

NUCLEAR REGULATORY COMMISSION

ORIGINAL

ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:

SOUTHERN CALIFORNIA EDISON COMPANY)
ET AL.,)
(SAN ONOFRE NUCLEAR GENERATING)
STATION, UNITS 2 AND 3)

DOCKET NOS. 50-361, OL
and 50-362 OL

DATE: SEPTEMBER 21, 1981

PAGES: 9395-9610

AT: Anaheim, California

*IRol
50/1*



ALDERSON *AR* REPORTING

400 Virginia Ave., S.W. Washington, D. C. 20024

Telephone: (202) 554-2345

8109300226 810921
PDR ADOCK 05000361
T PDR

1 UNITED STATES OF AMERICA
2 NUCLEAR REGULATORY COMMISSION

3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

-----X
:
In the Matter of: :
:
SOUTHERN CALIFORNIA EDISON COMPANY, et al. : Docket Nos.
:
7 (San Onofre Nuclear Generating Station, : 50-361 OL
:
8 Units 2 and 3) : 50-362 OL
:
9 -----X

Orange County Ballroom 2
Marriott Hotel
700 W. Convention Way
Anaheim, California

Monday,
September 21, 1981

Evidentiary hearing in the above-entitled
matter was resumed, pursuant to adjournment, at 9:08 a.m.

BEFORE:

JAMES L. KELLEY, Chairman
Atomic Safety and Licensing Board

DR. CADET H. HAND, JR., Member

MRS. ELIZABETH B. JOHNSON, Member

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

APPEARANCES:

On behalf of the Applicants, Southern California
Edison, et al:

DAVID R. PIGOTT, Esq.
EDWARD B. ROGIN, Esq.
SAMUEL B. CASEY, Esq.
Orrick, Herrington & Sutcliffe
600 Montgomery Street
San Francisco, California 94111

JAMES BEOLETTO, Esq.
General Counsel
Southern California Edison Company

On behalf of the Intervenors, GUARD, Carstens, et al:

PHYLLIS M. GALLAGHER, Esq.
1695 West Crescent, Suite 222
Anaheim, California 92801

CHARLES E. MC CLUNG, JR., Esq.
Fleming, Anderson, McClung & Finch, Inc.
23521 Paseo de Valencia, Suite 308A
Laguna Hills, California 92653

On behalf of the Nuclear Regulatory Commission Staff:

RICHARD J. HOEFLING, Esq.
DONALD HASSELL, Esq.
Office of the Executive Legal Director
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

SPENCE PERRY, Esq.
Assistant General Counsel
Federal Emergency Management Agency
Washington, D.C.

C O N T E N T S

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

WITNESSES

DIRECT

CROSS

REDIRECT

RECROSS

VOIR
DIRE

Sheldon Plotkin
By Ms. Gallagher
By Mr. Pigott
By Mr. Hoefling

9431

9488

9554

9546

9475, 9482

Irving Lyon
By Ms. Gallagher

9568

EXHIBITS

Intervenor's

IDENTIFIED

IN EVIDENCE

2

9418

3

9418

9477

4

9418

5

9419

6

9419

7

9419

9483

8

9419

9485

9

9420

10

9569

11

9570

tpl-1 1

P R O C E E D I N G S

2 9:08 a.m.

3 JUDGE KELLEY: Good morning. We are reconvening
4 this morning to resume the hearings on emergency planning
5 for San Onofre, in the expectation that we will complete
6 this part of the hearing, including some testimony on the
7 Applicants' motion for low power license during this sitting.
8 We'll have to see how that goes, but it is our current ex-
9 pectation that we will do that and we hope to do that.

10 Let me acknowledge receipt of several documents
11 relating to the issues to be heard on the application for a
12 low power license. In accordance with earlier discussions
13 on the record, we did receive a letter from the Intervenor,
14 GUARD, dated last Wednesday, I believe, and we had a tele-
15 phone conference to discuss that among the parties on
16 Thursday. I indicated our interest in seeing a further
17 memorandum in support of those contentions and I asked for
18 it to be mailed on Friday. It was mailed on Monday, but it
19 seems to me that that's not going to result in any net
20 prejudice to anyone. I subsequently spoke with the Staff on
21 the phone and indicated that the Board would be willing to
22 receive papers in opposition up to yesterday, Sunday.

23 So I did get and the Board did get the Applicants'
24 supplemental memorandum in support and we did then receive
25 memoranda in opposition to the GUARD contentions from the

2 1 Staff last Friday and the Applicants' memorandum in opposi-
2 tion was waiting for us last night. So we now have the
3 views of the parties on all of these low power issues.

4 We have admitted as a final contention the
5 issue worked out here just toward the end of the last
6 hearing. Then the question is whether we will have addi-
7 tional contentions along the lines of those being proposed
8 by GUARD. We quite frankly have not finished reading the
9 paper yet; it turned out to be a little longer than we
10 expected, I think. What I would propose is this: we will
11 get through the pleadings certainly by tomorrow morning and
12 we would like to set aside a little time at the beginning --
13 I expect not very much -- to at least ask questions, counsel
14 want to make some additional brief presentation, they can
15 do that. We would then envision deciding the question of
16 low power contentions finally by Wednesday.

17 That does come a couple of days later than we
18 thought two weeks ago, but a little delay of this sort has
19 been characteristic of our litigation by mail of contentions.
20 Let me just say that if we do let in additional contentions
21 on this subject we do not envision that any testimony on
22 such contentions would delay this case in any way. We would
23 set very tight due dates and move right ahead in connection
24 with the low power showing. I am not indicating one way or
25 the other; we indeed have not conferred on whether there

3 1 will be any additional contentions. But I just don't want
2 to hold out the idea that additional contentions would
3 materially delay our moving forward.

4 Turning to another subject, the Board did, as we
5 indicated we would, refer the earthquake question to the
6 Atomic Safety and Licensing and Appeal Board a week ago
7 today in an order wherein we set forth in somewhat greater
8 detail what we had in mind and why we wanted to do what we
9 wanted to do and also spoke to some legal points and to some
10 questions about the Board's authority to raise these kinds
11 of issues at all. And that was duly transmitted to the
12 Appeal Board, which entered a brief order the same day
13 calling for briefs on whether the issue ought to be referred
14 and the views of the parties on the merits.

15 Then last Friday I was advised that the Commis-
16 sion had taken up this subject and that they had decided
17 that they themselves would review the question presented.
18 I heard this informally. I do not even now have a copy of
19 the order. But I understand from Mr. Hoefling that the
20 order did in fact issue la Friday. Have you got a
21 verbatim -- perhaps it might be useful just for the informa-
22 tion of everybody, if it's not too long. Is it two pages
23 or ten?

24 MR. HOEFLING: It's a brief order.

25 JUDGE KELLEY: Okay. Why don't you just read

1 it into the record?

2 MR. HOEFLING: Fine. I'll do that. I'll read
3 into the record the order as it was related to me over the
4 telephone today, as follows:

5 "The Commission takes up on its own motion the
6 root issue posed by the Atomic Safety and Licensing Board
7 in its July 29, August 7, and September 1, 1981, orders -
8 Whether emergency planning should be concerned with earth-
9 quakes at or beyond the Safe Shutdown Earthquake coupled
10 with a release of radiation off-site. The Commission will
11 consider the briefs concerning whether this is an appropriate
12 issue already filed by the parties with respect to the July
13 29, 1981 and August 7, 1981 orders in reviewing the question.

14 "The Commission also directs the San Onofre
15 Board to provide an explanation of why it believes this is
16 an appropriate issue and what criteria it intends to use to
17 judge acceptability or adequacy. This explanation is to
18 be provided within 14 days of the date of this order.

19 "The Licensing Board has referred the matter to
20 the Atomic Safety and Licensing Appeal Board. Both Boards
21 are directed to hold consideration of this issue in abeyance
22 until further order of the Commission. It is so ordered."

23 The date of the order is September 18, 1981.
24 It is being served on September 21, 1981.

25 JUDGE KELLEY: Thank you. I assume copies will

1 be in hand in a day or two. But that's what was said.

2 Mr. Oviedo, you had a point you wanted to raise?

3 MR. OVIEDO: Yes, Mr. Chairman. My name is
4 Richard Oviedo. I am Deputy County Counsel, an attorney
5 for the County of Orange. It is my understanding that on
6 the remaining witness list Dr. Rex Ehling, the County Health
7 Officer, is scheduled for one of the witnesses to testify
8 before this Board. Apparently there was an attempted subpoena
9 of Dr. Ehling by the Intervenors. I was tendered a copy of
10 that subpoena last Friday as I unfortunately am not able to
11 make any formal written notice and motion to quash; however,
12 I am here for that purpose.

13 If I could present a copy of that subpoena to the
14 Board.

15 (Pause)

16 MR. OVIEDO: With reference to that particular
17 subpoena, it is our opinion that that subpoena is fatal in
18 several respects. No. 1, the subpoena was served subsequent
19 to the date indicated to appear on the subpoena; therefore,
20 the subpoena doesn't comply with the Code of Federal Regula-
21 tions, which specify that a subpoena must specify the exact
22 time and date. No. 2, although I don't have a declaration
23 of Dr. Ehling on hand, witness fees were never tendered with
24 the subpoena, as required by the Code of Federal Regulations,
25 nor was the subpoena served personally on Dr. Ehling. It

1 was served and left with his secretary.

2 Because of those three aspects, it is our
3 opinion that the subpoena should be quashed and we would
4 move that the Board quash the subpoena on that basis.

5 ///

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

1 JUDGE KELLEY: Let me ask you whether, putting to
2 one side the problems you have mentioned, and assuming that
3 witness fees might be tendered, does the County have any
4 substantive objection to this person appearing in this case?

5 MR. OVIEDO: I have not discussed this matter with Dr.
6 Dr. Ehling. Therefore, I really can't answer that question.
7 I can say right now that the County will probably have no
8 legal objections to Dr. Ehling testifying.

9 JUDGE KELLEY: Mrs. Gallagher?

10 MS. GALLAGHER: Were witness fees asked for at the time
11 of the attempted service?

12 MR. OVIEDO: The witness fee is not required to be asked
13 for. That is a requirement under the California Code of
14 Civil Procedure, but not under the Code of Federal Regulations.
15 They must be tendered with the subpoena.

16 JUDGE KELLEY: Assuming that you might be able to cure
17 these deficiencies, are you still interested in the witness?

18 MS. GALLAGHER: I believe so.

19 JUDGE KELLEY: Well, all of our disputes up until now
20 have had to do with burdens and the like. It seems to me that
21 these problems are fairly technical in nature. If you can
22 work them out, tender the fees, you may -- I am not asking
23 you to waive an objection, Mr. Oviedo. If the County has
24 some substantive reason why they don't want the doctor to
25 come, and I suppose that is a different matter, but it is --

4 22
1 The points that have been raised seem to me to be something
2 that can be fixed.

3 So, I am going to deny your motion to quash the
4 subject to Mrs. Gallagher's curing the defects that you have
5 referenced, and subject also if you want to get back to us by
6 when was this witness scheduled?

7 MS. GALLAGHER: He is scheduled for Wednesday.

8 JUDGE KELLEY: Wednesday? If you will let us
9 know by tomorrow whether there is any real substantive reason
10 why the County doesn't want the doctor to come?

11 MR. OVIEDO: Are you -- let me make this a little
12 clearer. Are you ordering Dr. Ehling's presence at the
13 Wednesday hearing, without a subpoena?

14 JUDGE KELLEY: Let me make it crystal clear if I
15 can. The fact that it was dated at the wrong point strikes
16 me as insignificant, and I would not regard that as a reason
17 to quash a subpoena, and indeed the only objection I saw that
18 I thought had much substance was the fact that he wasn't
19 tendered fees, and if they are prepared to tender fees, that
20 would take care of that. Now, am I overlooking something?

21 MR. OVIEDO: Well, yes, Mr. Chairman, you are
22 overlooking the fact that also Dr. Ehling was not personally
23 served with the subpoena.

24 JUDGE KELLEY: Do you think you can find him
25 personally, Mrs. Gallagher?

2 3
1 MR. MC CLUNG: I think we could. I went to his
2 office, and he wouldn't speak with me on advice of the County
3 Counsel.

4 MR. OVIEDO: Well, that is incorrect. I never
5 spoke with Dr. Ehling's office and never advised him not to
6 speak with anybody. I have never even spoken with the man.

7 JUDGE KELLEY: Okay. I don't need to pursue it.
8 I think that the fact that -- the fact that the doctor was not
9 personally handed this piece of paper, if he was in the office
10 and his secretary got it, I think ought to be enough for our
11 purposes. So, I am overruling that objection.

12 I am still interested in an objection on the
13 merits, if you have got one, and if you want to let us know
14 by tomorrow, and if we don't hear from you, then we will
15 assume that the subpoena, provided the fees are tendered,
16 is outstanding, and the doctor is to appear.

17 MR. OVIEDO: Well, I don't think Dr. Ehling -- I
18 have not spoken with Dr. Ehling, and I don't think Dr. Ehling
19 has been informed by anybody, particularly the Intervenors, as
20 to what date he should appear before this Board. So I myself
21 cannot guarantee his presence here on Wednesday.

22 JUDGE KELLEY: You are saying this morning that
23 you want him on Wednesday, is that right?

24 MR. MC CLUNG: Yes, I have spoken with his
25 secretary, and we have reserved a time Wednesday morning for

1 him to come. I couldn't speak with him personally as I said,
2 because he advised me that the Counsel advised him not to talk
3 to me.

