

ORIGINAL

UNITED STATES  
NUCLEAR REGULATORY COMMISSION

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IN THE MATTER OF:

DOCKET NO:

PUBLIC SERVICE COMPANY OF )  
NEW HAMPSHIRE, et al )  
(SEABROOK STATION, UNITS 1 AND 2 )

50-443-OL  
50-444-OL  
OFF-SITE  
EMERGENCY  
PLANNING

EVIDENTIARY HEARING

LOCATION: CONCORD, NEW HAMPSHIRE

PAGES: 7921 through 8103

DATE: December 16, 1987

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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
before the  
ATOMIC SAFETY AND LICENSING APPEAL BOARD

|                            |   |                       |
|----------------------------|---|-----------------------|
| In the Matter of           | ) |                       |
|                            | ) |                       |
| PUBLIC SERVICE COMPANY     | ) | Docket Nos. 50-443-OL |
| OF NEW HAMPSHIRE, et al.   | ) | 50-444-OL             |
|                            | ) |                       |
| (Seabrook Station, Units 1 | ) | (Offsite Emergency    |
| and 2)                     | ) | Planning Issues)      |
|                            | ) |                       |

APPLICANTS' CROSS-EXAMINATION OUTLINE  
ON TESTIMONY OF DONALD J. ZEIGLER,  
JAMES H. JOHNSON, JR. AND STEPHEN COLE  
ON BEHALF OF THE ATTORNEY GENERAL OF MASSACHUSETTS

Applicants' Cross-Examination intends to inquire into  
the following matters in challenge to the credibility of the  
witnesses and their testimony.

Panel Members:

Academic degrees - psychology? any branch?  
Specializations -  
Associations -  
Areas of interest  
    technological and natural hazard distinction  
Nature of research conducted  
    (geographer's surveys)  
    field work and experience

Cole's position as to the objectivity of sociological  
studies, value-free or value-involved sociology and the  
sociologist as a Technician or Reformer (p. 3). (See  
"The Sociological Method") (p. 3).



Basis for panel testimony that the Plan (NHRERP) assumes spontaneous evacuation of 25% of the EPZ population (p. 4). Same theme (p. 26).

Identification of the radiological and non-radiological emergencies from which the panel's knowledge of human behavior is (p. 5) claimed to be derived.

Basis for distinguishing cases where the disaster agent is radiation (p.6).

Effects of evacuation outside the EPZ on ETE's (p.6).

Where is geography defined in the manner of the panel definition (p.6).

Authority for conclusion "since behavior is linked to perception." Suggestion - that this relationship is one of cause and effect? (p.7)

Explanation of "intended human behavioral responses. Correlation of intended and actual human behavioral responses (p.7).

Confirm panel's opinion regarding a Seabrook shadow evacuation is based on TMI investigation (p.8-9). Review Chapter 3 of TMI social survey, methodology, statistical data, sampling. Note panel's comment on mail surveys (p. 13) and Cole caveats on mail surveys and sampling, in The Sociological Method p. 62.

Implications of TMI evacuation distances (p.10).

Extent of TMI study corroboration by others (p.11).

Factors contributing to TMI evacuation. Confirm two factors noted on pp. 11-12 of Seabrook Survey Report Attachment 5, (pp. 11-12).

Assistance to be rendered the Mass. Attorney General. Attorney General declared position (pp.12-13).

What were panelists commissioned to do for the Mass. Attorney General. Compare panel testimony with SDA's report to Mass. Attorney General (p.12). Is this same matters discussed on page 20 of panel testimony and on page 49 et seq. in the technical appendix to Attachment 5

Get details of meetings. Participants, objectives, plans. Question adequacy or demonstrate inadequacy in inadequacy of NHRERP?

Examine the three survey techniques. Pro's and Con's of each. Determine the most appropriate method for the survey undertaken (p.13).

Where in testimony or attachments is data that more than 95% of residents of EPZ have home telephones (p.14)?

Basis for employing of Survey Sampling Inc. to select sample. What instructions were given by SDA. Purpose of choosing number 1400 to be interviewed. Correlation between zip code numbers and telephone exchanges. How were telephone exchange populations determined. Determine method or procedures used to establish designated quotas for each town and each sex (pp.14, 16). Contrast with Cole's opinion (p.30).

Demonstrate non-randomness of sample. Compare design of sample with interviewees in survey.

Determination of sampling error for survey. How calculated. Conclusion that can be drawn from sampling errors (p.16).

Significance in the size of the sample (p.17).

Where is the result of call back procedures utilized in survey (p.17-18).

Accuracy of completion rate calculations. What were factors considered. Why omissions. Compare with Cole's 70% figure in "The Sociological Method" (pp.61-62).

Limitations on the confidence that can be had from past surveys (p.18).

Methods used to validate survey (p.19). Question of what was validated other than the interviewing processes.

Identify MKTG Inc. What was its role. How was conclusion of few survey errors sustained (p.19).

Review details of meetings with Mass. Attorney General and consultants to draft questionnaires used in survey. Explain nature of data required by consultants to conduct analysis (p.20). Compare with Shoreham survey even to same numbers.

How was questionnaire shortened. Questions abridged - eliminated? (p.21).

Correct testimony -- aim of survey to "find out what residents of EPZ would do" to what they think they would do. Show testimony moves from behavioral intention to actual activity (p.21-22).

Examine reasons for not using exact EBS messages in survey (p.24). Are interviews with respect to Seabrook scenarios or SDA scenarios. Who is to say - all of Seabrook's EBS messages are not essential. Repetition is one of foundations of EBS messages (p.24).

Difficulty in repeating long EBS messages in a telephone survey - points up inappropriate method chosen for survey. Classic example of forcing a study to a method. The topic of the study should determine the method.

Compare SDA's messages to Seabrook's EBS messages (p.23; Attachment 5, p.62).

On survey results of households requiring transportation. Can witnesses cite any study where public transportation was used to evacuate any one (p.25).

Compare variables on p.26 with witnesses TMI report variables SDA Report Attachment 5 pp. 11-12.

Identify research conducted by Cole in Long island (p.27).

Review witnesses summary - of what survey data contains (p.27).

Examine reasons offered by witness why surveys are a reliable means to predict what people would do during a real radiological emergency (p.28).

Compare with witnesses assessment of what might happen in real accident vs. that depicted in survey. What was the accident depicted in the summary? (p.28).

Explore witnesses' statement that there is no reasonable basis for ignoring the expression of behavioral intention when attempting to predict what population will do in the event of an emergency (p.29).

Reference to last two sentences on page 30. What if every effort is made by the researcher and these efforts are unavailing?

What was the systematic procedure for selecting the



member of the household to be interviewed in the SDA Seabrook survey (p.31)?

Why do you term the failure of FMR to utilize a callback procedure to have probably resulted in over and underestimating certain people (p.31).

Describe the manner in which the findings from SDA's Seabrook survey have been corroborated by Long Island surveys (p.32, 33).

Are social geographers qualified to opine on sociological concepts such as role conflict (p.37)?

Examine the witnesses' position on the prudence of NHPERP drafters' reliance on emergency workers to report "promptly" (p.39).

In the articles witnesses rely on pp. 41-44 for view that emergency workers will not be available to perform their assigned tasks. Do any cite instances where emergency workers have clear understanding of role?

Examine witnesses reference to recent studies in footnote 17 (p.45) recited by witnesses to indicate role conflict was a serious problem during crisis at TMI.

Do witnesses equate role conflict with role abandonment?

Compare witnesses representation that "at one local hospital, for example, only 6 of the 70 physicians who were scheduled for weekend emergency duties reportedly showed up for work" (citing note 20) with the language of the cited reference. Also compare testimony with note 20.

Compare KASL article to testimony text (p.47).

Examine basis for the witnesses' statement that the strongest and most direct evidence of the extent to which role conflict is likely to be a problem in the event of a Seabrook emergency comes from the Seabrook evacuation SDA study. Review survey results (pp.50-54). Have W compute Sampling error. Sampling error. Size of sample. See Attachment 5.

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1 UNITED STATES NUCLEAR REGULATORY COMMISSION  
2 ATOMIC SAFETY AND LICENSING BOARD

3  
4 In the Matter of: )  
5 PUBLIC SERVICE COMPANY OF ) Docket Nos.  
NEW HAMPSHIRE, et al., ) 50-443-OL  
6 ) 50-444-OL  
(SEABROOK STATION, UNITS 1 AND 2) ) OFF-SITE EMERGENCY  
7 PLANNING

8 EVIDENTIARY HEARING

9  
10 Wednesday,  
December 16, 1987  
11 Hall of Representatives  
New Hampshire Statehouse  
12 Concord, NH

13 The above-entitled matter came on for hearing,  
14 pursuant to notice, at 9:03 a.m.

15 BEFORE: JUDGE IVAN W. SMITH, CHAIRMAN  
16 Atomic Safety and Licensing Board  
U.S. Nuclear Regulatory Commission  
17 Washington, D.C. 20555

18 JUDGE JERRY HARBOUR, MEMBER  
Atomic Safety and Licensing Board  
19 U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

20 JUDGE GUSTAVE A. LINENBERGER, JR., MEMBER  
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21 U.S. Nuclear Regulatory Commission  
22 Washington, D.C. 20555

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DONALD ZEIGLER

JAMES JOHNSON

STEPHEN COLE

|    |                            |      |      |      |      |
|----|----------------------------|------|------|------|------|
| 5  | by Mr. Lewald (resumed)    | 7926 |      |      |      |
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| 7  | by Mr. Lewald              |      |      | 8098 |      |
|    | by Judge Harhour           |      |      |      | 8099 |
| 8  | by Judge Linenberger       |      |      |      | 8100 |
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I N D E X (Continued)

| <u>EXHIBITS:</u>     | <u>IDEN:</u> | <u>RECD:</u> | <u>REJD:</u> | <u>DESCRIPTION:</u>  |
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| <u>APPLICANTS':</u>  |              |              |              |  |
| No. 26 (Pre. Marked) | 8098         |              |              | Excerpts from The Sociological Method by Stephen Cole, 8 pages |
| No. 27 (Pre. Marked) | 8098         |              |              | Chapter 3, Report on Social Survey of TMI Residents, 7 pages   |
| No. 28               | 8026         |              |              | Letter 14 Dec '87, Smith To Callendrello, 1 page               |

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| Applicants' Cross-Examination Outline of Testimony of Drs. Johnson, Zeigler, & Cole | 8031        |
| NRC Cross-Examination Plan of the Panel of Zeigler, Johnson, & Cole                 | 8077        |

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P R O C E E D I N G S

JUDGE SMITH: Good morning.

Is there any preliminary business?

All right, you may proceed, Mr. Lewald.

Whereupon,

DONALD ZEIGLER

JAMES JOHNSON

STEPHEN COLE

having been previously duly sworn, were recalled as witnesses herein and were examined and testified further as follows:

CROSS-EXAMINATION (Resumed)

BY MR. LEWALD:

Q Gentlemen, when we concluded yesterday afternoon, I had inquired of you whether the passage with respect to the survey sample and also the questionnaire that was developed for the survey were discussed at the same meeting with the Attorney General and the consultants. And my memory is that your answer was that it was; is that correct, Dr. Cole?

A (Cole) Yes.

Q Could I ask you to turn to Page 49 of the technical appendix that's attached to Attachment 5, which in turn is attached to your testimony?

At the bottom of Page 49, under the heading Design of Questionnaire, recites that the research project was initiated when the Assistant Attorney General, Alan Fierce, of the

1 Massachusetts Attorney General's Office, asked Social Data  
2 Analysts to conduct a survey for use by the Attorney General's  
3 Office and its consultants in litigation currently underway  
4 before the ASLB in regard to the evacuation plan drawn up for  
5 the Seabrook Nuclear Power Station.

6 Is this the beginning of the survey and the  
7 questionnaire, and how it developed at the behest of the  
8 Attorney General, Dr. Cole?

9 A (Cole) Yes.

10 Q Now you go on to say that the survey was also made  
11 available for use by the other Intervenor, correct?

12 A (Cole) Yes.

13 Q And then after telephone conversations between Alan  
14 Fierce and both Stephen Cole and Ann Harriet Cole, may I ask is  
15 Ann Harriet Cole related to you, sir, in some fashion?

16 A (Cole) She's my ex-wife.

17 Q And after that conversation, she apparently arranged  
18 and did participate in a day-long meeting in New Hampshire  
19 which was attended by, as you point out, Alan Fierce, Ms. Jane  
20 Doughty of SAPL, and the number of consultants for the Attorney  
21 General as you have listed here on Page 50, correct?

22 A (Cole) Yes.

23 Q Then you go on to describe that at this meeting each  
24 consultant outlined the nature of the data that he or she would  
25 require in order to conduct their analysis.



1 Is there some -- was there some log done at this  
2 meetings, notes of what transpired?

3 A (Cole) Do I have notes?

4 Q Did you take notes?

5 A (Cole) I wasn't at the meeting.

6 Q You were not at the meeting?

7 A (Cole) No, I was not at the meeting. It says Ann  
8 Cole participated in a day-long meeting. I was not at the  
9 meeting.

10 Q You wrote this testimony, though, correct?

11 A (Cole) I wrote the testimony.

12 Q And so your writing is on the basis of what Ann Cole  
13 told you?

14 A (Cole) Yes, and everything that I know about what  
15 happened.

16 Q Well, you say at this meeting each consultant  
17 outlined the nature of the data that he or she would be  
18 required in order to conduct their analyses, right?

19 A (Cole) That's correct.

20 Q What was the nature of the analyses that they were  
21 intending to conduct?

22 A (Cole) You'd have to ask them. I mean, they told  
23 Social Data Analysts and its representative, vice president,  
24 what kinds of information they needed. We were serving their  
25 needs. We were collecting data that they told us they needed.

1 If you want to find out what kinds of analysis they intended to  
2 do or actually did, you'd have to ask them.

3 Q Well, at this point in time the Intervenor's had  
4 already filed their contentions, true?

5 A (Cole) Yes.

6 Q And in which the Massachusetts Attorney General is  
7 going to join, at least in part, that's true?

8 A (Cole) Yes, as far as I understand.

9 Q And are you saying here that despite the fact that  
10 the contentions had already been filed and the Mass. A.G.'s  
11 position, which at that point was rather notorious for James  
12 Shannon and his unequivocal opposition to the Seabrook plant,  
13 that the consultants nevertheless were going on a clean slate  
14 and analyze the evacuation plan; is that what you're saying?

15 A (Cole) We wanted to collect certain information that  
16 we felt we needed to answer certain questions. And we designed  
17 a research design, in particular, this survey, that we felt  
18 would give us an unbiased set of data that would be useful in  
19 answering these questions.

20 I had no idea how the survey was going to come out.  
21 At the time that I designed this survey, I had not the  
22 slightest idea whether you would have anybody saying they would  
23 overreact. I could have guessed, but I didn't know how it was  
24 going to come out, not the slightest idea.

25 Q Well, you're not suggesting that the analysis that

1 was going to be done was value-free, are you talking?

2 A (Cole) As far as I'm concerned, the analysis that  
3 was going to be done was value-free, yes.

4 A (Zeigler) And I'd like to echo that point. I think  
5 the questions that I participated in --

6 Q I beg your pardon?

7 A (Zeigler) I said, I believe the questions that I  
8 participated in designing were the same questions that would  
9 have been designed even before the State of Massachusetts took  
10 a position in this plant. I mean, there is no bias in the  
11 questions. There is no bias in analysis.

12 Q Would you swing your mike over a little bit to talk?  
13 I'm getting an echo in it. I understand there are line-of-  
14 sight mikes and you have to talk directly into them.

15 A (Zeigler) Okay. I don't believe there is any bias  
16 in the questions that I participated in designing, nor in the  
17 analysis that I ran afterwards.

18 A (Cole) And, furthermore, let me add that if I had  
19 been hired by the NRC to conduct the study of how people in the  
20 Seabrook EPZ would have behaved under a certain kind of  
21 scenario, and if they had given me the EBS messages, the  
22 questionnaire would have been identical.

23 Q If you were hired?

24 A (Cole) If I had -- the NRC could have come to me and  
25 they could have said, Dr. Cole, we would like your company to



1 conduct an analysis of how EPZ residents would react if the  
2 following event took place at the Seabrook Station, and then  
3 they had given me their EBS message, upon which we based the  
4 questionnaire.

5 The questionnaire that I designed for Public Service  
6 New Hampshire, the NRC, or any other client would have been  
7 identical insofar as those questions were concerned.

8 Q Well, you would have used the Shoreham questionnaire,  
9 wouldn't you?

10 A (Cole) Pardon me?

11 Q You would have used what you had used at Shoreham,  
12 wouldn't you?

13 A (Cole) No, we didn't use what we used at Shoreham.  
14 We used certain knowledge that we had gained from Shoreham as  
15 far as how to do particular kinds of questions. But, no, we  
16 would have designed the questionnaire to answer the specific  
17 question concerning this particular area, this EPZ and the  
18 scenario that we were given in the EBS message.

19 Q Well, I'm confused now. You say that if the NRC came  
20 to you, or if Public Service came to you, you would have  
21 designed exactly the same survey and the same questionnaires?

22 A (Cole) I'm not saying the entire survey. I'm saying  
23 in the questions regarding, let's say, evacuation. I mean, if  
24 the NRC had come to me, they might have had some different  
25 questions. They might have been interested in some things that

1 the people who were doing this survey, the various consultants,  
2 were not interested in.

3 But insofar as they had asked the same questions,  
4 that is, how would people react living in the EPZ to a  
5 particular time of event at the Seabrook Station, and then they  
6 had handed me the EBS message, how would people react if this  
7 EBS message was broadcast, we would have asked the same  
8 identical question if the sponsor of that research had been the  
9 NRC, Public Service New Hampshire or the Commonwealth of  
10 Massachusetts. It wouldn't have made any difference to me.

11 Q It would be more correct to say that the survey was  
12 what people thought -- how they thought they would act rather  
13 than how they would act; isn't that correct, Doctor?

14 A (Cole) How they said they would react if this --

15 Q How they said they thought they would react is what  
16 the result is.

17 A (Cole) They didn't use the word "thought". I don't  
18 think the word "thought" is in the question. We asked them  
19 what would you do, and this is what they told us they would do.

20 Now if you want to interject the word "thought",  
21 that's your privilege.

22 Q But that didn't change the meaning, as far as you're  
23 concerned?

24 A (Cole) No, not as far as I'm concerned.

25 Q Now, after the first meeting, Stephen Cole, it says,

1 and Ann Cole drew up a draft of the questionnaire which was  
2 distributed to the Attorney General's consultant and to Mr.  
3 Fierce, correct? On the bottom of that -- I guess it's the  
4 continue --

5 A (Cole) Yes, that's correct.

6 Q -- at the end of the continuation of the paragraph.

7 A (Cole) That's correct.

8 Q And this is the kind of questionnaire that you would  
9 have given to Public Service of New Hampshire or to the NRC if  
10 either of those entities had come to you and ask you to do the  
11 same work.

12 A (Cole) Let me reiterate what --

13 Q Is that true?

14 A (Cole) I can't answer that yes or no, because it's  
15 an unclear question.

16 Q All right.

17 A (Cole) Let me reiterate what I said before.

18 If they had come to us with these same set of  
19 questions, the same set of research questions, then the  
20 questionnaire would have been identical.

21 It's quite possible that if the client had been the  
22 NRC or Public Service, New Hampshire, they might have had some  
23 other interest. They might have had some other questions that  
24 they were interested in. Then obviously the questionnaire  
25 would have had to have been different to cover their particular



1 research questions.

2 But if they had come into me with the same set of  
3 questions, then the questionnaire would have been the same. We  
4 designed the best, most nonbiased questionnaire that we could  
5 possibly design, and this is the best that we could do, and it  
6 would have been the same no matter who the client had been.

7 Q What was the set of questions that was presented to  
8 you?

9 A (Cole) I don't have that at my fingertips. But  
10 each --

11 Q Don't you have a record of it somewhere?

12 A (Cole) No, I don't, no, not now.

13 Q You don't?

14 A (Cole) No. Each person --

15 Q This is the whole basis for setting up the  
16 questionnaires, and you've never preserved a copy of it?

17 A (Cole) It was unnecessary to do that. We don't  
18 preserve all these notes and papers. We'd have massive files.  
19 I mean, for example, Don Zeigler was at the meeting. Don  
20 Zeigler said that he needed certain information to do his  
21 analysis. We then drew up a draft of the questionnaire.

22 Once Don Zeigler said that that questionnaire met his  
23 needs, we didn't have to keep a record of what he said at a  
24 meeting. I mean, the questionnaire speaks for itself. This is  
25 what he said he needed.

1           The people at the Resource Systems Group gave us a  
2 whole list of information that they needed, a large list of  
3 information that they needed. And we drew up the  
4 questionnaire. Then they agreed that this questionnaire would  
5 provide them with the necessary information that they needed to  
6 make their analysis.

7           Once all these people concurred that the  
8 questionnaire had in it the information that they would need to  
9 do their analysis, there was no need to keep notes at a  
10 meeting.

11          Q     And their analysis was intended to support their  
12 contentions of the Intervenor's, and as were joined in by the  
13 Attorney General; isn't that correct?

14          A     (Cole) I would not like to put it "intended to  
15 support". My analysis was intended to find out what people  
16 would do if there was an accident at Seabrook. I don't know  
17 what their analysis was intended to do, but presumably their  
18 analysis was also aimed at answering some questions relevant to  
19 evacuation planning for the Seabrook plant.

20          A     (Zeigler) Yes. I might say that Dr. Johnson and I  
21 have broader research interests in mind than just generating  
22 data to serve the State of Massachusetts.

23                I mean, we were interested in finding out what people  
24 would do in the event of an accident at the Seabrook plant.  
25 This is a line of research that we've been following over

1 several years.

2 Q Well, you already knew in your own mind what that  
3 answer would be, didn't you?

4 A (Zeigler) Well, we had some hypotheses that we had  
5 been working on over the year.

6 A (Cole) Like any good research --

7 Q And you were just trying to confirm that hypothesis,  
8 were you not?

9 A (Johnson) We were testing the hypothesis. I think  
10 it borders on irresponsibility for a good social scientist to  
11 say that he's trying to confirm something. That's not  
12 objective research. We were testing a series of hypotheses  
13 that we had been working on for the last seven or eight years.

14 I might add that those hypotheses were derived from  
15 what actually happened at TMI. We were one of the first teams  
16 to conduct research there. And for the last seven or eight  
17 years, we have been building upon that research. We have been  
18 establishing a serious research record of both theoretical and  
19 empirical significance. And that's revealed in the survey that  
20 Dr. Cole and his organization did on the behalf of the  
21 Massachusetts Attorney General's Office.

22 Q The TMI research is, you say you were the first to do  
23 a survey, is what we discussed yesterday as far as Chapter 3?

24 A (Johnson) That's -- we did the first survey, and  
25 we've also analyzed the surveys done by Flynn for the NRC. We



1 have published work on that survey as well.

2 Q All right, Dr. Cole, apparently there was a second  
3 day-long meeting in Boston on April 1st to renew the initial  
4 draft?

5 A (Cole) Yes.

6 Q And were Drs. Zeigler and Johnson attendants at that  
7 meeting?

8 A (Zeigler) No, I wasn't?

9 A (Cole) No, they weren't.

10 Q What was discussed at that second meeting?

11 A (Cole) By that time we, as says in the appendix here  
12 in Page 50, we had a draft of the questionnaire. And at that  
13 meeting all of the people present went over the questionnaire  
14 and discussed whether or not the questionnaire, the way it was  
15 set up and the questions that it contained, whether this  
16 questionnaire would provide them with the necessary information  
17 for them to conduct their analyses.

18 Q And what was the necessary information that they told  
19 they needed?

20 MR. TRAFICANTE: Asked and answered.

21 MR. LEWALD: I think we're now in the second meeting.

22 JUDGE SMITH: Yes. Overruled.

23 THE WITNESS: (Cole) As far as I am concerned, the  
24 information that was ---

25

1 BY MR. LEWALD:

2 Q Do you know what they told you? Do you have any --

3 MR. TRAFICONTE: Let's let the witness answer the  
4 question if you are going to put it to him, and you're allowed  
5 to put it to him, let's have him answer it.

6 THE WITNESS: (Cole) They didn't tell me anything. I  
7 wasn't at the meeting. They told the representative of my  
8 company. They went over the questionnaire. The information  
9 that they needed essentially was the same set of information  
10 that they had laid out at the beginning, at the first meeting.  
11 And then the purpose of the second meeting was to go over, and  
12 now we had a draft of the questionnaire. We just weren't  
13 talking about abstract, we need information on this, we need  
14 information on that. We had a draft of the questionnaire which  
15 was designed to obtain this information.

16 They then went over specifically the draft of this  
17 questionnaire to discuss whether or not it would be adequate to  
18 give them that information. This is a procedure which is  
19 always followed in design of the questionnaire. You always  
20 design a draft of the questionnaire, and then you have to go  
21 over it with people who are going to use this information to  
22 find out if the questionnaire is adequate.

23 Then there are other procedures that you have to  
24 followed, like pretests which we did and are reported in the  
25 technical appendix.

