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# TRANSCRIPT OF PROCEEDINGS

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UNITED STATES OF AMERICA  
OFFICE OF SECRETARY  
OF ENERGY  
NUCLEAR REGULATORY COMMISSION  
BEFORE THE  
ATOMIC SAFETY AND LICENSING BOARD

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In the Matter of:	:
	:
LONG ISLAND LIGHTING COMPANY	:
	:
(Shoreham Nuclear Power	:
Station, Unit 1)	:
	:
----- -X	

Docket No. 50-322-OL-3  
(Emergency Planning)

DEPOSITION OF GRE C. MINOR

Washington, D. C.

Thursday, April 21, 1988

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NUCLEAR REGULATORY COMMISSION  
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: LONG ISLAND LIGHTING COMPANY : Docket No. 50-322-OL-3  
: (Shoreham Nuclear Power : (Emergency Planning)  
: Station, Unit 1) :  
: :  
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DEPOSITION OF GREGORY C. MINOR

Washington, D. C.  
Thursday, April 21, 1988

Deposition of GREGORY C. MINOR, called for examination pursuant to notice of deposition, at the law offices of Hunton and Williams, 2000 Pennsylvania Avenue, N.W., Conference Room Two, Ninth Floor, at 1:35 p.m. before WENDY S. COX, a Notary Public within and for the District of Columbia, when were present on behalf of the respective parties:

LEE B. ZEUGIN, ESQ.  
DAVID S. HARLOW, ESQ.  
Hunton & Williams  
707 East Main Street  
P. O. Box 1535  
Richmond, Virginia 23212  
On behalf of Long Island  
Lighting Company.

-- continued --

1 APPEARANCES (Continued):

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RONALD R. ROSS, ESQ.  
Kirkpatrick & Lockhart  
South Lobby, Ninth Floor  
1800 M Street, N.W.  
Washington, D. C. 20036-5891  
On behalf of Suffolk County.



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C O N T E N T S

WITNESS

EXAMINATION

Gregory C. Minor  
by Mr. Zeugin

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E X H I B I T S

MINOR DEPOSITION NUMBER

IDENTIFIED

Exhibit 1  
Exhibit 2

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P R O C E E D I N G S

Whereupon,

GREGORY C. MINOR

was called as a witness and, having first been duly sworn,  
was examined and testified as follows:

EXAMINATION

BY MR. ZEUGIN:

Q Mr. Minor, my name is Lee Zeugin from the law firm  
of Hunton & Williams. I will be taking your deposition  
today. With me is David Harlow, also of our firm, who  
represents LILCO in this Shoreham proceeding. The purpose of  
the deposition is to discuss your testimony on immateriality  
issues, particularly contentions 1 and 2 that have been filed  
in the Shoreham emergency planning proceeding. If at any  
time during this deposition you don't understand one of my  
questions, please let me know and I will be glad to try to  
restate it for you.

I would like to begin by having you state your  
name and business address for the record.

A My name is Gregory Minor; my business address is  
MHB Technical Associates, 1723 Hamilton Avenue, suite K,  
San Jose, California 95125.

1           Q     Mr. Minor, could I ask you to explain for me your  
2 understanding of the scope of the testimony you are being  
3 asked to present under contentions 1 and 2?

4           A     Well, our part of the testimony will probably --  
5 and I say probably, because it isn't written at this point,  
6 and I don't know what it entails in detail, but it isn't  
7 written, but it will probably be focused on the aspects of  
8 the possible increase in risk or dose experienced by the  
9 public during an evacuation during different types of  
10 controlling circumstances, such as impediments or delays due  
11 to traffic controllers not being there or not being effective  
12 in their control, and things of that nature.

13          Q     I take it, is your testimony going to cover  
14 essentially accident sequences that could occur at the plant  
15 and their off-site consequence as compared to alternatively,  
16 is it going to address the accuracy of the evacuation time  
17 estimates that appear -- currently appear in the LILCO plan,  
18 or will it cover both areas?

19               MR. ROSS: Are you asking the witness to speculate  
20 as to testimony he stated isn't written?

21               MR. ZEUGIN: No, I am not asking him to speculate  
22 as to the actual testimony. I am merely asking the scope of

1 what he foresees his testimony, which area he foresees his  
2 testimony to be in.

3 MR. ROSS: I think you are entitled to ask him  
4 about the views that he currently has, but he is not required  
5 to speculate as to views that he may or may not form in the  
6 future.

7 MR. ZEUGIN: Are you instructing him not to  
8 answer?

9 MR. ROSS: Perhaps you would like to restate your  
10 question.

11 MR. ZEUGIN: Are you instructing the witness not  
12 the answer that question?

13 MR. ROSS: If you remember the question, you are  
14 free to answer.

15 THE WITNESS: Well, I don't recall his exact  
16 question, but let me answer by giving you the premise for my  
17 answer, which I think is basically your question. The  
18 perspective with which we will be approaching testimony is  
19 not focused on redoing the traffic analysis or redoing the  
20 estimate of times for evacuation, that is not our purpose or  
21 our intent in the testimony.

22 However, we will be looking at the implications of

1 those differences in time for the various types of  
2 evacuations that have been outlined in LILCO's motion. I am  
3 not sure that the correct terminology may be a motion,  
4 affidavit, or some filing. In any event, there have been  
5 some new times identified, and we will probably rely on that  
6 data plus the data from other witnesses who may be appearing  
7 for the county who would do some looking at the traffic  
8 estimate.

9 BY MR. ZEUGIN:

10 Q In answering my question, Mr. Minor, at several  
11 points you used the word "we." Are you referring to yourself  
12 and Mr. Sholly as preparing this particular testimony?

13 A Yes, in general. But it may involve others from  
14 MHB who were helping along the way to prepare the testimony  
15 and do some of the analyses that we would like to have done  
16 in addition to Steve and myself. But Steve and I will  
17 sponsor the testimony.

18 Q Are there some particular areas, in sponsoring  
19 that testimony, that you believe you bring a special  
20 expertise to that Mr. Sholly does not?

21 A Well, one obvious example, I think, would be the  
22 length of time I have been exposed to this proceeding, and to

1 LILCO's emergency planning and to the plan itself and its  
2 numerous revisions.

3 Q All right. I take it that you are being offered  
4 as an expert on -- to offer expert testimony on this subject;  
5 is that correct?

6 A That's correct.

7 Q Mr. Minor, let me ask you when you were first  
8 contacted to be a witness on contentions 1 and 2?

9 A It was in early April, very near the first of  
10 April. I don't remember the exact date.

11 Q Approximately how much time have you spent since  
12 that time thinking about your testimony or actually preparing  
13 it?

14 A Well, there have only been two or three weeks  
15 elapsed in that period, so certainly it's less than that  
16 amount of time.

17 Q Significantly less, more than a day?

18 A I couldn't give you an accurate guess, but I am  
19 sure it's more than a day, but I don't think it's a number  
20 that I can give you very accurately, other than bracketed  
21 there, between <sup>two days</sup> ~~today~~ and a couple of weeks, but I don't know  
22 the exact numbers.

1           Q     I take it from your earlier answer that at this  
2 point you have not yet drafted any testimony?

3           A     That's correct.

4           Q     Could you list for me the documents you have  
5 reviewed since you were contacted in early April to be a  
6 witness in preparation for preparing your testimony?

7           A     Well, we will have to use the word "reviewed" very  
8 loosely here. There are several documents that I have  
9 thumbed through to see what information might be available in  
10 them, with the idea that I would later decide whether I was  
11 going to actually use that or not, and whether I would review  
12 it in more depth. Among those were some of the standards,  
13 NUREG-0654 and 10 CFR, and also, some of the past documents  
14 that were in the case earlier; and among those, of course,  
15 the plan, the PRA created back in '82-83, the testimony that  
16 I submitted on contention 61 during the emergency planning  
17 proceeding, and I did take a quick look at some other pieces  
18 of testimony that I had submitted since then in this  
19 proceeding, to see if they had any bearing on the subject.