4 JUDGE KELLEY: Okay. Well, now you as Counsel
5 know that he is wanted here Wednesday morning, in the absence
6 of some persuasive reason why he shouldn't be here.

7 Now, let me add that we have no notion of what
8 this witness is going to testify to, and by saying that he is
9 being subpoenaed and that we want his presence does not at all
10 imply that his testimony won't be objected to, won't be kept
11 out in part, I don't know. But we are calling him through
12 subpoena, and we expect him to appear, just like all these
13 other County officials are appearing.

14 MR. PIGOTT: It would also -- Applicants have not
15 taken a position on this particular motion at this time. We
16 would note, however, though, that we don't have any showing
17 as to the reason for which Dr. Ehling is being called. We
18 had a general outline of County witnesses, and that is it. If
19 we are going to get into some kind of a dispute as to whether
20 or not he is properly to appear, I would think that we should
21 also have notice as to what he is going to testify to.

22 JUDGE KELLEY: Another topic I wanted to raise
23 first thing this morning is where are we on outlines and what
24 is expected of these subpoenaed witnesses.

25 Now, is the Board's position clear?

1 MR. OVIEDO: Clear.

2 JUDGE KELLEY: Thank you.

3 MR. PIGOTT: Could I have a clarification as long
4 as we are on subpoenas and witnesses? Mrs. Gallagher
5 provided me last evening with a new witness list, which is
6 considerably modified from the one that was filed by the
7 Intervenors on -- well, there isn't a date on it, but that
8 was earlier filed by the Intervenors.

9 Could we have confirmation that those are the
10 only witnesses they intend to call, so that we are not
11 perhaps surprised by additional witnesses at some later time?

12 JUDGE KELLEY: Fine. I would like to backtrack a
13 little bit for clarity on that. Initially, we had from GUARD
14 the request for subpoenas, and that in effect was the
15 subpoenaed witness list, correct?

16 MR. MC CLUNG: That is correct.

17 JUDGE KELLEY: Okay. Now, I just don't recall
18 exactly what we decided upon shortly before we left about
19 timing for filing final lists, timing for filing outlines of
20 what was expected. Perhaps you could -- Mr. McClung, can you
21 refresh my recollection on that?

22 MR. MC CLUNG: Well, I don't think we settled it
23 on the record before we left. We did have a conference call
24 wherein it was strongly suggested to me that I provide that
25 list to the parties by Thursday of last week.

1 JUDGE KELLEY: I remember that, and I don't
2 remember a conference call. I remember it right here.

3 MR. MC CLUNG: That was on the conference call,
4 right, Mr. Pigott?

5 MR. PIGOTT: I think it was on the conference call
6 as well.

7 JUDGE KELLEY: Go ahead.

8 MR. MC CLUNG: Oh, okay, I am sorry.

9 JUDGE KELLEY: No, the witness list was your
10 final list of witnesses and that was --

11 MR. MC CLUNG: Right.

12 JUDGE KELLEY: -- to be served by last Thursday.

13 MR. MC CLUNG: That is correct, Your Honor.

14 JUDGE KELLEY: Now, have we got that?

15 MR. MC CLUNG: We have it -- the list that was
16 provided to the parties last night was the list, and we have
17 it typed up today to provide. The problem with the thing was
18 up until on Friday, I was still trying to get rid of some of
19 the witnesses, and pare down the list. We pared it down from
20 20 down to 10, and --

21 JUDGE KELLEY: Fine.

22 MR. MC CLUNG: -- we had -- I was still meeting
23 with various witnesses up until Friday of last week.

24 JUDGE KELLEY: Okay.

25 MR. MC CLUNG: And I had some problems.

1 JUDGE KELLEY: No, I think those efforts are fine,
2 and if you have a list now, why don't we distribute the list.

3 MR. MC CLUNG: I also --

4 JUDGE KELLEY: Just a minute. Okay. Now, does
5 this list dated September 20 reflect your final list of witnesses?

6 MR. MC CLUNG: Yes, sir.

7 JUDGE KELLEY: Okay. Now, we have discussed in
8 the past the question of providing an outline of areas. Fine.

9 MR. MC CLUNG: First, before we turn to the outline,
10 I would like to make one note for the record that there is one
11 witness on this list that has not appeared before, one new
12 witness, Dr. Mary Francis Reed will be appearing. She works
13 for Mr. Kerns at the Office of Emergency Services at the State,
14 and in -- she is going to be the last witness on Thursday,
15 and in consultations over the time with Mr. Kerns, it became
16 obvious that he himself could not personally testify to some
17 of the information which we wanted to put in evidence which
18 was prepared by Doctor Reed, and so it was with agreement with
19 them that she would also come and testify to substantially the
20 same things that Mr. Kerns was going to testify to, and now
21 they are going to split it up between them, so I don't think
22 there should be any prejudice involved there.

23 JUDGE KELLEY: Yeah, well, I -- just speaking for --
24 we do appreciate your paring down your list, and in light of
25 ground we have been over, and I think if you want to add

1 somebody for the reasons you have indicated, that that is
2 reasonable.

3 MR. PIGOTT: If I might, just a point of
4 clarification. Is Dr. Reed appearing as a voluntary witness
5 on the behalf of Intervenors?

6 MR. MC CLUNG: It is under an agreement. I told
7 her that I would attempt to get a subpoena for her if
8 necessary, and I agreed with -- came under an agreement with
9 her and Mr. Kerns in the Office of Emergency Services that
10 that would not be necessary. She is being treated as if she
11 were under subpoena, however, for purposes of witness fees,
12 and she is not a volunteer in that sense.

13
14
15
16
17
18
19
20
21
22
23
24
25

T3 kl

1 MR. PIGOTT: He is not appearing pursuant to
2 a subpoena- however.

3 MR. MC CLUNG: Not formally.

4 JUDGE KELLEY: Okay. So Dr. -- Dr. Plotkin is
5 a voluntary witness and who else?

6 MS. GALLAGHER: That is it.

7 JUDGE KELLEY: That is it. Okay.

8 MR. MC CLUNG: Now, with respect to the outlines
9 that also should have been provided to the parties on Thurs-
10 day of last week along with the witness list, I was able to
11 finally produce those for the parties and the Board today and
12 I will hand them out right now.

13 JUDGE KELLEY: Fine.

14 (Pause)

15 JUDGE KELLEY: Are there other matters of house-
16 keeping nature, Mr. Hoefling, anything from the Staff?

17 MR. HOEFLING: Yes, Mr. Chairman. With respect
18 to Applicants' Exhibit Number 132 which was revision two to
19 the Wilbur Smith Study, when that was offered by Applicants
20 the Staff reserved an objection to be permitted an opportunity
21 to examine that study. The Staff has since then had an op-
22 portunity to examine it and we have no objections to its
23 admission into evidence.

24 JUDGE KELLEY: Was that admitted subject to your
25 possible objection?

k2

1 MR. HOEFLING: That is correct.

2 JUDGE KELLEY: So that takes care of that.

3 MR. HOEFLING: Right.

4 JUDGE KELLEY: All right.

5 MR. HOEFLING: The Staff also has with it today
6 Supplement Number three to the Safety Evaluation Report and
7 testimony from NRC Staff and FEMA dealing with the low power
8 issue and EPZ contention which I would now like to identify
9 and distribute.

10 JUDGE KELLEY: Thank you. While Mr. Hoefling
11 is doing that, Mr. Pigott, anything else that you want to
12 raise at this point?

13 MR. PIGOTT: Well, we have just received the --
14 no, at this time I think we are just ready to proceed.

15 JUDGE KELLEY: Okay.

16 MR. HOEFLING: Mr. Chairman?

17 JUDGE KELLEY: Yeah.

18 MR. HOEFLING: Let me identify these items for
19 the record and then I will hand them out.

20 JUDGE KELLEY: Fine.

21 MR. HOEFLING: First, Supplement Number three to
22 the Staff Safety Evaluation Report. Secondly --

23 JUDGE KELLEY: What does that deal with,
24 Mr. Hoefling?

25 MR. HOEFLING: Pardon me?

k3

1 JUDGE KELLEY: What does that address?

2 MR. HOEFLING: It finalizes the Staff's review of
3 emergency planning and it discusses environmental qualifica-
4 tion of safety related electrical equipment, and closes out
5 several other technical issues.

6 JUDGE KELLEY: Are we to receive, as far as you
7 know, any more supplements to the SER?

8 MR. HOEFLING: I believe so. Let me confirm that
9 with Mr. Rood. Yes, there will be an additional supplement.

10 JUDGE KELLEY: It sounded from what you just said
11 like part of this might speak to one of the points that is
12 being raised in the GUARD contentions, environmental quali-
13 fications and so on. Is the Staff going to have further
14 things to say about those matters in further supplements?

15 (Pause)

16 MR. HOEFLING: The Supplement addresses the issue
17 of environmental qualification which was an issue before TMI
18 and in substance, the Staff would not consider that to be a
19 TMI issue.

20 JUDGE KELLEY: Okay. I didn't want -- I think
21 that is enough for now. I --

22 MR. HOEFLING: Okay.

23 JUDGE KELLEY: I am interested because I believe
24 that is one of the points that Mr. McClung references in
25 his motion --

k4

1 MR. HOEFLING: Yes. That subject is addressed
2 in the Supplement and it is not completely closed.

3 JUDGE KELLEY: Well, we will get -- of that more
4 later, perhaps.

5 MR. HOEFLING: Right.

6 JUDGE KELLEY: Okay. Fine. You have one other
7 SER that is going to be coming in, did you say?

8 MR. HOEFLING: There will be an additional sup-
9 plement to deal with the items which remain outstanding at
10 this --

11 JUDGE KELLEY: Whatever else is left --

12 MR. HOEFLING: Right.

13 JUDGE KELLEY: It is a sort of a catchall?

14 MR. HOEFLING: Right.

15 JUDGE KELLEY: Is that the last one, do you think?

16 MR. HOEFLING: We would hope so, but --

17 JUDGE KELLEY: Okay. All right.

18 MR. HOEFLING: A crystal ball question that we
19 are not prepared to --

20 JUDGE KELLEY: Okay.

21 MR. HOEFLING: -- sharply answer.

22 JUDGE KELLEY: Mr. McClung or Mrs. Gallagher,
23 anything else --

24 MR. HOEFLING: Excuse me --

25 JUDGE KELLEY: -- procedural that you want to

k5

1 raise before we --

2 MR. HOEFLING: Excuse me, Mr. Chairman.

3 JUDGE KELLEY: I am sorry.

4 MR. HOEFLING: I had begun my list of items.

5 JUDGE KELLEY: I am sorry. I am sorry. Go ahead.

6 MR. HOEFLING: It is a rather lengthy list. It
7 begins with Supplement three to the Safety Evaluation Report.
8 Then I am going to distribute the affidavit of Kenneth W.
9 Nauman, Jr., to which is attached testimony of Mr. Kenneth
10 W. Nauman, Jr., and direct testimony of Mr. Kenneth W. Nauman,
11 Jr.

12 Then we have the testimony of John R. Sears of
13 the NRC Staff on the EPZ contention, admitted by ASLB order
14 on the record of August 4, 1981.

15 We have the testimony of G. Normal Lauban and
16 Patrick B. O'Reilly on the subject of risk associated with
17 low power operation, and separately I will be handing out
18 the professional qualifications of Mr. O'Reilly. The quali-
19 fications of Mr. Lauban are attached to the testimony.

20 And finally, we have the testimony of John R.
21 Sears of the NRC Staff with respect to the state of emergency
22 preparedness for the San Onofre Nuclear Generating Station,
23 Units 2 and 3.

24 That completes my list, and I will now distribute
25 copies of these to the Board and the parties.

k6

1 JUDGE KELLEY: Thank you. Mrs. Gallagher, any-
2 thing else we should raise before getting into the case?

3 MS. GALLAGHER: Well, I would like to run through
4 Intervenors' list of exhibits and perhaps have them numbered.

5 JUDGE KELLEY: Fine.

6 MS. GALLAGHER: Since they have been delivered
7 at various times, I hope people have the things that were
8 delivered during the last set of hearings. Intervenors'
9 Exhibit Number 1 will be the testimony of Dr. Sheldon Plotkin.

10 MR. PIGOTT: I am going to have to raise a point
11 on this. The -- it has not been our custom to put testimony
12 in as an exhibit, as I recall. That is something that is
13 copied when the person takes the stand and sponsors it.

14 JUDGE KELLEY: I think that --

15 MR. PIGOTT: It raises a procedural problem.

16 JUDGE KELLEY: I think that has been the practice.
17 I suppose it might prevent a little confusion to leave it
18 consistent.

19 MS. GALLAGHER: I don't have any objection to
20 that.

21 JUDGE KELLEY: Now, when you put your witness on,
22 move the admission of his testimony and then we will see if
23 anybody objects.

24 MS. GALLAGHER: To avoid having to renumber every-
25 thing, may we just skip number one? Okay.

k7

1 JUDGE KELLEY: Yeah. I think so.

2 MS. GALLAGHER: Okay. Then Intervenors' Exhibit
3 Number 2 is Chapter Seven of NUREG 0490.

4 (Whereupon, the document re-
5 ferred to was marked for
6 identification as Intervenors'
7 Exhibit Number 2.)