1 BY MR. LEWALD:

2 Q And do these people with whom you are consulting have  
3 an expertise as to whether or not a questionnaire is adequate?

4 A (Cole) Some of them do, and they have -- they  
5 certainly know what information they need, what questions have  
6 to be answered. We were --

7 Q They know what information they're looking for, isn't  
8 that what you're saying?

9 A (Cole) They know the questions that have to be  
10 asked. They don't necessarily know the answers.

11 JUDGE LINENBERGER: Excuse me, Mr. Cole, but I would  
12 just like to quickly inquire, what year are we talking about  
13 for these happenings we're discussing right now?

14 THE WITNESS: (Cole) It's April of 1987.

15 JUDGE LINENBERGER: Thank you. Sorry.

16 BY MR. LEWALD:

17 Q Well, the upshot of that second meeting was that a  
18 second draft of the questionnaire was prepared and mailed to  
19 all the consultants, correct?

20 A (Cole) That's correct, yes.

21 Q And at this point you say a small pretest of  
22 questionnaire was conducted on April 3rd?

23 A (Cole) Yes.

24 Q Just what was done in that pretest?

25 A (Cole) We took the questionnaire, we used some



1 random numbers from the people living in the Seabrook EPZ, we  
2 dialed them, and we interviewed them just as we would in the  
3 regular survey. We went through the interview to see whether  
4 the questionnaire could be administered; whether it was smooth,  
5 whether there were questions that people didn't understand, how  
6 long it took to administer on the telephone, normal kinds of  
7 things that you always do in a pretest before you do a major  
8 survey.

9 Q Now, by we, do you mean SDA?

10 A (Cole) And that most competent, or that I know, all  
11 competent researchers and survey research, they all follow  
12 essentially similar procedures. They all do drafts of  
13 questionnaires, then they do pretests, and then they come up  
14 with their final instrument.

15 Q Did you miss my question?

16 A (Cole) Perhaps.

17 Q I asked you who did the calling.

18 A (Cole) Who did the calling?

19 Q Yes.

20 A (Cole) Employees of Social Data Analysts.

21 Q Now after this, another conference was held, this  
22 time by telephone, according to your --

23 A (Cole) Yes.

24 Q -- chronology?

25 A (Cole) That's correct.

1 Q And you say each consultant participating in this  
2 call reviewed the questionnaire and then relayed suggestions  
3 and comments back to Social Data Analysis.

4 Were you a party to any of this?

5 A (Cole) Excuse me, I don't understand the question.

6 Q Were you a party to any of the conference call  
7 callers?

8 A (Cole) I was not in that particular conference call,  
9 but I was a party as far as the final design of the  
10 questionnaire goes.

11 Q Well, based on the suggestions, you say another  
12 questionnaire set of questions was developed?

13 A (Cole) Another draft of the questionnaire, it says.

14 Q And this time you decided that you should conduct a  
15 pretest with 100 random cases?

16 A (Cole) Yes.

17 Q And you say this was done by MKTG.

18 A (Cole) Correct.

19 Q Who are they?

20 A (Cole) They're very --

21 Q Or who was it?

22 A (Cole) Sorry.

23 Q I correct my question to who is it.

24 A (Cole) Oh, Marketing is a large corporation located  
25 on Long Island that does nationwide telephone interviewing for

1 most of the major survey research companies in the United  
2 States.

3 Q You or Ann Cole have had some affiliation with  
4 Marketing?

5 A (Cole) No.

6 Q None whatsoever?

7 A (Cole) No.

8 Q Now, following this, you say an extensive telephone  
9 contact with the Massachusetts Attorney General's Office, the  
10 final, somewhat shorter version of the questionnaire was  
11 prepared, is that --

12 A (Cole) Correct.

13 Q Now, by shorter version, do you mean that some of the  
14 questions were abridged, or eliminated, or just how was it  
15 shortened?

16 A (Cole) Some of the questions were deleted.

17 Q Did you save any of the drafts of the early  
18 questionnaires that --

19 A (Cole) No.

20 Q You threw them away as soon as you proceeded to the  
21 next level, is that what I understand?

22 A (Cole) Correct.

23 Q Did anybody instruct you to do that?

24 A (Cole) Instruct us?

25 No. We normally do that. We just can't keep --



1 Q That's your normal procedure?

2 A (Cole) Yes.

3 Q So that each time you start developing a new  
4 questionnaire you start from a complete new slate? You don't  
5 have any of the old material?

6 A (Cole) I don't understand the question.

7 Q You don't understand the question. Well, I won't  
8 pursue it.

9 Could we -- let's turn over to Page 40 of the  
10 technical appendix.

11 A (Cole) Yes.

12 Q Now, I'm assuming that following your development of  
13 the questionnaire and the kind of data that was going to be  
14 compiled by Social Data Analysis, that you next turned to some  
15 method to go out and get that data; is that your statement?

16 A (Cole) Yes.

17 Q And so you looked to some sampling procedures.

18 A (Cole) We were working on the sampling all along.  
19 Once we decided that we wanted to do a random sample of EPZ  
20 residents, we started our sample design procedure. And then  
21 after we did that, we contracted with a company to actually  
22 draw the sample.

23 Q And have you worked with the company, Survey  
24 Sampling, Inc., of Fairfield, Connecticut; is that true?

25 A (Cole) Have I used it before as a subcontractor?

1 Q Did I ask you that?

2 A (Cole) Did I -- your question is unclear. Did I  
3 work for it? Have I worked with it? What does "with" mean?  
4 I'm sorry.

5 JUDGE SMITH: If you don't understand the question,  
6 you are just free to say you don't understand it.

7 MR. LEWALD: All right, let me rephrase it.

8 JUDGE SMITH: You're entitled to understand any  
9 question that is put to you.

10 BY MR. LEWALD:

11 Q On Page 40, you say, the sample was selected by  
12 Survey Sampling, Inc., of Fairfield, Connecticut, under the  
13 direction of Social Data Analysis.

14 How did you choose Survey Sampling, Inc., or why did  
15 you choose it to do this?

16 A (Cole) Well, Survey Sampling is one of the most, the  
17 largest and best known, and one of the companies with the best  
18 reputation for drawing telephone samples. We have used them  
19 before on many surveys, and they have always done a very good  
20 job, and they are very efficient. They are an excellent  
21 company.

22 Q And do you have any affiliation with them?

23 A (Cole) No.

24 Q Does Ann Cole have?

25 A (Cole) No.

1 Q Now, you say the survey was based upon a stratified  
2 random sample of households with residential telephone,  
3 correct?

4 A (Cole) That's right.

5 (Continued on next page.)  
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1 Q Now, you say data obtained from local telephone  
2 companies indicates that approximately 95 percent of the  
3 residents of the EPZ have telephones in their homes.

4 Where in your testimony of the survey data here  
5 presented, does that kind of data appear?

6 A (Cole) What data?

7 Q That 95 percent of the residents of the EPZ have  
8 telephones in their home.

9 MR. TRAFICONTE: Other than at the location that you  
10 just read?

11 I am a little puzzled by the question.

12 MR. LEWALD: If the witness has some problems with it,  
13 I will rephrase it.

14 THE WITNESS (Cole): It appears right here, on Page  
15 40 of the technical appendix.

16 BY MR. LEWALD:

17 Q That is what it says, but where is the data, itself?

18 A (Cole) What data?

19 Q That 95 percent of the residents of the EPZ have  
20 telephones in their home?

21 A (Cole) This is what was told to us by  
22 representatives of the local telephone companies.

23 Q You picked up the phone and said how many residents  
24 in the EPZ?

25 JUDGE SMITH: Do you really quarrel with that figure?

1 MR. LEWALD: Pardon?

2 JUDGE SMITH: Do you really quarrel with that  
3 statement?

4 Do you quarrel with the statement?

5 MR. LEWALD: I am looking for the backup for the  
6 statement. If there isn't any backup --

7 JUDGE SMITH: Do you believe or not believe as you  
8 are cross-examining, that approximately 95 percent of the  
9 residents of the EPZ have telephones in their homes?

10 MR. LEWALD: I don't know, I don't know.

11 And I was just looking for the data that would backup  
12 that statement.

13 JUDGE SMITH: You don't know.

14 Did you have discovery?

15 MR. LEWALD: I am sorry.

16 JUDGE SMITH: Did you have discovery on this issue?

17 MR. LEWALD: I don't understand you.

18 JUDGE SMITH: All right, never mind, proceed.  
19 You don't know what discovery is?

20 MR. LEWALD: I know what discovery is.

21 THE WITNESS (Cole): The way we obtained this  
22 information --

23 MR. LEWALD: I am satisfied if he, if that is the  
24 source of his information, he picked up the phone and he asked  
25 somebody at the Phone Company and this is what he got, then all

1 right.

2 JUDGE SMITH: Just proceed with your cross-  
3 examination.

4 BY MR. LEWALD:

5 Q Dr. Cole, do you know how many households in the EPZ  
6 do not have telephones?

7 A (Cole) Somewhat less than 5 percent.

8 Q In terms of numbers?

9 A (Cole) I would have to take a calculator and do 5  
10 percent of the total households. As far as I remember, there  
11 are something like, what 30,000 households in the EPZ. And you  
12 have to take 5 percent of that.

13 Q And this would be how you would determine that?

14 A (Cole) This would be an approximate estimate, yes.

15 Q Now, you say that you want to interview a total of  
16 1,400 residents of the EPZ?

17 A (Cole) That is correct.

18 Q Why 1,400?

19 A (Cole) We decided that was the largest sample that  
20 we could afford to interview for this survey.

21 Q And this was the governing factor, money, as to how  
22 many you would --

23 A (Cole) No, there is two factors.

24 One factor is how many interviews do you need to have  
25 an accurate sample, the more interviews, the better, but up to



1 a -- at a certain point, you get a point of diminishing  
2 returns.

3           You can interview more people but it doesn't  
4 substantially increase the accuracy of your survey. We felt  
5 that this sample of 1,400 would be a very accurate  
6 representative sample of the EPZ and it was something that --  
7 it was the -- it was to go above that we felt that the added  
8 cost would not be beneficial in terms of the very, very slight  
9 additions, a reduction in your sampling error that you might  
10 obtain.

11           Q     Now, you said earlier, this was a stratified sample.

12           A     (Cole) Correct.

13           Q     So, and what does that mean in this case?

14           A     (Cole) It means that we are really doing random  
15 samples within each of the 23 towns; 17 in New Hampshire and  
16 six in Massachusetts.

17           Q     So, even though you had numbers for individual towns,  
18 you considered the sample, itself, to be 1,400 and not the  
19 numbers for each of the towns?

20           A     (Cole) Depends upon what you are doing with the  
21 data. If you are using the data to generalize about the EPZ,  
22 then the sample size is 1,400 and practically all the results  
23 that I made use of, in my testimony, dealt with the entire  
24 sample, 1,404, and were generalized to the EPZ.

25           If somebody were going to make a generalization about

1 a specific town, then, of course, the sample would be those  
2 people interviewed living in that town.

3 Q Suppose that someone were trying to test the  
4 reliability, then would you use 1,400 or would you use the  
5 town, the numbers in the various towns?

6 A (Cole) The accuracy of the sample, in so far as it  
7 is generalizable to the EPZ population?

8 Is that what you are asking?

9 Q In each of the towns.

10 A (Cole) In so far as the sample is generalizable to  
11 the population of the EPZ, you would use the number 1,404.

12 Q Now, at the bottom of that page, you say that since  
13 telephone exchanges do not correspond exactly with geographical  
14 boundaries in the towns in the EPZ, you had to use a more  
15 complex procedure to draw the sample of telephone numbers used  
16 in the survey.

17 And then from this you say, from local telephone  
18 directories, we have obtained the list of zip codes for every  
19 town in the EPZ.

20 Is it significant that you were looking at telephone  
21 directories for the zip codes of every town in the EPZ, or were  
22 you just looking for the zip codes?

23 A (Cole) We were just looking for the zip codes, and  
24 this was a convenient way to obtain them.

25 Q And in the Yellow Pages you find a listing of these

1 Zip Codes?

2 A (Cole) To my knowledge, they are in the front part  
3 of the White Pages.

4 Q Is that so?

5 A (Cole) To my knowledge. I was not the one who  
6 collected the zip code data.

7 Q Now, then you say that in order to check that this  
8 list of zip codes was complete, we had Survey Sampling utilize  
9 a computer program, which listed all zip codes within 15 miles  
10 of Seabrook?

11 A (Cole) Correct.

12 Q What was the purpose of drawing a 15-mile radius  
13 around Seabrook, if I might ask?

14 A (Cole) Well, it was my understanding that there were  
15 some towns in the EPZ, that a portion of the town was within 10  
16 miles of the plant, but the rest of the town was outside of  
17 that 10-mile zone.

18 That the EPZ, as I understand it, was not just cut  
19 off at a 10-mile radius. It includes towns that have portions  
20 of the towns in the 10-mile zone, and portions outside.

21 Q So the EPZ border would be an irregular border  
22 following the geographical or political lines of the towns, any  
23 part of which were in the EPZ?

24 A (Cole) As I understand it, yes.

25 Q Now, do I understand your procedure was to use the



1 zip codes as surrogates for the towns themselves, in conducting  
2 your, or for setting up the sample?

3 A (Cole) Yes.

4 We are using the zip codes to help generate the  
5 sample.

6 Q But you were using a zip code only to identify a  
7 particular town, is that correct?

8 A (Cole) Yes.

9 Q And you could have used the name of the town, rather  
10 than a zip code?

11 A (Cole) No.

12 Because names of the towns are not in the Survey  
13 Sampling data base. The zip codes are.

14 Q There is already in the --

15 A (Cole) The zip codes, all the zip codes are in the  
16 Survey Sampling data base. The data base that they used to  
17 generate the sample. The names of towns aren't.

18 Q So this is the reason why zip codes were used as  
19 surrogates?

20 A (Cole) Yes.

21 Q All right.

22 Now, going on down on 41, I don't know if you can --  
23 you say for most, for each zip code within the EPZ Survey  
24 Sampling generated a list of telephone exchanges.

25 And then for most of the exchanges that appeared on

1 the list, all of the numbers were in the EPZ.

2 Some exchanges, however, contained numbers of people  
3 living inside the EPZ and numbers of people living outside.

4 This is as your explanation reads, correct?

5 A (Cole) Yes.

6 Q Now, in order to determine whether or not to include  
7 a particular exchange in the sample, you say you looked at the  
8 total proportion of the phone numbers in that exchange, which  
9 are inside the EPZ as determined by the zip code.

10 And then if 15, or more of the numbers, or 15  
11 percent, excuse me, or more of the numbers in a particular  
12 exchange were inside the EPZ, that exchange was included in the  
13 sample of generated telephone numbers, correct?

14 A (Cole) Yes.

15 Q Now, what happened to the remainder of that?

16 A (Cole) What do you mean, an exchange that had less  
17 than 15 percent of the numbers --

18 Q -- yes.

19 A (Cole) -- in the EPZ, they were excluded.

20 Q Is the, does the, anywhere is -- let me -- does the  
21 survey, anywhere within it, discuss the magnitude of the  
22 exclusion of these towns that had less than 15 percent?

23 A (Cole) No, but they were a very, very small number  
24 of -- not towns, there were not towns that were excluded, all  
25 the towns were included.

1 Q The exchange.

2 A (Cole) But the number of residents that were  
3 excluded were a very, very tiny number.

4 Q Do you have that number?

5 A (Cole) I don't have it here, with me, and it is hard  
6 to estimate what it is, but it is based upon my experience in  
7 analyzing these kinds of data. I would estimate that it is a  
8 very, very small number.

9 If anything, we over--included. We included a zip ---  
10 exchanges in our sample, in which 80 percent of everybody in  
11 that exchange were outside the EPZ.

12 Q But these towns, these areas that you excluded were  
13 on the very peripheral or the boundary of the EPZ?

14 A (Cole) Right.

15 Q And you attach no significance or bias to that, that  
16 fact?

17 A (Cole) I am absolutely sure that if we had some  
18 method of getting every single residential telephone number  
19 into the sampling base, the results would have been virtually  
20 identical.

21 Q All right, at the very bottom of Page 41, you say,  
22 Survey Sampling then calculated the total number of residential  
23 phones in all the exchanges included in the sample?

24 A (Cole) Yes.

25 Q How was this done?



1           A     (Cole) They have a list. It is on a computer. They  
2 have every single number in that exchange. They have data on  
3 the number of residential exchanges in every single exchange.

4           Q     Have you got, do you have any information as to how  
5 that information was derived, in so far as arriving at a number  
6 of residential phones concerned?

7           A     (Cole) I don't know exactly how they do it, but I  
8 know how I have done it for samples that I have drawn myself,  
9 without their assistance.

10                There are, for example, on Long Island, there is  
11 something called Cole's Directory which lists all the telephone  
12 numbers and they tell you exactly in that directory how many  
13 residential numbers there are in each exchange.

14                Presumably they obtained it from the Telephone  
15 Company and I am not exactly sure how they get it.

16           Q     It is your understanding that this is another  
17 telephone call to the Telephone Company?

18           A     (Cole) I was told by one of my colleagues that the  
19 Telephone Companies sell it to them.

20           Q     Oh, they sell it?

21           A     (Cole) They sell this information.

22           A     (Johnson) You can buy the information from the  
23 Telephone Company.

24                Now, there is also something called, address-first  
25 telephone directories.

1           There are address-first telephone directories that  
2 list every telephone number on a block and indicate whether  
3 they are residential phones or business phones.

4           And a lot of survey companies use those address-first  
5 telephone directories.

6           JUDGE SMITH: They certainly do.

7           BY MR. LEWALD:

8           Q     Now, in the -- you then go on to say that numbers  
9 were selected in such a way so that the proportion of numbers  
10 in the sample, in a particular exchange would be the same as  
11 the proportion of numbers in the population in that exchange?

12          A     (Cole) Yes.

13          Q     Do you understand how that procedure was or what that  
14 procedure was?

15          A     (Cole) I understand it, yes.

16          Q     And is this, can you tell us how this is done?

17          A     (Cole) Very simple. If they find out, for example,  
18 that one percent of the entire population that we are dealing  
19 with lives in a particular exchange, then they pick, they make  
20 up the sample so that one percent of the sample has that  
21 exchange.

22                They draw one percent of the entire body of numbers,  
23 over 6,000, in this case, from that exchange so that the number  
24 of numbers, the proportion of numbers in each exchange  
25 corresponds with the proportion of population living in that

1 exchange.

2 Q Now, you go on to say the sample utilized is a random  
3 digit sample, in which the last two digits in the telephone  
4 number are selected at random by a computer, from among all  
5 those working blocks in a particular exchange.

6 Now, I understand that you are taking discrete  
7 exchanges and taking blocks of numbers that have been issued by  
8 the phone company and taking this entire block and then running  
9 a two-digit number, the last two digits of all of the telephone  
10 numbers in that block, to determine the sample, is that  
11 correct?

12 A (Cole) More or less, yes.

13 Q That is the gist of what ---

14 A (Cole) Yes.

15 Q Now, you go on to say that even though utilizing this  
16 relatively complex procedure, it was still impossible to know  
17 whether a particular phone number was for a household included  
18 in the EPZ.

19 So, you had a double check on this and when the  
20 interviewer called the number, it, he or she asked the person  
21 in what town he or she lived?

22 A (Cole) Yes.

23 Q And you say that as interviews were completed with  
24 respondents in each town, you kept track of the number of  
25 completed interviews until you reached the designated quota for



1 that particular town.

2 And what happened then?

3 Was that town just crossed off?

4 A (Cole) Yes.

5 Q How would the interviewer know that a quota had been  
6 reached?

7 A (Cole) The supervisors would tell them. They would  
8 be giving out the samples for the various towns. As I said, it  
9 was a stratified random sample. That means that there were  
10 sections of the sample for each town.

11 So we would hand out telephone numbers -- oh, let's  
12 say, Seabrook and once we had completed the number of  
13 interviews that we had priorly designated to be completed in  
14 Seabrook, we stopped.

15 We collected back the sample sheets from the  
16 interviews, and we would hand out sample sheets for another  
17 town.

18 Q Now, on Page 43 of the Appendix, you say that the  
19 sample you utilized in this survey is a random sample of  
20 households with residential telephones, not a random sample of  
21 individuals.

22 And then within the household, you go on to say, we  
23 utilized either the male or female adult-head of the household  
24 as an informant on what the household would do in case of an  
25 accident at the Seabrook Nuclear Power Station, correct?

1 A (Cole) Yes.

2 Q And then you go on to say, interviewers are  
3 instructed to ask to speak to a male or female head of the  
4 household.

5 And then following this, it says, a sex quota was  
6 used to ensure what the final sample would represent, excuse  
7 me, a sex quota was used to ensure that the final sample would  
8 represent the population in terms of sex.

9 Now, how would the interviewer know that a sex quota  
10 had been reached for a particular town?

11 A (Cole) The interviewers are given particular  
12 instructions. The way that it is normally done is you tell an  
13 interviewer that they have to keep track of the number of men  
14 and women that they have interviewed.

15 And if an interviewer has interviewed two or more  
16 women, than she has men -- let's say she has interviewed three  
17 women and one man, the next person that interviewer interviews  
18 has to be a man.

19 That is how it normally is the sex quota.

20 Q And when the quota is reached on either side of the  
21 sex population, then you just ask questions of the other sex,  
22 until the quota is filled up?

23 A (Cole) That would only happen at the very end of the  
24 survey. But since we are keeping the quota throughout the  
25 interviewing, we never, we always have it roughly balanced.

1 Q Does what we have discussed pretty much describes  
2 the Survey Sampling methods that were used?

3 Have we covered that with most of the --

4 A (Cole) Yes.

5 Q We have?

6 Okay.

7 Now, on 43, we would go back, you say the survey is a  
8 random sample of households with residential telephones.

9 Not a random sample of individuals. But isn't the  
10 fact that the interviewers interviewed individuals and not  
11 households?

12 A (Cole) Correct.

13 Q And, in households that contained more than one head,  
14 there was no random sampling procedure done with respect to  
15 which head would be interviewed, is that correct?

16 A (Cole) No random sample, because as you know there  
17 was this quota system that was utilized, that is correct.

18 Q You dropped the random sample and went over to quota  
19 system, is that correct?

20 A (Cole) For as far as the selection of the individual  
21 within a household, yes.

22 Q And you would agree that within the household so far  
23 as there were two heads, that the belief, knowledge, and  
24 attitudes can vary markedly between these heads?

25



1           A       (Cole) Generally we find correspondence on a lot of  
2 the information that we wanted to obtain in this survey, but it  
3 is possible that it could vary, yes

4           Q       You say that in testimony don't you, that it is well  
5 known from prior surveys that the attitudes of men and women  
6 toward issues like nuclear power, generally differ?

7           A       (Cole) That is correct, yes.

8                   That is why we used the quota to make sure that we  
9 didn't have an overly large number of women in the sample.

10          Q       Well, isn't the result of this procedure that in  
11 those households containing more than one head, the sample  
12 over-represents those who are at home and willing to answer the  
13 phone?

14          A       (Cole) Yes.

15                   But there is no evidence that those people have any  
16 different attitudes on any of these questions.

17          Q       Well, haven't you, in your testimony, indicated that  
18 it is known from prior surveys, that the attitude of men and  
19 women toward issues like nuclear power generally differ?

20          A       (Cole) But we had a representative sample of men and  
21 women. We have 54 percent women and 46 percent men.

22          Q       You had a quota did you not?

23          A       (Cole) The sample, as far as sex goes, is  
24 representative of the population.

25          Q       Well, don't you say on Page 30 of your testimony that

1 you should not rely on quotas and you cannot project to the  
2 total population from quotas?

3 A (Cole) We, our ---

4 Q Don't you say this on Page 30?

5 A (Cole) If you want me to look at Page 30 --

6 Q If you need to, sure.

7 A (Cole) I don't know what -- Page 30 of my direct  
8 testimony or my attachment, could you refer me, please?

9 Q Your direct testimony.

10 A (Cole) Pardon me?

11 Q Why don't we look at the panel's testimony.

12 And I am referring you to the last two sentences,  
13 procedure utilized by the FMR makes their survey more of a  
14 quota sample than a random sample. In my opinion, it is  
15 dangerous to generalize from this type of sample to the  
16 population.

17 A (Cole) Our sample utilized --

18 Q That is your testimony?

19 A (Cole) That is my testimony.

20 Q Do you want to add something?

21 A (Cole) Yes, I would.

22 Q Okay.

23 A (Cole) Our sample that we did it for the Seabrook  
24 survey was designed to be a representative, random sample of  
25 households.

1           We have data on households. Within each household --  
2       we have randomly selected a set of households, within each  
3       household we are utilizing either the male or female head of  
4       household as an informant as to what that household would do.

5           The important unit, as far as we were concerned, were  
6       not individuals, since families or households tend to either  
7       respond as a family unit in emergencies.

8           The important unit was the household and we did a  
9       random sample of households.

10          Q     But you don't have a random sample of heads of  
11       households, do you?

12          A     (Cole) No.

13                I say that clearly in the direct testimony. We do  
14       not have a random sample of individuals. We are generalizing  
15       to households, not individuals.

