

January 14, 1985

DOCKETED
USNRG

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

'85 JAN 17 P1:57

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

OFFICE OF SECRETARY
REGULATORY & SERVICE
BRANCH

In the Matter of)	
)	
CAROLINA POWER & LIGHT COMPANY)	
and NORTH CAROLINA EASTERN)	Docket No. 50-400 OL
MUNICIPAL POWER AGENCY)	
)	
(Shearon Harris Nuclear Power)	
Plant))	

AFFIDAVIT OF ROBERT D. KLIMM
ON EDDLEMAN 215(3)

County of Middlesex)	
)	ss.
Commonwealth of Massachusetts)	

ROBERT D. KLIMM, being duly sworn, deposes and says:

1. I am an Associate of HMM Associates, Inc. My responsibilities at HMM Associates include the management and supervision of evacuation time studies. I have served as either Project Manager or Principal Transportation Engineer for many of the more than twenty evacuation time analyses conducted by HMM Associates in connection with emergency planning for nuclear power plants. I was Principal Transportation Engineer for the evacuation time estimate study prepared by HMM Associates for the Shearon Harris plume exposure Emergency Planning Zone (EPZ). That study is entitled "Evacuation Time Estimates for

8501180432 851114
PDR ADOCK 05000400
PDR
G

the Plume Exposure Pathway Emergency Planning Zone of the Shearon Harris Nuclear Power Plant" (October 1983) (hereinafter referred to as "ETE"). I am also responsible for all transportation-related computer analyses conducted by HMM Associates. I was involved in the system development of the NETVAC evacuation model, which is a state of the art computer evacuation simulation model. The NETVAC model has been used to estimate evacuation times for approximately 20 nuclear power plant sites. I co-authored the NETVAC model users manual. In addition, I have provided training to various groups on the use of the NETVAC model. A current statement of my professional qualifications and experience is attached hereto. My business address is 336 Baker Avenue, Concord, Massachusetts 01742. I have personal knowledge of the matters stated herein and believe them to be true and correct. I make this affidavit in response to Eddleman Contention 215(3).

2. The purpose of this affidavit is to explain that the assumption in the ETE that non-auto-owning households would evacuate at the rate of one vehicle per household is not a "conservatism" that results in an overestimate of evacuation times. Rather, the stated assumption is a practical means of simulating the evacuation traffic which would be generated in the provision of transportation assistance for non-auto-owning households in the event of an evacuation of the Harris EPZ.

3. The Harris ETE utilizes a state-of-the-art computer simulation designed to project evacuation times as accurately as possible. From a practical standpoint, it is necessary to use certain simplifying assumptions in order to develop input data that can be effectively used for the computer simulation. The input data consist of existing statistical information, such as census data and roadway characteristics, and assumptions about activity that will take place during the scenarios modeled. The joint NRC/FEMA criteria document on emergency plans, NUREG-0654/FEMA-REP-1 (Rev. 1 November 1980), recognizes that some such assumptions must be made. Appendix 4 to NUREG-0654, which contains acceptance criteria for evacuation time estimates, provides that the analyses should indicate the assumptions which underlie the time estimates. NUREG-0654 at 4-2, 4-7. For the Harris ETE, HMM Associates, Inc. attempted to use assumptions that are as realistic as possible and supportable. The assumptions incorporated into the Harris ETE are consistent with those used by HMM Associates in its compilation of similar analyses for other nuclear power plant sites. Most of the more than twenty evacuation time analyses prepared by HMM Associates already have been found acceptable by the NRC; the remaining analyses are currently under review.

4. The assumptions used to develop the evacuation time estimates presented in the Harris ETE (including the methodology used to estimate vehicle demand of permanent residents) were

developed based upon (1) informal discussions held with state and county emergency preparedness officials throughout the course of the study;^{1/} (2) reviews by HMM Associates, Inc. of empirical data on past evacuations; (3) knowledge and experience obtained by HMM Associates in conducting similar evacuation time studies for more than 20 nuclear power plant sites throughout the country; and (4) federal guidance (NUREG-0654, Rev. 1, Appendix 4).