8 MS. GALLAGHER: Intervenors' Exhibit Number 3 is
9 table 7.1.4-4 from the draft to the -- the supplement to the
10 draft Environmental Statement 0490.

11 (Whereupon, the document re-
12 ferred to was marked for
13 identification as Intervenors'
14 Exhibit Number 3.)

15 MS. GALLAGHER: Intervenor Number 4 is a Union
16 of Concerned Scientists' letter with attached -- it is
17 labeled Finding on NUREG 0490.

18 (Whereupon, the document re-
19 ferred to was marked for
20 identification as Intervenors'
21 Exhibit Number 4.)

22 MS. GALLAGHER: Intervenors' Exhibit Number 5 is
23 an article from the Geographical Review.

24 ///

25 ///

k8

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

(Whereupon, the document referred to was marked for identification as Intervenor's Exhibit Number 5.)

MS. GALLAGHER: Intervenor's Number 6 is from Science Applications Incorporated, pages C160 to 167.

(Whereupon, the document referred to was marked for identification as Intervenor's Exhibit Number 6.)

MS. GALLAGHER: Intervenor's Number 7 is an Assumption List.

(Whereupon, the document referred to was marked for identification as Intervenor's Exhibit Number 7.)

MS. GALLAGHER: Intervenor's Number 8 is an article called Earthquakes and Human Factors.

(Whereupon, the document referred to was marked for identification as Intervenor's Exhibit Number 8.)

MS. GALLAGHER: And finally, Intervenor's Number 9 are some findings in the form of graphs prepared by the Los Angeles Federation of Scientists.

k9

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

(Whereupon, the document referred to was marked for identification as Intervenor's Exhibit Number 9.)

MS. GALLAGHER: The only one that hasn't been previously distributed is the table from Intervenor's Number 3, and I will distribute that now.

JUDGE KELLEY: Can I ask whether the sound is okay toward the back? Can you hear the counsel? The mikes are awfully muffled, it seems to me. Can we turn this up or do anything?

tp4-1 1

2 JUDGE KELLEY: Could you try your mike again
and see if that's any better?

3 MS. GALLAGHER: Is that any better? It's kind
4 of low.

5 (Pause)

6 JUDGE KELLEY: We've got the exhibits numbered.
7 Anything else of a preliminary sort?

8 MS. GALLAGHER: I don't believe so.

9 JUDGE KELLEY: Okay.

10 MR. PIGOTT: I'll just make note that we have
11 wit' us and will distribute probably at a break our prepared
12 direct testimony with respect to the motion for low power
13 testing.

14 JUDGE KELLEY: Fine. Okay. Go ahead, Mrs.
15 Gallagher.

16 MS. GALLAGHER: We are going to begin with an
17 opening statement.

18 JUDGE KELLEY: All right.

19 MR. MC CLUNG: Just a brief couple comments.
20 I want to start out by saying that I think the emergency
21 preparedness aspect of licensing hearings is a special one
22 and it is so because the goal of all the people in the room
23 is the same, and that is the emergency preparedness. We
24 accept the nuclear power stations as a given and we are all
25 after making sure there is adequate assurance that the

1 population that lives surrounding the plant will be protected
2 in the unlikely event that there is a nuclear accident there.

3 With that in mind, the Intervenors have
4 attempted to allow as much evidence come into the record
5 as possible in the Applicants' case without interposing
6 formal objections of various kind or another, in the interest
7 of having the most complete record and having the most
8 complete possible decision made by this Board and by the
9 public with reference to the emergency planning in effect
10 at San Onofre.

11 On our side of the case, we are going to be
12 presenting evidence with respect to our contentions. The
13 first major point which we want to raise is that emergency
14 planning is important and that there is a danger. There
15 are health factors. If there were a radiological emergency,
16 the consequences could be disastrous and that emergency
17 planning is a very important topic.

18 The second point which we will be addressing in
19 our testimony is the actual adequacy of the plans of the
20 local jurisdictions and of their capability of being imple-
21 mented. We will be relying on reviews that have been made
22 by experts in this field. The first review that was made
23 was made by the RAC team for FEMA. They reviewed all the
24 state and local plans and found numerous deficiencies. The
25 plans were reviewed based against NUREG 0654, which is the

1 guiding light in this area. NUREG 0654 directly is reflected
2 in the regulations, Part 50.47(b), from which our contentions
3 were drafted.

4 The second report on which we will be relying
5 was a document prepared by the Office of Emergency Services
6 for the State of California in which all the state and
7 local plans were once again reviewed. This was also in May,
8 1981, before the exercise took place. This review also
9 disclosed numerous deficiencies when comparing the various
10 state and local plans against the NUREG 0654 criteria which
11 are reflected, again, in the regulations and our contentions.

12 Then an exercise was conducted in May of this
13 year. The exercise was reviewed by FEMA and the results
14 of that review are contained in a document which will also
15 be relied on by the Intervenors in this case. It is our
16 position that the exercise showed numerous deficiencies in
17 the local jurisdictions' plans and substantially validated
18 the conclusions contained in the RAC review and the Office
19 of Emergency Services review.

20 And finally, the FEMA findings themselves, dated
21 June 3, set forth in a summary fashion the problems the local
22 jurisdictions would have if they had to implement the
23 emergency planning during an emergency today.

24 It is our position, Intervenors' position, that
25 the plans as they exist today are still deficient when

1 measured against NUREG 0654 and that the FEMA findings of
2 June 3 have not been rebutted and we will attempt to support
3 them in our case.

4 It is our position, and I think the record will
5 reflect from our testimony, that promises of SOP's in the
6 future aren't sufficient to meet the NUREG 0654 standards.
7 In fact, the record will reflect that SOP's created hastily
8 in response to Licensing Board proceedings may not be ade-
9 quate and must be tested with drills and planning conferences
10 between the parties. The record will show that the inter-
11 jurisdictional planning committee which was formed by the
12 local jurisdictions was formed only after the May exercise
13 and that its work has only just begun.

14 The Intervenors' next point is that they will be
15 concentrating on special groups, special concerns. We do
16 not have the resources to provide computer models, simulated
17 evacuation studies. But we can tell by reading the plans
18 with a rational view, as was done by FEMA and the RAC review
19 people, that certain special groups have not been provided
20 for adequately in the plan. These special groups include
21 the school children, both public and private, the physically
22 handicapped, the transients and beachgoers, and of course
23 the elderly citizens who may not be able to take care of
24 themselves.

25 Finally, this final point, the Intervenors insist

1 and will show the importance of looking towards the future
2 because this plant will be on line for, if the utility is
3 correct, 30 to 40 years. We must look at the future growth.
4 We must look at what will be happening in the next ten years
5 to the community to make sure that our emergency preparedness
6 will be satisfactory now and after these proceedings are
7 finished.

8 Thank you.

9 JUDGE KELLEY: Okay.

10 MS. GALLAGHER: Intervenors would call their
11 first witness, Dr. Sheldon Plotkin.

12 Whereupon,

13 SHELDON PLOTKIN

14 was called as a witness herein and, after being first duly
15 sworn by the Chairman, was examined and testified as follows:

16 JUDGE KELLEY: Let me ask Mrs. Gallagher, do you
17 have in mind the format we have been following of an overview
18 statement?

19 MS. GALLAGHER: I thought it would be helpful
20 for the parties, since I had not prepared a question and
21 answer format, as the Applicants had, to run through a few
22 questions this morning.

23 JUDGE KELLEY: That's fine. I'm not quarreling
24 with that. I just wonder if you had in mind an overview. I
25 assume you will be offering the prepared testimony.

1 MS. GALLAGHER: Yes.

2 JUDGE KELLEY: Then I just wondered whether the
3 doctor had in mind a summary statement of his testimony.

4 MS. GALLAGHER: Would you prefer him to read the
5 testimony and then may I follow that with some direct examina-
6 tion?

7 JUDGE KELLEY: I think we would prefer not a
8 reading -- we have read it ourselves -- but perhaps a para-
9 phrase might be more helpful. The understanding would be,
10 and we have done this throughout the case, the testimony is
11 the direct evidence, plus if you want to ask him some ques-
12 tions to build on that. The overview would not be considered
13 direct evidence but rather would be a description of his
14 written testimony, really for the benefit of the Board and
15 the audience.

16 MS. GALLAGHER: We have not prepared an overview
17 in addition to the prepared document which we have submitted.
18 So I had planned to deal with that through a question and
19 answer format.

20 JUDGE KELLEY: Okay.

21 MR. PIGOTT: Excuse me. Does this question
22 and answer format anticipate that it is evidence to be
23 relied on by the Intervenors?

24 MS. GALLAGHER: Yes.

25 MR. PIGOTT: I would object. We've had rulings,

1 we've had ample time, we've had prepared testimony, and I
2 certainly object to further direct testimony at this time
3 without some showing as to either its need or the scope or
4 whether or not it is reasonable at this point in time.

5 MS. GALLAGHER: I think it is necessary to make
6 the record. I think there are many things contained in our
7 prepared testimony which need amplification. I do it for
8 the Board and for the parties.

9 MR. PIGOTT: I object, Mr. Chairman. This is
10 just totally in violation of the procedures that have been
11 set up for this portion of the proceeding and Intervenors
12 have been well aware of them, aware of them enough to present
13 prepared direct. I object to further direct at this time.

14 MR. HOEFLING: Mr. Chairman, the Staff would
15 also object to the procedure outlined by Mrs. Gallagher.
16 We have a prefiling rule that governs the presentation of
17 direct evidence in this proceeding. There has been ample
18 time to prepare whatever testimony GUARD wishes to sponsor
19 and to suggest that on the day the witness who sponsored
20 that additional direct evidence is to be elicited by
21 question and answer format runs contrary to the clear intent
22 of the prefiling rule.

23 MS. GALLAGHER: We have prefiled and we do not
24 intend to produce any evidence that is not contained in the
25 prefiling. But I think that for the purposes of understanding

1 what Dr. Plotkin has prepared it is necessary to ask the
2 questions and answers.

3 JUDGE KELLEY: Well, when I indicated before
4 Mr. Pigott objected that that sounded all right, I must say
5 I really wasn't focusing on what perhaps is an obvious
6 objection. We have had an unvarying approach to presentation
7 of evidence in this case from the beginning and indeed it
8 is founded in the rules concerning prefiling of testimony.
9 I am going to sustain the objections. You can offer --
10 the witness, as I indicated, if he wants to give an overview
11 so that the audience and the Board can have some appreciation
12 of the thrust of his testimony, that is all right. But it is
13 not evidence.

14 Your basic case, your direct case, was to be
15 filed in written form. What you filed, you filed. But we
16 are not taking additional direct. Objection sustained.

17 MR. MC CLUNG: At the risk of perhaps making
18 enemies of the Board at the present time, the Applicants
19 have presented on several occasions witnesses who have
20 amplified and testified to things that were not in their
21 direct testimony. For instance, Mr. DuBois came and
22 testified to significant things that were not contained in
23 his testimony on sirens, new stuff not contained in any
24 written filings.

25 I just don't understand why we filed our written

1 testimony, a few questions to bring out that testimony cannot
2 be considered as evidence at this time.

3 JUDGE KELLEY: Well, the Board has ruled. I think
4 it is pretty clear what our position is. Your reference to
5 Applicant witnesses, I would need some transcript citations
6 to make an assessment of your contention. It is not my
7 recollection that we have elicited direct through further
8 questioning. Indeed, I think the opposite has been true.
9 I'd be happy to look at transcripts, if you can show them to
10 me. But without something along that line, I just don't
11 believe that is a fair characterization of the way we have
12 been doing business.

13 MR. PIGOTT: Mr. Chairman, if I might respond,
14 I believe Mr. DuBois and also Mr. Barr took the stand after
15 they had testified by way of further testimony in response
16 I believe in both instances to questions and concerns that
17 had been raised by the Board during cross examination of
18 their direct and I don't think there was any -- there has
19 never been any attempt on our part to put in further direct
20 beyond the filed testimony unless there was some question
21 raised during the cross examination.

22 JUDGE KELLEY: Well, we have allowed redirect,
23 just as you will have a chance for redirect with Dr. Plotkin.
24 The scope of that is well understood.

25 MS. GALLAGHER: May I ask, Chairman Kelley, at

1 what juncture the Intervenors are to rebutt testimony in the
2 Applicants' case. If everything must be prefiled then things
3 in the Applicants' case cannot be addressed by Intervenors.

4 JUDGE KELLEY: I don't have in front of me the
5 stipulation on filing dates.

6 MR. PIGOTT: We filed over a week in advance of
7 the Intervenors. Three weeks in most instances, I believe.

8 JUDGE KELLEY: Normally we require simultaneous
9 filing. In this case, because the Applicants in this case
10 were still making some changes, we felt that it was only
11 fair that they be required to file in advance and tell you
12 what they had been doing most recently if they were going to
13 have that in their testimony. But part of the answer to
14 your question is that. You had their testimony a week before
15 you filed.

16 ///

17

18

19

20

21

22

23

24

25

25 k1

1 DIRECT EXAMINATION

2

BY MS. GALLAGHER:

3

Q Mr. Plotkin, will you please state your name for
4 the record?

5

A Dr. Sheldon C. Plotkin, P-l-o-t-k-i-n.

6

Q Dr. Plotkin, have you reviewed the prepared
7 testimony which -- and was it prepared under your direction?