16          Q     And you cannot represent that even the head of the  
17       household you interviewed, represented the household because  
18       the other head, assuming there were two heads in the household,  
19       most likely was, and indeed, you thought had different views,  
20       isn't that correct?

21          A     (Cole) Could you repeat the question, please?

22                (Continued on the next page.)

23

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1 MR. LEWALD: Can you read it back?

2 JUDGE SMITH: Please.

3 MR. LEWALD: I think it would be easier if I -- let  
4 me restate it.

5 JUDGE SMITH: Never mind, then.

6 BY MR. LEWALD:

7 Q It's true, is it not, that the person interviewed as  
8 the head of the household, particular household, cannot be  
9 considered to be representative even of the household that  
10 participated in the survey because the responding head for the  
11 particular household differed from the other head of that  
12 household?

13 A (Cole) I have no evidence that they differed.

14 Q You have no evidence that they are the same, do you?

15 And indeed it's your position, and well known that  
16 the attitudes of men and women toward issues like nuclear power  
17 are considerably different; isn't that correct?

18 A (Johnson) If I might, I'd like to comment on that,  
19 because it --

20 Q You can comment after Dr. Cole answers my question.

21 A (Cole) Our sample is completely representative of  
22 the EPZ population as far as the portion of men and women  
23 living in that population. So our results are accurate, and  
24 they are not distorted by sex differences in the respondents.  
25 We have 54 percent of our sample being women, and 46 being men.

1 According to the census data, that's approximately what exists  
2 in the EPZ.

3 I have absolutely no doubt that if you were to do a  
4 random sample of individuals, which I don't think would be  
5 proper in this case because we are interested in the household  
6 as the unit, but I have absolutely no doubt when you do a  
7 random sample of individuals, which I have done in other  
8 studies of attitudes towards nuclear power, you would find they  
9 are virtually identical results that we found in this survey.

10 MR. LEWALD: I move to strike that as not being  
11 responsive to anything.

12 JUDGE SMITH: Read the question back. Yes, read that  
13 last question back.

14 (According, the record was read back by the  
15 court reporter)

16 JUDGE SMITH: Is that --

17 MR. TRAFICANTE: As heard the question, it asks for  
18 his position. He commented on his position as to men and women  
19 in the sample.

20 JUDGE SMITH: I think the problem is he went on to  
21 challenge the inference and implication of the question that --

22 MR. TRAFICANTE: Households versus individuals.

23 JUDGE SMITH: Yeah, and that there was distortion.  
24 In any event, you have asked a series of argumentative  
25 questions, and you're getting argumentative replies, and it's

1 just exactly what you've established.

2 The answer did overreach the question. There is no  
3 question about it, but it will remain. You can't pick and  
4 choose in this type of examination unless it's clearly off on  
5 another subject. If you want narrow answers to your questions,  
6 you are entitled to them, but let's make it clear as you  
7 progress that that's what you want.

8 BY MR. LEWALD:

9 Q We'll go back to Page 22 of the panel testimony. And  
10 on the bottom of that page, in answer to the question, "What  
11 were the results of the survey relative to the evacuation  
12 shadow phenomenon," you -- the panel says that one of the  
13 primary aims of the survey was to find out what residents of  
14 the EPZ would do the case of an accident at Seabrook Station.

15 And you say, "Therefore, the survey contained several  
16 scenarios which we read to the respondent, and which we asked  
17 them what they would do under such circumstances."

18 Now, you say the scenarios were based as closely as  
19 possible on the actual emergency broadcasting system, EBS,  
20 messages contained in the plan.

21 And I assume the reason for using emergency broadcast  
22 system messages was because these were the messages that the  
23 Seabrook EPZ people would hear in the event of an emergency at  
24 Seabrook; is that correct?

25 A (Cole) Yes.



1 Q Now the first scenario that the testimony refers to  
2 says that it asks residents to assume that they and their  
3 families were home on a hot Sunday afternoon in July at 2:00  
4 p.m., and then going on skipping the next sentence, and the EBS  
5 message announces that the beaches have been closed and advises  
6 all people on the beaches and in the state park areas of  
7 Seabrook, Hampton and Salisbury to leave the area immediately,  
8 but it does not advise any residents of the EPZ to take any  
9 protective action.

10 And then you say to the exact wording of the  
11 question, "See Attachment 5 at Pages 60-1."

12 Now, I assume that the question that you refer in the  
13 questionnaire at Attachment 5 at 60-1 is patterned on the EBS  
14 messages in Revision 2 of the plan; am I correct in that?

15 A (Cole) Yes, I believe so.

16 Q I put before you what is entitled Appendix G,  
17 Emergency Broadcast System Activation, and then on the left-  
18 hand corner of that, it says Volume 4. On the right-hand  
19 column, it says Revision 2, 8-86.

20 And I ask you if you're generally familiar with that  
21 Appendix G?

22 MR. TRAFICANTE: Does counsel have an extra copy of  
23 what was handed out, or give us a ---

24 MR. LEWALD: Beg your pardon?

25 MS. SELLECK: He wants an extra copy.

1 (Pause.)

2 MR. LEWALD: Your Honor, may I ask that the excerpt  
3 from Volume 4, Appendix G, Emergency Broadcast System  
4 Activation, I've shown the witness, be marked for  
5 identification as Applicants' Exhibit 28?

6 JUDGE SMITH: What is this at Appendix 2.

7 MR. LEWALD: Appendix G is an appendix to Volume 4.  
8 I'm simply pulling it out of -- actually, it's an exhibit in  
9 this case, Exhibit 5, but I was keeping it as a separate  
10 exhibit for the point of convenience in examining the witness  
11 on.

12 It's, as I say, physically a part of what we have  
13 already marked as Exhibit 5 in this case.

14 JUDGE SMITH: This will be Applicants' Exhibit 28 for  
15 identification.

16 Do you intend to offer it?

17 MR. LEWALD: I was just marking it as -- it's already  
18 in evidence, Your Honor.

19 JUDGE SMITH: I know. That's what is confusing me.

20 MR. LEWALD: I was just marking it for identification  
21 so we could -- I could proceed and examine the panel on the  
22 basis of the scenarios that they present, and the matters that  
23 are contained in this.

24 JUDGE SMITH: So you don't intend to offer it as a  
25 separate --

1 MR. LEWALD: I don't intend to offer it at any time  
2 as a separate exhibit.

3 JUDGE SMITH: It's not necessary to give it an  
4 identification number. So all we have now is just a void in the  
5 list of exhibit numbers. But, nevertheless, proceed with it.

6 Is that also the case with Exhibit 27 and 26 for  
7 identification?

8 MR. LEWALD: I'll just refer to it as Exhibit G of  
9 Volume 4.

10 JUDGE SMITH: Well, refer to whatever you want to.  
11 I'm just asking, have you identified other exhibits that you  
12 don't intend to offer?

13 MR. LEWALD: Twenty-six and 27, I would intend to  
14 offer at some point in time before -- well, I'll offer them now  
15 if it's a problem.

16 JUDGE SMITH: I don't care what you do. I just want  
17 to know, you know, when you give an exhibit a number, it really  
18 should be one that you intend to offer into evidence.  
19 Otherwise, -- well, just proceed any way you wish.

20 MR. LEWALD: All right.

21 BY MR. LEWALD:

22 Q Dr. Cole, could I ask you if you would turn to Page  
23 G-13 of that -- of Appendix G?

24 A (Cole) Yes.

25 Q And could I ask you if you could -- are you familiar



1 with that, that EBS message on Page 6-13?

2 A (Cole) I can't say for absolute sure. We were given  
3 some EBS messages to look at, and in order for me to say  
4 definitely that this is the same as the ones that we were  
5 given, I would have to just go over this and compare it with  
6 the copies of the EBS messages that we were given. But it  
7 looks very similar. I certainly -- it's probably the same.

8 Q And would you have a moment to compare it with what  
9 you put in the wording of the question in the New Hampshire  
10 version that you refer to on Attachment 5 at Pages 60-1?

11 A (Cole) Yes.

12 Q And can you tell us what you left out of the EBS  
13 message in your question?

14 JUDGE SMITH: We are now looking at Attachment 5,  
15 Page 60 to the technical attachments? What are we looking at?  
16 What do you hope that the witness is looking at?

17 MR. LEWALD: The question was asking of -- in  
18 essence, asking the witness to compare the wording of the  
19 question in the New Hampshire version of the questionnaire  
20 which he refers to on Attachment 5 at Pages 60 - 61, and  
21 compare it to the message --

22 JUDGE SMITH: What page on Attachment 5?

23 MR. LEWALD: Attachment 5 at -- I'm reading from Page  
24 22 of the testimony, Your Honor.

25 JUDGE SMITH: Yeah?

1 MR. LEWALD: And I'm taking the --

2 JUDGE SMITH: Just tell me what page on Attachment 5  
3 you are working with.

4 MR. LEWALD: I'm following the reference given in the  
5 testimony, Your Honor, and I'm assuming that it's correct.  
6 Maybe I'm incorrect in --

7 JUDGE SMITH: Well, just tell me what it is. 60-1,  
8 all right.

9 All right, I have it. Thank you.

10 BY MR. LEWALD:

11 Q And I ask you if you could compare the message that  
12 is on Appendix G with the question that you asked the  
13 respondents that were interviewed?

14 A (Cole) Yes.

15 Q And are they the same?

16 A (Cole) No, not precisely, no. They are almost the  
17 same, but not precisely.

18 Q You have deleted certain things, have you not?

19 A (Cole) As I can see from -- well, first, let me say,  
20 let me repeat what I said before.

21 I am not 100 percent sure that this is the same copy  
22 of the EBS message that I was given. But on that assumption,  
23 it appears that we have deleted the last paragraph.

24 Q And the last paragraph repeats, does it not, that no  
25 action is necessary at this time for persons located in several

1 towns, does it?

2 A (Cole) Yes, that's what it says.

3 Q And you did not think that significant in your  
4 question?

5 A (Cole) No, we had already said that.

6 Q And where did you say that?

7 A (Cole) "At this time there is no need to take any  
8 action."

9 Q So you didn't see any need to say it again?

10 A (Cole) That's right, because we had to reduce the  
11 length of these scenarios. They were too long.

12 Q The scenarios were too long?

13 A (Cole) The EBS messages were too long to include the  
14 full text of all the EBS messages for all the scenarios that we  
15 wanted to cover in this survey.

16 Q Well, do I understand that you were putting your  
17 scenarios to witnesses and not the scenarios that were set  
18 forth in the EBS messages?

19 MR. TRAFICANTE: Objection. I think that's  
20 argumentative, Your Honor.

21 JUDGE SMITH: No. Overruled.

22 THE WITNESS: (Cole) Our scenarios were based upon,  
23 based upon the EBS messages that were included in the plan.

24 BY MR. LEWALD:

25 Q Well, do I understand that you redrafted them on



1 the -- redrafted the messages that you thought suitable to  
2 present in questions to witnesses -- to respondents?

3 A (Cole) No, we did not redraft them. What we did was  
4 we deleted what we felt was either confusing or unnecessary  
5 information, but we did not redraft them. We made every  
6 possible attempt to use the exact wording of the EBS messages  
7 that we were given.

8 Q Well, let's move to the second scenario included in  
9 the questionnaire.

10 And you say the second scenario -- this is on Page 23  
11 -- that the second scenario included in the questionnaire  
12 attempted to find out what EPZ residents would do if the first  
13 scenario were to involve a situation in which a general  
14 emergency was declared. Residents of Hampton Falls and  
15 Seabrook were advised to evacuate, and other EPZ residents were  
16 advised to shelter in place.

17 And you say for the exact wording of this question,  
18 see Question 31 in Attachment 5, Page 62, correct?

19 A (Cole) Yes.

20 Q Could you turn to that question on that page?

21 A (Cole) Yes.

22 Q And could I direct you to -- in the Appendix B -- to  
23 Pages 30 to 35, and I ask you if that is the EB message that  
24 you say you are presenting in Scenario 2?

25 MR. TRAFICANTE: Could I have a page in the document

1 you just distributed. Mr. Lewald?

2 MR. LEWALD: Page 6-30 to 34.

3 JUDGE SMITH: It continues on to Page 35, does it  
4 not?

5 MR. LEWALD: Excuse me, 35, too.

6 JUDGE SMITH: That's a rather long one. Do you want  
7 him to take some time to compare?

8 MR. LEWALD: I just asked him to look at -- I wasn't  
9 asking him to testify to anything. I was just asking him  
10 to --

11 JUDGE SMITH: To compare.

12 MR. LEWALD: compare them and then I --

13 JUDGE SMITH: It's a four and a half-page message. I  
14 suggest that maybe we should take a morning break and let  
15 him --

16 MR. LEWALD: Fine.

17 JUDGE SMITH: -- compare it.

18 Return at 10:30, please.

19 MR. BROCK: Your Honor, Matt Brock.

20 JUDGE SMITH: Yes.

21 MR. BROCK: In response to the Board's request, I  
22 called Sal Guadagua's office this morning. I was informed by  
23 his secretary that he is at a meeting in Maine and will be  
24 unavailable all day.

25 I also spoke with Bill Lord last night, and he did

1 confirm that he had a court appearance elsewhere this  
2 afternoon, and would also not be available.

3 I did check with those two witnesses, though, Your  
4 Honor.

5 (Whereupon, a recess was taken.)

6 (Continued on next page.)

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1 JUDGE SMITH: Proceed, Mr. Lewald.

2 BY MR. LEWALD:

3 Q Dr. Cole, I would ask you if you would compare the  
4 language of the Question 31, in your questionnaire with the  
5 message F, which is on G-pages, the G-30-to-35 of Appendix G,  
6 and ask if you have now had an opportunity to do so?

7 A (Cole) Yes, I have.

8 Q And now, if you could turn to Page 30, if you would,  
9 excuse me, G-30?

10 A (Cole) Yes?

11 Q And as I understand it, and correct me if I misstate  
12 it, that your Question 31 says a general emergency condition  
13 was declared at 3:30 today, at Seabrook Station.

14 Is that --

15 A (Cole) That is correct.

16 Q Now, this is in relation to --

17 JUDGE SMITH: Excuse me, go ahead.

18 I wanted just to interrupt here, a moment to let the  
19 record reflect that SAPL's representative has returned, and the  
20 Town of Hampton.

21 BY MR. LEWALD:

22 Q And that a general emergency condition indicates that  
23 there has been a failure in the plant safety systems.

24 And then going on, the Question 31 says, a release of  
25 radiation into the air occurred at -- and what is the time, is

1 there a time -- does Question 31 give a time for the blank that  
2 is on Page G-30?

3 A (Cole) No, it does not.

4 Q So that the time is skipped in the question and also  
5 the following words, New Hampshire, is that correct?

6 A (Cole) Yes.

7 Q And then the question goes on to read, civil defense  
8 and public health officials are currently reviewing the  
9 consequences of the release, local weather conditions and other  
10 factors.

11 And then the next block is not chosen, correct?

12 A (Cole) The next block of what?

13 Q Of Page G-30.

14 A (Cole) The one, the alternative for no release?

15 Q Yes.

16 A (Cole) No, that is correct.

17 Q And the last paragraph is in the question, correct?

18 A (Cole) Yes.

19 Q And all right, now, on Page G-31, you have deleted  
20 the first paragraph, of the EBS message in your question?

21 A (Cole) That is correct.

22 Q And you have paraphrased the second paragraph?

23 A (Cole) Well, we selected two of those towns, yes.

24 Q And the same is the case for the next town, you have  
25 deleted the -- these are not any of the towns in the, in your

1 scenario as presented in Question 31?

2 A (Cole) The next paragraph deals with reception  
3 centers for towns that weren't selected for evacuation in our  
4 questionnaire.

5 Q Now, is there anything on the remainder of Page 31  
6 that appears in your Question 31?

7 A (Cole) No.

8 Q And you have deleted G-32, in its entirety except for  
9 the fourth paragraph and the first three and a half lines of  
10 that paragraph, and in the next line, the phrase, remaining, or  
11 the sentence, remaining indoors will provide you with  
12 protection for any radiation being released from the plant,  
13 correct?

14 That is in your Question 31?

15 A (Cole) We included that entire paragraph except the  
16 last sentence.

17 Q And you have not included anything else on Page G-32?

18 A (Cole) No.

19 Q And nothing on Page G-33 that appears in your  
20 Question 31?

21 A (Cole) That is correct.

22 Q And nothing on Page 34.

23 A (Cole) That is right.

24 Q And nothing on Page 35.

25 A (Cole) Yes.



1 Q Now, the next scenario, if you will, appears as  
2 Question 312, does it not, in your questionnaire?

3 A (Cole) Yes.

4 Q And this was taken from message G, in Appendix G,  
5 appearing at Pages G-36 to -39, was it not?

6 A (Cole) I really cannot answer that, without, you  
7 know, reviewing this message and actually having access to the  
8 draft of the EBS message that I was given.

9 Q Well, maybe I can cut it short.

10 Isn't it true that insofar G-312 is concerned, as far  
11 as that scenario, that you took but one single paragraph from  
12 Message G, which appears on Pages G-37, through G-39, of  
13 Appendix G.

14 And that paragraph appears on the first page and the  
15 next paragraph from the bottom, it says, all schools within the  
16 town advised to evacuate, are being evacuated to the pre-  
17 designated reception centers, for the towns in which they are  
18 located. Parents should not drive to school to meet their  
19 children since children are being bussed directly to reception  
20 centers.

21 A (Cole) That is correct.

22 Q And you have used nothing else in Message G of the  
23 EBS messages as appear in Volume 4, of the Plan, Rev. 2 of the  
24 Plan?

25 A (Cole) Except that, at the beginning --

1 Q Pardon?

2 A (Cole) -- except that at the beginning of question,  
3 we tell them to -- that they had heard the last message  
4 ordering a general evacuation.

5 So that information was included then.

6 Q You just made a reference to it.

7 A (Cole) That is correct, yes.

8 Q You did not repeat it?

9 A (Cole) No, we did not.

10 Q And insofar the EBS message, it is fair to say that  
11 you took a single paragraph of an EBS message of some  
12 two-and-a-half pages?

13 A (Cole) Well, they had just heard the --

14 Q Is that true?

15 A (Cole) As far as what we took from this EBS message,  
16 or as far as what the respondents ---

17 Q As far as what you took from the EBS message.

18 A (Cole) As far as what we took from the EBS messages,  
19 that is true.

20 Q And now, on Page 24 of your testimony, you say that  
21 you did not utilize the exact wording of the EBS messages  
22 contained in the plan.

23 And that is a true statement?

24 A (Cole) Yes.

25 Q And you say the reason you did not is because you

1 regard the messages as either repetitious or not essential?

2 A (Cole) For the purposes of the survey.

3 Q For the purposes of the survey.

4 A (Cole) Right.

5 Q But you are not saying that these were not essential  
6 for the purposes of giving an emergency broadcasting, emergency  
7 broadcast message in a real emergency, are you?

8 A (Cole) No.

9 We were not making any attempt to evaluate the  
10 adequacy of these messages in a real emergency. We were just  
11 utilizing the messages to aid us to construct plausible  
12 scenarios to find out how people would behave, under a  
13 plausible scenario at Seabrook.

14 Q And you were not trying then to relate the possible  
15 scenarios that, in your questionnaire to what might be an  
16 actual scenario at Seabrook?

17 A (Cole) We believe that --

18 Q Can you answer that yes, or no, and then elaborate?

19 A (Cole) I don't think that I can, but if you will  
20 repeat the question, I will see if I can.

21 Q Well, in the scenarios that you incorporate into your  
22 questionnaire, in doing so, you did not intend to simulate what  
23 you might consider to be an actual scenario at an incident, or  
24 following an incident occurring at Seabrook?

25 A (Cole) We attempted to give these people an idea, an



1 essential idea of what would happen at Seabrook, what they  
2 would be told to do, and then find out what they would do.  
3 That is what we asked them.

4 We did not attempt to simulate the actual EBS  
5 messages.

6 Q You were just trying to give them a gist of it, is  
7 that what I understand?

8 A (Cole) We wanted to know how people in the EPZ would  
9 behave if there were an accident at Seabrook.

10 Now, there are a million possible accidents that  
11 could occur, and to help us to construct reasonable and  
12 relatively realistic scenarios, and to limit as far as  
13 possible, any unintentional bias that can come into a  
14 questionnaire, we utilized as far as possible, the actual EBS  
15 messages contained in the plan.

16 Q But as far as possible, in some of these instances,  
17 did not take you very far, did it?

18 A (Cole) We did as much as was possible to do in doing  
19 this research.

20 We conducted pre-tests as I said before, in which we  
21 had four versions of these EBS messages and we found that you  
22 just cannot read a five-page EBS message to somebody in a  
23 telephone survey.

24 Q Well, would it be fair to say that you found out that  
25 the survey methods that you had adopted, was not suitable for

1 the purpose intended, so that instead of changing the model of  
2 your survey, you changed the facts of what you were studying?

3 A (Cole) That is not true. That is not true.

4 The technique that we -- they utilized, I think, is a  
5 very good method, to collect information on what we were  
6 interested in studying.

7 We were interested in knowing what people would do if  
8 there were a radiological emergency at Seabrook and we found  
9 that out. We were not interested in using a telephone survey  
10 to do some sort of evaluation of the actual EBS messages in  
11 this plan.

12 We only utilized these messages to help us construct  
13 reasonable probable scenarios, that could occur if there were  
14 an accident at Seabrook.

15 Q Well, doesn't this point up the classic case of  
16 forcing a study to a method?

17 A (Cole) I don't understand what you mean by forcing a  
18 study to a method.

19 Q Well, you could not read the EBS messages as they  
20 were drafted, which were intended to cover a particular  
21 situation at Seabrook, so you improvised and created your own.

22 And you also in the method chosen to study, you could  
23 not examine households and you had to go to individuals. Had  
24 you chosen a methodology to go out and interview the various  
25 people that the sample would, households that the sample

1 indicated you should, then you would not have had these  
2 problems.

3 You would not have had to readapt the EBS messages,  
4 you could have interviewed households instead of individuals,  
5 isn't that so?

6 MR. TRAFICANTE: I am going to object to the  
7 mischaracterization of the testimony up to this point.

8 I don't believe that question was a fair  
9 characterization of the testimony.

10 JUDGE SMITH: It is a very lengthy question and it is  
11 going to be hard to go back and see if every element of it,  
12 every link of it is a correct characterization.

13 Can you break it down and --

14 MR. LEWALD: I am not going to pursue it.

15 It is just a follow-up of asking him whether he is  
16 forcing the study to the method.

17 JUDGE SMITH: I think that he has explained his  
18 objectives.

19 The Board feels the question as originally put is  
20 were you forcing the study to the method, was clear, and we  
21 think that it should be answered.

22 But if you don't understand it, let's try again, and  
23 see if we cannot satisfy Mr. Lewald's needs.

24 THE WITNESS (Cole): We were not forcing a study to a  
25 method. We used the best possible method to conduct this study.



1           We wanted to find out what people would do in a  
2 radiological emergency. We briefly described a hypothetical  
3 radiological emergency at Seabrook and then we asked people  
4 what they would do?

5           And we obtained their responses. And in my opinion,  
6 those responses are reliable. We utilized the EBS messages in  
7 order to help us construct these plausible accident scenarios.

8           MR. LEWALD: I will move to another subject.

9           BY MR. LEWALD:

10          Q     On Page 25, of your testimony, I guess this is yours,  
11 Dr. Cole, you refer to Question 341 of the survey, which asks  
12 respondents how many individuals in your household would need  
13 public transportation in order to evacuate?

14           And then you then proceed to analyze the results of  
15 that question or the results of answers to that question on the  
16 remaining portion of that page.

17           And then in the last paragraph, you say, thus, there  
18 are about 4,000 separate households requiring public  
19 transportation in the event of an emergency and a total of  
20 approximately 67,000 or 7.3 percent of the population requiring  
21 public transportation.

22           Now, and then you go on to say this about three  
23 times, the estimates made by KLD.

24           Now, have you, in the course of your scrutiny of the  
25 responses to the questions in your survey, considered the

1 responses to questions that were asked of people in the EPZ as  
2 to how many cars they would use to evacuate, one car, no cars,  
3 or whatever?

4 A (Cole) Yes, I believe that is a question in the  
5 survey, yes.

6 Q And would you accept that the answers to those  
7 questions with respect -- that with respect to no cars, fell in  
8 a range of zero to 3 percent of the population, does that seem  
9 in order?

10 A (Cole) I don't have the data in front of me.

11 Q You have the answers to the questions in front of  
12 you, don't you?

13 Do you want to take a minute and just look at a  
14 couple of those?

15 A (Cole) If you tell me the question number, that  
16 would help.

17 Q You are perhaps more familiar with the questionnaire  
18 than I am.

19 MR. TRAFIDONTE: If Mr. Lewald knows the number, it  
20 would certainly expedite matters.

21 MR. LEWALD: I appreciate that, but I don't have the  
22 number at my fingertips.

23 (Pause.)

24 MR. LEWALD: Can we start at --

25 THE WITNESS (Cole): Can you repeat the question, I

1 I think I have the relevant information now.

2 MR. LEWALD: Yes.

3 BY MR. LEWALD:

4 Q I was asking you to compare the survey responses of  
5 people who have answered that they have no cars to use in an  
6 evacuation, with respect to, and compare it with your figure of  
7 67,000 individuals, or 7.3 percent.