5. The ETE used the best data available at the time of the study to estimate the number of households within the EPZ which do not own vehicles and, accordingly, would need some type of transportation assistance in an evacuation.^{2/} The methodology used in the ETE assumes that vehicle occupancy rates for the non-auto-owning population are the same as those

^{1/} The State and County emergency preparedness officials were involved with and provided key input to the ETE, including many of the site-specific variables which must be considered in such a study (such as reasonable preparation and mobilization times, evacuation procedures, assumptions on evacuation characteristics associated with the various population segments, etc.).

^{2/} The ETE figure of 410 households was based on data from the 1980 Census of Population, Advance Estimates of Social, Economic, and Housing Characteristics. The ETE estimates of this population were refined (based on later, more detailed Census data indicating 655 households), for the purpose of assessing the transportation resources available to evacuate persons needing official transportation assistance. See "Affidavit of Kevin Twine on Wilson 12(b)(3) and EPJ-2." The refined figures would have no discernible impact on the evacuation times presented in the ETE.

for the auto-owning population; that is, one vehicle per household.

6. In the event of an actual evacuation due to an emergency at the Harris plant, transportation for all non-auto owning households would be furnished through rides with friends, neighbors, or relatives, or through coordinated efforts by state and county emergency preparedness officials. The exact number of vehicles necessary to evacuate this population category would vary based upon several factors, including the type and numbers of transportation resources available at the time of the evacuation.

7. The assumption that non-auto owning households (like auto-owning households) would evacuate at the rate of one vehicle per household was specifically reviewed with the local emergency preparedness officials and determined to be appropriate as the most realistic means of representing the evacuation traffic which would be generated in the provision of transportation assistance (by friends or family, or emergency response personnel) for non-auto-owning households.

8. Thus, in practice, the assumption that non-auto-owning households would each generate the traffic associated with one vehicle is a reasonable means of simulating traffic along the roadway network, following internal routes to collect non-auto-owning passengers. (This traffic could range from cars or vans going to individual homes to pick up evacuees,^{3/}

^{3/} For purposes of estimating evacuation times, it does not matter whether such vehicles are operated by friends or

(Continued next page)

to larger vehicles -- such as buses -- traveling from one pickup point to another to pick up evacuees.)

9. As a practical matter, for purposes of estimating evacuation times, the type and number of vehicles used to evacuate the non-auto-owning population within the EPZ are relatively insignificant, because that population category is a relatively small percentage of the total population within the EPZ. A reduction of a total of 410 (or 655) vehicles would not reduce evacuation time estimates appreciably -- i.e., a reduction of 10 minutes might be achieved by changing this assumption to include no vehicles to handle the non-auto-owning population.^{4/} The results of the ETE (see Section 7) indicate that the primary factor influencing evacuation times for most cases is the preparation and mobilization time period. The total evacuation times are less sensitive to vehicle demand than they are to these preparation and mobilization time periods. Variations in the number of vehicles used to evacuate the non-auto-owning population would not significantly affect the evacuation times.

10. In summary, the methodology for the Harris ETE utilized a state-of-the-art computer simulation that has been used

(Continued)

family, or by emergency workers. The effect of such traffic is the same.

^{4/} However, eliminating these vehicles altogether would tend to underestimate the time required to evacuate; this would be inconsistent with the thesis of Eddleman 215.

at numerous nuclear sites throughout the country and that has previously been approved by the NRC; and the assumptions incorporated in the Harris ETE are consistent with those in HMM's other NRC approved analyses. As explained above, the assumption that non-auto-owning households would evacuate at the rate of one vehicle per household was employed as a practical means of simulating the evacuation traffic which would be generated in the provision of transportation assistance (by friends or family, or emergency response personnel) for non-auto-owning households. For the reasons explained herein, the assumption is fully justified and results in realistic estimates of the evacuation times for the Harris EPZ. The assumption is not a "conservatism" that results in an overestimate of evacuation times.