8

A Item number one?

9

Q Yes.

10

A Yes.

11

Q In examining it, are there any corrections that
12 you would like to make?

13

A Well, I would like to revise some workding on
14 page nine. Underneath the listings at the top, I would like
15 to change the wording, modify it a little bit to read, I
16 have examined a severe earthquake scenario, and accidents
17 and/or adverse weather, but without earthquake conditions
18 using a systems engineering approach. It is a slight modifi-
19 cation which I think better describes what we did.

20

Q So now on page nine at line eight it should read,
21 I have examined a severe earthquake scenario, and accidents --

22

A Accidents and/or adverse weather.

23

Q And/or adverse weather --

24

A Condition. But without earthquake conditions.

25

Q Thank you. In addition to that correction, are

k2

1 there any others that you need to make?

2 A None that I am aware of at the moment. I think
3 the rest is reasonably clear. I hope so.

4 Q Is the testimony as prepared a true statement of
5 your findings and opinions on the items addressed therein as
6 of today?

7 A Yes, ma'am.

8 MS. GALLAGHER: I would ask to have the Inter-
9 venors' Exhibit Number 1 received in evidence at this time.

10 MR. PIGOTT: Mr. --

11 JUDGE KELLEY: A technical point, we were not
12 going to call this an exhibit --

13 MS. GALLAGHER: Excuse me. I am sorry. Strike
14 that Exhibit Number 1.

15 JUDGE KELLEY: What we have been doing is simply
16 incorporating it into the transcript as if read at this point,
17 and then it shows up in the transcript.

18 MR. HOEFLING: The Staff would raise an objection --

19 JUDGE KELLEY: Okay.

20 MR. HOEFLING: -- as to --

21 JUDGE KELLEY: That was just a technical point.
22 Now, the Staff has an objection, going beyond whether it is
23 number one or not?

24 MR. HOEFLING: Yes.

25 JUDGE KELLEY: Okay.

k3

1 MR. HOEFLING: Do you want to go first,
2 Mr. Pigott?

3 MR. PIGOTT: I also have an objection and was
4 going to ask for some Voir Dire before admission of this
5 evidence and think there is some question as to the quali-
6 fications of the Witness in the various subject areas.

7 MR. HOEFLING: The Staff as an objection in ad-
8 dition to the qualifications objection and that deals with
9 relevance.

10 JUDGE KELLEY: All right.

11 MS. GALLAGHER: I thought I had --

12 JUDGE KELLEY: So you have moved for admission
13 and we have objections. Mr. Pigott has asked for Voir Dire.
14 Shall we turn to that at this point?

15 MR. PIGOTT: I would think that Mr. Hoefling's
16 objection takes precedence. If it is sustained, it moots
17 everything.

18 MR. HOEFLING: I will make the objection,
19 Mr Chairman.

20 JUDGE KELLEY: Go ahead.

21 MR. HOEFLING: The Staff would raise its rele-
22 vance objection, and by so doing I don't want to waive any
23 other objections that I may have along the lines of competen-
24 cy or qualifications, but my relevance objection goes to a
25 substantial portion of the testimony, and I am prepared to

k4

1 delineate which portions of the testimony I don't believe
2 are relevant to the issue. The issue as the Staff sees it,
3 deals with Intervenor contention one, and at least as best as
4 the Staff can perceive, this testimony is offered to call into
5 question the evacuation time estimates and consequently the
6 viability of that protective action as is more particularly
7 set forth in Intervenor's contention number one.

8 And to the extent that the testimony speaks to
9 that issue, that is fine. However, substantial portions of
10 the testimony, and we can see this beginning at page four
11 in section three, analytical approach to determining cancers
12 of a person, indeed that entire section, is simply irrelevant
13 to the issue framed as contention one.

14 What we have here is an analysis that deals with
15 health effects and cancer deaths, which may be relevant
16 questions dealing with other issues relevant to the licensing
17 of this facility, but they are not issues in controversy in
18 this proceeding in the Staff's view, and that testimony con-
19 sequently is objectionable. I am speaking now of all of
20 section three, and I carry on to page nine, in conclusiary
21 paragraphs.

22 Again, those paragraphs discuss health effects,
23 and here we get into a discussion of evaluations with respect
24 to earthquakes. I think it is clear of record that Inter-
25 venors' contentions do not embrace earthquake considerations,

k5

1 yet here we have testimony that speaks to that question, and
2 the Staff would urge that that component of the testimony is
3 likewise irrelevant. That is the substance of the Staff's
4 objection. I am prepared to go through the testimony line by
5 line and indicate which portions I think should not be ad-
6 mitted.

7 JUDGE KELLEY: I should have in front of me, and
8 I don't, the precise wording of contention number one.

9 Well, would the Staff's view be on the relevance
10 of radiation risk -- the viability of evacuation -- wouldn't
11 it be significant to look at the effects of radiation to
12 decide --

13 MR. HOEFLING: The Staff would --

14 JUDGE KELLEY: -- a viable option?

15 MR. HOEFLING: The Staff would argue that that is
16 not the question before the Board. The question before the
17 Board is the viability of taking the protective measure,
18 couched in terms of physical feasibility. Is it possible
19 for the individuals within the plume exposure pathway -- is
20 it possible for them to be physically evacuated, and do we
21 have time estimates which are reasonable, which would permit
22 the planners to make an intelligent decision with respect to
23 whether or not that evacuation step should be taken.

24 The issue of the radiation exposure, or the
25 degree of radiation exposure to the individuals should the

k6

1 protective action be taken, is not before the Board.

2 JUDGE KELLEY: Well, we are arguing a lot about
3 time estimates, right?

4 MR. HOEFLING: That is correct.

5 JUDGE KELLEY: Whether it is going to take two
6 hours or four hours or ten hours.

7 MR. HOEFLING: That is correct, and that is --

8 JUDGE KELLEY: And that seems to be significant.
9 People think that is relevant. If that is relevant it must
10 be because it is hazardous if you don't get out within a cer-
11 tain time period.

12 MR. HOEFLING: The point that the Staff wishes to
13 make is that we should have time estimates that permit the
14 planners to make an intelligent decision, whether or not the
15 evacuation should be taken. The question of the health ef-
16 fects associated with taking that protective action is not a
17 relevant consideration.

18 JUDGE KELLEY: Why had the --

19 MR. HOEFLING: Taken as a given -- let me explain.
20 We have taken as a given that we have a radiological incident.
21 Consequently there are going to be health effects and there
22 are going to be, to some degree, health risks. The question
23 before the Board -- what are the protective actions that are
24 available, and are they doable, are they physically doable,
25 and do the planners have the information at their disposal to

k7

1 make intelligent protective action decisions.

2 Consequently, the question of time estimates is
3 very relevant, and to that extent, if Mr. Plotkin is speaking
4 to time estimates, and it appears that he is qualified to
5 do so, that is relevant testimony that the Board should have.
6 But the question of the degree of health risk associated with
7 a protective action, is not a relevant consideration before
8 this board if the protective action is doable and if there is
9 a good database for individuals to execute a decision to take
10 the protective action.

11 JUDGE KELLEY: Yeah, but what does doable mean?
12 Doable means doable within a certain time, and if you can't
13 do it within a certain time, you are going to get hurt.
14 Isn't that right?

15 MR. HOEFLING: The Staff would argue that doable
16 means physically doable. That there are roads available.
17 That there is a road network or other means in place to have
18 these people removed from the scene. That is doable. There
19 is no --

20 JUDGE KELLEY: It doesn't matter whether it is
21 done in a day or a week?

22 MR. HOEFLING: I think that is the extreme of
23 the argument, but there is no absolute time frame within
24 which the action must be taken. If the action can be taken,
25 and if there is a database that provides the planners with

k8

1 accurate information as to how long it will take them to
2 perform the action, that is a showing that is called for
3 under the Commission's regulations, and the subsidiary ques-
4 tion of the relative degrees of health effects associated
5 with the action is not a proper consideration in determining
6 whether or not the emergency planning regulations have been
7 met.

8 JUDGE KELLEY: You mean you can meet the regula-
9 tions in the Staff's view, even though your evacuation times
10 are open-ended and go out to days --

11 MR. HOEFLING: No.

12 JUDGE KELLEY: Ten days, two weeks, a month?

13 MR. HOEFLING: No, clearly not. Clearly if we
14 have a protective --

15 JUDGE KELLEY: When is it too late?

16 MR. HOEFLING: I think there has to be a showing
17 made that we do have a protective action that is taking an
18 unreasonably long period of time before we get into the
19 question of health effects associated with the taking of the
20 protective action.

21 Now, the record in this proceeding indicates
22 that the protective action can be taken within a matter of
23 hours. If the record indicated that the protective action
24 would not be available for some inordinantly long period of
25 time, and I am talking a number of days or a week, then we

k9

1 would have a threshold showing to get into considerations
2 of health effects and to see whether or not we really did
3 have viable emergency planning, but unless we have that
4 record base, I don't believe the Board should get into the
5 question of health effects, and I don't believe the regula-
6 tions contemplate that.

7 JUDGE KELLEY: Well, that -- that seems to be a
8 little different, though, if you are saying that evacuation
9 is doable in some fairly short period of time. We never get
10 the health effects, and only when you prove that it is going
11 to take a long time do you get them, that is a little differ-
12 ent, it seems to me. Is that basically your position?

13 MR. HOEFLING: Yes. Let me restate it again.
14 Obviously if we had a situation where we had a bottleneck, if
15 you will, at a site that extremely limited access, given the
16 numbers of people it would take a week to remove all those
17 people from the scene, the question would be whether we have
18 a viable protective action. If we don't have that showing,
19 if we have a showing rather that a protective action is
20 doable within a reasonable period of time -- we are talking
21 a day, several days, then the question of health effects
22 associated with the protective action should not be con-
23 sidered by the Board.

24 MR. PIGOTT: Fine. The Applicants might be
25 heard at the appropriate time.

k10

1 JUDGE KELLEY: Ms. Gallagher?

2 MS. GALLAGHER: Yes, I would like to respnd
3 first to Staff. I think that the regs in section 50.57 --
4 excuse me, section 50.47A1, require that a showing be made
5 that there will be reasonable assurance that adequate pro-
6 tective measures can and will be taken in the event of a
7 radiological emergency. We need to make our case in order to
8 rebutt the showing that Applicants have claimed to have made.

9 I don't think the Wilbur Smith time estimate has
10 yet been written into the law. I think that it is evidence
11 that the Applicants have put on and that is subject to re-
12 buttal. That is the nature of this evidence.

13 It is not irrelevant unless you think that evacua-
14 tion can be a sterile exercise that has nothing to do with
15 health. The whole point of emergency planning, it seems to
16 me, is to effect dose savings. Without that connection, it
17 doesn't make any sense at all. We have heard others on
18 various issues having to do with protective actions, including
19 sheltering. We have heard evidence which we would like to
20 rebutt on sheltering. And it is necessary for us to be heard
21 in order to make the record whole on that matter.

22 I cannot see how Staff can reasonably say that
23 this is not relevant.

24 MR. MC CLUNG: Because of the importance --

25 JUDGE KELLEY: What would be your position on

k11

1 this part of your contention? It speaks of evacuation --
2 evacuate or otherwise protect the people. What does that
3 mean?

4 MS. GALLAGHER: Under certain types of accidents
5 there would be other types of protection available to people,
6 such as -- and it would be a whole range of things. Under
7 certain types of accident scenarios, sheltering is appropriate.
8 Under severe accident circumstances it may not be.

9 We are not attacking the viability of evacuation.
10 We are only trying to point out that under certain kinds of
11 accident scenarios, there may nevertheless be exposure to
12 radiation. That doesn't mean you don't evacuate. It is
13 better to be exposed to a plume and evacuate within six hours,
14 than to stay in the plume and be irradiated for weeks. You
15 know, obviously that is protective, but we have to talk
16 about dose savings, and when you talk about dose savings, if
17 it doesn't take place in the context of health, I don't know
18 what it means.

19 JUDGE KELLEY: Mr. Pigott?

20 MR. PIGOTT: Yes. Applicants would join in the
21 objection that the Staff has lodged. The problem that we
22 see with the testimony that has been set forth in Section III
23 is that it does not go to adequacy of emergency actions, but
24 rather it appears to quarrel with the environmental impact
25 of the various postulated accidents. It goes directly to

k12

1 chapter seven of the Environmental Statement, and the quarrel
2 appears to be in those sections that the health impact is
3 something different than what has been evaluated by Staff
4 and Applicants in going through this proceeding.

5 That, to our mind, is definitely not within the
6 issue that has been promulgated. We are looking -- if we
7 go back far enough to the construction permit stage we will
8 find that what we litigated was whether or not it is feasible
9 to come up with evacuation plans. And now at the operating
10 license stage we have the issue to find out whether or not
11 we have in fact drafted and can implement appropriate emer-
12 gency planning procedures and plans, but all within the con-
13 text of -- or at least without there being raised the issue
14 of what are the appropriate health effects that are to be
15 assumed to be occurring during the time of this evacuation,
16 and those are well set forth in the environmental report, and
17 have not been contested up until the time we see this par-
18 ticular section of the Intervenors' testimony.

19 So as to Section three, we would submit that it
20 does go beyond the scope of the issue in that it quarrels
21 with health effects rather than feasibility of evacuation or
22 ability to implement evacuation, and for that reason we
23 would join in the Staff's objection.