8 JUDGE SMITH: That is 6,700.

9 MR. LEWALD: That is 6,700.

10 BY MR. LEWALD:

11 Q And I was asking you to accept a statement that the,  
12 insofar the people in New Hampshire in the EPZ, that have  
13 answered the question, how many of your vehicles would you and  
14 your family use to evacuate, that those responding with no  
15 vehicles to the question, no vehicles or responding with the  
16 answer no vehicles were from zero to 3 percent.

17 A (Cole) That seems reasonable.

18 (Continued on the next page.)

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1 Q And that if you took three percent of the EPZ  
2 population, what figure would you arrive at? Well, let  
3 me -- strike that.

4 MR. TRAFICANTE: If this would help, I think the data  
5 is contained at Page 25 of the technical appendix, if I'm  
6 following the line of questioning.

7 BY MR. LEWALD:

8 Q Is three percent -- is three percent that far away  
9 from the 2.5 percent that the plan assumed as those residents  
10 of New Hampshire which would require public transportation  
11 during a radiological emergency?

12 A (Cole) I don't really understand the logic of  
13 your --

14 Q Would it be fair to assume that those people who  
15 answered the survey and said that they had no cars with which  
16 to evacuate would need public transportation to evacuate?

17 A (Cole) Not necessarily.

18 Q Not necessarily. All right.

19 Dr. Cole, can you cite any study anywhere where  
20 public transportation is used to evacuate anyone, let alone 7.3  
21 percent of the total population?

22 A (Cole) Could you repeat the question, please?

23 Q Sure.

24 Can you cite any study anywhere where public  
25 transportation is used to evacuate anyone, let alone 7.3

1 percent of the population?

2 A (Cole) I'm not familiar with those studies.

3 Q Turn back to Page 16 of your testimony.

4 And do -- in the middle of that page is a question,  
5 "Can the result of such a random sample survey be used to  
6 generalize to all of the households in the EPZ?"

7 Do you see that question?

8 A (Cole) Yes.

9 Q First of all, can we agree that the survey that was  
10 undertaken was not a random sample survey?

11 A (Cole) No.

12 Q We cannot agree with that?

13 A (Cole) No.

14 Q Even though the heads of households were not changed,  
15 were not selected randomly?

16 A (Cole) It was a random sample of households.

17 Q But you didn't interview households, did you?

18 A (Cole) We interviewed individuals as informants  
19 about what households would do.

20 Q All right, we've been over that.

21 You then go on to say, "With the exception of a few  
22 households who do not have residential telephones, that this  
23 sample is an accurate way to generalize to all the households  
24 living in the EPZ."

25 And you say that because you consider the sample to

1 have been a random sample.

2 A (Cole) I consider it to be a random and accurate  
3 sample of households in the EPZ, correct.

4 Q Now, you go on to say, "For this survey, the sampling  
5 error is plus or minus three percentage points."

6 Then you further say that, "This means, in theory,  
7 that if the survey would be repeated 100 times using the same  
8 techniques, in 95 out of 100 times the result obtained for a  
9 particular question would be within three percentage points of  
10 the results which would have been obtained by interviewing  
11 every member of every household with telephones living in the  
12 EPZ."

13 Now, how did you compute the sampling error?

14 A (Cole) There is a standard statistical formula  
15 that's utilized.

16 Q Well, would it be fair to say that you took twice the  
17 standard error, and called it the sampling error?

18 A (Cole) Yes. 1.96 times the standard error.

19 Q 1.96?

20 A (Cole) Yes.

21 Q Could you tell us what the standard formula is?

22 Could you write that on the board? Have you --

23 (Pause while witness writes on blackboard.)

24 BY MR. LEWALD:

25 Q And by doubling the 1.96, you -- this is standard



1 error that you have given us the formula for, correct?

2 A (Cole) The sampling error. I give the sampling  
3 error of the survey.

4 Q Now, on -- thank you, Doctor.

5 Now, on Page 53 of the technical appendix you say  
6 with respect to this error that, "This means, in theory," and  
7 going on is a repetition of what you have on Page 16 of your  
8 testimony, correct?

9 JUDGE SMITH: What are you going to do with that  
10 sampling error formula? Anything? Do you want to put it in  
11 the record? It hangs there unproductive.

12 MR. LEWALD: Why don't we put it in the record?

13 JUDGE SMITH: All right.

14 Could you duplicate that?

15 JUDGE SMITH: All right, why don't you read it into  
16 the record.

17 THE WITNESS: (Cole) All right, it's --

18 BY MR. LEWALD:

19 Q Could you tell us what it is, Doctor, verbally?

20 A (Cole) Yes. It's  $P$  times  $P$  minus  $Q$ .

21 Q  $P$  is percentage?

22 A (Cole)  $P$  is the percentage on a particular question.  
23  $P$  times  $P$  minus  $Q$  --  $Q$  is not  $P$  -- divided by the square root  
24 of  $N$  times 1.96.

25 Q And  $N$  is the number of interviews?

1 A (Cole) Correct.

2 Q Or responses of --

3 A (Cole) Correct.

4 Q Now, on Page 53, Dr. Cole, you say that, "The  
5 calculations," and these are the calculations that determine  
6 the sampling error, "assume that the survey was conducted under  
7 ideal circumstances."

8 And then you say, "Since there are a large number of  
9 practical problems in conducting surveys of this type, it is  
10 possible there could be other sources of error in the survey."

11 A (Cole) Correct.

12 Q And is it fair to say that this caveat is in the  
13 technical appendix because the formula by which you have used  
14 to determine for a standard error, and then sampling error, is  
15 for situations which present simple random samples?

16 A (Cole) The caveat is in there because it's  
17 essentially boilerplate. It's in every report I do. There  
18 are all sorts of other types of possible errors that could be  
19 in surveys besides sampling error.

20 Q Is the formula you have used to determine sampling  
21 error adaptable to a stratified random sample?

22 A (Cole) I'm not an expert on --

23 Q Is it appropriate to use that formula where you have  
24 a stratified sample?

25 A (Cole) I'm not an expert on statistics. I don't

1 claim to be an expert on statistics. But as far as I can  
2 understand, this way of computing the sampling error on a  
3 survey of this type is an adequate way. Where there is some  
4 more complex way to do it, I really don't know. You would have  
5 to ask a statistician that.

6 But from my experience in dealing with all sorts of  
7 surveys, this is an adequate way of computing the sampling  
8 error for a survey.

9 Q For any survey, irrespective of whether or not it's  
10 stratified, or multistage; is that so?

11 A (Cole) I am not a sampling expert. I am not going  
12 to give testimony on the different -- there are many -- this is  
13 a whole field in statistics. It's a specialty in statistics,  
14 and there are literally hundreds of various tests to compute  
15 the sampling errors under all sorts of different circumstances.

16 Q Well, you have used a statistic in your testimony,  
17 have you not?

18 A (Cole) That's right. I believe that the statistic  
19 is more or less accurate.

20 Q But you are not certain as to its limitations in more  
21 complex sampling procedures, are you?

22 A (Cole) No.

23 Q Does your lack of knowledge in this field concern you  
24 that your determination of the sampling error may give a  
25 misleading interpretation of the reliability to be obtained by



1 your survey?

2 A (Cole) I am absolutely sure, since I have worked  
3 with statisticians, that if you use any other method of  
4 computing the sampling error, it is not going to be  
5 significantly different from what I have indicated. Given the  
6 purposes of this survey, the method that I have used of  
7 computing the sampling error is very accurate.

8 We aren't interested in figuring out whether 52  
9 percent, or 54 percent, or 50 percent of the Seabrook  
10 population would evacuate. We were interested in looking at a  
11 general idea of what's going to happen here.

12 You can't get another method of computing the  
13 sampling error that's going to show a sampling error that's  
14 very different from what I have done, because I have worked  
15 with statisticians on more complex surveys such as election  
16 surveys where they have used more complex methods of computing  
17 sampling error, and using the least complex method does not  
18 give you sampling error estimates which are significantly  
19 different from the most complex methods.

20 Q But it does give you -- the most simple form does  
21 give you a lower sampling error, does it not, lower sampling  
22 error figure?

23 A (Cole) It's possible that if you were to use some  
24 more complex method, you might get a sampling error of four  
25 percent instead of three percent.

1 Q But you think it would be in that range, do you?

2 A (Cole) Yes. From my experience, that's the maximum  
3 that it would change. You might get four percent.

4 Q Now, on the bottom of Page 17, you describe what your  
5 interviewers did by way of a -- well, by way of following a set  
6 of callback procedures.

7 Do you see that?

8 A (Cole) Yes.

9 Q Where are the results of the callback procedures  
10 located in the study?

11 A (Cole) The only information that is presented in the  
12 study is included in the technical appendix in Table A-3 on  
13 Page 57.

14 Q And what does that tell us? Does that tell us how  
15 many successes the interviewers had by calling back  
16 individuals?

17 A (Cole) Yes. It tells us what happened to every  
18 single phone number in that sample.

19 What we do is we give an end result for every phone  
20 number. There were a total of 6611 phone numbers. In 1404 of  
21 these numbers, we completed interviews, et cetera.

22 Q But it doesn't tell us on what callback were managed  
23 to complete the interview.

24 A (Cole) No.

25 Q And in fact it doesn't tell us whether any completed

1 interviews were made on callbacks, does it?

2 A (Cole) This table does not, no.

3 Q Does any table?

4 A (Cole) No.

5 Q Do you personally know whether any callbacks resulted  
6 in completed interviews?

7 A (Cole) Yes, I do.

8 Q But you didn't choose to put this information in the  
9 study?

10 A (Cole) This type of information is never included in  
11 any of the 150 reports I've written. It's detailed information  
12 that doesn't have any relevance to this study. We never  
13 include that information in our reports.

14 Q That's in your reports?

15 A (Cole) I haven't seen it in other reports either.

16 Q Now, on Page 18, you were asked the question, "What  
17 was the response rate in this survey?"

18 And your answer to that is, "Normally in surveys,  
19 such as this one, response rates are computed by dividing the  
20 number of completed interviews by the number of eligible people  
21 contacted (the complete plus the refusals)."

22 Then you go on to say when you did this, you found a  
23 completion rate of 64 percent. And then you are discussing the  
24 reciprocal of that and say, "This means that we were unable to  
25 complete interviews with 36 percent of the households we



1     contacted," correct?

2             A     (Cole) Correct, yes.

3             Q     Now the 64 percent completion rate ignores, does it  
4     not, the 1055 no answers that you received after three  
5     callbacks?

6             A     (Cole) Correct.

7             Q     And it also ignores the 457 busy signals, inability  
8     to reach household heads?

9             A     (Cole) Correct.

10            Q     And it also ignores the 2270 nonworking numbers that  
11    you found?

12            A     (Cole) Well, those would be totally irrelevant. I  
13    mean, those aren't real phone numbers.

14            Q     They were not real phone numbers?

15            A     (Cole) No. The random digit dialing practice  
16    generates a whole list of numbers, some of which don't really  
17    exist. That's the only way you can be sure of including  
18    unlisted numbers.

19                    So some of those numbers don't exist in the sense  
20    that they're not assigned to anybody. They are not real  
21    numbers. They are not existing numbers.

22                    Every survey that uses random digit dialing has a  
23    substantial portion of these.

24            Q     But some of them do exist, but were not working at  
25    the time you attempted to call these numbers.

1           A       (Cole) No, I'm sorry that the term "not a working  
2 number", it's a technical term; it's not clear in this report.  
3 Not a working number means it is no phone number. When you  
4 dial that number, you get a recorded message saying, this is  
5 not a working phone number. But nobody has that number. No  
6 individual, no business, nobody has that number. There are  
7 gaps in the blocks.

8                   Let's say we're dealing with 751-6000 as a block.  
9 That's what my home phone is. There might be 751-6234, which  
10 is assigned to nobody. It's an empty number. And the computer  
11 could generate that, and if you dialed that number, you'd get  
12 this recording.

13           Q       All right, you began in your sample by taking  
14 discrete telephone codes, correct?

15           A       (Cole) We started with exchanges.

16           Q       Would you -- these are -- do you accept that these  
17 are discrete telephone codes, exchanges, 823 or 523?

18           A       (Cole) Yes. We started with those exchanges.

19           Q       And would you accept that there are roughly 10,000  
20 numbers in each of these discrete exchanges?

21           A       (Cole) Oh, no. Some of them have very much less  
22 than that. Some of them only have less than a thousand.

23           Q       I'm talking about -- not talking about issued  
24 numbers. I'm talking about total possible numbers in an  
25 exchange.

1 A (Cole) Of possible numbers?

2 Yes.

3 Q Now, in the discrete exchange, there are subdivisions  
4 called blocks; is that what we're saying?

5 A (Cole) Yes.

6 Q And it's the blocks that you're concerned with, not  
7 the numbers in the exchange?

8 A (Cole) The computer has information on which of the  
9 blocks are working; that is, have numbers that you're assigned.  
10 And they only draw the random numbers from the working blocks.

11 Q So you're taking random numbers of the total possible  
12 telephone numbers in an exchange, is that true?

13 A (Cole) No, we're taking random numbers from the  
14 working blocks.

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15 (Continued on next page.)

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1 Q From a block in which any number may be working, is  
2 that what I understand?

3 A (Cole) Right.

4 Q And it could be one or 5,000?

5 A (Cole) In a block?

6 Q No, that is working.

7 A (Cole) The blocks are smaller. There couldn't be  
8 5,000 in a block. A blocks are smaller units. They are  
9 defined generally by the first --

10 Q What category do you have of the numbers called that  
11 you were unable to complete because the line was out of order,  
12 if that's a better term? It had a household on the other end  
13 of it, but for some reason the line was malfunctioning.

14 A (Cole) That would have either come in in a no  
15 answer, or busy. If the line is out of order, it could ring,  
16 or it could ring as a busy.

17 Q And the 2270 is just a plain nonissued number is what  
18 you're telling me.

19 A (Cole) Yes.

20 Q Now, you also say the 64 percent complete rate  
21 ignores 93 cases where the communication was too difficult to  
22 complete the interview.

23 A (Cole) Correct.

24 Q And it also ignores 439 cases where the sex or town  
25 quota was filled, correct?

1 A (Cole) 249, yes.

2 Q Isn't that 439?

3 A (Cole) It's 249 on my page.

4 Q Now earlier in your testimony with respect to the  
5 response rate, you say the lower the response rate, the less  
6 confidence you could have in the survey of result; is that --  
7 that's true?

8 A (Cole) In general, yes.

9 Q And then you go on to say, "It is also important in  
10 assessing the adequacy of the result of the survey results how  
11 the numbers of no answers, busy signals, or no eligible  
12 respondents at home, because there can be no way of knowing  
13 whether these people would have answered differently than those  
14 interviewed."

15 A (Cole) Correct.

16 Q And is what all this comes down to that you have no  
17 way of knowing as to how -- knowing that 155 no answers, to 457  
18 busy signals, and 93 communication difficult cases, and the  
19 cases in which sex or town quota was filled would answer the  
20 question?

21 A (Cole) Correct.

22 Q Now proceeding on Page 19, you talk about methods  
23 used to validate the surveys.

24 Wouldn't it be more accurate to say that you weren't  
25 validating the survey, but validating the interviewing process?

1 A (Cole) Yes, I'll accept that.

2 JUDGE LINENBERGER: Excuse me, Mr. Lewald, but with  
3 respect to the last question inquiring about validation, I  
4 thought I heard you say, Dr. Cole, in answer to the question,  
5 "Yes, that also."

6 Did I hear correctly?

7 THE WITNESS: (Cole) No, I said, yes, I'll accept  
8 that.

9 JUDGE LINENBERGER: Oh, excuse me.

10 THE WITNESS: (Cole) His change of my wording.

11 JUDGE LINENBERGER: Thank you.

12 THE WITNESS: (Cole) He said that we utilized two  
13 methods to validate the interviewing process. I think that  
14 is -- that's more accurate than --

15 JUDGE LINENBERGER: That's fine. Thank you.

16 MR. LEWALD: May I have a moment?

17 (Pause.)

18 BY MR. LEWALD:

19 Q Like to ask the panel to turn to Page 28 of the  
20 testimony, and to the question that's put on that page, "In  
21 other proceedings," which I'll read. "In other proceedings  
22 concerning emergency planning for nuclear power plants,  
23 witnesses for the owners have argued that surveys are not a  
24 reliable means to predict what people would do in a real  
25 emergency."



1 And then you ask yourself, "Why should the Board  
2 accept as valid the survey results you have described?"

3 And I want to ask the panel if isn't it the almost  
4 unanimous position with panel acceptance, that no credit can be  
5 given to responses as to a belief of individual in their own  
6 behavior in an emergency that they have never experienced?

7 Isn't their great weight of authority in profession  
8 to this extent?

9 A (Cole) That's not true, in my opinion. And --

10 Q But isn't that the weight of authority is?

11 A (Cole) No, it's not. And if you can -- I can give  
12 you an example. A witness for LILCO during the recent  
13 proceedings down there, Michael K. Lindell has published  
14 extensive research in which he has used the same kind of  
15 surveys as we use, and gives them tremendous credence in  
16 analyzing what people will do in a radiological emergency.

17 Dr. Dennis Mileti and Dr. John Sorenson of Oak Ridge  
18 National Laboratories have published many papers in which they  
19 use surveys, for example, the Cynthia Flynn survey, in  
20 analyzing what people do in emergencies. I mean this is --

21 Q These are not studies simply to determine people's  
22 perception of a risk?

23 A (Cole) The Lindell and Barnes study --

24 Q No, the Mileti studies.

25 A (Cole) Do you want to answer --

1 Q Well, finish the Lindell study.

2 A (Cole) The Lindell and Barnes study dealt totally  
3 with hypothetical accidents. One caused by a radiological  
4 accident at a nuclear power station, and the other by some  
5 chemical accident. And then they asked samples of people what  
6 they would do in this condition. And they published an  
7 extremely good and interesting article analyzing why so many  
8 people would overreact, if you will, in the case of a  
9 radiological emergency. It's a fine piece of research.

10 Q Is that study cited in the testimony?

11 A (Cole) Yes, it is.

12 Q And that's at what page?

13 A (Cole) Page 34.

14 Q And the Miletic study that you were talking about, is  
15 that cited in the testimony?

16 A (Cole) It's cited in the -- I think in the report,  
17 the Social Data Analysts report. It's on Page 12 of the Social  
18 Data Analysts report. I do not have an exact reference to the  
19 paper there, but it was a paper that -- it was written  
20 initially by Sorenson, who was a witness for LILCO in  
21 proceedings on Long Island.

22 Q Now, in your answer to the question that you have  
23 asked yourself on Page 28, you say that, "No one suggests that  
24 the survey is a precise instrument which accurately predicts  
25 exactly how many, or which people would actually attempt to

1 evacuate were a real accident to occur. But the survey is the  
2 best tool we have."

3 Is it the only tool that you have to determine how  
4 people are going to behave in an accident?

5 A (Cole) No.

6 Q Isn't the empirical evidence of some value to reach a  
7 determination as to what people may act -- how people may act  
8 in an accident?

9 A (Cole) What empirical evidence?

10 Q Empirical evidence of how people have acted in  
11 accidents?

12 A (Cole) In a radiological emergency such as TMI?

13 It's extremely important, very important what people  
14 did at TMI.

15 Q TMI would be one example, would it not?

16 A (Cole) TIM, to my knowledge, we don't have good  
17 data, unfortunately, on Chernobyl. But TMI is the only example  
18 of a significant radiological emergency in the United States,  
19 and certainly the only example upon which we have any data.

20 A (Zeigler) And I think most researchers today would  
21 agree that it's better to generalize from Three Mile Island to  
22 future nuclear emergencies than it is to generalize from the  
23 many studies of floods and hurricanes to nuclear emergencies.

24 Q Now, going on still on that page, the last sentence  
25 in that page you say, "In a real accident, depending on the



1 seriousness of the accidents and the variables, the evacuation  
2 shadow might be somewhat larger or smaller than that found in  
3 the survey."

4 Are you suggesting that in a real accident we  
5 shouldn't count on the survey?

6 A (Cole) The statement speaks for itself. We're  
7 saying that in a real accident you could have either a larger,  
8 perhaps a significantly larger or a somewhat smaller evacuation  
9 shadow than that indicated by the survey. There are all sorts  
10 of variables that could influence that in a real accident.

11 Q Turn to Page 39 of your testimony, and the question  
12 in the middle of the page. It says, "Was it prudent for the  
13 New Hampshire Radiological Emergency Response Plan drafters to  
14 have assumed that these emergency workers can be relied upon to  
15 report to duty promptly."

16 And your answer is no.

17 Could I ask the panel how it is using the word  
18 "promptly" here in this question? Is there a time frame that  
19 the "promptly" suggests?

20 A (Johnson) I think the time frame would be dictated  
21 by the nature of the accident, the speed of onset of the  
22 accident. Promptly is used in the sense of protecting public  
23 health and safety.

24 Q Then if the accident was one of slow development,  
25 then the promptly would be -- could be slow response also; is

1 that what you're --

2 A (Johnson) No.

3 A (Zeigler) No, I think promptly means, in most  
4 people's minds, as fast.

5 Q Think it means what?

6 A (Johnson) In most people's minds, promptly means --

7 Q What does it mean in your mind?

8 A (Zeigler) Well, I think I'm representative of most  
9 people. In most people's minds, promptly means as fast as you  
10 can. And there is no way to assess a slow moving accident  
11 except in retrospect.

12 Retrospectively, you could say it's a slow-moving  
13 accident. But if you're looking to the future of a developing  
14 accident, you have to assume that an accident could break  
15 almost instantly and require emergency personnel to pay  
16 attention to their duties almost instantly.

17 Promptly means as fast as possible, as fast as you  
18 can.

19 Q Well, going on with your answer, you say, "In making  
20 this," -- after "no". "In making this assumption, the State of  
21 New Hampshire has failed to consider the impact of role  
22 conflict on the behavior of emergency workers in crisis  
23 situations."

24 The fact that people may have role conflicts, you  
25 would agree, does not mean that they will actually abandon

1 their roles, does it?

2 A (Zeigler) No, there's a range of behavior. Role  
3 abandonment is one possible behavior.

4 Q And in that role abandonment has never been -- has  
5 never happened where the nature of the emergency worker's role  
6 was defined, would it not be imprudent for the New Hampshire  
7 drafters to assume that the emergency workers aren't going to  
8 show up?

9 A (Johnson) I'm not sure of -- I'm unclear on your  
10 question.

11 Q You are unclear as to that?

12 A (Johnson) Yes.

13 MR. SELLECK: He doesn't understand the question.

14 MR. LEWALD: No, I know he doesn't understand the  
15 question.

16 BY MR. LEWALD:

17 Q The question that you posed is, was it prudent for  
18 the New Hampshire drafters to have assumed that these emergency  
19 workers can be relied upon to report to duty promptly.

20 And from that question, we have in our discussion has  
21 led us to the fact that failure to report in some instances may  
22 be for reason of role abandonment; is that true?

23 A (Zeigler) In some instances, role abandonment may  
24 result from role conflict.

25 Q And you would consider in --



1 JUDGE SMITH: Well, you -- I didn't think that was a  
2 response -- responsive.

3 If you are happy with it, proceed.

4 MR. LEWALD: Well.

5 THE WITNESS: (Zeigler) I'm unclear to the question.

6 BY MR. LEWALD:

7 Q Would it not be imprudent for the New Hampshire  
8 drafters to assume that emergency workers with defined roles  
9 will not report to duty promptly or when needed?

10 MR. TRAFICANTE: I'm going to object. I'm sorry, but  
11 I think the question was, would it not be imprudent to assume  
12 they would not." I think it's a triple negative, and I sure  
13 don't understand it, if that's what the panel is struggling  
14 with.

15 MR. LEWALD: Well, it may be, and let me rephrase it.

16 BY MR. LEWALD:

17 Q Would you agree that it would be imprudent for the  
18 New Hampshire drafters, or New Hampshire emergency response  
19 drafters, to have assumed, or to assume that emergency workers  
20 under the plan cannot be relied upon to report to duty where  
21 emergency workers with defined roles have never refused to  
22 report to duty?

23 A (Zeigler) At Three Mile Island, while there was not  
24 a plan to take care of an accident at Three Mile Island, there  
25 were groups of people in the population that had generally

1 assigned emergency duties. They knew that they would be called  
2 upon to take care of emergency situations in general.

3 These people at Three Mile Island did not universally  
4 respond. They experienced role conflict. Some of them existed  
5 role abandonment behavior.

6 And I think we ought to generalize once again from  
7 the experience at Three Mile Island to future nuclear  
8 emergencies.

9 Q Well, what you're saying is, Doctor, that in an  
10 emergency, even though it's not part of a specific emergency  
11 response plan, people look to the fire department, the local  
12 fire department, the local police department, to respond to  
13 emergency functions?

14 A (Zeigler) I think that --

15 Q And that these people in Three Mile Island, they had  
16 not stayed on the premises. Is that what you're talking about?