20                   I looked, of course, at the different filings,  
21 briefings and opinions that have flowed back and forth in the  
22 process here, related to this subject, to try to understand

1 how it came to be in the form that it is now. I think that's  
2 the general list. I don't recall all of them now, but that's  
3 all that I recall at this time.

4 Q Okay. Let me ask you to describe for me your  
5 understanding of LILCO's immateriality argument?

6 A My understanding of LILCO's immateriality  
7 argument?

8 Q Yes.

9 A Well, it would be far better for you to read your  
10 own briefs than to get my interpretation of it, because I am  
11 not a lawyer. I can't interpret what legal premise you are  
12 putting it under and all of that. I am not trying to  
13 interpret it that way. But just as a technical perspective,  
14 I view it as being an argument that says there may be  
15 impediments to evacuation that would delay the actual leaving  
16 of the zone by the people who were the last to leave, let's  
17 say, people that take the longest to evacuate, by some number  
18 of minutes or hours; and the basic argument that LILCO is  
19 making is they think that is an immaterial difference, and it  
20 has no materiality in the decisions related to this  
21 particular aspect of the case.

22 Q You used the term "impediments." By that did you



1 mean traffic accidents or do you have some other meaning for  
2 that term, as you have used it?

3 A Well, I look at it as two aspects, traffic control  
4 and impediments of the nature of obstructions or things  
5 placed in the roadway, either as part of the exercise, as  
6 they did during the exercise, or as the reality of what you  
7 are likely to find in a real evacuation. Things are going to  
8 break down. There are going to be some types of obstructions  
9 they will have to work around in an evacuation.

10 Q Let me just ask you a few follow-up questions on  
11 the documents you have reviewed since being asked to be a  
12 witness.

13 You said you have looked at the plan, for  
14 example. Are there any particular parts of the plan or any  
15 particular procedures that you may have looked at more  
16 closely than at others?

17 A Well, it seemed to me in the file that the plan is  
18 the estimates for evacuation. It's either a direct part of  
19 the plan or is something that <sup>was</sup> we filed with the plan, I am  
20 not sure which. But I wanted to look at what the estimates  
21 had been in the past versus what they were now for the new  
22 timing study. So, looking at it in that perspective.

1 Q That's the one you remember reviewing specifically  
2 as compared to the plan in general?

3 A Yes.

4 Q You also said that you looked at your previous  
5 testimony on contention 61, as well as some other testimony  
6 that you had presented earlier in the Shoreham proceeding.  
7 With regard to the other testimony, did you identify any  
8 testimony among that group that you thought may be relevant  
9 to your upcoming testimony on contentions 1 and 2?

10 A What was your question again?

11 Q My question is, you said you reviewed your  
12 testimony on contention 61.

13 A Yes.

14 Q You also said that you looked, in a more general  
15 sense, at other testimony that you had provided earlier in  
16 the Shoreham proceeding.

17 A Yes.

18 Q My question is, from that group of testimony, did  
19 you identify any specific testimony that you thought was  
20 particularly relevant to the issues that are being presented  
21 by contentions 1 and 2?

22 MR. ROSS: Counsel, maybe we need a

1 clarification. I am not sure that he characterized his  
2 review of the other testimony as being in a more general  
3 sense, which is the way you just characterized it.

4 MR. ZEUGIN: Maybe Mr. Minor can clear it up. If  
5 not, I will try to restate the question.

6 MR. ROSS: I think he is trying to find out what  
7 your testimony will be.

8 THE WITNESS: As I understand your question, it is  
9 to find out what, if any, of the testimonies that I looked at  
10 do I consider relevant to this particular action; is that  
11 <sup>it</sup>~~its~~? (9a)

12 BY MR. ZEUGIN:

13 Q Exactly.

14 A I looked at the testimony we presented on  
15 contention 61, dealing with the question of sheltering versus  
16 evacuation, and this is testimony that I presented and  
17 coauthored with Fred Finlayson and Ed Radford. I thought  
18 that that testimony was potentially relevant. The other  
19 testimonies I was looking at dealt with more issues in the  
20 emergency plan and the exercise that I thought may have had  
21 some potential, but when I just glanced through the  
22 conclusions and the subject matter, I decided they probably

1 were not relevant.

2 BY MR. ZEUGIN:

3 Q That's fine. Mr. Minor, I would like to ask you a  
4 series of questions about a number of other documents that I  
5 am sure at one point in the Shoreham proceeding you probably  
6 have reviewed, and ask you about your familiarity with those  
7 documents. I take it you have previously reviewed  
8 NUREG-0396.

9 A Yes.

10 Q And are you familiar with that document?

11 A Generally, yes.

12 Q How about WASH-1400?

13 A Yes.

14 Q How would you describe your knowledge of that  
15 particular document?

16 A WASH-1400, of course, has a lot of historical  
17 prominence, and, therefore, it's a document that was reviewed  
18 a long time ago by me and others in our company; and I think  
19 it sets the general tone for PRAs and, therefore, has  
20 importance in this case.

21 Q How about NUREG-1150, which I believe is a more  
22 recent NRC publication.

1           A     I have done some review of 1150, not a great  
2 deal.

3           Q     Are there any other NRC documents that you feel  
4 have a bearing on contentions 1 and 2?

5           A     Well, the answer has to be yes. But I also could  
6 not give you the title or number of the particular ones that  
7 may have that bearing. There have been a lot of studies done  
8 recently with the -- excuse me, or from the point of view of  
9 looking at particular accident sequences and how they develop  
10 and what is going on and the methodology or the understanding  
11 of the phenomenology of accident progression and how  
12 accidents develop and what type of releases may occur from  
13 those accidents, and there have also been documents put out  
14 dealing with the type of emergency planning decisions that  
15 people have to make.

16                   Now, I have given you very general descriptions of  
17 these documents, because I honestly don't remember the  
18 numbers of them at this point.

19           Q     That's fine. Let me ask you about your review of  
20 Shoreham specific PRAs. I believe you mentioned earlier that  
21 at least since early April you have at least glanced at  
22 LILCO's PRA from that. I believe the correct date is 1983;

1 is that correct?

2 A Yes. This is the original 100 percent PRA.

3 Q How would you describe your review of that  
4 document since April 1; was it brief?

5 A Excuse me. My review of that document since April  
6 1?

7 Q Yes.

8 A That was a very brief review to look for some of  
9 the tabulations dealing with accidents and accident  
10 sequences.

11 Q Have you reviewed that document in more detail at  
12 an earlier time?

13 A Yes.

14 Q Could you briefly describe for me when that  
15 occurred and -- for example, give me some estimate of how  
16 long that review took?

17 A Well, this may actually predate your time with the  
18 case, but several years ago, when we were in safety hearings,  
19 in 1983, when the PRA was issued, and pieces of it became  
20 available, we were looking at that in terms of an  
21 understanding of the aspects of the case, such as ATWS, for  
22 instance. I looked at it in relationship to the testimony on

1 that part of the hearing.

2 Q Would you characterize your review as fairly  
3 detailed at that point?

4 A Certainly in those areas it was. I didn't go  
5 through the entire report in detail.

6 Q I take it you really didn't conduct any other  
7 review following that initial review until just recently when  
8 you looked at it again; is that correct?

9 A No. It came up again during low power hearings,  
10 when we were looking at relative risk, and I reviewed it  
11 somewhat at that time.

12 Q Have you reviewed the more recent PRA that was  
13 prepared for 25 percent power operation?

14 A What do you call reviewed? I have briefly read  
15 through it to understand the nature and premise of it, but I  
16 have not studied it in detail.

17 Q When did you review it in the terms you just  
18 described?

19 MR. ROSS: Counsel, we are starting to stray a bit  
20 into discovery on another issue. I think you ought to tie  
21 these issues to the matter at hand, and that is the  
22 immateriality theory. If you remember the question as stated

1 -- do you remember the question?