24 ///

25

1 JUDGE KELLEY: Would you comment on Mrs.
2 Gallagher's observation that in evacuation, dose saving is
3 the whole purpose?

4 MR. PIGOTT: Well, whether or not evacuation --
5 dose saving is the purpose of evacuation, I think the question
6 we are supposed to be looking at is the issue that was
7 stipulated to, and that was -- that is not the issue. The
8 issue is simply whether or not we are able to devise and
9 implement evacuation plans. I don't have the language in
10 front of me at the moment, but the question is not the
11 appropriate dosages to be concerned with under various
12 accident scenarios, and that is what section 3 goes to, and
13 that is beyond the scope.

14 JUDGE KELLEY: In asking my questions, I am not
15 necessarily suggesting that any particular action is
16 appropriate here one way or the other. It is just the broad
17 idea of do health effects belong in this contention at all, and
18 I hear the Staff saying no, they don't, and you agree with
19 that?

20 MR. PIGOTT: Applicants would say no, they don't.
21 If they had wanted to get into health effects, appropriate
22 dosages from various accidents, they should have raised that a
23 long time ago under -- actually, I guess it would have been a
24 part of an environmental hearing.

25 JUDGE KELLEY: Well --

1 MR. MC CLUNG: Chairman?

2 JUDGE KELLEY: -- it is certainly true that this
3 contention doesn't say anything at all about health effects,
4 and if that was the major thrust, one would think you would
5 find it in there. It does say, or otherwise adequately
6 protected, and I assume adequate has something to do with
7 doses, but --

8 MR. PIGOTT: Yes.

9 JUDGE KELLEY: -- okay?

10 MR. PIGOTT: In the context of the doses set
11 forth in the environmental impact -- or the environmental
12 report, final environmental statement, and we have always
13 considered that that is what Staff was -- or what the Board
14 would be measuring them against, but the vice here is that
15 they are now going to the level against which they would be
16 measured.

17 JUDGE KELLEY: They are now going what?

18 MR. PIGOTT: They are coming up with a different
19 level of health effects. They would measure evacuation
20 capability or feasibility against a different analysis for the
21 dosages that would be received by the population than what are
22 contained in the final environmental statement, NUREG 0490,
23 and that is not a part of the issue.

24 MS. GALLAGHER: Mr. Chairman, may I be heard on
25 this?

3g 1 JUDGE KELLEY: Let me just follow up on this.
2 Doesn't the FES included doses of this magnitude?

3 MS. GALLAGHER: Yes, it does.

4 MR. PIGOTT: Not the magnitude that is set forth
5 in Section 3 of Mr. Plotkin's testimony, not by a long shot.

6 JUDGE KELLEY: There are doses and doses back
7 there, but there are Class 9 so-called accidents in the FES,
8 too, right?

9 MR. PIGOTT: Oh, certainly.

10 MS. GALLAGHER: I would like to make it clear
11 that we are not attempting to attack any of the NRC or EPA
12 figures. We have used NRC figures for our analysis, and also
13 in regard to the absence of health effects in our contention,
14 early on we attempted to have that issue within our
15 contention. Applicants succeeded in getting it removed.

16 We still have, however, 50.47(a)(1), which says
17 reasonable assurance that adequate protective assurances, that
18 is within our contention, and we submit that that does take
19 care of health and safety issues.

20 I have no notion of what adequacy could mean
21 if it doesn't mean that it protects you.

22 JUDGE KELLEY: Well, I think we have heard your
23 positions on the Staff's objection. Mr. Pigott indicated a
24 somewhat different objection. Well, let us see. It is 20
25 after 10:00. Shall we take a coffee break at this point, 15

4
1 minutes, and then we will come back, and return to you. Off
2 the record.

3 (Brief recess)

4 JUDGE KELLEY: Back on the record.

5 The Board has considered the Staff's objection to
6 portions of Dr. Plotkin's testimony, objections joined by the
7 Applicants and opposed, of course, by the Intervenors, and we
8 have decided to sustain this objection. We think it is a
9 close question. The wording of this contention -- we are
10 talking about contention number one -- is somewhat ambiguous.
11 One can argue that it reaches health effects, but we think the
12 somewhat stronger argument is on the other side.

13 We read it basically as a feasibility contention.
14 It is concerned with things like traffic and roads, and
15 communication; in short, is it possible to get a lot of
16 people out of a given area in short time, things like the
17 time estimates are crucial to it, and we have some elaborate
18 time estimates.

19 There is no reference in here at all to health
20 effects, and we find that, particularly in light of the
21 history of this contention, the history being the initial
22 GUARD contention which is essentially a coordination
23 contention, if you will, a contention also which did not
24 reference health effects.

25 We do have a separate contention which does

5
1 involved consideration of health effects, numbur 2(d), for
2 example, speaks of arrangements for medical services, and we
3 did hear some testimony on health effects in connection with
4 that, but we don't think that health effects are properly
5 considered under this contention, so that is our ruling.

6 Now, that came up in the context of Dr. Plotkin's
7 prepared testimony, and we have not attempted to go through it
8 line by line. I believe I will suggest that we don't need to
9 do that right away. Dr. Plotkin is prepared to address the
10 time estimates as I understand it, and perhaps other questions,
11 and to be questioned on them.

12 Mr. Hoefling, it was your motion. Could you go
13 through a copy of the testimony, and bracket what you think
14 should be included, and could you bracket it, and then Xerox
15 it, and then the Board and the other parties can look at it,
16 and see whether that fits the Board's ruling, or whether it
17 should be changed in some way?

18 MR. HOEFLING: Certainly, Mr. Chairman. I have
19 one related point. I also objected to the earthquake-related
20 conclusions that Dr. Plotkin was reaching on page nine. I
21 could bracket that as well, and pass that about, and we could
22 consider that.

23 JUDGE KELLEY: Well, this raises the obvious
24 question. It talks about a severe earthquake scenario. Dr.
25 Plotkin, how severe did you have in mind?

6
1 WITNESS PLOTKIN: Severe enough to affect the
2 freeway structure. What I had in mind, which I took from one
3 of the -- well, one of the exhibits that you have, is the San
4 Fernando Earthquake, which was a Richter of 6.5 --

5 JUDGE KELLEY: But the idea is highway
6 disruption.

7 WITNESS PLOTKIN: That -- you know, a reasonable
8 earthquake, and the freeway collapsed under that kind of an
9 earthquake, and so given that severe catastrophic condition,
10 then what happens?

11 JUDGE KELLEY: Did you have -- was your objection
12 based on an earthquake in excess of the SSE, or -- or what?

13 MR. HOEFLING: No, sir. It was based on any
14 earthquake, essentially, consistent with the Staff's
15 objection made at the last hearing session, which I take to
16 be a continuing exception that earthquakes are simply not
17 within the bounds of the Intervenor's contentions, and I
18 believe the Board at that point ruled that it would take
19 evidence in a certain limited fashion with respect to
20 earthquakes below the SSE, but I want to renew the Staff's
21 objection to any consideration of earthquakes within the
22 framework of the Intervenor's contentions.

23 JUDGE KELLEY: Comment from Mrs. Gallagher on the
24 sentence on page 9 concerning earthquake effects? Staff is
25 moving to strike. Let me just add, I think the Board -- from

7
1 the Board you can take it as given that we are not talking
2 about an earthquake in excess of the SSE. What we are talking
3 about is something less than that, but we all know from having
4 sat here, that hearing Mr. -- the man from Caltrans, that
5 something below the SSE can indeed do things to highways, but
6 with that sort of a framework, would you comment on Mr.
7 Hoefling's motion?

8 MS. GALLAGHER: Well, I -- certainly the earthquake
9 scenario is not as crucial to our evidence as the motion on
10 which we have lost.

11 I would say that historically, again, I raised
12 the same point in regard to the health effects issue.
13 Historically we had tried to claim earthquake as a geographi-
14 cal constraint, that we were concerned about. I think the
15 fact that things aren't explicitly in one's contention ought
16 not to come back to haunt the Intervenor when the contentions
17 were framed by joint efforts. It isn't a matter of -- of
18 defaulting or not wishing to have certain terminology. As you
19 know, contentions are arrived at through a lot of give and
20 take, and I just really would like to go on record to
21 objecting to having the fact that we don't have health effects
22 and the fact that we don't have earthquakes in our contention
23 now be used against us.

24 JUDGE KELLEY: Mr. Pigott?

25 MR. PIGOTT: I think we have been heard with

8
1 respect to the health effects. With respect to earthquakes,
2 Applicants cannot join in the objection of the Staff. We
3 feel that as long as the investigation stays at or below the
4 level of the SSE, and the Board has evidenced its interest in
5 the effect of such earthquakes, that even though not
6 directly within the language of a contention, that it is
7 appropriate for testimony to be presented on that matter.

8 JUDGE KELLEY: The Board is going to overrule the
9 objection, consistent with similar objections in the
10 past about earthquakes in the case, we think that there is
11 something that we ought to look at here. I don't believe
12 there is any real inconsistency between this ruling and the
13 last one.

14 After all, if we are focusing on highway and
15 traffic, and things like that, and we then look at an earth-
16 quake that can cause a lot of problems in that regard, it
17 seems to us it is much more closely related that the subject
18 of health effects.

19 So, is your objection moot, the one you were
20 going to --

21 MR. PIGOTT: Partially. You know, with -- no,
22 with -- if -- I think our usual procedure has been to admit
23 subject to a motion to strike, and given the -- essentially
24 the striking of the health effects, I am willing to cross-
25 examine and move to strike then on any basis of lack of

1 foundation, et cetera, that might be found with respect to the
2 transportation testimony, and earthquake.

3 JUDGE KELLEY: Fine. Yes?

4 BY MS. GALLAGHER:

5 Q Okay, Dr. Plotkin, would you please give us an
6 overview of your testimony?

7 A An overview of what we did entails first of all the
8 fact this was a team effort of the Los Angeles Federation of
9 Scientists. I did some of the work myself, and we did -- we
10 did the work together. The -- we --

11 JUDGE KELLEY: Could you identify who they are,
12 now that you have referred to them?

13 WITNESS PLOTKIN: Well, Miguel Polido was one,
14 who is sitting at the table, Dr. Jack Jennings, and Dr. Irving
15 Lyon, four of us essentially. I also made inquiry and used
16 some information from others.

17 BY MS. GALLAGHER:

18 Q Dr. Plotkin, if you would tell who the Los
19 Angeles Federation of Scientists is, it is a group that you
20 belong to?

21 A It is a group of engineers and scientists who are
22 desirous of using their technical capability to perform
23 studies and analyses that have social impact. We have numer-
24 ous projects, and all of our projects are socially oriented.
25 We have a weekly radio program. We have been in existence

10
1 about a year and a half to two years now, in reorganized form.
2 We have one published study which has received wide publicity,
3 a Russian second strike on Los Angeles.

4 The most recent study, which was just released the
5 other day was the conversion of San Onofre to natural gas and
6 what the economic aspects are. That analysis was also applied
7 to Diablo Canyon.

8 We have a number of other projects in-house that we
9 are working on, on which would be an accidental nuclear
10 catastrophe, strictly by accident, not somebody having a
11 nervous breakdown, or something of that, but simply a normal
12 technical -- technically oriented accident.

13 Numerous programs in the community. We are
14 involved with the hearings, the relicensing of UCLA's nuclear
15 reactor, and so forth. So that is the Los Angeles Federation
16 of Scientists.

17 JUDGE KELLEY: Thank you.

18 WITNESS PLOTKIN: We were contacted by a
19 representative of the Intervenors as a result of our radio
20 program some months ago, and since then, we began looking at
21 the evacuation aspects of this matter. We did -- took an
22 overall analysis of the Wilbur Smith study, which is, I guess,
23 the prime element in this matter at the moment, came to
24 certain conclusions.

25 Should I state those?

1 BY MS. GALLAGHER:

2 Q Yes.

3 A We concluded at that point after reviewing the
4 Wilbur Smith document that it was -- only dealt with about 35
5 percent or so of the evacuation material that it should have
6 dealt with, in our view.

7 Our view, there -- they -- what the Wilbur Smith
8 study did was compile basic data, which is good, and then took
9 the -- you might say one scenario, and analyzed an optimum
10 case, optimum situation, determined under the most favorable
11 of conditions what would the evacuation time be.

12 What is left, of course, is what we would term a
13 more realistic evaluation of -- analysis of evacuation times,
14 and then the other end, which is the earthquake part, the --
15 what we termed in our study the worst worst case, that is the
16 other -- one needs a range of scenarios in order to get a
17 proper view of what the real situation is, then that was one
18 part of the study.

19 And the second part of the study, which you just
20 ruled out, was the answer to the question, so what? What
21 difference does it make whether it is six hours or ten hours
22 or 20 hours, if it -- if the health hazards are only, you know,
23 an added ten percent or so effect, after the long hours, then
24 it really doesn't make any difference, and errors,
25 fundamental errors in the Wilbur Smith study would not be very

1 important, even though they might appear to be at first, so we
2 felt it essential to have that second, and in terms of time
3 devoted to this matter, most of our time was spent on that
4 second part, because it is the most difficult, but at any rate,
5 at this point, the evacuation part, certain deficiencies in the
6 Wilbur Smith study was noted.