17 A (Johnson) I think we're talking --

18 Q That people with general emergency duties?

19 A (Johnson) I think we're talking --

20 Q Is there anybody in Three Mile Island that had an  
21 emergency role as defined in the plan, that abandoned his role?

22 A (Johnson) First of all, it is important to establish  
23 that there wasn't a plan at TMI. And I think we can be more  
24 specific with the groups that we're talking about.

25 To my way of thinking, medical doctors have emergency

1 roles irrespective of the kind of incident, especially  
2 emergency room doctors. Moreover, I think the National Guard  
3 has emergency roles irrespective of the kind of incident.

4 And the research record shows that in both instances  
5 we had people who failed to report for duty, who were unable to  
6 be contacted by telephone and so forth and so on. And that led  
7 to role abandonment. They just weren't available. The  
8 evidence shows that they had evacuated with their families.

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9 (Continued on next page.)  
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1 Q Is one of the sites for this proposition that you  
2 have just given me, Dr. Johnson, in that of Maxwell's Hospital  
3 organization's response to the nuclear accident at Three Mile  
4 Island, which appears in your footnote 17 to your testimony?

5 A (Johnson) What page are you referring to?

6 Q Page 45.

7 A (Johnson) I think that all of the sites in footnote  
8 17 refer to the basic proposition that role conflict was a  
9 problem at TMI.

10 Q Well, I thought in your testimony you were  
11 specifically referring to Maxwell, and then, indeed, on Page  
12 46, of your testimony, you say at one local hospital, for  
13 example, only six of the 70 physicians who were scheduled for  
14 weekend emergency duty reportedly showed up for work?

15 A (Johnson) Yes.

16 (Pause.)

17 BY MR. LEWALD:

18 Q On Page 46 of your testimony, that we just made  
19 reference to, in Note 20, you cite Maxwell and then footnote  
20 17, and at Page 278, for the sentence, at one local hospital,  
21 for example, only six of the 70 physicians who were scheduled  
22 for weekend emergency duty, reportedly showed up for work, do  
23 you not?

24 Do you find that on Page 278?

25 A (Johnson) On Page 278?

1 Q Isn't that what you cite as a reference to that  
2 statement in your testimony?

3 A (Zeigler) No, in fact, I would have to clarify that  
4 and say that the quote is from Page 276, the reference --

5 Q The quote is on Page 226?

6 A (Zeigler) The quote is on Page 276, that is an  
7 error.

8 Q And where is the quote on Page 276?

9 A (Zeigler) There is a section called staffing at the  
10 end of that first paragraph, under the section called staffing.

11 Q Can you find a quote that at one local hospital, for  
12 example, only six of the 70 physicians who were scheduled for  
13 emergency duty reportedly showed up for work?

14 Where is that quote appearing in that?

15 A (Johnson) It is not a quote in our testimony. It is  
16 a reference to the statement at the bottom of the first  
17 paragraph on staffing, which reads, physician staffing reached  
18 critical levels at at least one institution, with one emergency  
19 department physician noting that only six of more than 70  
20 doctors remained available.

21 Q This is not quite the same thing as saying that in  
22 one local hospital, for example, only six of the 70 physicians  
23 who were scheduled for the weekend emergency duty reportedly  
24 showed up for work, is it?

25 A (Johnson) Well, it is not the precise wording. I

1 think the critical thing here is the notion that physician  
2 staffing reached critical levels, at least, at at least one  
3 institution.

4 That suggests to me that they were not available for  
5 work. I think that we are splitting hairs if we are talking  
6 about the wording, but the idea is that there were not  
7 physicians available to do needed work.

8 Q You are not suggesting that 70 physicians who were  
9 lined up for emergency duty, defaulted, and only six appeared,  
10 or are you?

11 A (Johnson) The statement states that only six of more  
12 than 70 doctors remained available to work. Now, whether they  
13 were lined up or whether they had evacuated, I don't know.

14 Q You don't even know whether they were emergency  
15 workers.

16 A (Johnson) Well, it said that they were emergency  
17 department workers.

18 Q The department head was emergency.

19 A (Johnson) Well, in most studies of organizational  
20 behavior, you have to interview someone. Rarely do they ever  
21 interview every emergency worker. They interview the  
22 organization heads.

23 Q Do you know of any hospital that would have an  
24 emergency staff of 70 people on duty, during a weekend?

25 A (Johnson) I am sure that a lot of hospitals



do --

Q You think a lot --

A (Johnson) -- major cities.

(Pause.)

JUDGE SMITH: Excuse me, where does the testimony appear on his testimony, that --

MR. LEWALD: That statement in testimony?

JUDGE SMITH: Yes.

MR. LEWALD: In Page 46, Your Honor, at the second sentence on that page, beginning on the ninth line and it begins with, "At one local hospital -- "

JUDGE SMITH: I see it.

Are you still happy with that statement?

Are you still pleased with that statement?

THE WITNESS (Zeigler): I am sorry, I did not hear you.

JUDGE SMITH: Are you still content or comfortable with that statement?

THE WITNESS (Zeigler): Based on this article, I might modify it to be more in line with the wording that appears in the article.

But I think that the essential point that we are making is made, either way.

And Dr. Johnson says that he has talked to Dr. Maxwell on the phone and I don't know whether that is where the

1 rewording came from or not.

2 THE WITNESS (Johnson): I spoke with him a couple of  
3 years ago with reference to the Shoreham proceedings, and it  
4 was based on our conversation that the way that it was  
5 structured here.

6 I think it is real splitting hairs, personally, so --

7 MR. LEWALD: I see.

8 JUDGE SMITH: Well, let's pursue that.

9 Don't you appreciate the difference that is being  
10 made here, as compared to those actually scheduled to work,  
11 compared to those available to work?

12 Is that a difference, do you think, is a hair-split?

13 THE WITNESS (Johnson): No.

14 I think what is crucial is, that implicit in these  
15 studies is that there is a staffing crisis, if they are  
16 available to work, it seems to me that there would not be a  
17 staffing crisis.

18 JUDGE SMITH: Well, just talk about the word,  
19 "scheduled", in your testimony, is that an important word?

20 THE WITNESS (Zeigler): Yes, I would change that to  
21 bring it more into line with the article.

22 BY MR. LEWALD:

23 Q Actually, the portion of Maxwell article that is  
24 referenced, is footnoted to another source, itself, is it not?

25 A (Zeigler) Yes, it is.

1 Q And what source is it footnoted to?

2 A (Zeigler) The Harrisburg Patriot Evening News.

3 Q Has anybody ever read that?

4 A (Zeigler) Oh, yes.

5 Q Does anybody have it?

6 A (Zeigler) No.

7 Q I would like to go over your testimony on Page 50.

8 And we are still on role conflict and your testimony  
9 says the strongest and most direct evidence of the extent to  
10 which role conflict is likely to be a problem in the event of a  
11 Seabrook emergency comes from the Seabrook Evacuation Survey  
12 already discussed.

13 And then you go on to say, among the other questions,  
14 the Seabrook Survey respondents in the New Hampshire portion of  
15 the Seabrook EPZ, were asked whether or not they had an  
16 assigned role in the plan?

17 And if so, what specific role were they expected to  
18 perform and then what they would do first if a general  
19 emergency requiring full-scale evacuation of the 10-mile plume  
20 exposure was declared at Seabrook?

21 And the precise wording of the question, you suggest  
22 is in Attachment 5, at Pages 68 and 69.

23 Now, the result of that question was that of the 959  
24 households surveyed, 2 percent contained individuals who  
25 reported that they had an assigned emergency role in the plan.



1 And then you go on to say, as Table 2 shows, the  
2 range of services these individuals are expected to perform is  
3 fairly extensive; including police and fire protection and  
4 traffic control, emergency and transportation -- school bus and  
5 ambulance drivers, emergency medicine, nurses and doctors and  
6 emergency communication and official radio or TV position.

7 Now, on Page 51, which is inserted in the middle of  
8 that response, there is a Table 2, and the Table says, Assigned  
9 Emergency Work Roles of Seabrook Evacuation Survey Respondents,  
10 and then in parens, (N equals 31).

11 And, can you tell me what N-31 means in reference to  
12 this Table?

13 A (Zeigler) If you add up the absolute frequency  
14 column in the Table, you will get 31. There were 31 people who  
15 responded to this question.

16 Q So there were, your 31 people responding and six of  
17 those responding said, police, and two of them, four of them  
18 were associated with fire, and so on?

19 Is this --

20 A (Zeigler) Yes.

21 Q On the column.

22 And then if we could go back to Table 1, which is on  
23 Page 49, and this Table shows the initial reaction of  
24 designated emergency personnel to an evacuation summary.

25 And then in regard, under the column, Behavioral

1 Intentions, The Selected Personnel, Seabrook, N-31.

2 Is this the same reference that appears in Table 2,  
3 this N-31?

4 And then on that, we have percentages for the 31  
5 Seabrook personnel, wherein, 52 percent say that they will  
6 perform the emergency work; 39 say that they will check on  
7 family; and three will leave the area; three do something else;  
8 and three don't know.

9 Can the panel help me by applying some numbers to  
10 these percentages?

11 What is 52 percent in terms of numbers?

12 A (Johnson) About 16.

13 Q Pardon?

14 A (Johnson) About 16.

15 Q And 39?

16 A (Johnson) About 12.

17 Q And the three is --

18 A (Johnson) One each.

19 Q Pardon?

20 A (Johnson) One each.

21 Q One each.

22 Now, Dr. Cole, if we were to compute sampling errors  
23 in the methodology that you have done for the survey, for these  
24 statistics, what figures would we get?

25 A (Cole) I am sorry, I don't have a calculator with

1 me.

2 (Counsel proffers witness calculator.)

3 JUDGE SMITH: While he is calculating that, are  
4 you -- it seems like you are almost completed with your cross-  
5 examination.

6 MR. LEWALD: I have, I think, less than five minutes,  
7 but we can stop here. I -- we will be coming back anyway so --

8 (The Board confers.)

9 JUDGE SMITH: All right, let's break and return at  
10 1:00 p.m., please?

11 (Whereupon, at 11:57 a.m., a lunch recess was taken,  
12 the hearing to reconvene at 1:00 p.m., the same day.)

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## AFTERNOON SESSION

(1:03 p.m.)

JUDGE SMITH: You may proceed, Mr. Lewald.

MR. TRAFICANTE: Your Honor, Dr. Cole would like to  
being with a correction, if we might.

THE WITNESS: (Cole) Yes, excuse me.

When I gave you the formula for computing the  
sampling error, it should have been the following. It's P  
times P minus Q, divided by N minus 1, square root, times 1.96.  
Yes, it's the square root of P times P minus Q, divided by N  
minus 1, times 1.96.

Thank you.

## CROSS-EXAMINATION (Continued)

BY MR. LEWALD:

Q And the values of the letters are the same? P is  
percentage, Q is what?

A (Cole) It's the inverse. If P is 50, then Q is 50.  
P-Q is not P.

Q So you could substitute 50 percent above the line  
within the square root symbol, or 50 percent over N minus 1?

A (Cole) It would be .5 times .5 if you assume a  
dichotomy.

Q Okay, thank you.

Now when we had adjourned for lunch, I think I had  
asked you if you had -- if you would compute the sampling error

1 using the same formula for that portion of Table 1 involving  
2 Seabrook-selected personnel for the categories. I think the  
3 first two would be sufficient. I'm not asking you to do the  
4 leave the area, do something, and don't know categories.

5 Have you done that?

6 A (Cole) Yes. Assuming that you have a dichotomy, and  
7 it's 52 as opposed to all others, it would be a sampling error  
8 of plus or minus 18 percentage points.

9 Q For the 52, perform emergency work?

10 A (Cole) Correct.

11 Q And how about check on family?

12 A (Cole) I didn't compute it for the others.

13 Q Would you accept 17 percent?

14 A (Cole) I mean, if you've computed it, it sounds  
15 reasonable, yes.

16 Q Thank you.

17 Now, before lunch I had referred to that part of your  
18 answer, well, to a question, I guess, beginning on Page 50,  
19 which appears on 51 and the top of 52, and resuming  
20 interrogation with respect to that answer and directing your  
21 attention to Page 52.

22 You say that "When asked what they would do, first,  
23 if a general emergency were declared at Seabrook," and this is  
24 the emergency plan workers at Seabrook, "only half," which is  
25 52 percent, "indicated that they would report immediately to

1 their assigned emergency posts."

2 That's the way the testimony reads, correct?

3 "The other half gave responses suggesting that they  
4 would either not report, or would not report promptly to  
5 perform their assigned emergency roles."

6 And then you say, "Among this latter group, a small  
7 percentage indicated they would either leave immediately, do  
8 something else, or unsure what they would do."

9 And then you go on to say, "It's not surprising the  
10 majority indicated."

11 Now, majority here, I assume, means the remaining 39  
12 percent and not majority of 52 percent who said that they  
13 would, they would report immediately; is that correct?

14 A (Johnson) That's correct.

15 Q And then "not surprising the majority," which I take  
16 it is the 39 percent, which is what the panel agreed with,  
17 "indicates that they would first make sure their families were  
18 safely out of the evacuation zone."

19 "Now, in response to the question, 'How would you  
20 make sure your family was safely out of the evacuation zone,'  
21 eight percent of 39," which I take it is some two people or so,  
22 "indicated that they would go home and drive their families to  
23 a safe place out of the evacuation zone, but a majority, 67  
24 percent," which I calculate to be 17 percent, "indicated they  
25 would call home and tell the family to leave without them."



1 Is that correct as I have added the numbers to the  
2 percentages?

3 A (Johnson) You said 17 percent.

4 Q Yes.

5 A (Johnson) I assume you meant 17 individuals.

6 Q Seventeen what?

7 A (Johnson) I assumed you meant 17 individuals. You  
8 said 17 percent.

9 Q Oh, 17. I'm sorry, I do mean -- I did mean 17.  
10 Thank you for correcting me.

11 With that correction, have I correctly stated your  
12 testimony?

13 A (Johnson) I think so, yes.

14 Q Now you go on to say, "Implicit in the latter  
15 testimony responses, the notion the individual would then  
16 report to his or her assigned emergency post."

17 Then the testimony goes on to say, "It is highly  
18 unlikely, however, that these designated emergency workers  
19 would be able to contact family members by telephone during an  
20 accident at Seabrook plant."

21 And for this statement, I read your testimony to rely  
22 on some study that was done in 1979, to the effect that the  
23 telephone system would not be able to handle the emergency work  
24 numbers; is that true?

25 A (Johnson) That's one source, yes.

1 Q Is there another cited?

2 A (Johnson) There is no other cited here, but there  
3 are other studies that show that telephone overload is a  
4 problem in many disasters.

5 (Pause.)

6 BY MR. LEWALD:

7 Q Dr. Johnson, in reference to your prior answer and  
8 your sources in addition to the source cited in your testimony  
9 and in Note 27 as to telephone overload, are these other  
10 sources that you're referring to from the New England, or in  
11 particular, the Seabrook area?

12 A (Johnson) No.

13 Q And I have placed before you a one-page letter, a  
14 copy of a one-page letter on the stationery of the New England  
15 Telephone Company, under the date of December 14, 1987,  
16 addressed to Mr. Anthony Callendrello, signed by Berton Smith,  
17 Operation Manager.

18 MR. LEWALD: And I would ask that this be marked  
19 Applicants' Exhibit 28 for identification.

20 JUDGE SMITH: Twenty-nine.

21 MR. LEWALD: Excuse me, 29.

22 I think Appendix G had been -- I had asked that be  
23 28.

24 JUDGE SMITH: That's right.

25 MR. LEWALD: And I think with the discourse with the

1 Board, I had asked that that not be marked as an exhibit for  
2 identification because I didn't intend to offer it as a  
3 separate exhibit.

4 JUDGE SMITH: All right, so we will mark the letter  
5 of December 14, 1987, as Applicants' Exhibit 28 for  
6 identification.

7 (The document referred to was  
8 marked for identification as  
9 Applicants' Exhibit No. 28.)

10 MR. TURK: For clarification, Your Honor, do I  
11 understand that Appendix G, Emergency Broadcast System  
12 Activation, should not bear --

13 JUDGE SMITH: Doesn't have any number.

14 BY MR. LEWALD:

15 Q In light of the information contained in Applicants'  
16 Exhibit 28 for identification, should your -- well, should you  
17 not alter your testimony as to the opportunities for emergency  
18 workers to reach their homes in the EPZ area in Seabrook?

19 MR. TRAFICANTE: I'm going to object, Your Honor. I  
20 don't think it's appropriate to use information gathered  
21 apparently yesterday or the day before from officials who are  
22 not here, and then put this kind of information directly before  
23 the witness and ask, in light of this information.

24 We don't know what the questions were that were put  
25 to New England Telephone. We don't know the context in which



1 the information is to be interpreted. Clearly, we don't know  
2 whether it's true or not, but that would go to the hearsay  
3 aspect of it.

4 But beyond that, the recent vintage of this letter  
5 gives me some pause as to whether it's appropriate to use in  
6 this fashion. It may be rebuttal, but I don't see it as  
7 appropriate technique for cross.

8 MR. LEWALD: Well, the witness obviously was relying  
9 on hearsay for the statement that he has in his testimony as to  
10 the sources that he has in his testimony, and that which he  
11 cited today. I don't see that this is any different than the  
12 other sources, and the question was --

13 JUDGE SMITH: Well, you're --

14 MR. LEWALD: And I don't know whether he will say yes  
15 or no, he would or would not.

16 JUDGE SMITH: So in effect right now you are asking  
17 the Board and the panel to accept as established the statements  
18 contained in this letter for the truth of it?

19 MR. LEWALD: Well, I'm asking if they would accept it  
20 as the truth of the matters stated, whether this would change  
21 their testimony, yes.

22 MR. TRAFICANTE: As a hypothetical then. In which  
23 case, I don't think we need this letter at all. If it's put as  
24 a hypothetical, then I have no problem.

25 JUDGE SMITH: Do you intend to support this letter

1 other than just a naked offer of it?

2 MR. LEWALD: We can bring in a witness who will  
3 testify to this, as to the contents of the letter. I assure  
4 you I didn't make up the letter.

5 JUDGE SMITH: Oh, no, Mr. Lewald, you know --

6 MR. LEWALD: I -- we do have a --

7 JUDGE SMITH: -- this is a very fundamental --

8 MR. LEWALD: We would call this witness to have him  
9 present the testimony, if necessary.

10 JUDGE SMITH: All right, if you are representing that  
11 that's what you will do if it is required to do, I'll allow you  
12 to cross-examine on it. But you're not going to, over the  
13 objection of counsel, you're not going to offer the letter  
14 unsponsored.

15 MR. LEWALD: Is the question still to the witness?

16 JUDGE SMITH: Yeah, you can examine him about this as  
17 a hypothetical, and the hypothetical will be, presumably,  
18 redeemed when you call your witness.

19 BY MR. LEWALD:

20 Q Assuming, Dr. Johnson, that the contents of the  
21 letter are true as stated in the letter, would that cause you  
22 to change the conditions that you relate in your testimony on  
23 Page 53 with respect to the hypothetical emergency worker being  
24 able to contact his family?

25 A (Johnson) No, sir.

1 Q And could I ask you what more you would need in this  
2 respect?

3 A (Johnson) Sir, I'm relying on my knowledge of the  
4 social science literature, and I think one of the general  
5 findings in that literature is that telephone systems  
6 traditionally have been overloaded in disasters.

7 If that were not the case, I'm remiss to understand  
8 why, in one of your own EBS messages, you advise people not to  
9 use their telephone systems. It's stated clear on one of the  
10 messages that you handed out.

11 And I quote: "You use of telephones for unnecessary  
12 calls may tie up circuits needed by others for emergency  
13 calls."

14 You are advising people not to use the telephone  
15 system.

16 I can also give you a recent example of a natural  
17 emergency in which the telephone system was tied up. And that  
18 example is the October 1st earthquake in California. My mother  
19 tried to call me all day and was unable to reach me. I tried  
20 to call one of my colleague's spouse, my colleague happened to  
21 be in Boston at the time, and I was unable to reach her all day  
22 long. I finally reached her at 7:00 p.m. at night.

23 Now if that's not evidence that, you know, telephone  
24 systems are problematic in emergencies, then I don't know what  
25 evidence you want to bear.



1 I cannot comment on a specific telephone system. I'm  
2 not an expert in emergency communications, and I would  
3 certainly not sit here and even attempt to be one. But the  
4 general emergency literature shows that problems with telephone  
5 communications are real in terms of emergencies. And that is  
6 what our testimony is based on.

7 Q Would it be a fair summation of what you have told me  
8 that you are not a communication expert, or an expert in  
9 telephone connections, but you just know the circuits are going  
10 to be overloaded?

11 A (Johnson) It would be fair to summarize what I said,  
12 and I'll restate it again, that the social science evidence  
13 shows that telephone tie ups are a potential problem in  
14 emergencies, and that it is unrealistic to rely, or to expect  
15 that that may not be a problem.

16 Q Thank you, Doctor.

17 Now, you didn't -- in this context you say, the  
18 survey data supported your contention that if a major accident  
19 were to occur at Seabrook, problems of conflict group loyalties  
20 among the designated emergency personnel who reside within the  
21 10-mile plume would significantly hinder efforts to implement  
22 the emergency response plan promptly, correct?

23 A (Johnson) That's correct.

24 Q Now viewed in the context that you have viewed it, it  
25 is necessary, is it not, because of the result that you found

1 from your own survey?

2 A (Johnson) It's necessary because of the social  
3 science evidence that exist, including some of the results that  
4 we found in our survey.

5 Q And where you have social science evidence that  
6 indicates a matter that is contrary to the findings of the  
7 survey, you would accept the social science evidence rather  
8 than the results of the survey; is that correct?

9 A (Cole) That's a hypothetical that I am not in a  
10 position to comment on.

11 Q You don't want to answer that?

12 A (Cole) No.

13 MR. LEWALD: I have no further questions.

14 (Applicants' Cross-Examination  
15 Outline on Testimony of Drs.  
16 Zeigler, Johnson and Cole  
17 follows:)

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1 JUDGE SMITH: Okay. Do you have --

2 MR. TURK: Yes, I do.

3 MR. BROCK: Your Honor, excuse me, I did want to  
4 follow up on the questions about the telephone system overload  
5 just now.

6 JUDGE SMITH: I'm sorry, I didn't hear you.

7 MR. BROCK: I did wish to examine the panel very  
8 briefly on the issue that Mr. Lewald was just addressing.

9 JUDGE SMITH: All right, let's take your examination  
10 next, right now.

11 MR. BROCK: Thank you.

12 (Continued on next page.)

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1 MR. BISBEE: Good afternoon, gentlemen, I am Dana  
2 Bisbee from the New Hampshire Attorney General's office.

3 I just have a very few questions for you.

4 And as I said, it is about this question of  
5 telephone-overload.

6 CROSS-EXAMINATION

7 BY MR. BISBEE:

8 Q Could you tell me what the actual impact was at Three  
9 Mile Island when there were two million calls made on a system  
10 made to handle only one million?

11 A (Johnson) It is my understanding that the system was  
12 rendered useless.

13 Q No calls were able to be made at all, is that your  
14 understanding?

15 A (Johnson) Overload means, to my way of thinking,  
16 that you just cannot use the system, it is overloaded.

17 Q And it is your understanding that it remained  
18 overloaded for an extended period of time?

19 A (Johnson) I don't remember the specific details.

20 Q Something like what, you, yourself, experienced, Dr.  
21 Johnson, during the earthquake where you could not --

22 A (Johnson) That is pretty frustrating, yes.

23 Q So, is your testimony based on the assumption when  
24 that in a Seabrook emergency the system would be overloaded so  
25 that no calls at all would be made for a certain period of

1 time?

2 A (Johnson) Yes.

3 Q So the statement that you make on Page 53 of your  
4 testimony, that the only reasonable assumption that you could  
5 make is that people would leave immediately to check on their  
6 loved ones, is based on the assumption that they would not be  
7 able to reach their family by telephone at all?

8 A (Johnson) That is correct.

9 (Pause)

10 Q What if there were a slight delay in their ability to  
11 call their families?

12 A (Johnson) It would --

13 Q Would that change your position?

14 A (Johnson) That is a hypothetical that I cannot  
15 speculate on.

16 Q You cannot --

17 JUDGE SMITH: You can -- you may -- you don't have to  
18 agree with a hypothetical before you give your best answer.  
19 You can accept, you know, you can make it clear that you don't  
20 agree with a hypothetical but you can accept the hypothetical  
21 for the purpose of the question and answer it to the best of  
22 your ability assuming the hypothetical is true.

23 BY MR. BISBEE:

24 Q Do you understand what I am asking?

25 A (Johnson) Yes.

1           It did not have any time frame on it, and I guess  
2   that is why I characterized it as a hypothetical. How long are  
3   you expecting people to wait to be able to contact their  
4   families?

5           Q     Okay, let me ask you this.

6           If an emergency worker were to make one call and be  
7   unable to reach the person he was trying to, would that  
8   inability to reach that person, by itself, cause, in your view,  
9   the person to leave immediately?

10          A     (Johnson) I think it varies depending on the person.  
11   Some people it may be enough to force them to go immediately.  
12   For others, they may wait and try two, three maybe even four  
13   times, maybe even five times to reach their families.

