events are the Autumn on Parade festival and the Byron Dragway and Motosport Speedway events. As stated on page 6-2 of the Study, these events were analyzed in separate simulations. Based on these simulations it was determined that the presence of additional transient populations which would be associated with these events do not increase the time required to evacuate.

Q12. Does the Study address expected behavioral aspects of individuals involved in an evacuation?

A12. Yes. Certain of the assumptions used in developing the time estimates which are represented in section 4.1.3 of the Study are based on expectations regarding human behavior. For example, the Study assumes that persons within the plume exposure EPZ will leave when instructed to leave. In addition, we assumed that persons in the outer primary evacuation zones will not evacuate when an inner primary evacuation zone is the only zone to be evacuated, and that persons instructed to evacuate will obey traffic rules. These assumptions are based in part on the findings represented in an Environmental Protection Agency publication entitled "Evacuation Risks -- An Evaluation" published in June 1974. This publication analyzes information regarding human reactions to actual evacuations, and concludes "the idea that people will panic in the face of great threat or danger is very widespread. However, it is not borne out in reality. Insofar as wild flight is concerned the opposite behavioral pattern in most disasters is far more likely."

Q13. Page 4-10 of NUREG 0654 suggests that the impact of peak populations, including behavioral aspects, should be considered with respect to developing estimates for special facilities. Are you aware of any information which would lead you to conclude that the impact of peak populations, including behavioral aspects,

would significantly effect the evacuation time for special facilities in the Byron EPZ.

A13. No.

Q14. Does the Study utilize site weather characteristics such as those presented in the Byron FSAR?

A14. Yes. The FSAR and NUREG 0654 Appendix 4 were reviewed during the initial planning of the Study. NUREG 0654 Appendix 4, Page 4-6, notes that two conditions -- normal and adverse -- are to be considered in the analysis. The adverse weather which was used in the Study was assumed to be the most common adverse weather, i.e., rain which was assumed to reduce road capacity to 70% of normal and increase the time required to travel home from 30 to 45 minutes. Obviously, snow and icy pavements in the extremes identified as "snowfall in excess of six inches and often accompanied by damaging glaze" can effectively reduce the capacity to zero. However, because such conditions occur, on the average, about once per year, it was decided that the evacuation time estimates should address the most common adverse conditions, thereby providing officials a more useful aid in making decisions regarding protective actions.

Evacuation is only one of the possible protective actions available for recommendation to the public. The decision whether to evacuate is generally dependent upon projected dose rates, exposure duration and the feasibility of evacuation. Should conditions exist

at the time of potential evacuation that, in the judgment of the public officials, would significantly decrease roadway capacity, other actions such as roadway clearing, could be taken prior to recommending evacuation.

Q15. Does the Study analyze every conceivable evacuation scenerio which could exist in the Byron area?

A15. No. The Study does not purport to consider every conceivable permutation or combination of circumstances which could exist during an actual emergency. Thus, one should not read the Study as a presentation of our conclusion that under any circumstance evacuation can be accomplished in the time frames presented. The Study is intended to serve as one of the tools to decision makers, to help them assess the feasibility of evacuation. Obviously, to the extent actual conditions during an emergency differ from those considered in the Study, we would expect that decision makers would take this into account in selecting the course of action which is most appropriate under the circumstances.