2 THE WITNESS: I don't recall the date. It was  
3 shortly after it was issued and in preparation for a meeting  
4 that was held at the Shoreham site to review some outstanding  
5 questions with the different contractors that had helped  
6 prepare it.

7 BY MR. ZEUGIN:

8 Q And, again, I don't want to put words in your  
9 mouth. Your "review of that document," at least to this  
10 point, has been fairly limited to reading through it; is that  
11 a fair description?

12 A Yes. I think if I were going to be testifying  
13 under it or doing something related to it in testimony, I  
14 would certainly have to do a much more thorough review than I  
15 have done so far.

16 Q Mr. Sholly also mentioned this morning that he had  
17 at least briefly read also a recent filing of LILCO dealing  
18 with a more recent PRA that was a summary document that was  
19 prepared on a recent PRA that was done at 100 percent power,  
20 comparing the plant with a supplemental containment system  
21 and one without. Are you familiar with that document?

22 A Yes. I have seen that document also, and just



1 recently we obtained a copy. It is very summary in nature,  
2 though. It is not a full PRA.

3 Q I take it your review of that is basically just to  
4 read through it?

5 A That's correct.

6 Q At any time have you previously reviewed the  
7 evacuation time estimate documentation for the Shoreham plan,  
8 for the evacuation time estimates that are contained in the  
9 evacuation plan?

10 MR. ROSS: Counsel, can you refer to the specific  
11 estimates you are referring to, 1 through 9?

12 MR. ZEUGIN: At any time in this proceeding.

13 MR. ROSS: There are several sets of time  
14 estimates here. Can you clarify this question? What time  
15 estimates are you asking him if he has reviewed?

16 BY MR. ZEUGIN:

17 Q I would first like to ask if he has reviewed any  
18 time evacuation estimates. Then I will get more specific.

19 A I am aware of the time estimates that were  
20 originally put into the plan, and I am aware that there were  
21 revisions along the way of these estimates. I didn't  
22 personally dig into the details and try to understand the

1 rationale for the revisions, nor did I dig into the details  
2 and try to understand what KLD -- is I guess, is the one that  
3 did the most recent -- in the recent filing, so I can't say  
4 that I have really studied any of those different traffic  
5 estimates.

6 Q So, for example, you have never looked at the  
7 actual computer results that underlie the estimates that  
8 appear in the plan; is that correct?

9 A That's correct.

10 Q I take it you have also not examined the specific  
11 assumptions that underlie those evacuation time estimates,  
12 such as roadway capacities, et cetera?

13 A Well, I have looked at that in terms of the  
14 write-up that is in there, in the plan, both at the earlier  
15 date and recently, just to make sure I understood what types  
16 of assumptions they were making. But not in terms of  
17 attempting to redo it or anything of that nature, just to  
18 understand it.

19 Q I take it you don't consider yourself an expert in  
20 traffic engineering; is that correct?

21 A That is not my training.

22 Q Let me move along, Mr. Minor, just briefly, your

1 professional qualifications. I am sure we have gone over  
2 these with you so many times in the last year, that I will  
3 try to spend very little time on it. Let me show you a  
4 document I would like to have marked as Minor Exhibit 1.

5 (Minor Exhibit 1 identified.)

6 BY MR. ZEUGIN:

7 Q I believe this statement of professional  
8 qualifications was attached to your recent testimony on the  
9 school issues, which I believe was filed a week or two ago.  
10 Do you recognize the document that I have had had marked here  
11 as Minor Exhibit 1?

12 A You mean EBS issues?

13 Q Yes, could well be EBS, yes.

14 A I am not sure this is the exact same copy, but I  
15 think it is the same copy. Looking at the last page, it has  
16 item 69, August 31, 1987, testimony date. I believe there  
17 has been another one since then, but I don't recall what it  
18 is. Probably fairly well up-to-date.

19 Q Could I ask you to briefly just look through this  
20 and see if there are any great changes from this document in  
21 your professional qualifications?

22 A I think this represents the current or almost

1 exactly current representation of my resume, with the  
2 possible exception there may be a 70th piece of testimony in  
3 my list of publications and testimony that I am not  
4 recalling.

5 Q Might have been the one you filed a week or two  
6 ago.

7 A Perhaps that's the one I am thinking about.

8 Q All right. Mr. Ross, I would ask, if there is a  
9 more recent statement of professional qualifications, if  
10 there is one, we would like to receive it. I think this is  
11 probably the last one we will receive.

12 A Let me clarify. If this is the one attached to  
13 the EBS testimony, then it is the most recent.

14 Q That's where I got it. I didn't know which piece  
15 of testimony it was, I knew it was one in the pile in my  
16 office.

17 Let me ask you just one other question about your  
18 statement of professional qualifications, Mr. Minor, and that  
19 is do you intend to review any of the 69 publications that  
20 you have listed in your statement of professional  
21 qualifications as part of your preparation to testify in  
22 contentions 1 and 2; and, if so, could you please identify

1 those for me.

2 MR. ROSS: If you have a present intention.

3 THE WITNESS: Well, I am not sure whether I have  
4 properly evaluated item 37, which is the evacuation times and  
5 doses testimony. I did look at item 40, and I probably would  
6 rely on that to some extent, which is the emergency planning  
7 regarding sheltering. Contention 61 in the OL procedure.  
8 Probably number 63, which is regarding contention EX-36, but  
9 I really am not sure about that. That's probably a complete  
10 list of the ones I might look at.

11 BY MR. ZEUGIN:

12 Q That's fine. Mr. Minor, let me show you another  
13 document that I would like to have marked as Minor Exhibit 2  
14 and ask you if you recognize this document?

15 A Yes, I do.

16 (Minor Exhibit 2 identified.)

17 BY MR. ZEUGIN:

18 Q Can you describe for me what it is?

19 A This is my January 29, 1988 affidavit that I  
20 submitted in the OL-3 hearing relating to the LILCO motion  
21 for summary disposition of contentions 1, 2 and 9.

22 Q Could you tell me what documents you used or

1       relied on to prepare this affidavit?

2               A       Well, the motion that LILCO filed was clearly the  
3       starting document. Attached to that was an affidavit of, I  
4       believe, Mr. Lieberman, and I reviewed those to understand  
5       what they were arguing was the basis for the summary  
6       disposition motion. I believe at this time I also went back  
7       to look at the previous estimates of evacuation times. I  
8       don't recall whether I looked at it at this time or I am  
9       confusing that with a subsequent review of the old PRA, the  
10      100 percent PRA. But I did look at accident development  
11      times, and I believe it was connected with this affidavit.

12              Q       The source of those accident progression times  
13      would be the Shoreham PRA and not some other non-Shoreham  
14      specific PRA type document?

15              A       At the time I prepared this, I believe that is  
16      correct. I looked at the Shoreham PRA.

17              Q       But not a document like NUREG-0396 or WASH-1400?

18              A       That's correct. Now, I may have looked at that  
19      set of data on accident and development times from some other  
20      source than the PRA; that's where I am a little fuzzy right  
21      now where I got the set of accident times, accident  
22      development times, when I prepared this affidavit.

1 Q Was it a particular table that you had to prepare  
2 -- the accident time data you are talking about, what form  
3 was it in, to the best of your recollection?

4 A I don't really recall, except that it was not in  
5 the same form as Mr. Lieberman's affidavit. So it makes some  
6 translations between information I had and what Mr. Lieberman  
7 had in his affidavit.

8 Q Do you believe you still have this information  
9 that you relied on at your offices in California?

10 A Since I can't even remember what document it's  
11 from, I would have to say maybe, but I don't know. I am not  
12 sure if I could locate it again. If I had to locate it  
13 again, I would probably look in a different place. I would  
14 probably look in the plan.