14          I think it depends on the person.

15          Q     In your view, is it reasonable to expect that people  
16   would try a second time and reach their families so that if  
17   they were unable to reach someone the first time that they  
18   would try again and perhaps be successful in doing so the  
19   second time?

20          A     (Johnson) I don't know whether they would be  
21   successful but I don't think it is unreasonable to expect that  
22   a person would try a second time.

23               MR. BISBEE: That is all that I have.

24               Thank you very much.

25               JUDGE SMITH: Mr. Turk?



1 MR. TURK: Thank you, Your Honor.

2 CROSS-EXAMINATION

3 BY MR. TURK:

4 Q Gentlemen, my name is Sherwin Turk and I am an  
5 attorney with the NRC Staff.

6 I have a series of questions, which to some extent  
7 are going to tread over the same ground that were raised in Mr.  
8 Lewald's examination earlier today.

9 I ask you to bear with me. I won't prolong this and  
10 I hope that I will be able to finish with you before limited  
11 appearances start.

12 I can't promise that that will happen, but I am going  
13 to try.

14 Dr. Johnson, your testimony addresses to some extent  
15 the survey work you did in the area of the Three Mile Island  
16 nuclear plant.

17 And I am wondering if you know what the population  
18 size is of the area which was the subject of your survey?

19 A (Johnson) I don't recall.

20 Q Do you have a general idea of that population size?

21 A (Johnson) No.

22 Q Well, let me see if I can focus for a moment.

23 MR. TURK: Excuse me, one minute, gentlemen, I would  
24 appreciate it if you would not confer while the question is  
25 being asked. If a person to whom a question is asked, needs to

1 confer, he can identify that on the record, and then we can see  
2 if that will be permitted.

3 But absent an indication that the conference is  
4 needed, I would appreciate it if you would hold back on your  
5 conferring at the table for the moment.

6 BY MR. TURK:

7 Q Dr. Johnson, in your survey of the Three Mile Island  
8 area, you sought to send in questionnaires to people who lived  
9 within five miles of the plant, is that correct?

10 A (Johnson) That is one of the distance spans that was  
11 included in our survey design.

12 Q And in addition to that area, you looked to send out  
13 questionnaires to people who lived within five-to-15-miles of  
14 the plant, is that correct?

15 A (Johnson) Yes.

16 Q And in addition to those two areas, you also sought  
17 to send questionnaires to people who lived in other communities  
18 outside the 15-mile radius, is that correct?

19 A (Johnson) That is correct.

20 Q And do you have any idea at all of what the  
21 population size is in those areas?

22 A (Johnson) No, I don't.

23 Q You indicated in your testimony that approximately  
24 144,000 people evacuated from the Three Mile Island Area, is  
25 that correct?

1 A (Johnson) Yes.

2 Q Do you know what percentage of the population  
3 evacuated?

4 A (Johnson) That is 39 percent of the population  
5 within a 15-mile radius of the plant.

6 Q Does the figure, 144,000 represent only those persons  
7 who live within 15 miles of the plant?

8 A (Johnson) Yes.

9 Q So if I do a simple calculation, I come up with  
10 something on the order of 369,000 people, who would be presumed  
11 to live within 15 miles of the plant, is that approximately  
12 your understanding of what the population size would be, within  
13 the 15 miles of the plant?

14 A (Johnson) As I indicated earlier, I don't know what  
15 the population is, and if your calculation is correct, then I  
16 accept your figure.

17 Q Do you have a calculator at the table with you?

18 A (Johnson) No, I don't.

19 Q And let me explain what I have done.

20 I have taken 144,000 and I have divided it by 39,  
21 would that be an appropriate measure to determine what the  
22 percentage, what the 100 percentage figure would be?

23 A (Johnson) I guess so.

24 Q Excuse me, I should say I divided it by .39.

25 A (Johnson) .39, yes.



1 Q And when I did that I came up with 369,230 people.

2 Now, in addition to that population size, you

3 surveyed several communities outside the EPZ.

4 And you identified in your testimony that one of them

5 was a small community; one of them a medium-sized community;

6 and one of them was a large community.

7 I believe the large one was Lancaster.

8 Do you know what the population sizes are in those  
9 three communities?

10 A (Johnson) No, I don't.

11 Q Can you give me an order of magnitude?

12 A (Johnson) I have no idea.

13 Q Does anyone at the table have an order of magnitude  
14 idea for that?

15 A (Zeigler) Lancaster is a metropolitan statistical  
16 area. There are at least 50,000 people living in Lancaster.

17 Carlisle perhaps has maybe 30,000 people. Duncannon  
18 perhaps has -- gosh, I don't know -- 12 or 10,000? No, that is  
19 too many.

20 Duncannon is a smaller town. I would hate to even  
21 offer an --

22 MR. TURK: Excuse me, I would like to ask that there  
23 be no conferences at the table while the questions are pending.

24 THE WITNESS (Johnson): I am sorry, sir.

25 MR. TRAFICANTE: Now, wait a minute, while the

1 questions are pending or while the questions are being  
2 formulated. Because we have had conferences at the table  
3 certainly after the question has been put, as I understood your  
4 earlier comment.

5 Now, it is conferences while they are pending. So  
6 that would be a change, in my understanding of the ground  
7 rules.

8 The panels have conferred while there have been  
9 questions pending.

10 JUDGE SMITH: If he doesn't want collaboration in the  
11 formulation of answers to his questions, that is his  
12 prerogative.

13 MR. TRAFICANTE: I understand that, Your Honor, but  
14 this is a new instruction is my point, to the panel. They are  
15 not to confer at any time, either before a question is put, or  
16 even when it is pending.

17 I just want clarification. They have to understand  
18 what they are supposed to do and not do.

19 JUDGE SMITH: I guess I don't appreciate it, but the  
20 distinction you are drawing, but it would be better gentlemen,  
21 if you did not confer unless you are invited to by the, by Mr.  
22 Turk.

23 MR. TURK: And also if, at some point, you feel the  
24 need to confer, you may identify that on the record, and we can  
25 see if that is necessary.

1 I want to explain my reasons. I don't want you to  
2 feel that I am being unfair. In cross-examination of a panel  
3 it is important that the person to whom a question is directed  
4 provide an answer.

5 And if someone else has something to supplement, or  
6 if they differ, they are free to make that expression. We are  
7 not seeking a collegial opinion in the first instance, or  
8 seeking independent thought to the best extent possible.

9 BY MR. TURK:

10 Q Dr. Zeigler, you indicated that Lancaster had a  
11 population of 50,000-plus, what would be the upper-end of that  
12 potential population size?

13 A (Zeigler) I will only say that it has been so long  
14 since I looked at these population figures, that they are not  
15 fresh in my mind, and I would prefer not to respond to that.

16 Q Well, if I simply add the 369,000 figure to the  
17 50,000, 30,000 and 12,000 figures, I come up with a population  
18 in the range of 461,000-plus.

19 Would that be a fair characterization of the  
20 population size of the area surveyed?

21 Yes, or no.

22 A (Zeigler) -- I --

23 MR. TRAFICANTE: -- well, I think that question has  
24 been put to them in parts. And you have gotten the answer that  
25 they are not sure.



1 And so if you add it up and put the question again, I  
2 think that it is a little bit unclear as to what they can  
3 possibly respond.

4 They have indicated to you that they don't know the  
5 population in those areas.

6 JUDGE SMITH: Now, you are asking -- there was a  
7 question and answer that I missed, but I thought we had fairly  
8 well established the mathematics of arriving at the greater  
9 Harrisburg, or 15-mile.

10 And then it would seem to be a reasoned estimate for the  
11 other three cities, but there was an intervening question and  
12 answer that I missed, but it seems to me, absent that being  
13 contradictory, this question right now, is appropriate.

14 MR. TRAFICANTE: I thought there was another  
15 population input there, besides the 15-mile band and the three  
16 towns. Maybe I missed that intervening question, too.

17 MR. TURK: Your Honor, at this point, I would like to  
18 note that Dr. Cole has passed a note to Dr. Johnson.

19 And I don't understand what is going on at the table  
20 and I would like to ask the witnesses what is happening there?

21 JUDGE SMITH: Well, what is happening?

22 THE WITNESS (Cole): Yes, I did pass a note.

23 It was our understanding that as we wrote this  
24 testimony that it was a collaborative work.

25 JUDGE SMITH: Well, that may very well be. I did say

1 that it would be better if you did not consult.

2 I guess I should have gone all the way and told you,  
3 direct you not to consult. Is there any question about that?

4 THE WITNESS (Johnson): No.

5 THE WITNESS (Zeigler): May I add something here?

6 MR. TURK: I would like to make a note, also, around  
7 this point. The testimony in question, in the direct testimony  
8 as identified as the testimony of Dr. Zeigler and Dr. Johnson.

9 And this is the question and answer beginning at the  
10 bottom of Page 6, and continuing on to Page 7. I don't see Dr.  
11 Cole's name on that piece of testimony.

12 JUDGE SMITH: Just proceed.

13 MR. TRAFICOMIN: Well, I don't --

14 JUDGE SMITH: Proceed, proceed.

15 THE WITNESS (Zeigler): May I add?

16 BY MR. TURK:

17 Q Would you like to come back to the original question?

18 A (Zeigler) To the original question?

19 Q Yes. And that is in terms of the population size --

20 A (Zeigler) Yes, I am willing to accept your addition  
21 that is, your mathematical addition, with the proviso that I am  
22 not sure at this point in time what the population of these  
23 communities was at the time of the accident.

24 (continued on next page)

25

1 But I would also like to say that the 144,000 figure  
2 was a figure that we computed using the NRC's own data. So that  
3 was not a figure that we generated nor was the percentage, as I  
4 recall, 39 percent, a figure that we generated.

5 The NRC had a larger data base and they computed  
6 their estimate of the number of evacuees and we have reported  
7 that.

8 Q And when you refer to the NRC, are you referring to  
9 the report done by Mountain West Research?

10 A (Zeigler) Yes, I am.

11 Q You don't quarrel with their statistics or with their  
12 population by estimate, do you?

13 A (Zeigler) No.

14 Q Gentlemen, how did -- and this is to Dr. Johnson, in  
15 the first instance, how did you make a determination to send  
16 out 300 surveys?

17 A (Johnson) Cost.

18 Q Could you explain that?

19 A (Johnson) Yes.

20 We funded the study ourselves, but Dr. Zeigler and I  
21 were graduate students at the time and we did it in  
22 collaboration with our dissertation advisor.

23 We felt it important to get data as soon after the  
24 accident as humanly possible, therefore, we did not have time  
25 to write a grant, so we funded it ourselves.



1 And we funded what we could afford to fund.

2 Q I would like to focus on several aspects of the  
3 evacuation at Three Mile Island.

4 At Page 9, of your testimony, there is a discussion  
5 near the bottom of the page, that "During the emergency, the  
6 State of Pennsylvania advised evacuation of all pregnant women  
7 and pre-school age children within a five-mile radius of the  
8 plant."

9 Gentlemen, do you know when that advice was issued?

10 A (Zeigler) Yes.

11 As I recall, that was issued by the Governor of  
12 Pennsylvania, around 10:00 a.m. on Friday morning, of that  
13 week.

14 Q And to the best of your recollection, when did the  
15 accident occur at Three Mile Island?

16 A (Zeigler) The accident occurred the previous  
17 Wednesday, I believe around 4:00 a.m., in the morning, with  
18 notification being delayed until about 7:00 a.m.

19 Q And do you have any knowledge as to when the first  
20 reports of that accident began to appear in the media?

21 A (Zeigler) It was Wednesday morning.

22 Q So that approximately two days time passed before the  
23 Governor of Pennsylvania issued the advice to pregnant women  
24 and young children to evacuate?

25 A (Zeigler) Oh, yes.

1 Q After the initial reports were out to the media?

2 A (Zeigler) Yes.

3 Q And do you know, generally speaking, what sort of  
4 information had been provided to the public prior to the  
5 Governor's recommendation on Friday morning?

6 A (Zeigler) Well, there was just every conceivable  
7 type of information that you could imagine.

8 Q Do I assume from that, that there were conflicting  
9 reports?

10 A (Zeigler) Oh, yes.

11 Q Confusing reports?

12 A (Zeigler) Yes, sure.

13 Q Do you recall whether the Mountain West research  
14 study indicated that the existence of confusing information  
15 within the public or within the public realm was a contributor  
16 to the public's reasons for evacuating?

17 A (Zeigler) Oh, yes, it was.

18 It was also, according to our survey, a contributing  
19 factor in the people's decision to evacuate. And it was also  
20 one of the factors that people, who did not evacuate, cited for  
21 their decision.

22 So, people were using confusing information, to make  
23 a decision both to evacuate and not to evacuate. And I believe  
24 both the Mountain West study and I know our study reached that  
25 same conclusion.

1           So confusing information cut across both  
2 categories -- the evacuees and the non-evacuees. It was a  
3 constant.

4           Q       Gentlemen, are you aware, as to whether at the time,  
5 of the Three Mile accident, the Nuclear Regulatory Commission  
6 had any regulations or guidance in place, as to the type of  
7 public information that should be made available to the public  
8 in the event of a radiological emergency?

9           A       (Zeigler) I cannot say that I know if they had any  
10 regulations in place. If they had it in place, they were not  
11 employed.

12          A       (Johnson) Not at TMI.

13          A       (Zeigler) Not at TMI.

14          Q       Are you familiar at all with the regulations that had  
15 been adopted in 1980, and the regulatory guidance contained in  
16 NUREG-0654?

17          A       (Johnson) Yes.

18          A       (Zeigler) Yes.

19          Q       And you are aware that those regulations and those  
20 statements of guidance, were issued after the accident at Three  
21 Mile Island, weren't they?

22          A       (Johnson) That is correct.

23          A       (Zeigler) Yes.

24          Q       And you do recognize, don't you, that the Emergency  
25 Broadcast System Messages which were discussed in part, in Mr.



1 Lewald's examination, were drafted in response to NRC  
2 regulations and guidance, you recognize that, don't you?

3 A (Johnson) Yes.

4 A (Zeigler) Oh, yes.

5 Q And at Page 12, of your testimony, this is addressed  
6 to anyone on the panel who cares to respond.

7 I see all three of your names appear at the answer.

8 You indicate that, "In connection with this  
9 litigation the Massachusetts Attorney General's office retained  
10 as consultants a group of social and behavioral scientists with  
11 expertise in technological hazards, and planning, to analyze  
12 the adequacy of NHRERP Revision 2."

13 Do you see that statement?

14 A (Zeigler) Yes, I see it.

15 Q Can you identify the members of this group of  
16 scientists referred to, in your testimony?

17 A (Zeigler) Well, there was Doctor Johnson and there  
18 was me. And there was --

19 A (Johnson) There was Dr. Al Luloff.

20 A (Zeigler) -- Dr. Al Luloff. Dr. Ortman Renn.

21 Q Pardon me?

22 A (Zeigler) Dr. Ortman Renn, I believe.

23 Q I don't catch the name.

24 A (Zeigler) Ortman Renn.

25 Q How does he spell that?

1 A (Zeigler) R-E-N-N, perhaps?

2 A (Johnson) W-R- -- I don't know.

3 A (Zeigler) I don't know.

4 And Dr. Cole, and Dr. Adler, Tom Adler, Dr. Colin  
5 High.

6 I believe they are all mentioned at one point or  
7 another in this testimony.

8 Q Apart from persons mentioned in your testimony, or  
9 sponsors of other testimony in this proceeding, afforded by the  
10 Intervenor or by the Massachusetts Attorney General's office,  
11 are you aware of any other persons who were consulted?

12 A (Zeigler) I am not, no.

13 Q Anyone else on the panel?

14 Dr. Cole?

15 A (Cole) No.

16 (Pause.)

17 Q We have had some discussion today already about the  
18 survey you did in the Seabrook area.

19 And Dr. Cole indicated that the questions that he put  
20 forward in the questionnaire would have been the same, even if  
21 the NRC had asked him to do a questionnaire.

22 Is that a fair paraphrasing of your testimony?

23 (Pause.)

24 A (Cole) The questions on given topics, I tried to  
25 make clear that if the NRC had wanted to cover other topics,

1 then we would have included questions dealing with those  
2 topics.

3 To the extent that the NRC had asked us to do a  
4 survey on the same topics, as we were asked to by the  
5 Commonwealth of Massachusetts, then the questionnaire would  
6 have been the same, yes.

7 (Pause.)

8 Q In the development of the questionnaire, I believe  
9 that you indicated that there were a series of meetings, with  
10 Massachusetts Attorney General, Intervenors and other persons,  
11 is that correct?

12 In the course of developing the questionnaire?

13 Is that correct?

14 A (Cole) There were a series of meetings with the  
15 representatives of the Massachusetts Attorney General on the  
16 other consultants.

17 Q And in the course of those meetings, were suggestions  
18 made to you, as to how questions should be phrased?

19 A (Cole) Yes.

20 Q And were suggestions also made to you as to whether  
21 or not certain questions were appropriate?

22 A (Zeigler) It was a general atmosphere of discussion  
23 that reigned at these meetings.

24 So, yes, there was quite a common interchange  
25 concerning what questions we needed to achieve the objectives



1 we had set out for ourselves, and so forth.

2 (Continued on the next page.)

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1 Q That's your understanding as well, Dr. Cole?

2 A (Cole) Yes. You should remember that I was not  
3 actually present at these meetings.

4 Q Yes, I believe you referred to your ex-wife as one  
5 person, and perhaps someone else from your firm who actually  
6 attended the meeting.

7 A (Cole) That's correct.

8 Q Now you don't know, do you, if you had met with NRC  
9 Staff or other persons apart from the groups who did meet with  
10 your firm, what sort of questions or comments they might have  
11 had with respect to your questionnaire, do you?

12 A (Cole) No.

13 Q At Page 16 of the testimony, and this is addressed to  
14 Dr. Cole, in the upper half of the page, you indicate that,  
15 "The survey ended up with 54 percent female respondents and 46  
16 percent male respondents, which closely corresponds to the sex  
17 distribution of the population."

18 Dr. Cole, can you tell me what the sex distribution  
19 is of the population within the Seabrook EPZ?

20 A (Cole) I don't recall precisely, but it was either  
21 53 or 54 percent female, as I recall.

22 Q And where did you obtain that number?

23 A (Cole) From census data.

24 Q And I presume that was the most recent census  
25 available?

1 A (Cole) Yes.

2 Q Census data available to you?

3 A (Cole) Yes.

4 Q Do you know what the distribution is for heads of  
5 households by sex within the Seabrook EPZ?

6 Q (Cole) Would the census data indicate that?

7 A (Cole) It might.

8 Q And your survey was with heads of households, wasn't  
9 it?

10 A (Cole) Yes.

11 Q Did you know at the time you conducted the survey  
12 what the sex distribution was for heads of household within the  
13 Seabrook EPZ?

14 A (Cole) No.

15 Q Do you have an experience in the survey work you have  
16 done prior to the Seabrook survey which would lead you to have  
17 an opinion as to whether males or females generally predominate  
18 as heads of households?

19 A (Cole) Well, generally there are more female heads  
20 of households than male heads of households.

21 Q That's true on a national basis?

22 A (Cole) Yes. I'm not a demographer, but that's my  
23 understanding, yes.

24 Q In the event there is a family situation where  
25 father, mother and children reside within the same household,



1 is there a standard, or a general tendency for either male or  
2 female to be considered the head of the household?

3 A (Cole) No, we would refer to the female or male head  
4 of household. In the case of a married couple living together  
5 in a home, they would both be heads of household.

6 Q So you would have two heads of household in that  
7 situation?

8 A (Cole) Yes.

9 Q And that's regardless of what the psychological  
10 makeup was of the family and of the relationship between  
11 husband and wife?

12 A (Cole) Yes, we have no idea about that.

13 Q There would simply be a standard assumption that  
14 there are two heads of household.

15 A (Cole) Yes.

16 Q And that's the assumption you made in your survey?

17 A (Cole) Yes.

18 Q At Page 20 of the testimony, at the top of the page,  
19 Dr. Cole, you indicate that, "An occasional error by an  
20 interviewer was detected and corrected."

21 Do you recall at this time approximately how many  
22 such errors were detected and corrected?

23 A (Cole) Oh, very few; a handful, four, five, six,  
24 something like that.

25 Q And what was the nature of the error that was

1 detected?

2 A (Cole) Oh, sometimes you would find an interviewer  
3 would put down what we call a stray punch. That is, they would  
4 write down a number for which there was no designated code.  
5 For example, if you have three categories in a question, one,  
6 two, three, you would see a five there. That's an error,  
7 obviously. There is no category for that.

8 Sometimes a skip instruction wasn't followed  
9 precisely.

10 But as I said, there were very few such errors.

11 Q In the course of the verification effort, you  
12 indicate on Page 19 that there was to some extent some  
13 listening in on the telephone calls. Do you see that at the  
14 top.

15 A (Cole) Yes.

16 Q The answer there in the middle of Page 19.

17 How many telephone calls were listened in to by a  
18 verifying person

19 A (Cole) Well, there were two sets of verifiers.  
20 There were employees of Marketing and there were employees of  
21 Social Data Analysts. This is just a rough estimate. I would  
22 say that the Social Data Analysts employees must have listened  
23 in on several hundred calls, and I'm sure that the marketing  
24 supervisors listened in on more.

25 Q And in those instances, did they listen into the

1 whole conversation?

2 A (Cole) Sometimes, but generally not.

3 Q Was the person conducting the interview by telephone  
4 given some directive as to how long his interview should take?

5 A (Cole) No.

6 Q How long did the interviews actually take?

7 A (Cole) As I recall, they were between 15 and 20  
8 minutes.

9 Q Did any extend beyond 20 minutes?

10 A (Cole) Yes. There's always a tremendous variation  
11 in the length of time that it takes to complete interviews. I'm  
12 sure that some extended beyond 20 minutes, and there were  
13 probably some that were completed in 10 minutes, or maybe even  
14 less. There's a huge variation in this.

15 Q And how many persons actually conducted the telephone  
16 calls?

17 A (Cole) I can't answer that precisely, but I can take  
18 a guess, and I would say that there probably would have been  
19 maybe 30, 30 to 40 people that were doing it.

20 Q Was each of those persons expected to achieve some  
21 sort of quota in terms of number of telephone interviews  
22 conducted?

23 A (Cole) No.

24 Q Were they expected to complete their work within any  
25 particular time frame?



1 A (Cole) No.

2 Q Do you believe that there may have been any perceived  
3 pressure by the telephone callers to complete the interview  
4 within a certain time?

5 A (Cole) No.

6 Q In the occasions in which telephone calls were  
7 listened into for verification, and where -- also where  
8 occasional errors were detected, were there any errors detected  
9 where the questioner omitted a question, one or another  
10 question?

11 A (Cole) Not that I'm aware of.

12 Q Were there any instances detected where an  
13 interviewer neglected to read all of the words in the  
14 questionnaire?

15 A (Cole) I personally did not listen in on several  
16 hundred calls, and I couldn't answer that.

17 Q It's quite possible in all those calls that one  
18 interviewer, or whatever, may have left out a word. You're  
19 reading a questionnaire. It's possible that anybody could leave  
20 out a word. But, in general, the interviewers were following  
21 the survey instrument as it was written.

22 Q Did you make any attempt to compare the results  
23 obtained by each of the callers to see if they were consistent  
24 with the results achieved by other callers?

25 A (Cole) No, there were too many interviewers doing

1 this. The ends wouldn't have been sufficient to do any  
2 reliable comparisons. That's only relevant if you have a  
3 relatively small number of interviewers doing a relatively  
4 large number of interviews.

5 When you have 30 or 40 interviewers, it's not  
6 generally done.

7 Q Earlier you made reference to some census data for  
8 percentage of persons within the EPZ who may be male or female.

9 Are you aware of any census data for number of  
10 persons who do not own their own automobile?

11 A (Cole) No, I haven't seen those.

12 Q I may have missed this in going through your  
13 questionnaire, and I ask you to forgive me if I have.

14 Some of the questions were directed toward the issue  
15 of whether persons within the household would require public  
16 transportation. I don't recall seeing any question as to  
17 whether or not the persons surveyed had available space in  
18 their vehicles to offer to others who might need ride  
19 assistance.

20 Was that type of question asked?

21 A (Cole) We did not ask that, no.

22 Q And did you ask whether any of the respondents would  
23 in fact offer rides to persons who needed assistance in  
24 transportation?

25 A (Cole) No.

1 Q I'd like to turn to the specifics of the survey for a  
2 little bit. And I have to admit I'm a little bit confused in  
3 the numbers.

4 If I'm correct, you completed interviews with 915  
5 persons who reside within the New Hampshire portion of the  
6 Seabrook EPZ; is that correct?

7 A (Cole) Yes.

8 Q And of those 915 persons with whom you completed  
9 interviews, you indicate that, and this is at Page 50, two  
10 percent of those households represented by those telephone  
11 calls contained individuals who reported that they had an  
12 assigned emergency work role in the plan.

13 How many of those 915 households had individuals who  
14 reported an emergency worker role in absolute numbers rather  
15 than percentages?

