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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before the Administrative Judges:
Ivan W. Smith, Chairperson
Dr. Richard F. Cole
Kenneth A. McCollom

In the Matter of	
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE, et al. (Seabrook Station, Units 1 and 2)	Docket Nos. 50-443-OL (Off-site EP)
	April 10, 1989

TESTIMONY OF DR. COLIN J. HIGH ON BEHALF
OF JAMES M. SHANNON, ATTORNEY GENERAL FOR THE
COMMONWEALTH OF MASSACHUSETTS,
CONCERNING CONTENTION JI-56 (Monitoring Rate)

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I. SUMMARY OF TESTIMONY

In this testimony, Dr. Colin High, an expert in the area of air photo interpretation, survey techniques, and statistical methods, uses the "20% formula" set forth in the NHRERP PID at § 5.19 to estimate the number of people who, for planning purposes, can be expected to arrive for monitoring at the SPMC's two reception centers. This testimony is intended to lay a foundation for JI-56, which challenges the SPMC's ability to achieve a monitoring rate that will permit the ORO to monitor 20% of the total population within 12 hours.

II. IDENTIFICATION OF WITNESS

Q.1. What is your name and current occupation?

A.1. My name is Colin J. High and I am a Principal of Resources Systems Group, Inc., of Norwich, Vermont.

Q.2. What are your professional qualifications?

A.2. In addition to my work at Resource Systems Group I am also Research Professor of Environmental Studies at Dartmouth College, Hanover, NH. I hold BS and Ph.D. degrees in Georgraphy and Geology from the University of Bristol, England. I have received formal undergraduate and graduate training in air photo interpretation, survey techniques and statistical methods. I have been an instructor in geography, air photo interpretation, remote sensing and statistical

methods at the university level. I have 23 years experience in the use of air photographs and statistical surveys in transportation, land use studies, site evaluation and environmental science. I have received grants and contracts from NASA, the U.S. Department of Energy, and the U.S. First Service which involves the use of air photography and statistical analysis. A copy of my curriculum vitae is on file in this proceeding. It is Attachment 1 to the testimony which I presented to the Board for the hearing on the NHRERP, December 1, 1987 (fol. Tr. 6849).

III. TESTIMONY

Q.3. What is the purpose of your testimony?

A.3. This testimony is designed to lay the foundation needed to assess the ability of the SPMC to achieve a monitoring rate that enables the New Hampshire Yankee Offsite Response Organization ("NHY-ORO") to monitor 20% of the total resident and transient population within a 12 hour period. My testimony provides an estimate of the number of persons that, using the "20% method" described in Section 5.19 of the Board's NHRERP PID, may be expected to arrive at the monitoring trailers at the SPMC's reception centers in North Andover and Beverly during and after an evacuation of the Massachusetts part of the Seabrook EPZ, under peak population conditions, on hot summer days at midweek and weekends.

Q.4. What is the method you used to make this estimate?

A.4. The mathematical formula used in this case for estimating the reception center load is that formula which is described in the Boards's NHRERP PID, section 5.19 at page 74 as follows:

Evacuee Load = (0.20 x (PP -SFP -TDP)) + TDP

Where: PP=Sum of the peak population for the assigned communities;

SFP=Special facilities population of the assigned communities;

TEP=Transit dependent population of the assigned communities.

Q.5. Please describe the data used in this calculation.

A.5. The data was obtained in the following way:

Peak resident populations for the assigned communities (PP) were drived form the estimates of resident populations for 1989 given by Dr. Albet E. Luloff in his pre-filed testimony dated April 3, 1989. These were 24,090 for the communities assigned to the North Andover reception center and 30,882 for the communities assigned to the Beverly reception center.

The summer midweek non-resident (transient) populations assigned to both North Andover and Beverly were calculated from the table of Maximum Evacuation Population given in Table 3.6-1 of Section 6 of the SPMC. The summer weekend non-resident population assigned to North Andover was also calculated from the same source (Table 3.6-1).

The summer weekend non-resident population of communities assigned to Beverly include substantial number of visitors at the beaches of Plum Island and Salisbury. The estimated non-resident population of the Salisbury beaches and Plum Island beaches which are assigned to Beverly are calculated by using the Board's finding that the maximum peak vehicle population of the beach area of the EPZ for planning purpose is 35,000 to 36,000 (PID, § 9.12) and then applying the proportion of the total vechicles in the EPZ beach areas which are normally found at Salisbury and Plum Island beaches. Using the vehicle counts based on air photograph interpretation in beach areas made by KLD and reported in Volume 6 of the NHRERP at E-5 and the counts reported in the testimony of Befort, Adler and High (fol. Tr. 6849), I calculated that on average 40% of the total number of vehicles in the EPZ beach areas are at Salisbury and Plum Island beaches on hot summer weekends. Therefore, using 35,500 as the maximum EPZ beach area vehicles estimate times 40%, I calculate the maximum number of vehicles at Salisbury and Plum Island beaches to be 14,200. Using the vehicle occupancy rate of 2.4 (NHRERP Vol. 6 at 2-12), this gives a maximum beach population of 34,080 to be assigned to Beverly. The non-residents of the assigned communities outside the beach areas are calculated from the data given in Table 3.6-1 of Section 3.6 of the SPMC.

The transit dependent populations were taken from Table 11-7 of Volume 6 of the NHRERP; and special facilities

populations of the assigned communities are taken from PSNH Intra-company business memo from B. Bovino to D. Tailleart dated January 13, 1989 (a memorandum obtained through discovery by the Massachusetts Attorney General). That memo appears to use special facility population data which are more current than the data reported in the SPMC (Amend. 6).

Q.6. What are the results of your calculations using the method and data that you have described?

A.6. The estimates for the evacuee loads reporting for monitoring at the SPMC's reception centers in North Andover and Beverly are given in the following table:

Evacuee Loads at Reception Centers

	Peak Summer Midweek	Peak Summer Weekend
North Andover	7,395	6,144
Beverly	12,652	14,103

Q.7. Do you believe these estimates are the best possible estimates of the evacuee loads at these receptions centers?

A.7. No. They would likely be higher for two reasons. First, I used the Applicants' vehicle occupancy rate of 2.4 for the vehicles at Salisbury and Plum Island beaches. In my opinion, the vehicle occupancy rate is probably higher than that. Surveys conducted of vehicle occupancy on hot summer days at New Hampshire beaches within the EPZ and adjoining the Massachusetts beaches (see Volume 6 of the NHRERP at E-4, reporting data collected by the Southeastern New Hampshire

Regional Planning Commission) show occupancy rates from 3.0 to 3.5 person per vehicles. If an occupancy rate of 3.0 were applied to the beach area vehicle estimates for a peak summer weekend, then the evacuee load at Beverly would increase to 15,807 people.

Second, the formula approved by the Board in its NHRERP PID, and used here, assumes that only 20% of the non-transit dependent population will go to be monitored at the reception centers. No evidence, based on conditions at this site, is given to support this assumption. The percentage of the population that choose to be monitored could be much higher that 20%. If that were the case, then evacuee loads at both North Andover and Beverly would be higher.

Q.8. Does this conclude your testimony?

A.8. Yes.