15 MR. ZEUGIN: Mr. Ross, I would in fact request  
16 that Mr. Minor look for whatever document he may have relied  
17 on in preparation of this affidavit, and we would like to  
18 have it produced.

19 MR. ROSS: No, I think the practice in this case  
20 is for you to put your request in writing.

21 BY MR. ZEUGIN:

22 Q We will put it in writing after the deposition.

1           A     Perhaps I can short-change it. I did not rely on  
2 it in this affidavit. I looked at it before I prepared the  
3 affidavit, but I did not rely on it. There is nothing in  
4 this affidavit that relates to it.

5           Q     In any case, I would still like to have any  
6 documents that you consulted before preparing the affidavit.

7           MR. ROSS: I am going to object to that  
8 mischaracterization. I think it mischaracterizes what the  
9 witness said.

10           BY MR. ZEUGIN:

11           Q     I would like to go through a few of the statements  
12 and ask for a little bit of an explanation.

13           A     All right.

14           Q     Paragraph 1, last sentence, you state that "I am  
15 qualified to offer the following opinions regarding LILCO's  
16 motion." Could you describe for me the bases that you  
17 believe qualify you to offer the following opinions?

18           A     Yes, I think there's a combination of experience  
19 and training here that I would say qualify me. I have  
20 testified on matters very closely related to this in this  
21 proceeding; and that, by itself, is one measure of  
22 qualification.



1 I have reviewed emergency plans, and I have  
2 reviewed accident scenarios and accident sequences in various  
3 <sup>P</sup>ERA endeavors; and so I have the experience both from the  
4 practical side and the testimony side to qualify me for  
5 this.

6 Q All right. Let me have you turn to page 2 of the  
7 affidavit and look at paragraph 3. On the third line of that  
8 paragraph, you used the term "fast-developing accidents."

9 Could you please define that term for me, as you  
10 are using it in this affidavit?

11 A Certainly. If you look at the accident sequences  
12 that can result in core damage and/or releases to the  
13 environment, they develop at different rates. For instance,  
14 a very small break or a small leak in the primary pressure  
15 loop, primary loop of the reactor, in a boiling water  
16 reactor, is a potential loss of coolant, but it develops very  
17 slowly; has been contrasted with a large break, which is  
18 rapid, with more rapidly developing LOCA event.

19 There are some events which take a long time to  
20 result in core damage; some core damage results very  
21 quickly. What I am talking about are those events or  
22 sequences which, from the initiating activity or event,

1 whatever it is, to the time when they are in a vulnerable  
2 state or already in a state of releasing radiation to the  
3 environment, there is a short period of time.

4 And since this is a continuum of times, there's no  
5 one specific time you say is short and one that is long. But  
6 it was, the ones I had in mind were the ones that would  
7 certainly occur in less time than it took to evacuate the  
8 people from the EPZ.

9 Q Let me just follow up on a couple of things, to  
10 make sure I completely understand your deposition. I take it  
11 because the Lieberman affidavit talked about total evacuation  
12 times either being five hours and five minutes in the case of  
13 the controlled evacuation, or five hours 35 minutes in the  
14 case of an uncontrolled evacuation, that in using this term,  
15 you are talking about accidents that progressed from their  
16 initiating event to either a vulnerable state or release of  
17 radiation off-site, that were less than those periods of  
18 time; is that correct?

19 A Yes. Generally correct, yes.

20 Q So these are generally less than five hour  
21 accidents?

22 A I would say that's a good generalization of the

1 timing, yes. You might say that there are some that are  
2 slightly shorter that would be more important, because those  
3 that are shorter would have time for a release, and you would  
4 have time for the release to reach the evacuating people, be  
5 they five, six, seven, eight, nine, 10 miles away from the  
6 plant, before they actually escape the zone, and qualified to  
7 be considered evacuated from the EPZ.

8 Q Fine. You used the term "vulnerable state" as a  
9 plant condition. Could you briefly explain that for me.

10 A Well, that's a term that was invented for the  
11 Shoreham PRA. It was meant to differentiate between the  
12 danger of a core melt and a core melt, and there is a point  
13 where you are in danger of losing all of your cooling and  
14 possibly melting the core. In that state, you would say that  
15 you were in a core vulnerable state. That's a term of art  
16 that was used, mainly in the Shoreham PRA, and I haven't seen  
17 it used a lot since then.

18 Q So, I take it then you aren't redefining the time  
19 period from the way those are defined in the Shoreham PRA;  
20 but, rather, you are using those terms equivalently with the  
21 way they were used in the Shoreham PRA; is that correct?

22 A I wasn't basing that definition on the Shoreham

1 PRA. It's a general reference to accidents that develop  
2 quickly as opposed to those that may take a day or two before  
3 they release any radiation.

4 Q The last part of that sentence has the phrase "or  
5 for the full range of evacuation scenarios." Could you  
6 explain to me what you meant by that phrase?

7 A Where are we? I am having trouble finding the  
8 sentence.

9 Q Actually, it's the third line, paragraph 3, and  
10 runs over onto the fourth line. What I am trying to do is  
11 distinguish how -- what the full range of accident scenarios  
12 means in comparison with the fast-developing accidents that  
13 you referred to just before that.

14 A Would you repeat your question?

15 Q Yes. I would just like you to explain to me what  
16 you meant when you used the phrase "for the full range of  
17 evacuation scenarios" as it is used in this sentence.

18 A Well, I would have to go back a bit here to define  
19 what I did mean. I considered LILCO's analysis to be  
20 representative of a fairly idealized approach. In LILCO's  
21 analysis, they were talking about the difference being 35  
22 minutes, I believe, 25 minutes, something of that nature, the

1 difference between a controlled and an uncontrolled  
2 evacuation with full compliance by the public. What I  
3 consider to be the full range of evacuation scenarios would  
4 include controlled and uncontrolled, but also compliant and  
5 noncompliant responses by the public.

6 Q So when you are using the phrase full range of  
7 evacuation scenarios, you are talking about the various  
8 assumptions that were made in the testimony and ultimately in  
9 the plan with regard to people's compliance or noncompliance  
10 with the evacuation plan that is contained in the Shoreham  
11 plan; is that correct? Maybe I am not making myself clear.

12 As contrasted to, essentially, a full range of PRA  
13 accidents. In other words, the entire universe of accidents  
14 that could occur in a representative of PRAs.

15 MR. ROSS: Only if you understand the question.

16 THE WITNESS: I can't answer it the way you asked,  
17 because I didn't do what you asked. So let me answer by  
18 first stating what I am interpreting your question to mean.  
19 I would answer that that there are two parts to this first  
20 sentence in paragraph 3. I am talking about accidents, and I  
21 am talking about evacuation scenarios. In terms of  
22 accidents, I don't believe that the fast-developing accident

1 is properly accounted for in deciding immateriality, in the  
2 LILCO affidavit and brief. And in terms of scenario, I don't  
3 believe they considered what I would interpret to be the  
4 important comparison, and that is whether or not the public  
5 is going to respond as directed, whether you have to consider  
6 a compliant or a noncompliant public response. Does that  
7 answer your question?

8 BY MR. ZEUGIN:

9 Q Yes. I think that clarified the sentence for me.  
10 Let me have you look at the next sentence. In that sentence  
11 you state, "in such accidents, it is possible that there  
12 could be a release sooner than LILCO expects." What did you  
13 mean or what did you have in mind was the release time that  
14 LILCO "expected"?

15 A Well, LILCO's premise was that the time difference  
16 between a controlled and uncontrolled evacuation was so small  
17 that it would be immaterial on the terms of its impact, in  
18 essence. I am not trying to quote LILCO's position, but  
19 that's my general interpretation.

20 What I am implying in the second sentence is that  
21 it is my belief that there are possibilities of accidents  
22 which either misanalyzed, misinterpreted, or changed state

1 because of some variable or some misdirected mitigation  
2 effort, and become a more rapidly developing accident after  
3 evacuation has been called for. Once that happens, then you  
4 have people on the road, in their automobiles, with no  
5 effective shielding, subject to the possible doses they would  
6 receive if the plume does catch up and overtake their  
7 evacuation route.