16 A (Cole) You're addressing this to the people who  
17 wrote the testimony, Drs. Zeigler and Johnson?

18 Q Forgive me. Yes.

19 A (Zeigler) Could you tell me where you are again?

20 Q Yes.

21 A (Zeigler) Page 50 of the direct testimony?

22 Q That's correct.

23 MR. TRAFICANTE: Your Honor --

24 THE WITNESS: Two percent of 915, so it would be  
25 about 20, 19, 20 people.



1 BY MR. TURK:

2 Q If I multiply 915 by two percent, I get 18.3  
3 households.

4 A (Zeigler) Okay, fine.

5 Q Well --

6 A (Cole) Yes.

7 Q You obviously don't have a fraction of a household.

8 A (Zeigler) Right.

9 Q So was it probably about 18 households, Dr. Johnson?

10 A (Johnson) Yes.

11 Q I see Dr. Cole wants to add something.

12 A (Cole) When you get a very small number like this,  
13 you have rounding error. When we report two percent, it could  
14 have been, let's say, 2.46 or something. So it's -- without  
15 going back to the raw data, it's impossible for us to compute  
16 the exact number of cases.

17 Q Dr. Cole, do you agree that it was approximately 18  
18 households which reported emergency worker members?

19 A (Cole) More or less, yes.

20 Q Within what range of approximation?

21 A (Cole) Well, you have the calculator. What would  
22 2.49 times 915 be?

23 Q I get 22.78.

24 A (Cole) Yes, so it's more or less within about 3.18.

25 Q And that's the upper end. I suppose the lower end

1 could be 1.5 --

2 A (Cole) One.

3 Q Which leads me to 13.8 households.

4 So, Dr. Cole, is the range somewhere between 13.8 and  
5 22 and a fraction?

6 A (Cole) Yes, assuming your calculations are correct.

7 Q And can we agree that it's approximately 18  
8 households?

9 A (Cole) Yes.

10 MR. TURK: Your Honor, I'm on Item 8 of my cross-  
11 examination plan. As you can tell, I have 11 items. I would  
12 project another 20 minutes of questioning. I realize we have  
13 members of the public here who are waiting to speak.

14 JUDGE SMITH: Yes, we're running over, but we had  
15 pretty much planned on having this panel completed today, and  
16 if you can --

17 MR. TURK: I'll try to speed through it.

18 JUDGE SMITH: Yes. How much redirect, Mr.  
19 Traficonte? Will that be very long?

20 MR. TRAFICONTE: I will be as concise, and I was  
21 hoping to get in 20 minutes at the most.

22 JUDGE SMITH: Okay.

23 MR. TRAFICONTE: We would very much like to get this  
24 panel --

25 JUDGE SMITH: Yes. Well, that was a rather firm

1 planning objective we had.

2 MR. TURK: Thank you. I'll try to speed.

3 BY MR. TURK:

4 Q I would address this to either Dr. Johnson or Dr.  
5 Zeigler. I guess alphabetically, let's start with Dr. Johnson.

6 Of these 18 households which identified that they had  
7 emergency workers within the house, do you recall whether any  
8 of those households had more than one emergency worker?

9 A (Johnson) I think they did.

10 Q So that the person who responded to the telephone  
11 call would be identifying his anticipated conduct as an  
12 emergency worker, as well as what he anticipated the other  
13 family member -- the other -- strike that.

14 The respondent to the telephone call would be  
15 predicting in part his own response in an emergency; is that  
16 correct?

17 A (Johnson) I think the question, if I'm not wrong  
18 here, asked if they had assigned emergency work roles in the  
19 event of an emergency at Seabrook.

20 So what the person would be doing is indicating  
21 whether or not someone else in the household had an assigned  
22 emergency work role.

23 Q All right. Now to return to my question then.

24 When the telephone call came in to whoever it was who  
25 received it, and let's call that person the respondent, the



1 respondent then would be providing information as to what he  
2 predicted his own role would be if in fact he had an assigned  
3 emergency worker role; is that correct?

4 A (Johnson) I don't know what you mean by predicted.  
5 A person either knows whether he or she has an assigned role or  
6 not. I think you have to look at it within the context of  
7 which the question was posed.

8 Q Forgive me. It's the problem of trying to rush  
9 through.

10 Part of your survey sought to identify the intended  
11 behavior of emergency workers; is that correct?

12 A (Johnson) That's correct.

13 Q And the respondent to your survey, in describing  
14 his intended -- in describing the intended behavior of an  
15 emergency worker, might be describing his own conduct if he was  
16 the person with an assigned emergency role; is that correct?

17 A (Johnson) That's correct.

18 Q And he might also be describing the intended conduct  
19 of some other family member who may have been assigned an  
20 emergency role; is that correct?

21 A (Johnson) I don't like the use of your word  
22 "intended" here. The question reads, "Do you play any assigned  
23 role in the evacuation plan?"

24 Now, it seems to me that a person would know whether  
25 or not he or she is to play an assigned role. I think the key

1 question here is "assigned". And your use of "intended", I  
2 don't think is appropriate here, and, thus, I don't want to  
3 answer yes here. It's no, I don't agree with the way you've  
4 stated it.

5 MR. TRAFICONTE: If I might interrupt in the service  
6 of time here.

7 I have a strong hunch that the two percent may be in  
8 error, because if you look at Page 26 --

9 MR. TURK: Your Honor, I object.

10 MR. TRAFICONTE: Well, I know, I --

11 MR. TURK: I think we're getting testimony from  
12 counsel.

13 JUDGE SMITH: All right, let's see if he can be  
14 helpful. I don't see that he's trying to shape the testimony.

15 MR. TRAFICONTE: Your Honor, I may have misspoke  
16 myself. Typo instead of error.

17 On Page 26 of the technical appendix, which I believe  
18 Dr. Johnson was just referring to, the statistics are set forth  
19 on that page as to the number of respondents who said that  
20 someone in the household had an assigned role. And that number  
21 is three. It's at the bottom of the page, Mr. Turk. And that  
22 number seems to be three.

23 In the testimony that you are reviewing, the number  
24 is two percent. You then multiplied the two percent and come  
25 up with your 18. But you might want to do the same thing with

1 the three.

2 MR. TURK: Well, Your Honor, I think the problem that  
3 I was objecting to has just materialized. We have counsel  
4 providing information to the witnesses for their evaluation in  
5 response to the line of questioning.

6 MR. TRAFICONTE: Well, it was a fruitful line of  
7 questioning, and I think it had some merit as long as the  
8 numbers were right. But if counsel would want to ask whether  
9 there should be a correction from two percent to three percent,  
10 we could save ourselves some time.

11 JUDGE SMITH: Proceed. We are trying to be efficient  
12 here. Proceed.

13 BY MR. TURK:

14 Q Dr. Johnson, is your testimony incorrect when it  
15 states two percent of the households contain individuals?

16 A (Johnson) It could have been a typo there. It  
17 doesn't appear that --

18 Q It could have been?

19 A (Johnson) Yes.

20 Q Was it?

21 A (Johnson) I don't know. I don't remember what I  
22 sent in on the original draft, but it appears to be a typo.

23 Q Now your testimony says that two percent of those  
24 households "contain individuals who reported that they had an  
25 assigned emergency work role in the plan."



1 Does that mean that two percent of the respondents  
2 themselves personally had an assigned emergency work role?

3 A (Johnson) I think it says two percent of the  
4 households, doesn't it?

5 A (Zeigler) The way the question reads, do you have an  
6 assigned emergency work role." And I would presume when the  
7 questionnaire was administered, that only the person who was  
8 speaking on the telephone as the informant would have qualified  
9 to say, yes, I have one.

10 Q So should I then -- should we modify your testimony  
11 then to say that it's not that the households contained  
12 individuals necessarily, but the respondents?

13 A (Zeigler) Well, the households did contain  
14 individuals. The individual was the informant.

15 Q All right. Gentlemen, if you look at Page 26 of the  
16 attachment to your testimony, Attachment 5, Question 342 does  
17 ask in fact, "Do you play any assigned role in the evacuation  
18 plan?"

19 Now, is it that question and the series of answers  
20 which are tabulated after it to which you then refer in your  
21 testimony that we have been discussing?

22 A (Zeigler) I believe it is, yes.

23 Q And, I'm sorry, who made that response?

24 A (Zeigler) I did.

25 Q Dr. Zeigler. Do you believe your testimony then

1 should be amended to change the two percent indicated on Page  
2 50 of the testimony to read three percent?

3 A (Zeigler) Well, if I accept the number on Page 26 as  
4 being correct, and I believe that it is, then, yes, I would say  
5 go ahead and change that number from two to three percent.

6 (Continued on next page.)  
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1 Q Do you know what three percent of 915 is?

2 A (Zeigler) Twenty-seven, 31, 27 people, 28 people.

3 Q Approximately 27?

4 A (Zeigler) Yes.

5 Q And you agree with that number?

6 A (Zeigler) I beg your pardon?

7 Q Did you just agree with me, that it is approximately  
8 27?

9 A (Zeigler) Yes.

10 MR. TURK: Your Honor, may Counsel approach the  
11 bench, please?

12 JUDGE SMITH: Certainly.

13 (Bench conference.)

14 BY MR. TURK:

15 Q I would like to turn to Page 52 of the testimony, and  
16 this is a continuation of the same answer provided by Dr.  
17 Zeigler and Dr. Johnson.

18 In the first full paragraph on the page, you indicate  
19 that "among this latter group, a small percentage indicated  
20 that they would either leave immediately (1 percent); do  
21 something else (1 percent); or were unsure what they would do,  
22 (1 percent)."

23 Do you see that statement?

24 A (Zeigler) Yes.

25 A (Johnson) Yes.



1 Q Is this an error also in the testimony?

2 A (Zeigler) The providing of these figures of one  
3 percent?

4 Q Maybe I can tell you what my concern is.

5 If you have a survey group of approximately 31  
6 people, and I am puzzled as to how one percent of 31 gives you  
7 anything less than a fraction of a person, or anything more  
8 than a fraction of a person.

9 A (Johnson) It should have been three percent.

10 Q Three percent for each category?

11 A (Johnson) Yes.

12 A (Zeigler) One person or three percent.

13 A (Johnson) Yes, it appears in the Table. It is a typo  
14 there. If you look at the Table 1, you will see that it is  
15 three percent.

16 Q Do any of you gentlemen know how many persons in the  
17 New Hampshire portion of the Seabrook EPZ have been assigned  
18 emergency worker roles?

19 A (Zeigler) I don't.

20 A (Johnson) I don't.

21 A (Cole) No.

22 Q Do you have, would you know an order of magnitude  
23 that we can put on it?

24 A (Cole) No.

25 A (Johnson) No.

1 A (Zeigler) No.

2 Q And your survey, I take it, as described in Table 2,  
3 of your testimony, found that some of your respondents were on  
4 the police force, and the fire department force, they had  
5 traffic control functions, they may have been school bus  
6 drivers, special emergency bus drivers.

7 They may have had a role as an ambulance person or as  
8 an assigned doctor or nurse, and they may have been media  
9 personnel, and there are some people who could not specify  
10 their roles.

11 Do you know whether the total number of persons could  
12 fit all of these different categories, including roles which  
13 were not specified by your respondents, exceeds 1,000 persons?

14 A (Johnson) I have no idea.

15 A (Zeigler) I don't know.

16 Q None of you have any idea, is that correct?

17 A (Cole) I could take an educated guess.

18 Three percent of the 915 said that they were involved  
19 and you can project it as three percent of the population,  
20 which would give you several thousand.

21 Q Do you know what the current population is within the  
22 New Hampshire portion of the EPZ?

23 A (Cole) It is about 90,000. I may be wrong. I would  
24 have to check.

25 Q I think that we have that established in the record,

1 already through the emergency plans, so we don't need you to  
2 guess as to the number.

3 A (Cole) Pardon me?

4 Q You won't need to guess. We do have that in the  
5 record, already.

6 Also, in your testimony, at Page 54, at the top of  
7 the page you discuss the local telephone company in the  
8 vicinity of the Three Mile Island nuclear plant.

9 And you indicate that the company there had  
10 difficulty finding telephone personnel who were willing to  
11 "expose themselves to the hazards of venturing near the plant,  
12 in order to install additional phone equipment."

13 Now, does that testimony refer to telephone employees  
14 in the Three Mile Island area?

15 A (Zeigler) It is my understanding that it does, yes.

16 Q And do you know if those persons had previously been  
17 assigned roles as emergency workers in the event of a nuclear  
18 emergency at Three Mile Island?

19 A (Zeigler) I don't know, but I would suspect that  
20 they had not been assigned specific emergency roles in the  
21 event of an emergency at Three Mile Island since we were not  
22 planning for an emergency there.

23 Q You suspect that they had not been?

24 A (Zeigler) I suspect that they were not assigned  
25 emergency roles that is, to go to Three Mile Island, should an



1 event happen.

2 Q I would like to turn to Attachment E, of your  
3 testimony, and in particular Table A-3, at Page 57.

4 And this provides a summary of what is characterized  
5 as "Failure to complete" and then "number of telephone numbers  
6 dialed and outcome by state."

7 And is it fair for us to characterize this as a  
8 summary of the total number of calls placed by category and the  
9 outcome of the telephone call?

10 A (Cole) Yes.

11 Q And what time of day were these different calls made?

12 A (Cole) The survey was conducted mostly during the  
13 evenings between 5:00 and 10:00 p.m., but call-backs were made  
14 on Saturday, during the day, for people who could not be  
15 reached by phone at several different days and several  
16 different times during the evenings.

17 Most of them though were made and completed in the  
18 evenings.

19 Q And in this Table, you indicate, well, the bottom  
20 line indicates refusals, 542 persons within the New Hampshire  
21 EPZ refused to respond to the questionnaire, is that correct?

22 A (Cole) Yes.

23 Q At what point in the questioning did that refusal  
24 take place?

25 A (Cole) Various points, most of them at the

1 beginning, but if somebody stopped the interview, stopped  
2 participating, at any point in time, including up to the end,  
3 we counted that as a refusal.

4 But most of the refusals take place at the beginning  
5 where the potential respondent refuses to begin the interview.

6 Q And would the same thing be true for the 251 refusals  
7 in Massachusetts?

8 A (Cole) Yes.

9 Q So that the total of 793 refusals reflects people,  
10 who at one point in the interview or another, either in the  
11 beginning or some time in the course of it, refused to  
12 participate?

13 A (Cole) Yes, with the overwhelming majority of those  
14 people being people who refused at the very beginning.

15 Q In your experience, Dr. Cole, as a surveyor, do you  
16 have an opinion as to what sorts of people are likely to refuse  
17 to complete an interview, and what sorts are likely to agree to  
18 complete it?

19 A (Cole) I don't have any general information on that.  
20 And in my experience of doing over 150 telephone surveys, I  
21 would say that it depends a lot upon the topic of the survey.

22 I mean some people are more or less interested in  
23 various topics.

24 Q And the ones who respond to an interview, are those  
25 who are interested in the topic?

1 A (Cole) There is a correlation between people's  
2 interests and their agreeing to respond, yes.

3 Q So that you may expect that a number of people who  
4 refused the call, or who refused to participate further, are  
5 simply not interested in the topic?

6 A (Cole) Some of them, yes.

7 Q But statistically, can you correlate the people -- is  
8 there any statistical significance that we can establish as to  
9 whether a person may be interested in the interview topic,  
10 which we can correlate whether or not he refuses to participate  
11 in the interview?

12 A (Cole) I don't know of any such studies.  
13 There may exist but I am not aware of them.

14 Q Do you have an opinion as to whether that kind of a  
15 correlation exists?

16 I believe that you said --

17 A (Cole) I would imagine that it is relatively low, if  
18 it exists.

19 Q Are people who have strong opinions about a subject  
20 more likely than not to be willing to discuss their opinions?

21 A (Cole) Not necessarily, no.

22 Q Do you think that people who have strong opinions  
23 keep them to themselves?

24 A (Cole) They may not want to share their opinions  
25 with other people. They may feel that it is not somebody



1 else's business.

2 I think that just my personal intuitive feeling from  
3 doing a tremendous amount of survey research, is that the  
4 personality characteristics of the respondent are the primary  
5 determinant.

6 There are some people who just don't want to talk to  
7 any strangers on the telephone and there are other people who  
8 are much more friendly and willing to talk to people.

9 Q In the course of your interviews, in this survey, did  
10 you ask the respondents whether or not they have an opinion as  
11 to whether the Seabrook Nuclear Plant should be licensed?

12 A (Cole) Yes, we did.

13 Not licensed. We -- I think the wording of the  
14 question was whether it should be allowed to operate, but I  
15 could check that if you want me to.

16 Yes, we asked, do you think that the Seabrook Nuclear  
17 Power Plant should be allowed to operate to generate  
18 electricity?

19 Q Where are you looking?

20 A (Cole) On Page 60 of the Technical Appendix, of the  
21 Attachment 5, Question 16.

22 Q And I am looking to see if you have the numbers  
23 tabulated as to how many answered, yes or no?

24 A (Cole) Yes, we have that in the Table in the report.  
25 It is on Page 15 of the Attachment 5, and it shows

1 that -- are you concerned only with New Hampshire residents or  
2 the total EPZ population?

3 Q I think they are both shown there, aren't they?

4 A (Cole) They are both.

5 Twenty-nine percent of the entire EPZ population said  
6 that it should be allowed to operate; 65 percent said it should  
7 not be; and six percent had no opinion.

8 Q Did you make any attempt to correlate the responses  
9 to Question 16, as to whether or not the respondents thought  
10 that the plant should be allowed to operate with the other  
11 results of the survey?

12 A (Cole) Yes, we did.

13 Q Is that presented somewhere in your study?

14 A (Cole) Yes, it is.

15 Q Where would I find that?

16 A (Cole) I think it is Table 3, but let me just check  
17 for a second.

18 (Pause.)

19 THE WITNESS (Cole): Yes, it is on Page 33.

20 At the bottom.

21 BY MR. TURK:

22 Q And is this the only instance where you correlate  
23 that, the response to Question 16, with other questions posed?

24 Actually no, I see that it is not. I see another  
25 instance on Page 38, where you correlate it, with the question

1 of whether they would not evacuate at all?

2 A (Cole) Yes, that is correct.

3 Q All right, thank you, I appreciate your held on that.

4 MR. TURK: I have no further questions.

5 JUDGE SMITH: Okay.

6 We will take a 10-minute break and we will come back  
7 to your redirect examination.

8 (A brief recess was taken.)

9 (The NRC Cross-examination  
10 Plan of the Panel of Zeigler,  
11 Johnson, and Cole follows:)

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1. Identify the population size of the area surveyed by the witnesses at Three Mile Island (p. 7).
2. Identify certain aspects of the evacuation at Three Mile Island: (a) when the advice was issued for pregnant women and young children to evacuate (P. 9); (b) what information had been provided to the populace at that point in time; (c) whether the Mountain West Research study (Flynn, et al) identified as a factor in the reasons why people evacuated, the problem of their having received confusing information (p. 11).
3. Determine whether the witnesses are familiar with post-TMI developments in regulations and guidance concerning emergency information.
4. Determine whether other social and behavioral scientists have been identified (p. 12).
5. Determine the sex distribution of the Seabrook EPZ, as a whole and in NH and Mass (p. 16). Determine witnesses' basis for this estimate. Determine the sex distribution for heads of households within the same areas (p. 16).
6. Describe nature of errors identified upon verification (p. 20). Determine whether any callers skipped over some portion of the simulated EBS messages in order to complete the survey within the available time.
7. Determine whether they are aware of census data as to the number of households without cars in the NH section of the EPZ (p. 25). Determine whether their survey requested information as to how many respondents would offer rides to persons without vehicles of their own.
8. Determine the number of respondents in the NH portion of the EPZ who were, themselves, emergency workers (p. 50). Determine the reliability of the survey to predict the behavior of other members of the same household. Identify the respective numbers of persons represented on Table 2 (p. 51).
9. Determine whether the witnesses know the number of persons who are assigned roles as emergency workers in NH. Determine the reliability of the survey as a sampling of this group. Determine whether the percentages reported on p. 52 are related to the numbers reported in Table 1 (p. 49).
10. Determine whether telephone company personnel near TMI were previously assigned roles as emergency workers (p. 54).
11. Determine whether potential biases affect the survey (Attachment 5, Table A3, p. 57).

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JUDGE SMITH: Proceed, Mr. Traficonte.

REDIRECT EXAMINATION

BY MR. TRAFICONTE:

Q Dr. Cole, I'd like to ask you, do you have a view as to the accuracy and reliability of the survey conducted by Drs. Zeigler, Johnson and Brunn that's discussed in the direct testimony?

A (Cole) Yes, I do.

Q And could you tell us what your view is?

A (Cole) I think that the evidence suggests that the basic conclusions of that survey, for example, the fact that approximately 40 percent of EPZ residents engaged in a voluntary evacuation are very valid.

And the reason I would not be concerned about the response rate or the size of the sample in this particular survey, which are potential problems in survey, and I would like to underline that potential, is that because in this case the results of this survey were independently corroborate by two other investigators, including one funded by the NRC, and all three surveys came up with essentially similar results.

And to my knowledge, the results of the Zeigler, Johnson, Brunn study are almost universally, or virtually universally accepted in the literature on response to TMI.

In fact, they are cited by Dr. Mileti in his work and in his testimony.

1 Q Now, Dr. Cole, you will recall that you were cross-  
2 examined at some length concerning a text that you have  
3 written, Sociological Method. Portions of that text were read  
4 to you concerning value freedom in sociology.

5 Do you recall that testimony?

6 A (Cole) Yes.

7 Q And you were asked to place yourself in one of two  
8 camps: the value-free technician camp as opposed to those in  
9 sociology who would want, for the sake of a term we'll call it  
10 committed sociology, sociology that is pursued for identified  
11 reasons and values.

12 Do you recall that discussion?

13 A (Cole) Yes, I do.

14 Q And it was your testimony that you place yourself in  
15 the technician camp. That's correct, isn't it?

16 A (Cole) Yes.

17 Q Is there any evidence that you could provide us for  
18 your self-evaluation that you should be considered, or that you  
19 consider yourself in the technician camp?

20 A (Cole) Yes. I have done a substantial amount of  
21 research on energy and public response to energy and to nuclear  
22 energy in particular. And I'd like to point out that I have  
23 worked for Brookhaven National Laboratories on surveys funded  
24 by the NRC; that I have worked for Columbia University, School  
25 of Engineering, on a survey funded by Consolidated Edison.



1 And, furthermore, I have worked for the Long Island Lighting  
2 Company, and I have done surveys for them on the attitudes of  
3 Long Island residents towards the company and towards the  
4 Shoreham Nuclear Power Plant.

5 In fact, in one report that I wrote for LILCO in  
6 1981, I made a set of recommendations to LILCO on what they can  
7 do to increase their credibility. And I believe if they had  
8 listened to those recommendations, the situations on Long  
9 Island might have been different.

10 Q Dr. Cole, there was some examination that dealt with  
11 the random sampling of households performed for the survey that  
12 you have provided in this case. Specifically, there were some  
13 questions directed to the 50-50 division between male and  
14 female heads of household.

15 Do you recall that testimony?

16 A (Cole) Yes.

17 Q Would you explain why there was a conscious choice  
18 made of ensuring that male and females heads responded in a  
19 roughly equal proportion?

20 A (Cole) Yes, I'll repeat what I said in my testimony.  
21 If we had simply interviewed any head of household, male or  
22 female who we were able to obtain on the telephone, we probably  
23 would have ended up with a larger proportion of female  
24 respondents.

25 In fact, I think that the first market research

1 survey used by KLD in preparing work for the Applicant ended up  
2 with something like 58 percent of women.

3 It has been my general experience that if you do not  
4 use a sex quota system, you obtain higher proportions of women  
5 than you would find in the population, because women are more  
6 likely to answer the phone, and probably more likely, or  
7 slightly more likely to be willing to talk on the phone.

8 Now, it's well known from my research and the  
9 research of other people that women have more negative  
10 attitudes towards nuclear power than men. And if the survey  
11 overrepresents women, if it has more women in the sample than  
12 exists in the population, it could be biased against nuclear  
13 power. And therefore we made a specific effort to make sure  
14 that the proportion of women in the sample was not more than  
15 the proportion in the general population.

16 Q Dr. Cole, the question was put to you earlier by Mr.  
17 Lewald concerning callbacks that were actually performed in  
18 your survey.

19 Do you recall that question?

20 A (Cole) Yes, I do.

21 Q Let me ask you, do you have a rough estimate for the  
22 number of callbacks that were actually performed for your  
23 survey?

24 A (Cole) Our contract -- it wasn't a written contract,  
25 but our informal agreement with Marketing called upon them to

1 make one initial call, and at least -- I'd like to emphasize  
2 the "at least" -- at least three additional callbacks.

3 So that before we decided that a number could not be  
4 reached, at least four calls were made. I would say that  
5 generally more calls were made.

6 Now, I can't tell you exactly how many callbacks were  
7 made. Sometimes we were able to reach a number of the first  
8 call, sometimes on the second call, third call, fourth call, in  
9 some cases. five, six and seven calls were made to these  
10 people. But in every case, at least a total of four calls were  
11 made.

12 Q Well, do you have some sense for how large number of,  
13 the absolute number of callbacks was? Was it a significant  
14 number?