7 The first that comes to mind as I am sitting here
8 is the freeway traffic going south at the time the accident
9 occurs. The -- they spoke of CHP response in a half hour to
10 shut off southbound traffic and reroute it, et cetera, which
11 would certainly be an optimum condition. Caltrans personnel
12 also have to be present with their signs, et cetera.

13 A more realistic view of that might be two hours,
14 to stop the southbound traffic. Don't forget, we have got
15 people living in the area who may be outside the area at the
16 time, and have to come home to get their families. This
17 large amount of traffic for that initial -- initial time in
18 the accident sequence has to be accounted for.

19 It seemed to us that a good way of handling that
20 would be to take the -- I don't know the names of the offramps,
21 but at San Juan Capistrano is the offramp that goes to Pacific
22 Coast Highway, so that traffic could be routed in a smooth
23 manner, in our opinion, to turn around and go north on
24 Pacific Coast Highway.

25

T7 kl

1 A Also, the residents of Dana Point should take
2 that highway to go north and not be brought across the traf-
3 fic in that area to go north.

4 So, that is one aspect. Then the other aspects
5 are based on the results at Three Mile Island. There is
6 going to be a large number of, you might say, volunteer
7 evacuees north of the EPZ. There are going to be people
8 voluntarily evacuating, and they are going to evacuate on
9 I-5 in exactly the same section of freeway that the evacuees
10 from the EPZ zone are going to leave, so to a reasonable
11 approximation in this first cut systems engineering analysis
12 to the problem, we said that the people from Dana Point would
13 be compensated -- that are taken off of I-5 from our EPZ
14 and routed north on Pacific Coast Highway would be replaced
15 by volunteer evacuees, so the numbers are about the same.

16 We took the total number of people in the northern
17 sector and concluded that one could reasonably expect them
18 to evacuate on I-5.

19 The next error in the Wilbur Smith -- or deficien-
20 cy in the Wilbur Smith analysis has to do with the slowing
21 down of the traffic. We have, I believe it is eight -- I
22 left my notes -- there are eight on-ramps to I-5 in the zone
23 that we are concerned with. There are only four highway
24 lanes. We all know what happens going into downtown Los
25 Angeles in the morning due to the similar situation. A lot

k2

1 of people trying to go to another area and having a larger
2 number of on-ramps than there are freeway lanes. That causes
3 the traffic to slow down, bumper to bumper, stop and go traf-
4 fic. That, to us, is a more reasonable condition than the
5 free flowing traffic at 1,800 cars per lane hour.

6 In fact, if one stops to think what happens under
7 severe bumper to bumper conditions, zero to 15 miles an hour
8 is the kind of speed that one is accustomed to. Stop for a
9 little bit, speed up as the traffic moves to 15 miles an
10 hour, stop again. Average speed being about seven and a half
11 miles an hour. Taking now, the highway data and the flow
12 that one can expect for this bumper to bumper condition,
13 seven and a half miles an hour, the figure drops from 1,800
14 cars per lane hour -- that Wilbur Smith used -- to 800 cars
15 per lane hour as being what we considered a more reasonable
16 condition, and --

17 MR. PIGOTT: Excuse me. I apologize, Dr. Plotkin,
18 but it would appear, Mr. Chairman, that we are now hearing
19 the results, finally, of the Los Angeles Federation of
20 Scientists' time estimates for evacuation, the studies which
21 were requested by Applicants during the last set of hearings,
22 and which have not yet been provided. And I -- unless we
23 are going to be afforded the -- some kind of clarification
24 by Counsel for Intervenors as to how this information is to
25 be used, or how it is to be tested in this proceeding, I

k3

1 really must object to the continued discussion.

2 MS. GALLAGHER: Dr. Plotkin was prepared to
3 testify on this matter and has calculations with him. This
4 is not a published study. It is not in form to disseminate
5 it. The calculations for the traffic flow are quite basic
6 as compared to the radionuclide calculations which now are
7 not in issue. If you will be patient, or await your turn to
8 cross examine, Dr. Plotkin would be quite happy to go through
9 the math with you if that is what you want to do. He is
10 giving you the results right now.

11 MR. PIGOTT: Well, it is --

12 JUDGE HAND: Well, why aren't we -- why weren't
13 we afforded a copy of this to examine and to consider?

14 MS. GALLAGHER: These are data used in reaching
15 conclusions. It is not in the form of a published study.

16 WITNESS PLOTKIN: Well, if I might --

17 JUDGE HAND: Well, conclusions are not very help-
18 ful unless one has the basis in front of them.

19 WITNESS PLOTKIN: I might say that, you know, we
20 would -- I personally would have liked to have had that at
21 this time, but it is just impossible. Now, my time is volun-
22 teered, as are all the other members. We are not receiving
23 any compensation for what we are doing. This work had to have
24 been done at nights and weekends, and it was -- we also don't
25 have the funds to do the publishing either, and we just have

k4

1 not been able to compile anything like the Wilbur Smith study
2 that is very well done, and also, as you well know, very
3 costly.

4 MS. GALLAGHER: I would like to --

5 JUDGE KELLEY: The data -- the data that is being
6 referred to now, these are the estimates that your group
7 came up with as a result --

8 WITNESS PLOTKIN: Yes, and I --

9 JUDGE KELLEY: -- of your study?

10 WITNESS PLOTKIN: -- have calculations. They
11 are --

12 JUDGE KELLEY: Is this something that could be
13 provided to the parties at this point?

14 MS. GALLAGHER: These calculations are quite
15 simple and could be provided. Not this moment, but --

16 JUDGE KELLEY: Well, what I am thinking about is
17 having other counsel have some opportunity to look at these
18 numbers as a basis for cross.

19 MS. GALLAGHER: I think if you would give
20 Dr. Plotkin a moment to find his notes that he could walk
21 through these calculations for you. They are not -- even I
22 can understand them, and I am not a mathematician. They are
23 not at all complicated, as opposed to the others that I did
24 provide some written data on.

25 JUDGE KELLEY: Is that satisfactory to you,

k5

1 Mr. Pigott?

2 MR. PIGOTT: I think we will just have to proceed
3 and find out. I would reserve further objection. I really
4 object to the details, and apparently there has been a study
5 or an evaluation, if not in the form of a published document,
6 but there must have been some type of evaluation that went
7 into the conclusions that we find in the testimony that has
8 been available for some period of time, since the conclusions
9 have been in writing for some period of time, and I object
10 to this way of getting in additional evidence without any
11 real basis for cross examining, but I think we have to proceed.

12 JUDGE KELLEY: I understand. Go ahead, Doctor.

13 WITNESS PLOTKIN: I forget where I was. We --

14 MR. HOE LING: Mr. Chairman?

15 JUDGE KELLEY: Yes.

16 MR. HOEFLING: Just for clarification, is this
17 considered direct evidence now? Are we beyond the overview
18 or --

19 JUDGE KELLEY: We are in an overview. We are
20 in an explanation that can be referred to, which in effect
21 supplements and explains your direct testimony, but it is
22 not evidence as such.

23 WITNESS PLOTKIN: I apologize, but I kind of get
24 the two confused. We have a certain amount of information,
25 and there is something I have to say which I think is

k6

1 pertinent, and the exact sequence and the stop and go type
2 of presentation is something I am not too adaptable to.

3 The -- we attempted to take into account realis-
4 tic scenarios, and in doing so we considered the anticipated
5 freeway flow during evacuation of a severe accident -- follow-
6 ing a severe accident. We took and considered that freeway
7 flow under strictly stop and go traffic conditions with no
8 accidents. Then we considered the human factor aspects of
9 stress in such a situation and how that might affect the
10 traffic flow and the behavior of drivers and assumed a cer-
11 tain number of accidents occurring on the freeway, and what
12 that will do to the freeway flow and the evacuation time,
13 at least in a first cut analysis that we are doing.

14 That gave us two numbers which appear -- 14 hours --
15 well, 14 is not in here, I don't think. I don't remember.
16 But under the no accident condition, one could expect -- an-
17 ticipate evacuation time of about 14 hours, and with some
18 severe accidents, which I can describe a couple of possibili-
19 ties, the freeway flow reduces to half, so that the evacuation
20 time doubles, 28 hours evacuation time. Then the -- of course,
21 the worst, worst case is simply judgment as to how long the
22 people would be stranded in the area should the freeways be
23 damaged so severely that they couldn't be repaired and we just
24 took a week as a length of time that people might be there,
25 and --

k7

1 JUDGE HAND: Do you mean that literally? You
2 just took a week without any basis?

3 WITNESS PLOTKIN: Well, this is a matter of en-
4 gineering judgment, if you will, as to how long it takes to
5 reconstruct some of the roads in the area. We have evidence
6 that Pacific Coast Highway is subject to mudslides a certain
7 amount of the year and closes. Under earthquake conditions
8 that same material that comes down in the rain might very
9 well come down in an earthquake, and so the Pacific Coast
10 Highway is blocked so that no traffic can go north on Pacific
11 Coast Highway. A 6.5 magnitude earthquake as we had at San
12 Fernando Valley that knocked out the -- is that Highway 5
13 too going north? I think that is Highway 5 in that section
14 that also was damaged so severely that -- you know, it just
15 tumbled down, and given that same condition for Highway 5,
16 then how long is it going to take to get 100,000 people out
17 of the area?

18 JUDGE HAND: How did you know --

19 WITNESS PLOTKIN: A week is not an unreasonable
20 number.

21 JUDGE HAND: How did you relate the necessity
22 to evacuate to the occurrence of the earthquake?

23 WITNESS PLOTKIN: Could you state that again,
24 please?

25 JUDGE HAND: How did you relate the necessity to

1 evacuate to the occurrence of the earthquake? Are they one
2 and the same? Does the earthquake --

3 WITNESS PLOTKIN: No, we said that there would
4 be an earthquake and also a severe nuclear accident simul-
5 taneous -- that the earthquake induced a nuclear accident.
6 There is of course the possibility that it wouldn't.

7 JUDGE HAND: How big an earthquake were you
8 using to get your baseline?

9 WITNESS PLOTKIN: Well, 6 and a half is what
10 Richter -- a reading of six and a half is what one registered
11 for the San Fernando earthquake.

12 JUDGE HAND: And how did you get the six and a
13 half earthquake to cause a nuclear event that required
14 evacuation?

15 WITNESS PLOTKIN: Oh, we are talking about having
16 a nuclear accidents, and there are such things as multiple
17 failure modes, and which things happen simultaneously. We
18 had eight things happen simultaneously at Three Mile Island.
19 Now --

20 JUDGE HAND: These are coincident but not --

21 WITNESS PLOTKIN: Coincident.

22 JUDGE HAND: -- related events, is what you are
23 saying?

24 WITNESS PLOTKIN: Yes, or maybe slightly related.
25 I am sure there are -- I can assure there is mechanism inside

9463

1 San Onofre's Nuclear Power Plant that is affected by earth-
2 quakes and the shaking of the ground. It may not be cata-
3 strophic. It may not cease -- an instrument may not cease
4 operating entirely, but I am sure there are a number of
5 instruments that will give erroneous readings and there will
6 be some problems with an earthquake magnitude six and a half
7 at San Onofre, even if the containment structure does not
8 fracture. I don't know if that is what you wanted.

9 JUDGE HAND: And did you make any attempt to
10 estimate the probability of this coincident phenomenon, so
11 that we can --

12 WITNESS PLOTKIN: No, the problem --

13 JUDGE HAND: -- look at the likelihood that
14 perhaps it will occur?

15 WITNESS PLOTKIN: Well, the only likely -- the
16 probability of accidents that we considered, just to make
17 sure that we weren't doing something that was irrelevant,
18 was the -- all right. I forget the --

19 JUDGE HAND: All right.

20 WITNESS PLOTKIN: -- regulation, but at any rate,
21 one can show -- I am sure you have seen the numbers, but --

22 JUDGE HAND: So what --

23 WITNESS PLOTKIN: -- for a TWR2 accident, which
24 is a pretty severe accident by NRC's standards, can have as
25 high as four percent probability at San Onofre --

1 JUDGE HAND: And that is --

2 WITNESS PLOTKIN: And that is a pretty probable
3 kind of event to be considering.

4 JUDGE HAND: And so as an engineer, if you now
5 consider coincident events unrelated, what happens to the
6 probability?

7 WITNESS PLOTKIN: The probability is much reduced,
8 but also the chances of these things occurring is quite high.
9 You know, I do accident analysis for a living, and every
10 single accident is a one in a million chance. How many
11 vehicles went through the intersection before two collided?
12 You know, it is quite high, but given a very small probabili-
13 ties, and very large numbers of time units for which that
14 probability can come about, then one has an event every so
15 often. It is not unusual, as we know from Three Mile Island,
16 to have multiple simultaneous failures, each one independent
17 of the other.

18 JUDGE HAND: You call that not unusual?

19 WITNESS PLOTKIN: That is right, not unusual.
20 We have 70 reactors on line. There is something like 490
21 reactor years, and we have had one Three Mile Island, that
22 is for something of that nature -- we have one point in the
23 statistics which is you know, very poor statistics, but this
24 is the kind of matters we have to deal with. I don't like
25 it, and I am sure you don't like the dearth of adequate

1 probability numbers. That is the problem with the Rasmussen
2 study. They tried, but they are dealing with numbers that
3 they just don't have.

4 JUDGE HAND: Doesn't it make it easier if you
5 at least attempt an estimate so we can look at the likelihood?
6 Then we would have your opinion of that.