8 Q Let me restate what I think you just said, and  
9 tell me if I restated it correctly.

10 A All right.

11 Q What you are assuming, in this particular  
12 sentence, then, is a situation in which LERO has made an  
13 evacuation recommendation based on its belief of when a  
14 release will occur at the Shoreham facility. Intervening  
15 events subsequent to that protective action recommendation  
16 speed up the ultimate release of radiation, so that it  
17 actually occurs much before it was predicted to occur at the  
18 time the protective action recommendation was made; is that  
19 correct?

20 A Partly.

21 Q How is that wrong?

22 A You said intervening events caused it to release



1 earlier. It may be that there were no intervening events,  
2 but it was misanalyzed. They thought it was one type of  
3 accident developing when in reality it was something they  
4 overlooked that would have told them it was a different type  
5 of accident. It was already on a faster progression toward  
6 release, and they got caught by it after they have already  
7 ordered people to evacuate.

8 Q Let me have you then look at the next sentence,  
9 where you conclude that while 35 minutes represents only 10  
10 percent increase in evacuation time -- this is the language I  
11 am interested in -- "it would represent a much larger  
12 increase in the dose received by the evacuees caught in the  
13 tail end of the evacuation."

14 Can you explain to me the basis for that  
15 conclusion?

16 A Sure. If you assume that an evacuation was  
17 ordered on the premise that people would evacuate in time,  
18 before the plume got to the edge of the EPZ, let's say, then  
19 the dose the people would receive would be zero. If, indeed,  
20 the plume catches up with their evacuation, and does engulf  
21 them in the plume for a period of time, be it even 35  
22 minutes, the dose they would receive would be infinitely



1 larger, because you are comparing it to zero otherwise.

2 I am not trying to say it would be infinite, of  
3 course it would not. But it would be a substantially larger  
4 increase than just 10 percent. It's not as if they were  
5 already getting 1 rad and now they are getting 1.1 rad of  
6 dose. It may be that they would receive many rem of dose  
7 when before they might receive zero.

8 Q Have you attempted to quantify how much larger the  
9 dose may be?

10 A No, I haven't. And any new or revised  
11 calculations, I have not attempted to produce such  
12 calculations.

13 Q Do you contemplate doing so as part of your  
14 testimony on contentions 1 and 2?

15 A Well, that's a possibility.

16 Q How would you go about doing that calculation, if  
17 you were to do so?

18 A Well, one possibility, I say it's only a possible,  
19 because I haven't really contemplated how I would do this, is  
20 to look at the data we have already prepared in the past for  
21 contention 61, which deals with evacuation and talks about  
22 exposure of people in automobiles within the EPZ and

1 calculates the probabilities of them receiving doses within a  
2 couple of hours <sup>period</sup> per-unit of exposure. (92)

3 Q In doing that calculation or preparing such an  
4 estimate, would one have to make assumptions about the  
5 off-site release that would occur as a result of the accident  
6 at the plant?

7 A Yes, that's inherent in the analysis that had  
8 already been done.

9 Q I take it your prior testimony on contention 61  
10 has already made certain assumptions with regard to the size  
11 of those off-site releases?

12 A Yes.

13 Q You would probably follow the same assumptions  
14 today, or you believe those assumptions remain valid today?

15 A There's some factors that may even make them  
16 larger today.

17 Q Those would essentially be the assumptions you  
18 would use if you were to do this -- or at least as of the  
19 present time, those would be the assumptions you would use if  
20 you were to do this calculation?

21 A If I were to do this calculation by that  
22 technique, which I just described as one possible way, that's

1 what I would do.

2 Q Mr. Minor, in paragraph 4, in the first sentence,  
3 you talk about the difference in evacuation times that result  
4 from the assumption one makes with regard to compliance or  
5 noncompliance of an evacuation order.

6 A Yes.

7 Q Do you believe that you are expert in drawing  
8 conclusions about the amount of noncompliance that may result  
9 as a result of an uncontrolled evacuation?

10 A More likely, for that part of the testimony I  
11 would rely on other witnesses to provide that input.

12 Q And so I take it, then, as far as your own  
13 expertise is concerned, the part of this particular paragraph  
14 that you feel qualified to testify to is the fact that there  
15 is a greater likelihood of evacuees being affected by a fast  
16 moving plume if there is an 80-minute difference between  
17 controlled and uncontrolled evacuations, than if there was a  
18 35-minute; is that correct?

19 MR. ROSS: Counselor, I am going to object to that  
20 as a mischaracterization of the witness' statements. He has  
21 testified he is competent to testify to the matters there in  
22 the affidavit. You have mischaracterized about his role in

1 the upcoming testimony.

2 MR. ZEUGIN: I think the witness can correct me if  
3 I was wrong.

4 MR. ROSS: Do you remember the question?

5 THE WITNESS: Yes, I believe I do. I would like  
6 to go back to what is in my affidavit, because that's the  
7 start of your question.

8 BY MR. ZEUGIN:

9 Q Fine.

10 A What I am stating here is that from my position  
11 and my belief, the important range of evacuation times to  
12 consider is different than that chosen by LILCO in their  
13 affidavit, in their motion or filing, and I believe that  
14 based on my knowledge and experience with emergency planning  
15 issues, and emergency plans per se, that it is important to  
16 consider the range of variables that would be important in  
17 determining dose reductions. And if you cannot assure  
18 yourself of dose reductions, when you consider the full  
19 range, then you have to make a different protective action  
20 decision. That is where I state in paragraph 4 of my  
21 affidavit I believe that LILCO's motion has fallen down.

22 Now, I don't know if that answers your question,

1 but I am trying to clarify the basis that I came from in  
2 creating paragraph 4.

3 BY MR. ZEOGIN:

4 Q Let me ask you, Mr. Minor, if you have attempted  
5 at any point to quantify the probability of these  
6 fast-developing accidents that you express concern about in  
7 both paragraphs 3 and 4?

8 A Quantifying the probability?

9 Q Their probability of occurrence?

10 A I have not attempted to make a new  
11 quantification. There are quantifications around that I  
12 could look at.

13 Q Could you identify those for me?

14 A The PRA, the 100 percent PRA has many accidents  
15 defined and defines their warning time, their release time,  
16 duration of release. You can get some values from those that  
17 are representative of accidents.

18 Q Do I take it the numbers you are talking about are  
19 in documents that have been prepared by LILCO or LILCO's  
20 consultants, as compared to independent assessments that you  
21 may have done in the past of those probabilities; is that  
22 correct?

1           A     In making the statement I just completed and made  
2 to you, yes, that is correct. But it doesn't mean they  
3 aren't also elsewhere. There may be some similar accident  
4 release times and so forth involved in the analysis done by  
5 Dr. Finlayson and myself for contention 61. But I have not  
6 gone back to that data, and I am sure I haven't.

7           Q     But that would be the other source you are aware  
8 of at this time?

9           A     Yes.

10          Q     Are there any others?

11          A     Oh, there are numerous other possibilities, but a  
12 lot of them are the theoretical work that's going on now to  
13 try to decide what would be a good standard to use in the  
14 future. And not many of those are in an accepted state at  
15 this point.

16          Q     In paragraph 5, in the second sentence, you used  
17 the phrase "slow-developing" to define accidents. Is your  
18 use of the term "slow-developing" meant to encompass all  
19 accidents that aren't defined in the class of "fast-breaking  
20 accidents"?

21          A     Well, there's probably a gray zone in between  
22 them. But it is meant to define those types of accidents

1 which are sufficiently slow that even if you had an extended  
2 evacuation, the people had still left the EPZ by the time the  
3 release had reached the area, near the edge of the EPZ.

4 So it would be -- well, I couldn't put a number on  
5 it exactly, but probably longer than the, let's say, 6-1/2  
6 hours that we are talking about in the LILCO affidavit.