Robert D. Klimm
Robert D. Klimm

Subscribed and sworn to before me this 11th day of January, 1985.

Carl J. Harris
Notary Public

My Commission expires:

~~January 11, 1987~~

ROBERT D. KLIMM

Education

M.S. Civil Engineering (Transportation), Northeastern University, 1979
B.S. Civil Engineering, Worcester Polytechnic Institute, 1975

Summary of Experience

Mr. Klimm specializes in transportation engineering and emergency preparedness/evacuation planning. He has served as Project Manager or Technical Advisor on most of the evacuation time estimate analyses conducted by HMM. He also has been responsible for numerous emergency preparedness tasks for nuclear power plants including: the development of school facility evacuation plans and procedures; the development of evacuation and population data for CRAC2 and CRACIT consequence modeling; and the development of evacuation routings and time estimates for special facilities.

Mr. Klimm was involved in the system development of the NETVAC evacuation simulation model, which has been used at 20 nuclear power plant sites throughout the country. He has provided training to groups that have been licensed to use the NETVAC model, and was responsible for conducting an Evacuation Time Estimate Workshop for Public Service Electric and Gas Company of New Jersey.

Professional Experience

1980 - Present HMM Associates. Mr. Klimm serves as Project Manager and/or Principal Engineer for projects involving emergency preparedness planning and emergency evacuation. Recent experience includes the following:

- o Principal Engineer for the development of evacuation time estimates for the Susquehanna Steam Electric Station (Luzerne County, Pennsylvania, 1981).
- o Project Manager for the preparation of supplemental evacuation time estimates for the Midland Nuclear Power Plant (Midland, Michigan, 1983).
- o Project Manager for the development of evacuation time estimates for the D.C. Cook Nuclear Plant (Berrien County, Michigan, 1984).

- o Project Manager for the development of an Evacuation Traffic Management Plan for the Midland Nuclear Power Plant Plume Exposure EPZ (Midland, Michigan, 1983).
 - o Principal Engineer for the preparation of evacuation time estimates for the Shearon Harris Nuclear Power Plant (Wake County, North Carolina, 1983).
 - o Project Manager for the development of an Evacuation Traffic Management Plan for the primary Plymouth Station Evacuation Relocation Center (Hanover, Massachusetts, 1983).
 - o Principal Engineer for the development of population and evacuation data for CRACIT radiological consequence modeling within the Seabrook Station EPZ (Seabrook, New Hampshire, 1983).
 - o Project Manager for the development of an Evacuation Traffic Management Plan for the Seabrook Station Plume Exposure EPZ, (Seabrook, New Hampshire, 1982).
 - o Project Manager for the preparation of evacuation time estimates for the Grand Gulf Nuclear Station (Clairborne County, Mississippi, 1981).
- 1977-1980 Fay, Spofford & Thorndike, Inc. Transportation Engineer. Responsible for traffic operations analyses; traffic control design, specifications and cost estimates; transportation environmental impact analyses; highway safety analyses; truck circulation studies, and traffic circulation plans for private and public developments.
- 1975-1977 Central Massachusetts Regional Planning Commission. Transportation Engineer/Planner. Responsible for transportation corridor planning studies, transportation systems management, traffic operations analyses, and coordination of the regional transportation air quality control plan.

Other Professional Data

Affiliations: Transportation Research Board: National
Academy of Sciences
Institute of Transportation Engineers
American Society of Civil Engineers
Boston Society of Civil Engineers

- Papers/
Publications:**
- o Klimm, R., "Comparison of Optional Cycle Lengths for an Urban Arterial Signal System Using Maximum Bandwidth and Minimum Vehicle Delay Criteria," Northeastern University, 1979.
 - o Klimm, R., "Fringe Parking and Intermodal Transportation System--Feasibility Study," CMRPC, 1976.
 - o Klimm, R., Sheffi, Y., Mahnassani, H., Powell, W., NETVAC2 USER MANUAL," HMM Associates, 1982.