7 WITNESS PLOTKIN: Well, I didn't think that was
8 part of the problem here. I thought the problem here was to
9 evacuate -- to evaluate the evacuation and whether or not
10 it is something that one should consider, and that is some-
11 thing that we thought should be considered in the proper
12 analysis of evacuation as one end of the spectrum.

13 MS. GALLAGHER: If I may say, I did not ask
14 Dr. Plotkin to address the elements of probability that the
15 Board is raising.

16 JUDGE HAND: I am merely searching for a basis
17 to attempt to evaluate the things that the man is saying.

18 WITNESS PLOTKIN: Well, it has to do with what
19 one has to do to do a proper evacuation analysis, is all I
20 am saying, and that one end will be this worst, worst case
21 and --

22 JUDGE HAND: The Board has imagined a sort of
23 a worst, worst case, that you weren't hear to listen to some
24 of the discussion or read the papers, but we have thought
25 about such things.

1 WITNESS PLOTKIN: Am I far off the mark, might
2 I ask?

3 JUDGE HAND: Well, our worst case is worse than
4 yours.

5 WITNESS PLOTKIN: Oh, I see.

6 JUDGE KELLEY: It is more credible, though.

7 WITNESS PLOTKIN: Then I am in the ballpark.

8 MR. PIGOTT: But it is without bases.

9 JUDGE KELLEY: Now we did deviate from what you
10 are saying, because we were talking some months ago about
11 a scenario of the multiple disaster scenario where you get a
12 very serious accident at the plant and lo and behold at the
13 same time, a very big earthquake, and our reaction to that
14 is that that is just a fantasy. We are not worried about
15 that and you can forget it. But there are some other
16 scenarios that seemed to us to be somewhat more realistic.

17 WITNESS PLOTKIN: All right. Well, we included
18 that type of thing as one end of the spectrum. One does have
19 a spectrum of evacuation times under different conditions.
20 At the same time, the part you ruled out as health hazards
21 under various conditions as well and these two interweave
22 in order to come up with a proper picture of what the situa-
23 tion really is.

24 ///

25

tp8-1 1

2 Also considered some details regarding how one
3 would go about achieving the optimum evacuation time that
4 Wilbur Smith concluded. This is optimum time, six and a
5 quarter hours. Just exactly what do you have to do? Well,
6 there's a considerable human factor analysis understanding
7 that has to go into those considerations. It is quite
8 apparent that, based on our military experience, police
9 department experience, fire department experience, that
10 I think there is a specific study Mrs. Gallagher pointed out
11 having to do with the Green Berets and the relation between
12 adequate functioning under emergency conditions and training.

13 In order to get -- obtain disciplined proper
14 behavior on the part of a population the police and Caltrans
15 authorities and all others involved, considerable training
16 is required. In order to achieve this optimum six and a
17 quarter hour evacuation, for example, the traffic flow on
18 the freeway has to be kept at 35 miles an hour in order to
19 achieve the 1800 vehicles per lane hour. In order to do
20 that you have to keep cars from bunching up, which means
21 they have to be controlled on the on ramps. So now we need
22 a very definitive and concerted training program for the
23 police officers that are going to do that work. We concluded
24 that it is unreasonable to think that -- to conclude that
25 under emergency conditions that people would abide by the
stop and go lights on the on ramps if the situation were

2 1 controlled automatically, that a police officer directing
2 traffic would be required. That police officer has to be
3 coordinated with the speed monitors. As the speed of the
4 freeway slows down, cars bunch up, he has to know or she has
5 to know how to control the vehicles on the on ramps. This
6 has to be -- that study and that determination has to be
7 carried out. It is a definite or defined technical problem,
8 engineering problem. It can be done. We haven't done it.
9 It takes some time and effort to do. But that has to be
10 done.

11 And the way that the police officers are going
12 to be trained to handle that, along with the speed monitors,
13 how one is going to feed the velocity information to the
14 officer at the time has to be considered.

15 Then we -- I'm trying to think of the other
16 factors that we included in the study. I can't think of any
17 more at the moment, so that will have to do as a summary.

18 BY MS. GALLAGHER:

19 Q Dr. Plotkin, I want to call your attention to the
20 exhibits and ask if you have relied upon Exhibit No. 2,
21 which is Chapter 7 of 0490, in arriving at your conclusions.
22 That is the Exhibit No. 2 and it is the final environmental
23 statement, chapter 7.

24 A Yes. This gave us an overall overview of the
25 situation health-wise and then the other document that goes

3 1 with that, the --

2 Q Table 7. That is No. 3. Table 7.1.4-4.

3 However --

4 A That's from the draft environment -- that's
5 a different document.

6 Q Yes.

7 A But still part of this NUREG 0490.

8 Q Okay. And then Exhibit No. 4, the Union of
9 Concerned Scientists release, did you rely upon that for
10 any of your data?

11 A Yes. Well, that material, of course, was taken
12 from this draft statement NUREG 0490 and simply summarizes
13 the data and that is where I learned of the 4 percent
14 probability of a PWR 2 accident. There are also the health
15 hazards that are related which we've ruled out.

16 Q And in Exhibit No. 5, the geographical review
17 article which summarizes the TMI accident experience for
18 evacuation, did you rely upon that?

19 A Yes. Well, it was that article, of course,
20 that alerted us to the fact that a considerable number of
21 people outside of the EPZ will be evacuating. Thirty-nine
22 percent of a population of 390,000 around TMI voluntarily
23 evacuated without any direction. So we can expect something
24 similar at San Onofre, should a similar accident occur.

25 Q And as far as Exhibit No. 6, the SAI report that

4 1 has to do with the wind roses, did you rely upon that?

2 A Well, that was used in what I call the "so what"
3 section. We took, you know, is it likely that one would get
4 a --

5 MR. PIGOTT: Objection. I believe we are now
6 going beyond the scope of what has been determined to be
7 the relevant scope of the evidence here.

8 MS. GALLAGHER: Okay. I will not attempt to have
9 that document entered.

10 JUDGE KELLEY: This objection pertains to which
11 document?

12 MS. GALLAGHER: No. 6.

13 JUDGE KELLEY: And that is?

14 MS. GALLAGHER: It was wind directions and speed,
15 wind roses for the area.

16 MR. PIGOTT: SAI report.

17 MS. GALLAGHER: Since we are not now dealing
18 with health effects, it is not relevant.

19 JUDGE KELLEY: All right.

20 BY MS. GALLAGHER:

21 Q And were the assumption lists prepared by you,
22 Dr. Plotkin?

23 A Yes, they were --

24 Q In No. 7.

25 A Yes. They were -- those are far from complete

5 1 and just something that occurred at the time they were
2 written. I have some additions. I don't know if that's
3 appropriate or not.

4 MS. GALLAGHER: Would the Board want to hear the
5 additions to the assumption list?

6 JUDGE KELLEY: Counsel?

7 MR. PIGOTT: I would be objecting to them as --
8 at least I would object to them as being added to the exhibit
9 per se as a part of the direct evidence. I would assume they
10 might come out on cross examination.

11 WITNESS PLOTKIN: I believe we have already
12 mentioned them anyway.

13 BY MS. GALLAGHER:

14 Q And as far as Exhibit No. 9, Intervenors' No.
15 9, the Los Angeles Federation of Scientists results, are they
16 all related to health effects?

17 A Yes. Those are the results -- as I say, most of
18 our work went into that, and they are summarized in the three
19 curves which we were rather proud of.

20 Q Are they related in any way to just mere time
21 estimates or at the --

22 A No. The time estimates were used to then evaluate
23 the numbers and obtain the endpoints for those curves. Also,
24 it shows how one can use our math model to then include
25 other types of accidents, variations, variations of wind

6 1 direction, variations of evacuation times. These things all
2 interrelated.

3 MS. GALLAGHER: Then I would move to have
4 Exhibits 2, 3, 4, 5, 7, 8 entered into evidence.

5 MR. PIGOTT: I'm going to have some objections.
6 Perhaps we should take them one at a time.

7 JUDGE KELLEY: I think so.

8 MR. PIGOTT: First of all, with respect to
9 Exhibit No. 2 as identified by the Intervenors --

10 JUDGE KELLEY: I didn't write these numbers as
11 I should have and I am still sort of fumbling. Can you
12 tell me what --

13 MR. PIGOTT: That's Chapter 7 of 0490.

14 JUDGE KELLEY: Of the FES?

15 MR. PIGOTT: Yes. And so my statement there
16 would be that it is redundant to readmit what I believe is
17 a Staff exhibit.

18 MR. HOEFLING: Staff Exhibit No. 4.

19 MR. PIGOTT: And I would therefore think it not
20 necessary.

21 JUDGE KELLEY: Wasn't it stipulated in?

22 MR. PIGOTT: Yes.

23 MS. GALLAGHER: That's fine, then.

24 MR. PIGOTT: With respect to Exhibit No. 3, I
25 think that from what it has been identified as being one

7 1 table from a draft --

2 JUDGE KELLEY: The title again, please?

3 MS. GALLAGHER: It is Table 7.1.4-4 from NUREG
4 0490, the draft to the -- supplement to the draft environ-
5 mental statement of January, 1981.

6 JUDGE KELLEY: All right. I understand.

7 MR. PIGOTT: I would object to that. There has
8 been no foundation or basis laid. It is incomplete. It
9 is further superceded by an official document of the NRC
10 Staff. I don't see how this witness sponsors that particular
11 document.

12 MR. HOEFLING: The Staff would also object to
13 it for reasons similar as stated by Mr. Pigott. In addition,
14 the table, at least on its face, appears to be dealing with
15 this question of health effects which would take it beyond
16 the issue that Mr. Plotkin is being permitted to testify on.

17 MS. GALLAGHER: Excuse me. It also deals with
18 probabilities and I would ask Mr. Hoefling, has this table
19 been repudiated by the NRC Staff?

20 MR. HOEFLING: I have no idea. The table appeared
21 in the draft and, to the extent that it was, if you will,
22 either repeated or updated in the final environmental
23 supplement, I don't know.

24 JUDGE KELLEY: The question in my mind is is
25 this table that was in the draft in the FES that we just

8 1 got through talking about or is this different information?

2 MS. GALLAGHER: It's different information.

3 JUDGE KELLEY: Is there a similar table but the
4 numbers are different?

5 MS. GALLAGHER: There is a similar table, but
6 it isn't just that the numbers are different. Some numbers
7 are not dealt with. They use a different way for assessing
8 certain subjects having to do with irrelevant -- for our
9 purposes, we are admitting it for the probability data that
10 it has.

11 MR. PIGOTT: Mr. Chairman, as --

12 JUDGE KELLEY: I'm sorry. Having ruled out
13 health effects under this contention, why are we into
14 probabilities of accidents?

15 MS. GALLAGHER: Well, the probability is still
16 relevant as to the possible necessity for evacuating.

17 MR. PIGOTT: Applicants have assumed that the
18 evacuation is necessary. I don't think we have to go into
19 probabilities.

20 MS. GALLAGHER: And for setting the parameters
21 of the severity of an accident to be expected. In terms
22 of our assessment of evacuation time estimates that was an
23 interesting point and a crucial point, you know, what
24 parameters do you plan for. Dr. Plotkin shows the PWR 1
25 through 9 classification and that particular table has data

9 1 on that sets a 4 percent likelihood of a severe accident.
2 We used it to support the need for planning for a broad range
3 of accidents because it seemed to Intervenors that many of
4 the accidents that are planned for by Staff and that have
5 been presented by Applicant do not address the serious
6 accident.

7 MR. PIGOTT: Perhaps if I could ask a couple of
8 questions of the witness concerning the table. I don't
9 think it is relevant to the issue that is left to be tried
10 and I don't think the witness is qualified to discuss the
11 figures that are on the table.

12 VOIR DIRE EXAMINATION

13 BY MR. PIGOTT:

14 Q Dr. Plotkin, did you have anything to do with
15 respect to the drafting of this document?

16 A The drafting, making up of the table?

17 Q Yes.

18 A No, I didn't.

19 Q Okay. And what portions of this -- well, let me
20 ask, what is your understanding or what knowledge do you have
21 of how the probabilities were arrived at under let's say the
22 first column, Probability of Impact per Year?

23 A Well, these were numbers that were derived by
24 the NRC and so forth. What I was concerned with and what
25 I used it for was just to show the relevance of the rest of

10 1 our study and what we were doing and how important is it.

2 Q But you don't know whether they are right or
3 wrong or whether we should rely on them as being true?

4 A I can't vouch for those probabilities. That is
5 certainly true. I know that, you know, just in general
6 they are always low. And the reason they are low is because
7 they haven't included a sufficient number of failure modes
8 and included low probabilities that could not be evaluated
9 properly.

10 Q Is there any figure on that table that you can
11 testify to as to being true and accurate and understanding
12 the manner in which it was calculated?

13 A No, I didn't calculate those numbers.

14 MR. PIGOTT: I'd say there is no basis, no
15 sponsor for the testimony -- for the exhibit.

16 JUDGE KELLEY: Doctor, you are saying that you
17 are offering this because you read this and this influenced
18 you in your decision to take a certain kind of accident
19 into account, is that correct?

20 WITNESS PLOTKIN: Yes.

21 JUDGE KELLEY: Okay. Well, I think it is very
22 clear we are not here to litigate accident probabilities in
23 any very detailed sense. That is beyond the scope of this
24 hearing and we can't contribute to those questions one way
25 or the other. If it is offered for the narrow basis of the

11 1 fact that the witness in doing his study looked at these
2 numbers and thought that they represented the accidents
3 that ought to be considered, we can admit it on that basis.