7 Q You also used the phrase "idealized accidents."  
8 Could you define that phrase for me?

9 A Well, that was a reference in paragraph 3. If you  
10 look at an evacuation, and you say this evacuation will occur  
11 in a certain period of time, and the effect on the public, as  
12 far as risk and dose, will be essentially zero, because they  
13 evacuate before the release gets to the area they were  
14 previously occupying, then you would say that was an  
15 idealized accident, and the accident wasn't allowed to get  
16 there before they had already left.

17 What I am trying to identify is the other types of  
18 accidents that may not follow that exact plan or scenario and  
19 may actually release earlier and arrive at that area while  
20 the public is still in the EPZ. Does that clarify that?

21 Q Yes. Let me ask you, Mr. Minor, if it is your  
22 understanding of the way the protective action recommendation

1       procedures of the Shoreham plan work, that that evacuation is  
2       recommended only in those cases where it can be completed in  
3       terms of the last person leaving the EPZ before a release  
4       occurs from the plant? Is that your understanding of the  
5       cases in which evacuation was recommended?

6               A     No.

7               Q     Could you give me your understanding of how the  
8       protective action recommendations work as they appear in the  
9       Shoreham procedures?

10              A     Well, I don't know the exact words that come from  
11       the procedures, but, in essence, it's predicated on a dose  
12       reduction. If you can achieve a substantial dose reduction  
13       by evacuating, compared to sheltering, you would recommend  
14       the evacuation. Vice versa, if you could get more dose  
15       reduction by sheltering than evacuating later, you would do  
16       that.

17              MR. ZEUGIN: I think this is a good place to take  
18       a good five-minute break. Before we go on the break, though,  
19       Ron, I wanted to ask you if you were aware yet of the status  
20       of the nine witnesses that I guess have been proposed for  
21       next week?

22              MR. ROSS: We can discuss that during the break, I



1 think.

2 MR. ZEUGIN: Do you know yourself right now, or do  
3 you need to check back with your office?

4 MR. ROSS: I think we can discuss it at a break.

5 MR. ZEUGIN: Okay.

6 (Recess.)

7 BY MR. ZEUGIN:

8 Q Mr. Minor, maybe we can short-circuit what is left  
9 of this deposition. Let me ask you if your current views  
10 regarding LILCO's immateriality argument have changed since  
11 the time you changed your January 29 affidavit?

12 A They have not changed.

13 Q Have they been amplified in any way by thinking  
14 about the issue more?

15 MR. ROSS: Objection, asked and answered.

16 THE WITNESS: I think there is more substantiating  
17 evidence that the probability of fast-moving accidents is  
18 quite high. Therefore, the chance of getting into these  
19 situations that I talk about in the affidavit are possibly  
20 higher probability than I thought at the time I wrote it.

21 BY MR. ZEUGIN:

22 Q What is the basis for that different belief today

1 than at the time that you wrote that, the January 29  
2 affidavit?

3 A Just going back and looking over data in the  
4 meantime, such as the PRA, and reflecting on both timing and  
5 probability.

6 Q So it isn't any generation of new data; it's  
7 rather more of an opportunity to consider the existing data;  
8 is that correct?

9 A That's correct.

10 Q You also stated -- you just stated, Mr. Minor,  
11 that the probability of fast-breaking accidents is, and I  
12 think I remember your words, "quite high." Have you  
13 attempted to quantify in any way that probability?

14 A Not on my own. I had attempted to determine which  
15 portion of accidents analyzed in the 100 percent PRA would  
16 fit into the fast developing category, and just looked at the  
17 part of the total probability of core melt and release that  
18 could be categorized into the fast-developing bracket.

19 Q What percent, to the best of your recollection,  
20 falls into that bracket?

21 A I don't recall the number. It's a substantial  
22 part of the whole probability of core melt though.

1 Q More than 10 percent?

2 MR. ROSS: Objection, asked and answered. He said  
3 he doesn't recall.

4 THE WITNESS: I don't really recall the number,  
5 but it's a number you or I or anybody else could go look at  
6 the PRA and recreate. It's just a matter of doing it.

7 BY MR. ZEUGIN:

8 Q Mr. Minor, is there anything you would like to add  
9 in the way of technical information or discussion to your  
10 expressed concerns about LILCO's immateriality argument that  
11 do not appear in your affidavit?

12 MR. ROSS: Counsel, I am not clear. Are you  
13 asking him if he needs to modify this affidavit? For what  
14 purpose?

15 BY MR. ZEUGIN:

16 Q Basically, my earlier question was have any of  
17 your views changed since the time you drafted this  
18 affidavit. What I am now asking is are there other reasons  
19 that Mr. Minor might have, in addition to the ones that are  
20 laid out in his affidavit, for having -- for disputing  
21 LILCO's immateriality argument.

22 MR. ROSS: The affidavit purports to support the

1 government's opposition to a motion for summary disposition.  
 2 There's been a ruling on that motion. There's no requirement  
 3 for Mr. Minor to come up with any additional reasons to  
 4 support the government's position on that motion.

5 BY MR. ZEUGIN:

6 Q You can answer the question, Mr. Minor.

7 A No.

8 MR. ZEUGIN: I have no further questions.

9 MR. ROSS: Thank you.

10 (Whereupon, at 2:55 p.m., the deposition was  
 11 concluded.)

12  
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22

*Gregory C. Minor*  
 \_\_\_\_\_  
 GREGORY C. MINOR

Subscribed and sworn to before me  
 this 5<sup>th</sup> day of May, 19 88

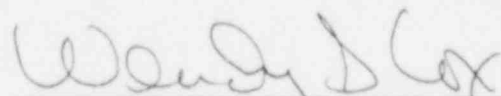
*Myrna L. Barry*  
 \_\_\_\_\_  
 Notary Public  
 My Commission Expires 6/24/91



CERTIFICATE OF NOTARY PUBLIC & REPORTER

47

I, WENDY S. COX, the officer before whom the foregoing deposition was taken, do hereby certify that the witness whose testimony appears in the foregoing deposition was duly sworn by me; that the testimony of said witness was taken in shorthand and thereafter reduced to typewriting by me or under my direction; that said deposition is a true record of the testimony given by said witness; that I am neither counsel for, related to, nor employed by any of the parties to the action in which this deposition was taken; and, further, that I am not a relative or employee of any attorney or counsel employed by the parties hereto, nor financially or otherwise interested in the outcome of this action.

  
\_\_\_\_\_  
Notary Public in and for the  
District of Columbia

My Commission Expires NOVEMBER 14, 1992

Minor 2 x 1  
4/12/88

PROFESSIONAL QUALIFICATIONS OF GREGORY C. MINOR

GREGORY C. MINOR  
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EXPERIENCE:

1976 to PRESENT

Vice-President - MHB Technical Associates, San Jose, California

Engineering and energy consultant to state, federal, and private organizations and individuals. Major activities include studies of safety and risk involved in energy generation, providing technical consulting to legislative, regulatory, public and private groups and expert witness in behalf of state organizations and citizens' groups. Was co-editor of a critique of the Reactor Safety Study (WASH-1400) for the Union of Concerned Scientists and co-author of a risk analysis of Swedish reactors for the Swedish Energy Commission. Served on the Peer Review Group of the NRC/TMI Special Inquiry Group (Rogovin Committee). Actively involved in the Nuclear Power Plant Standards Committee work for the Instrument Society of America (ISA).

1972 - 1976

Manager, Advanced Control and Instrumentation Engineering, General Electric Company, Nuclear Energy Division, San Jose, California

Managed a design and development group of thirty-four engineers and support personnel designing systems for use in the measurement, control and operation of nuclear reactors. Involved coordination with other reactor design organizations, the Nuclear Regulatory Commission, and customers, both overseas and domestic. Responsibilities included coordinating and managing and design and development of control systems, safety systems, and new control concepts for use on the next generation of reactors. The position included responsibility for standards applicable to control and instrumentation, as well as the design of short-term solutions to field problems. The disciplines involved included electrical and mechanical engineering, seismic design and process computer control/programming, and equipment qualification.