15 A (Cole) Oh, yes.

16 Q Now, Dr. Cole, there was some examination directed to  
17 the nature of the survey questionnaire with regard to EBS  
18 messages or portions of EBS messages that were used in the  
19 questionnaire.

20 Do you recall that testimony?

21 A (Cole) Yes.

22 Q And there was also testimony as to a pretest  
23 conducted by you, I believe, of an initial questionnaire.

24 Do you recall that testimony?

25 A (Cole) Yes.



1           Q     The EBS messages or portions of EBS messages that  
2 were used in the pretest, were they the same, were they  
3 identical to the ones that ended up in the final questionnaire?

4           A     (Cole) No. In the pretest, we included more, a  
5 larger portion of the EBS message. But what we found when we  
6 actually administered this questionnaire on the telephone to  
7 real people living in the EPZ was that the respondents found  
8 the question to be too long, to be confusing, and difficult to  
9 answer.

10                     And so we decided that in order to get reliable  
11 information, we would try to delete some sections of the EBS  
12 messages which we felt were not crucial in order to identify  
13 the scenario that we wanted the respondents to reply to.

14           Q     Now I'd like to direct the panel's attention to Page  
15 6 in the technical appendix. Specifically, Question No. 31 as  
16 well as in a document that was distributed but unmarked, headed  
17 Appendix G, Emergency Broadcast System Activation. I would  
18 like to direct your attention to Pages 6-30 and the following  
19 pages.

20                     Have you located those two pieces, two documents?

21           A     (Cole) Yes.

22           Q     Now, first, Dr. Cole, let me put this question to  
23 you.

24                     Was the intent of this survey instrument to simulate  
25 for the respondents the actual EBS messages that they would be

1 hearing during an emergency at Seabrook?

2 A (Cole) No. The intent was to ask the respondents  
3 what they would do in a scenario which was based as closely as  
4 we could base it upon the EBS messages. But the intent was  
5 certainly not to read the EBS messages, or do any kind of test  
6 of the clarity of the EBS messages.

7 Q Were you attempting to test the effectiveness of the  
8 EBS messages?

9 A (Cole) No.

10 Q Would it, in your opinion, be possible to empirically  
11 validate or test the effectiveness of the EBS messages?

12 A (Cole) If by the effectiveness you mean the extent  
13 to which the typical kinds of people living in the EPZ would  
14 understand those messages and would feel that they would listen  
15 to the advice given in those messages, then the answer is yes.

16 Q Well, let me be more precise in my question.  
17 Would it be possible to test empirically the clarity  
18 of the EBS messages?

19 A (Cole) Yes.

20 Q And would it be possible to test empirically the  
21 believability of those messages for the people to whom they are  
22 going to be addressed?

23 A (Cole) Yes.

24 Q How would such an empirical validation be done?

25 A (Cole) We conducted a study of EBS message in our

1 research on involving litigation concerning LILCO's exercise in  
2 February of 1986. In that exercise, LILCO simulated the  
3 broadcast of a set of EBS messages; messages which were either  
4 written by or partially by Dr. Dennis Miletic.

5 And in order to find out how clear these messages  
6 were and how believable they would be, we recruited a random  
7 group of approximately 50 Long Island residents living in the  
8 EPZ and right outside the EPZ.

9 We had, prior to the actual research, made a tape  
10 recording of somebody reading the EBS messages. So we then had  
11 these people come into a room. We had them sit down. There  
12 were three different groups. We didn't do all 50 at once. We  
13 had three different groups. And we told them to imagine they  
14 were at home on a given day, and a certain time, and that they  
15 heard the following message on the radio.

16 And we then played the EBS message exactly as it was  
17 simulated in the LOCO exercise. We then had the people discuss  
18 these messages, and we found that the great majority of the  
19 people who listened to them found them to be confusing,  
20 frightening. People said they didn't believe that they were  
21 real EBS messages; that these couldn't -- these were so bad  
22 that they could not possibly be real EBS messages. And a great  
23 majority of the people who listened to those messages said that  
24 they would not do what they were advised to do in those EBS  
25 messages.



1 A similar type of research could be done here at  
2 Seabrook in which real people living in the Seabrook EPZ were  
3 asked to listen to the EBS messages, and then asked to respond  
4 to them to see how they felt about them, whether they felt that  
5 they were clear, understandable, and what they would do under  
6 those circumstances.

7 Q But I take your testimony to be that the survey that  
8 you conducted did not have that as one of its purposes.

9 A (Cole) No.

10 Q Now I would like to ask the panel to turn to, and I  
11 won't spend a lot of time on this, but to turn to Page G-30,  
12 and if you will, compare what appears on G-30 with what appears  
13 on Page 62. G-30 of the document already identified as  
14 Appendix G. Compare what appears on that page with Page 62 in  
15 the technical appendix.

16 And I would like to ask in the first instance, there  
17 is a blocked piece of text that is headed "No Release of  
18 Radiation". That blocked piece of text does not appear on Page  
19 62, does it?

20 A (Zeigler) No.

21 A (Cole) No.

22 Q And why is that?

23 A (Zeigler) We were trying to structure a scenario  
24 here to put people in the context of an emergency at the  
25 Seabrook plant.

1           And so we chose the first blocked section on Page  
2 G-30 where there had been a release of radiation.

3           Q     Did you understand the two blocked portions of text  
4 to be alternatives?

5           A     (Zeigler) Yes, they were taken to be alternatives.

6           Q     So that a choice of one would preclude the choice of  
7 the second?

8           A     (Zeigler) Right.

9           Q     If you would turn to Page G-31, the following page in  
10 the Appendix G. Does the very first paragraph on that page,  
11 does it appear on Page 62 of the technical appendix?

12          A     (Zeigler) No, it doesn't.

13          Q     Does the following paragraph appear? Well, let me  
14 summarize it for the sake of time.

15                 Does any of the text on Page G-31 appear on Page 62  
16 of the technical appendix?

17          A     (Zeigler) No, I don't believe it --

18          Q     And do you have a view as to why that's the case?

19          A     (Cole) No, it does. Excuse me.

20          A     (Zeigler) The second paragraph there, Evacuation --  
21 no, I'm sorry, on Page 62, we're simply advising the -- on Page  
22 62, the scenario on Page 62 simply advises people in the beach  
23 areas and the state parks to evacuate.

24                 So I don't believe anything on Page G-31 appears in  
25 that scenario.

1           A       (Cole) No, it's evacuation of recommended people in  
2 Seabrook --

3           Q       Well, If I could direct Dr. Zeigler to the last  
4 sentence, or the next to the last sentence that appears in the  
5 first quoted paragraph on 62, if you would like to modify --

6           A       (Zeigler) Okay, evacuation is also recommended for  
7 people in Seabrook and Hampton Falls.

8                   So the second paragraph on Page G-31, we selected the  
9 communities here, Seabrook and Hampton Falls, and thus did  
10 include part of the paragraph, the second paragraph on Page  
11 G-31.

12          Q       So essentially you were directing -- on Page 62 you  
13 were directing two towns to evacuate.

14          A       (Zeigler) Yes, we were directing two towns to  
15 evacuate.

16          Q       And what are the directions being given to the other  
17 towns?

18          A       (Zeigler) The directions being given to the other  
19 towns are specified in the paragraph following, people living  
20 in the towns, and then they are specified, are advised to  
21 shelter in place. So it was a sheltering advisory for the  
22 remaining portion of the zone.

23          Q       So all the towns were either told to evacuate or  
24 shelter. There was no town given no protection?

25          A       (Zeigler) There were only two groups, right, either



1 evacuate or shelter.

2 Q Now, rather than take the time here going through the  
3 entire emergency broadcast message that's set forth at G-30  
4 through G-35, do you have a general view as to why the portions  
5 that were deleted from the message read as is set forth on Page  
6 62 were deleted?

7 A (Zeigler) yes, we could go through them one by one,  
8 but there were several reasons why we did not use some of the  
9 material that appears in Message F.

10 One of the reasons was that we really wanted to get a  
11 handle on evacuation, the evacuation shadow, spontaneous  
12 evacuation. So we were interested in what the people that were  
13 advised to shelter in place would do.

14 We therefore eliminated some of the information about  
15 where to seek shelters for those people living in Seabrook and  
16 Hampton Falls.

17 In addition to that -- and that was our singular,  
18 basically our singular focus here. We wanted to get an idea of  
19 the evacuation shadow.

20 But, in addition, we also eliminated some portions  
21 that were not fit into the context of the scenario given that  
22 it was a weekend. People who were advised not to pick up their  
23 children at school, that was eliminated. And, in addition,  
24 some of the repetition, much of the repetition was eliminated  
25 from Message F.

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1 So we believe that we did a good job of retaining  
2 the spirit of Message F, without parroting it verbatim.

3 Q I would like to ask, as a final question, I would  
4 like to ask the panel a question very similar to one put by  
5 Judge Linenberger.

6 And we have heard testimony both on direct and cross  
7 with regard to TMI. And what happened from a behavioral point  
8 of view at TMI, and its relevance, if any, to predictions  
9 concerning what might happen in the event of an emergency at  
10 Seabrook.

11 And I would like to put to the panel, this question,  
12 we have heard from you that it was quite clear that there was  
13 no emergency plan in place, at the time of the TMI incident.

14 And it is quite clear, or you could at least assume  
15 as a hypothetical, that if the Seabrook plant is licensed, it  
16 will only be licensed as a consequence of the NRC determining  
17 that there is, in accordance with the regulations, an adequate  
18 emergency response plan in place.

19 And based on your own knowledge of NRC regulations as  
20 to the contents of that plan as well as your knowledge as  
21 behavioral scientists, do you have a view on what difference of  
22 differences the existence of an approved plan will make for  
23 human response to an emergency or potential emergency at  
24 Seabrook?

25 MR. TURK: Your Honor, objection to the form of the



1 question.

2 I am not sure where the premise ended and the  
3 question began.

4 MR. TRAFICONTE: Well, I will restate it, if you want  
5 me to, I thought that it was clear but --

6 JUDGE SMITH: If you wish, if you want to accomodate  
7 counsel, do it.

8 I thought that it was clear, but whatever you wish.

9 MR. TRAFICONTE: Well, I will try to simplify it.

10 BY MR. TRAFICONTE:

11 Q You have all studied what happened at TMI, and you  
12 have testifying as to what might happen at Seabrook in light of  
13 TMI. And it is clear to everyone here that there was no  
14 emergency plan in place at TMI, but Seabrook will not be  
15 licensed at all, without an approved emergency plan in place.

16 Now, based on those statements which you can assume  
17 is a hypothetical if you are not otherwise comfortable with  
18 them, what is your view on the impact of an approved plan, in  
19 place, on the human response to an emergency in the event of an  
20 incident at Seabrook?

21 A (Zeigler) We do not believe that the planning that  
22 has gone on in this case, or any other case, or the planning  
23 that is required by the NRC and FEMA takes into consideration  
24 the realities of human behavior in the context of a nuclear  
25 emergency.



1           In this country, we have one general emergency on  
2       which to draw out for experience in planning and that is the  
3       emergency at Three Mile Island.

4           And at Three Mile Island, in an area that was not  
5       anti-nuclear to begin with, we had an extremely large response  
6       to a very limited evacuation advisory.

7           I believe that that response would materialize again,  
8       should an accident occur at the Seabrook or any other nuclear  
9       power plant.

10          And the reality of that behavior is not factored into  
11       planning as it currently exists. Instead, what seems to be  
12       factored in here, is a dependence on the emergency broadcast  
13       messages to completely control human behavior in a disaster  
14       situation.

15          And I do not believe there is a shred of evidence  
16       that supports that contention. I do not believe that by  
17       adjusting emergency broadcast messages you can cope with, you  
18       can overcome the complex set of confusing and conflicting  
19       information that will naturally occur at any nuclear power  
20       plant accident in the future.

21          People are going to look after their own welfare,  
22       during a nuclear accident. Given the fact that there has been  
23       a lot of thought on the part of the public, given to nuclear  
24       power in the aftermath of Three Mile Island, in the aftermath  
25       of Chernobyl, I think people now, are even more likely to

1 respond to evacuation --

2 JUDGE SMITH: Just a moment. Did you intend for such  
3 an extended response to your question?

4 MR. TRAFICONTE: Well, I wanted a summary if I could  
5 get one, of the --

6 JUDGE SMITH: Very well, okay.

7 THE WITNESS (Zeigler): I will try to be brief.

8 I think that given the context of events as they have  
9 followed Three Mile Island that you may, in fact, expect just  
10 as strong, if not a stronger evacuation response at Seabrook or  
11 any other plant.

12 Maybe I will give my colleagues a chance to respond,  
13 too.

14 THE WITNESS (Johnson): I will be brief.

15 With respect to the whole role of EBS messages, I  
16 think it is important to point out that in the long list of  
17 disaster studies that have been cited, by Dr. Mileti and other  
18 people in this proceeding, I think that it is important to  
19 point out that what the research shows is that EBS messages  
20 have been important in under-response, that is, getting people  
21 who refuse to respond to take protective actions initiative.

22 It has been important in getting those people to take  
23 protective actions.

24 There is no evidence to suggest that those EBS  
25 messages will deal with the issue that we are confronted with

1 in terms of a nuclear power plant accident, and that issue is  
2 over-response.

3 There is no evidence that an EBS message will keep  
4 people in place, will stop them from spontaneously evacuating.

5 I think when you add that fact to the whole notion  
6 that the revised regulations do nothing to deal with the large  
7 amount of other conflicting information that is likely to  
8 present itself, in the event of another nuclear emergency in  
9 this country, I think that when you factor that in, I have to  
10 concur with Dr. Zeigler, that spontaneous evacuation is a real  
11 problem that is likely to present itself, in the event of a  
12 nuclear emergency at Seabrook or any other nuclear power plant.

13 THE WITNESS (Cole): Just very briefly, it seems to  
14 me that one of the primary if not the basic difference between  
15 the witnesses for the Applicant and the witnesses for the  
16 Intervenor on the behavioral issues, is that we all agree that  
17 the residents of the Seabrook EPZ have a strong fear of  
18 radiation, that might be released in a radiological emergency  
19 at Seabrook.

20 The witnesses for the Applicant argue that the  
21 clarity of the EBS messages, will overcome all of this fear,  
22 and we believe that the EBS messages, no matter what they say  
23 in them, cannot possibly overcome this fear, in the light of  
24 the atmosphere that is going to exist in a real radiological  
25 emergency, with all the media, all the different people



1 commenting on it, and the lack of credibility that the people  
2 issuing the EBS messages will have under that situation.

3 And that was very strongly supported by our research  
4 on Long Island, in which we found that the people living around  
5 Shoreham just did not believe the EBS messages and found them  
6 confusing and frightening and anxiety-producing and this was  
7 only in a room at the University, it was not during a real  
8 radiological emergency.

9 So, essentially we believe that on all the basis, all  
10 the evidence that we have that these EBS messages, in  
11 themselves, can't overcome the strong fear of radiation.

12 And that if there is a radiological emergency there  
13 will be a very substantial over-response.

14 MR. TRAFICANTE: I have nothing further, Your Honor.

15 JUDGE SMITH: Are you going to have recross?

16 MR. LEWALD: I have two matters.

17 One I would like to move to introduce the Applicants'  
18 Exhibits Number 26, and 27 for identification, which I do not  
19 believe I have formally done earlier. It has been alluded to  
20 but -- and I would like to do it at this time.

21 JUDGE SMITH: Are there objections?

22 (No response.)

23 JUDGE SMITH: The Applicants' --

24 MR. TRAFICANTE: -- can we just, we are just trying  
25 to locate which ones they were. There were other papers that

1 we had.

2 MR. LEWALD: These are the Sociological Method  
3 excerpts, and the Chapter 3 Section from the Three Mile Island  
4 study that was conducted by Drs. Zeigler and Johnson.

5 MR. TRAFICONTE: But not the Maxwell piece?

6 MR. LEWALD: No.

7 That is already part of Exhibit Number 5, as I  
8 understand that is already in evidence.

9 MR. TRAFICONTE: Well, just on that last part, I  
10 don't believe that is correct.

11 I don't believe the Maxwell study is part of --

12 MR. LEWALD: No, the Maxwell study is not, I am  
13 sorry. The Maxwell study was not offered in evidence. I  
14 thought that you were referring to Appendix G of Volume 4.

15 The Maxwell study was neither marked nor am I  
16 offering it.

17 JUDGE SMITH: Two Exhibits, Numbers 26 and 27; 26 is  
18 the Sociological Method, excerpts by Dr. Cole, and 27 is the  
19 Chapter 3 of the Social Survey of TMI Area Residents.

20 MR. TRAFICONTE: I have no objection to those.

21 I would just, if I might, add our motion to have the  
22 next document which was the Maxwell article also entered into  
23 evidence, that Mr. Lewald used during the cross-examination of  
24 Drs. Johnson and Zeigler.

25 MR. LEWALD: I don't know on what basis this is being

1 offered. It is an article that somebody wrote and the person  
2 who wrote it, is apparently, at least in the portion we were  
3 concerned with was quoting to a newspaper --

4 JUDGE SMITH: So you object?

5 MR. LEWALD: I object.

6 JUDGE SMITH: Okay.

7 MR. TRAFICANTE: Well, if we are going to have a  
8 motion heard, I am sure that we don't want to, I would just  
9 point out that Mr. Lewald did cross-examine on the basis of the  
10 information contained in that --

11 JUDGE SMITH: That does not get it into evidence  
12 though.

13 You cannot get it into evidence on that basis;  
14 objection sustained.

15 You are not at this time offering the telephone  
16 company letter, Exhibit Number 28?

17 MR. LEWALD: No.

18 I think that I already had a ruling on that, that in  
19 the face of the objection raised, that it wouldn't be admitted,  
20 so I won't press its admission.

21 JUDGE SMITH: Yes.

22 At least it was a portender of what an offer might  
23 bring.

24 MR. LEWALD: That is correct, Your Honor.

25 And I just have one question on redirect.



1 Not redirect but recross. If it is inappropriate to  
2 do it, at this time, I could hold it.

3 JUDGE SMITH: This would be your last chance, as the  
4 panel will be going.

5 MR. DIGNAN: Your Honor, may I point out that I don't  
6 think you formally received 26 and 27 yet.

7 JUDGE SMITH: Oh, thank you.

8 Exhibits Numbers 26 and 27, thank you, are received.

9 (The documents previously  
10 marked for identification as  
11 Applicants' Exhibits Numbers  
12 26 and 27 were received.)

13 RECROSS EXAMINATION

14 BY MR. LEWALD:

15 Q I would ask the panel if it would direct its  
16 attention to Page 11, of Attachment S, to your testimony and  
17 the last paragraph on that page, which reads, "most special  
18 scientists studying the response to the public to the  
19 radiological emergencies agree that whether or not the public  
20 complies with protective action recommendations, depends  
21 primarily on two factors: pre-existing fear of exposure to  
22 radiation and the information the public receives during the  
23 accident, (including the official EBS messages)."

24 And there is a cite forward to footnotes, including  
25 studies by Lindell, Dennis Mileti, James Johnson, Donald

1 Zeigler, Stanley Brown and another by Dr. Johnson, Dr. Zeigler,  
2 and a fourth one by Dr. Johnson.

3 My question is, do you now want, in light of your  
4 last answer to Assistant Attorney General Traficonte's  
5 question, do you want to strike that paragraph and the citation  
6 from the Attachment to your testimony?

7 A (Zeigler) No.

8 We are not saying that the EBS message has no impact,  
9 we are just saying that it is one fragment of the information  
10 that people receive. It is part of the information matrix in  
11 which people find themselves.

12 It is information that is going to play a role in  
13 this decision. It is not one element of information.

14 MR. LEWALD: I have nothing further.

15 JUDGE PARBOUR: I have one question of Dr. Zeigler.

16 In response to the last question from Mr.

17 Traficonte, I understood right at the beginning, that you were  
18 making a correlation between spontaneous evacuation and either  
19 pro-nuclear or anti-nuclear sentiments on behalf of the  
20 population.

21 Is that correct, did you infer that or state that?

22 THE WITNESS (Zeigler): I would say that if I stated  
23 it in a pro-nuclear or anti-nuclear context, I would modify  
24 that to say, a fearful context. It is correlated, I think, with  
25 the fear of radiation.

1 JUDGE HARBOUR: All right.

2 THE WITNESS (Zeigler): People who are fearful of  
3 radiation.

4 And I think, what I think, in that context what I was  
5 saying at the time of the Three Mile Island accident, people  
6 were not exceptionally conscious of the hazards of nuclear  
7 energy in this particular setting.

8 Whereas, now, I think that the people are very  
9 conscious and hence, very fearful of the reality of a nuclear  
10 accident taking place.

11 JUDGE HARBOUR: So you were not making such a  
12 correlation then?

13 THE WITNESS (Zeigler): I was not intentionally.

14 JUDGE HARBOUR: Thank you.

15 JUDGE LINENBERGER: Very quickly, Dr. Cole, the  
16 respondents to your, I will say your survey questionnaires,  
17 lived in a quite a few towns, within the EPZ or borders the  
18 same.

19 And I am wondering if -- I should like to inquire,  
20 was any effort made to determine whether the responses, total  
21 responses, from any given town, represented a significant  
22 departure from the overall response of the total aggregate of  
23 respondents?

24 Was that looked at?

25 THE WITNESS (Cole): Many people analyzed the data.



1 My primary role was in collecting it. And in my analysis I  
2 did not do that. My analysis was aimed at generalizing to the  
3 entire EPZ. Some of the other consultants may have looked at  
4 some of the separate towns. But I personally did not.

5 JUDGE LINENBERGER: Do any of the other panel members  
6 have a comment that would help here?

7 THE WITNESS (Johnson): We did not look by town,  
8 either.

9 THE WITNESS (Zeigler): No.

10 JUDGE LINENBERGER: All right, thank you.

11 That is all.

12 JUDGE SMITH: Any further questions?

13 MR. BISBEE: Just one matter to follow-up, Your  
14 Honor.

15 RECROSS EXAMINATION

16 BY MR. BISBEE:

17 Q And I would like to address this to Dr. Cole, in the  
18 first instance.

19 I thought that I heard you say in response to Mr.  
20 Traficonte's question earlier, about the impact of the EBS  
21 messages that these EBS messages would not overcome the fear  
22 that the public has to a large extent to diminish the  
23 spontaneous evacuation that would occur.

24 Were you referring to the messages that are contained  
25 in the plan as it now stands?

1           A     (Cole) My statement would certainly include those  
2 messages, yes.

3           Q     But it would also include any EBS message.

4           A     (Cole) It would include all the ones that I have  
5 seen.

6           Q     Are there EBS messages that you would prepare so that  
7 the impact would be greater on diminishing spontaneous  
8 evacuation?

9           A     (Cole) I think I could do a better job, but I don't  
10 think I could overcome the tremendous fear of radiation that  
11 people have.

12                I agree with my colleagues, that the messages are one  
13 factor and they, by themselves, cannot overcome this tremendous  
14 fear, no matter how clear the messages are, no matter who  
15 writes them or what is in them, they are not going to  
16 completely overcome the fear.

17                And there will be a significant spontaneous  
18 evacuation which should be considered in making up the plan.

19                However, I think that there is room for good and bad  
20 in the messages and they can have some effect. How much, is  
21 hard to say.

22           Q     And can I ask the last question to Drs. Johnson and  
23 Zeigler.

24                Do you agree that really, in essence, no EBS message,  
25 regardless of how clear it might be, would overcome to any

1 appreciable extent, the impact on the public in terms of  
2 spontaneous evacuations?

3 A (Zeigler) Well, in general, I would agree with that.  
4 I mean I agree with Dr. Cole's assessment of the situation.

5 A (Johnson) I concur.

6 MR. BISBEE: Thank you.

7 JUDGE SMITH: You may step down, gentlemen.

8 Do you have any further questions?

9 (No response.)

10 JUDGE SMITH: Thank you very much for coming.

11 You are excused.

12 (Whereupon, the witnesses were excused.)

13 (Whereupon, at 3:00 p.m., the evidentiary hearing was  
14 recessed, to be reconvened immediately to the public limited  
15 appearance statements.)

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CERTIFICATE

This is to certify that the attached proceedings before the  
United States Nuclear Regulatory Commission in the matter of:

Name: PUBLIC SERVICE COMPANY OF  
NEW HAMPSHIRE, et al.

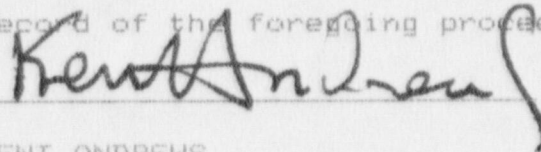
Docket Number: 5-443-DL, 5-444-DL

Place: CONCORD, NEW HAMPSHIRE

Date: December 16, 1987

were held as herein appears, and that this is the original  
transcript thereof for the file of the United States Nuclear  
Regulatory Commission taken electronically by me and,  
thereafter reduced to typewriting by me or under the direction  
of the court reporting company, and that the recording is a  
true and accurate record of the foregoing proceedings.

/s/



(Signature typed): KENT ANDREWS

Official Reporter

Heritage Reporting Corporation