1970 - 1972

Manager, Reactor Control Systems Design, General Electric Company, Nuclear Energy Division, San Jose, California

Managed a group of seven engineers and two support personnel in the design and preparation of the detailed system drawings and control documents relating to safety and emergency systems for nuclear reactors. Responsibility required coordination with other

design organizations and interaction with the customer's engineering personnel, as well as regulatory personnel.

1963 - 1970

Design Engineer, General Electric Company, Nuclear Energy Division, San Jose, California

Responsible for the design of specific control and instrumentation systems for nuclear reactors. Lead design responsibility for various subsystems of instrumentation used to measure neutron flux in the reactor during startup and intermediate power operation. Performed lead system design function in the design of a major system for measuring the power generated in nuclear reactors. Other responsibilities included on-site checkout and testing of a complete reactor control system at an experimental reactor in the Southwest. Received patent for Nuclear Power Monitoring System.

1960 - 1963

Advanced Engineering Program, General Electric Company; Assignments in Washington, California, and Arizona

Rotating assignments in a variety of disciplines:

- Engineer, reactor maintenance and instrument design, KE and D reactors, Hanford, Washington, circuit design and equipment maintenance coordination.
- Design engineer, Microwave Department, Palo Alto, California. Work on design of cavity couplers for Microwave Traveling Wave Tubes (TWT).
- Design engineer, Computer Department, Phoenix, Arizona. Design of core driving circuitry.
- Design engineer, Atomic Power Equipment Department, San Jose, California. Circuit design and analysis.
- Design engineer, Space Systems Department, Santa Barbara, California. Prepared control portion of satellite proposal.
- Technical Staff - Technical Military Planning Operation. (TEMPO), Santa Barbara, California. Prepare analyses of missile exchanges.

During this period, completed three-year General Electric program of extensive education in advanced engineering principles of higher mathematics, probability and analysis. Also completed courses in Kepner-Tregoe, Effective Presentation, Management Training Program, and various technical seminars.

## EDUCATION

University of California at Berkeley, BSEE, 1960.

Advanced Course in Engineering - three-year curriculum, General Electric Company, 1963.

Stanford University, MSEE, 1966.

## HONORS AND ASSOCIATIONS

- Tau Beta Pi Engineering Honorary Society
- Co-holder of U.S. Patent No. 3,565-760, "Nuclear Reactor Power Monitoring System," February, 1971.
- Member: American Association for the Advancement of Science.
- Member: Nuclear Power Plant Standards Committee, Instrument Society of America.

## PERSONAL DATA

Born: June 7, 1937

Married, three children

Residence: San Jose, California

## PUBLICATIONS AND TESTIMONY

1. G. C. Minor, S. E. Moore, "Control Rod Signal Multiplexing," IEEE Transactions on Nuclear Science, Vol. NS-19, February 1972.
2. G. C. Minor, W. G. Milam, "An Integrated Control Room System for a Nuclear Power Plant," NEDO-10658, presented at International Nuclear Industries Fair and Technical Meetings, October, 1972, Basle, Switzerland.
3. The above article was also published in the German Technical Magazine, NT, March, 1973.
4. Testimony of G. C. Minor, D. G. Bridenbaugh, and R. B. Hubbard before the Joint Committee on Atomic Energy, Hearing held February 18, 1976, and published by the Union of Concerned Scientists, Cambridge, Massachusetts.
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20. Testimony of G. C. Minor and D. G. Bridenbaugh before the New York State Public Service Commission, Shoreham Nuclear Plant Construction Schedule, in the matter of Long Island Lighting Company Temporary Rate Case, case # 27774 September 22, 1980.
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38. Testimony of G. C. Minor, Sizewell 'B' Power Station Public Inquiry, Proof of Evidence Regarding Safety Issues, December, 1983.
39. Testimony of D. G. Bridenbaugh, L. M. Danielson, R. B. Hubbard and G. C. Minor before the State of New York Public Service Commission, PSC Case No. 27563, in the matter of Long Island Lighting Company Proceeding to Investigate the Cost of the Shoreham Nuclear Generating Facility - Phase II, on behalf of County of Suffolk, February 10, 1984.
40. Testimony of Fred C. Finlayson, Gregory C. Minor and Edward P. Radford before the Atomic Safety and Licensing Board, in the Matter of Long Island Lighting Company, Shoreham Nuclear Power Station, Unit 1, on behalf of Suffolk County Regarding Emergency Planning - Sheltering (Contention 61), Docket No. 50-322-OL, March 21, 1984.
41. Testimony of G. Dennis Eley, C. John Smith, Gregory C. Minor and Dale G. Bridenbaugh before the Atomic Safety and Licensing Board, in the matter of Long Island Lighting company, Shoreham Nuclear Power Station Unit 1, regarding EMD Diesel Generators and 20 MW Gas Turbine, Docket No. 50-322-OL, March 21, 1984.
42. Revised Testimony of Gregory C. Minor before the Atomic Safety and Licensing Board, in the matter of Long Island Lighting Company, Shoreham Nuclear Power Station Unit 1, on behalf of Suffolk County regarding Emergency Planning - Recovery and Reentry (Contentions 85 and 88), Docket No. 50-322-OL, July 30, 1984.
43. Testimony of Dr. Christian Meyer, Dr. Jose Roesset, and Gregory C. Minor before the Atomic Safety and Licensing Board, in the matter of Long Island Lighting Company,

- Shoreham Nuclear Power Station Unit 1, on behalf of Suffolk County, regarding Low Power Hearings - Seismic Capabilities of AC Power Sources, Docket No. 50-322-OL, July 1984.
44. Affidavit of Gregory C. Minor, Emergency Planning Legal Authority Court Case, State Court of New York, September 11, 1984.
  45. Surrebuttal Testimony of Dale G. Bridenbaugh, Lynn M. Danielson, Richard B. Hubbard, and Gregory C. Minor, Before the New York State Public Service Commission, PSC Case No. 27563, Shoreham Nuclear Station, Long Island Lighting Company, on behalf of Suffolk County and New York State Consumer Protection Board, regarding Investigation of the Cost of the Shoreham Nuclear Generating Facility, October 4, 1984.
  46. Direct Testimony of Dale G. Bridenbaugh, Lynn M. Danielson and Gregory C. Minor on behalf of Massachusetts Attorney General, DPU 84-145, before the Massachusetts Department of Public Utilities, regarding Prudence of Expenditures by Fitchburg Gas and Electric Light Company for Seabrook Unit 2, November 23, 1984, 84 pgs.
  47. Direct Testimony of Dale G. Bridenbaugh, Lynn M. Danielson and Gregory C. Minor on behalf of Maine Public Utilities Commission Staff regarding Prudence of Costs of Seabrook Unit 2, Docket No. 84-113, December 21, 1984.
  48. Direct Testimony of Dale G. Bridenbaugh and Gregory C. Minor on behalf of Suffolk County regarding Shoreham Emergency Diesel Generator Loads, Docket No. 50-322-OL, January 25, 1985.
  49. Direct Testimony of Dale G. Bridenbaugh, Lynn M. Danielson, and Gregory C. Minor on behalf of the Vermont Department of Public Service, PSB Docket No. 5030, regarding Prudence of Central Vermont Public Service Corporations Costs for Seabrook 2, November 11, 1985.
  50. Surrebuttal testimony of Gregory C. Minor on behalf of the Vermont Department of Public Service, PSB Docket No. 5030, Prudence of Central Vermont Public Service Corporations Costs for Seabrook 2, December 13, 1985.
  51. Direct Testimony of Dale G. Bridenbaugh, Gregory C. Minor, Lynn K. Price, and Steven C. Sholly on behalf of State of Connecticut Department of Public Utility Control Prosecutorial Division and Division of Consumer Counsel regarding the Prudence of Expenditures on Millstone Unit 3, Docket No. 83-07-03, February 18, 1986.
  52. Direct Testimony of Dale G. Bridenbaugh and Gregory C. Minor on behalf of Massachusetts Attorney General regarding the Prudence of Expenditures by New England Power Co. for Seabrook Unit 2, Docket Nos. ER-85-646-000, ER-85-647-000, February 21, 1986.
  53. Direct Testimony of Gregory C. Minor on behalf of the Prosecutorial Division of CDPUC regarding CL&P Construction Prudence for Millstone Unit 3, Docket No. ER-85-720-001 March 19, 1986.
  54. Direct Testimony of Dale G. Bridenbaugh and Gregory C. Minor on behalf of Massachusetts Attorney General regarding WMECo Construction Prudence for Millstone Unit 3, Docket No. 85-270, March 19, 1986.

55. Direct Testimony of Dale G. Bridenbaugh and Gregory C. Minor on behalf of Massachusetts Attorney General regarding WMECo's Commercial Operating Dates and Deferred Capital Additions on Millstone Unit 3, Docket No. 85-270, March 19, 1986.
56. Rebuttal Testimony of Dale G. Bridenbaugh and Gregory C. Minor on behalf of Massachusetts Attorney General regarding Rebuttal to New England Power Company's Seabrook 2, Docket Nos. ER-85-646-001, ER-85-647-001, April 2, 1986.
57. Direct Testimony of Dale G. Bridenbaugh and Gregory C. Minor on behalf of State of Maine Staff of Public Utilities Commission regarding Construction Prudence of Millstone Unit 3, in the matter of Maine Power Company Proposed Increase in Rates, Docket No. 85-212, April 21, 1986.
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59. Direct Testimony of Dale G. Bridenbaugh and Gregory C. Minor on behalf of the Vermont Department of Public Service, regarding Prudence of Costs by Central Vermont Public Service Corporation for Millstone 3, Docket No. 5132, August 25, 1986.
60. Surrebuttal Testimony of Gregory C. Minor in the matter of Jersey Central Power and Light Company, regarding TMI Restart and Performance Incentives, (Oral testimony), OAL Docket No. PUC 7939-85, BPU Docket No. ER851116, September 11, 1986.
61. Surrebuttal Testimony of Gregory C. Minor on behalf of State of Vermont Department of Public Service, regarding CVPS/NU Construction Prudence related to Millstone Unit 3, Docket No. 5132, November 6, 1986.
62. Direct Testimony of Gregory C. Minor and Lynn K. Price on behalf of State of Vermont Department of Public Service, regarding Prudence of Expenditures for Seabrook 1, Docket No. 5132, December 31, 1986.
63. Direct Testimony of Gregory C. Minor on behalf of Suffolk County, before the Atomic Safety and Licensing Board, concerning Shoreham - Protective Action Recommendations (Contention EX 36), in the matter of Long Island Lighting Company, Shoreham Nuclear Power Station, Unit 1, Docket No. 50-322-OL-5, February 27, 1987.
64. Direct Testimony of Gregory C. Minor et. al. on behalf of the State of New York and Suffolk County, before the Atomic Safety and Licensing Board, regarding The Scope of the Emergency Planning Exercise (Contentions EX 15 and 16), in the matter of Long Island Lighting Company, Shoreham Nuclear Power Station, Unit 1, Docket No. 50-322-OL-5, April 6, 1987.
65. Direct Testimony of Gregory C. Minor regarding Emergency Planning Reception Centers - Monitoring and Decontamination, Shoreham Docket 50-322-OL-3 (Emergency Planning), April 13, 1987.
66. Testimony of Gregory C. Minor, Steven C. Sholly et. al. on behalf of Suffolk County, regarding LILCO's Reception Centers - Planning Basis, before the Atomic Safety and

Licensing Board, in the matter of Long Island Lighting Company, Shoreham Nuclear Power Station Unit 1, Docket No. 50-322-OL-3, April 13, 1987.

67. Rebuttal Testimony of Gregory C. Minor and Steven C. Sholly on behalf of Suffolk County regarding LILCO's Reception Centers (Rebuttal to Testimony of Lewis G. Hulman), in the matter of Long Island Lighting Company, Shoreham Nuclear Power Station, Unit 1, Docket No. 50-322-OL-3, May 27, 1987.
68. Direct Testimony of Dale G. Bridenbaugh and Gregory C. Minor on behalf of Massachusetts Attorney General, before the Federal Energy Regulatory Commission, regarding Canal Electric Company Prudence Related to Seabrook Unit 2 Construction Expenditures, Docket No. ER86-704-001, July 31, 1987.
69. Direct Testimony of Dale G. Bridenbaugh and Gregory C. Minor before the Pennsylvania Public Utility Commission, Regarding Beaver Valley Unit 1, Docket No. 1-79070318, OCA Statement No. 2, August 31, 1987.



Minor Ex 2

January 29, 1988

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

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In the Matter of )  
 )  
LONG ISLAND LIGHTING COMPANY )  
 )  
(Shoreham Nuclear Power )  
Station, Unit 1) )  
\_\_\_\_\_

Docket No. 50-322-OL-3  
(Emergency Planning)

AFFIDAVIT OF GREGORY C. MINOR

Gregory C. Minor, being duly sworn, hereby deposes and says as follows:

1. I am Vice President of MHB Technical Associates of San Jose, California, a consulting firm specializing in energy-related issues. I have appeared several times previously before this Board as an expert on emergency planning issues; including accident consequences. I have read and am familiar with LILCO's Motion for Summary Disposition of Contentions 1, 2 and 9 -- Immateriality (December 18, 1987) (the "Motion") which seeks summary disposition of Contentions 1, 2 and 9 on grounds of "immateriality." I am qualified to offer the following opinions regarding LILCO's Motion.

2. The basis for LILCO's Motion is its assertion that the alleged 35-minute difference between a controlled and uncontrolled evacuation is "immaterial." Accordingly, LILCO argues that if it were incapable of implementing any traffic control, the protective actions available to it would not be unacceptably limited. I do not agree with LILCO's unqualified statement.

3. While the basis for LILCO's argument may be true when considering idealized accident and evacuation scenarios, it does not necessarily hold true for fast-developing accidents or for the full range of evacuation scenarios. In such accidents, it is possible that there could be a release sooner than LILCO expects, and that such a release could be of sufficient severity for the radioactive plume to overtake and immerse late evacuees in the plume. Although 35 minutes represents only about 10% increase in LILCO's projected evacuation time for a controlled, fully-compliant evacuation, it would represent a much larger increase in the dose received by evacuees caught in the tail end of the evacuation. Such evacuees could be exposed to doses in excess of the EPA's protective actions guidelines (PAGs) and possible health consequences could result to those evacuees experiencing such doses.

4. The more important range of evacuation times to be considered is the range between a controlled/compliant evacuation



and an uncontrolled/50% non-compliant evacuation. Here the difference is 80 minutes, rather than 35 minutes, and represents an even greater likelihood of delayed evacuees being effected by a fast-moving plume from an unexpectedly fast-developing accident. The doses received in this case would be even larger.

5. On this basis, it is apparent that the premise of LILCO's Motion does not hold true in all cases. Proper emergency planning requires that one address a range of accidents, not just the slow-developing or idealized accidents which would support LILCO's Motion. Fast-developing accidents with severe releases, such as is discussed above, must also be considered. When all factors are considered, LILCO's Motion is not factually valid.

6. The above facts and opinions are true and accurate to the best of my knowledge and belief. I am competent to testify to such matters and would so testify in any formal proceeding on this matter.

  
GREGORY C. MINOR

Subscribed to and sworn before me this 29<sup>th</sup> day of January, 1988.



  
NOTARY PUBLIC

My commission expires:

June 24, 1991