4 MR. PIGOTT: For that very limited purpose?

5 JUDGE KELLEY: For that very limited purpose.
6 Not for the truth of the matter asserted therein.

7 (The document marked for
8 identification as Exhibit No.
9 3 was received into evidence.)

10 MR. PIGOTT: With respect to Exhibit No. 4,
11 which apparently originated with the Union of Concerned
12 Scientists --

13 JUDGE KELLEY: And that one is?

14 MR. PIGOTT: Intervenors' Exhibit No. 4.

15 JUDGE KELLEY: Okay.

16 MR. PIGOTT: It is entitled "UCS Finding on NUREG
17 0490."

18 BY MR. PIGOTT:

19 Q Dr. Plotkin, did you play any part in the drafting
20 of this document?

21 A No, sir. I verified the prime numbers, however,
22 from the Nuclear Regulatory --

23 Q I think you have answered the question, Dr.
24 Plotkin.

25 MR. PIGOTT: Again, Mr. Chairman, absolutely no

12± 1 basis for admitting this which is patently a release or an
2 editorial by other persons to be admitted into evidence for
3 the truth of the matter stated and would object to its
4 admission.

5 MR. HOEFLING: Mr. Chairman, the Staff would
6 note that what we have here are the UCS comments on the
7 draft supplement, which were then addressed in the final
8 NUREG document. I just point that out for information to
9 the Board. The Staff would object again on the grounds of
10 relevance. The thrust or the gravamen, if you will, of this
11 UCS document deals with health effects and consideration of
12 the health effects in the Staff's FES and it is not relevant
13 to the issue to be tried.

14 (Pause)

15 JUDGE KELLEY: I'm going to sustain the Staff's
16 objection to this and the Applicants', too, in a sense. It
17 seems to me it is very tangential to the issues in this
18 case. It does address health effects in large measure.
19 What it is is the Union of Concerned Scientists telling us
20 its view of a lot of things and there is nobody here from
21 the Union of Concerned Scientists. So it is hearsay. It
22 can't be tested. I admitted a prior exhibit for a very
23 narrow purpose. I don't think that is necessary or desirable
24 with respect to this one. So I am going to sustain the
25 objection.

1 MR. PIGOTT: With respect to Exhibit 5, which is
2 identified as an article from the Geographical Review on
3 evacuation from nuclear technological disaster, I would have
4 the same objection. The authors of that article are
5 apparently a Mr. Ziegler, Mr. Brune, and a Mr. Johnson. There
6 has been no foundation laid for admitting this document for
7 the truth of what is stated, no sponsor. Objection.

8 MR. HOEFLING: Object on those same grounds, Mr.
9 Chairman.

10 JUDGE KELLEY: Ms. Gallagher?

11 DIRECT EXAMINATION (RESUMED)

12 BY MS. GALLAGHER:

13 Q Dr. Plotkin, for what purpose did you rely upon
14 the Geographical Review article?

15 A It is already stated what I used it for. The
16 fact that their study, these people did a study, and it is a
17 matter of one scientist relying on another scientist's work
18 as far as results are concern. Thirty-nine percent of the
19 people at the Three Mile Island, in the vicinity of that plant,
20 voluntarily evacuated, and I think that whether that number
21 actually should have been 41 or 37 or something else really
22 is irrelevant.

23 The fact is, a significant number of people can
24 be expected to voluntarily evacuate in the vicinity of San
25 Onofre, should there be a nuclear accident at that point.

2
1 While the people within the EPZ area are going to
2 be instructed to evacuate, and the authorities are going to do
3 everything in their power to see that they are evacuated, the
4 ones outside of that zone are free to evacuate or not evacuate
5 as they see fit, and I think it is quite apparent that, from
6 the data we have in this particular exhibit, that we can
7 expect a significant number of evacuees outside the EPZ.

8 Q Is this a scholarly journal, this Geographic
9 Review?

10 A I believe it is. It seems like a well-done piece
11 of work, that is certainly as valid as the Wilbur Smith study
12 that I have read, and that I have had to accept on the same
13 basis.

14 JUDGE KELLEY: Well, there is a big difference,
15 and the big difference is that Mr. Wilbur Smith came here and
16 was subject to cross-examination, and Mr. Ziegler and Mr. Brun
17 and Mr. Johnson are not here, and as far as I know, they
18 aren't going to be here, and yet we are being handed this long
19 article making all sorts of assertions based on we don't know
20 what, and we are being asked to put this in the record.

21 Now, is there some particular narrow part of this
22 that speaks to the particular point that you relied upon it
23 for?

24 WITNESS PLOTKIN: Well, I just stated -- I don't
25 remember which page it is on, but -- there it is. Page 7,

3
1 that the estimated 144,000 persons, the 39 percent of the
2 population, evacuated their homes in the area, as far as 15
3 miles from the plant.

4 Let us see, now, get within 15 miles of San
5 Onofre, that is outside the EPZ, and as I understand -- well,
6 I haven't seen the population figures. I am under the
7 impression that there are some 250,000 people north of the EPZ
8 in the -- around I-5.

9 JUDGE KELLEY: But this particular part was at page
10 seven?

11 WITNESS PLOTKIN: Yes, in the middle of page seven
12 is where that material is.

13 JUDGE KELLEY: And that is the part that you refer
14 to particularly as what influenced your thinking, is that
15 correct?

16 WITNESS PLOTKIN: Yes, this is just a guide to
17 what basis have I got to say that one can expect people to
18 evacuate north of the EPZ, you know, outside the area, and
19 voluntarily evacuate, as an engineer having done human factor
20 studies and so forth, and --

21 JUDGE KELLEY: Okay, I understand that.

22 WITNESS PLOTKIN: -- I can use my engineering
23 judgment and conclude that this is going to be the case.

24 JUDGE KELLEY: All right.

25 WITNESS PLOTKIN: But it adds a little credibility

4
1 to that judgment by having a document.

2 JUDGE KELLEY: Well, the Board is willing to admit
3 page seven for the limited purpose of its showing a document
4 that you relied on to reach your conclusion that people
5 outside the EPZ might evacuate it. But as to the remainder of
6 it, we have no basis of testing it, and are not accepting it.

7 MR. PIGOTT: It is again, a limited purpose
8 document, is that correct?

9 JUDGE KELLEY: Yes.

10 MR. PIGOTT: Okay. Exhibit Number 6, the portion
11 of the SAI Exhibit, I understand that has been withdrawn, is
12 that correct?

13 MS. GALLAGHER: That is correct.

14 VOIR DIRE EXAMINATION

15 BY MR. PIGOTT:

16 Q Number 7, the assumption list was done by you, is
17 that correct, Dr. Plotkin?

18 A Probably. Yes.

19 Q That was written by you?

20 A Yes. That was early on.

21 Q I beg your pardon?

22 A I said that was early on. I have -- as I say --
23 some more comments. It was just a matter of trying to get in
24 the record some specific comments regarding the Wilbur Smith
25 study.

5 & 1 MR. PIGOTT: I have no objection to that Exhibit.

2 MR. HOEFLING: No objection by Staff.

3 JUDGE KELLEY: The document is admitted.

4 (Intervenor's Exhibit No. 7
5 was thereupon received into
6 evidence)

7 MR. PIGOTT: Exhibit number eight is the portion
8 of the article from the Sunset Magazine publication, I believe,
9 "How earthquakes are measured." Again, the same objections
10 as were lodged with respect to Exhibit 5, the Geological
11 Review item, the UCS issuance, there is no basis shown that
12 this witness can testify as to the matters stated in this
13 article, without any foundation.

14 MR. HOEFLING: Staff would join in that objection,
15 and object additionally on the grounds of relevance along the
16 lines that we have objected previously to the admission of
17 earthquake-related testimony on these contentions.

18 JUDGE KELLEY: Doctor, in referencing this article,
19 I believe you referred to the portion of it that speaks of the
20 human factor, right? I am looking at page 33, 34.

21 WITNESS PLOTKIN: Yes, not so much the human
22 factor. That is included in there, as to the fact that --
23 that people, you know, behave a little differently under
24 earthquake conditions, and more stressful than at other times.

25 So, that is included in there, and also the San

6
1 Fernando Earthquake, and just again, more supporting testimony
2 to what most of us -- certainly most of any of us living in
3 the area know, that the bad earthquake caused one freeway to
4 collapse.

5 JUDGE KELLEY: Well, again, some of this
6 article certainly we spent 25 days of hearing in San Diego
7 listening to seismologists on this subject, and they told us
8 all about measuring earthquakes, so I am trying to single out
9 what might be helpful in this particular context. The human
10 factor feature, I gather, is one thing that you took into
11 account in coming up with the times that you came up with.

12 WITNESS PLOTKIN: Yes.

13 JUDGE KELLEY: Is that correct?

14 WITNESS PLOTKIN: Human factor aspects were
15 included in the work that we did.

16 JUDGE KELLEY: Okay, and what about -- you
17 referenced the San Fernando discussion, where is that?

18 WITNESS PLOTKIN: Well, that is -- they talk
19 about different earthquakes, and the San Fernando is there.
20 A picture on page 37 shows collapsed buildings. For my
21 purposes, it would have been better to have shown the freeway,
22 which -- rather than the buildings, but nevertheless -- page
23 37 of the article.

24 MS. GALLAGHER: Excuse me. Page 40 refers to the
25 San Fernando Valley earthquake .

7
1 WITNESS PLOTKIN: Yes, on page 40 is the San
2 Fernando, and a discussion of the severity. I am looking for
3 the 6.5 number that -- it must be included someplace else.

4 MR. PIGOTT: 6.6, and it is on page 32.

5 WITNESS PLOTKIN: Thank you.

6 JUDGE KELLEY: It must be in the record someplace,
7 too.

8 MR. PIGOTT: I think it might be.

9 JUDGE KELLEY: Well, I think that consistent with
10 our last ruling, what we are happy to have in the record is
11 material that bears directly on the witness's testimony, and
12 what we don't want to get into is a lot of extraneous matter.
13 The Board has -- the Board will admit pages 33 and 34 for
14 purposes of providing some information on human factors in
15 earthquakes, and human behavior, and the fact that Dr. Plotkin
16 reviewed that, and that he relied on that in his study, again
17 for the same type of limited purpose, but we don't believe that
18 the other portions are relevant to the issues that we are
19 looking at now, so we are not going to admit the remainder
20 of the Article.

21 MR. PIGOTT: Those pages, 33 and 34, are admitted,
22 again, the limited purpose of reference?

23 JUDGE KELLEY: Yes.

24 MR. PIGOTT: Not for the truth of what is stated.

25 JUDGE KELLEY: Yes.

1 (Intervenor's Exhibit No. 8
2 was thereupon received into
3 evidence)

4 MR. PIGOTT: Exhibit number 9, which were the
5 three graphs, have been withdrawn, have they not?

6 MR. MC CLUNG: Yes.

7 MR. PIGOTT: Yes. I believe that completes the
8 list, Mr. Chairman.

9 JUDGE KELLEY: Well, it is five of 12:00. Why
10 don't we break until one o'clock. Off the record.

11 (Whereupon, at 11:55 a.m., the hearing recessed,
12 to reconvene at 1:00 p.m. that same day.)
13
14
15
16
17
18
19
20
21
22
23
24
25

tp10 1

A F T E R N O O N S E S S I O N

2

1:12 p.m.

3

JUDGE KELLEY: Back on the record. We had just completed hearing objections to exhibits. I guess, Ms. Gallagher, that would take it back to you with Mr. Plotkin. Is he here?

7

MS. GALLAGHER: Yes, he is here.

8

Whereupon,

9

SHELDON PLOTKIN

10 the witness at the time of the recess, resumed the stand and,
11 having been previously duly sworn by the Chairman, was
12 examined and testified further as follows:

13

MS. GALLAGHER: I will tender the witness for cross examination.

15

JUDGE KELLEY: Very well. Cross examination by the Applicants.

17

MR. PIGOTT: Thank you. Before we commence, I understand that the NRC Staff has in fact marked up a copy of Dr. Plotkin's testimony. Is that correct, Mr. Hoefling?

20

MR. HOEFLING: That's correct.

21

MR. PIGOTT: And Applicants I guess are getting it -- we are trying to get it copied right now.

23

MR. HOEFLING: That's right. And when that is available we can distribute it and discuss it.

25

MR. PIGOTT: I think I can proceed on the back-

1 ground and bias portions of the examination.

2 JUDGE KELLEY: Fine.

3 CROSS EXAMINATION

4 BY MR. PIGOTT:

5 Q Dr. Plotkin, you are here as a volunteer, is that
6 correct?

7 A That's correct.

8 Q Okay. And could you describe for us again how
9 it was that the Intervenors came into contact with you as a
10 potential witness?

11 A Yes. The Los Angeles Federation of Scientists
12 has a radio program once a week and one of the members of
13 the Intervenors organization contacted us and asked us if
14 we would be willing to lend our expertise to these hearings.
15 We decided we would. That's what we have done.

16 Q And you have a weekly radio show, is that correct?

17 A Yes.

18 Q Program. And is the nature of that -- well,
19 what is the nature of that program?

20 A It is called "The Wizard Show". It's on KPFK.
21 It deals with technical subjects and we attempt to explain
22 technical matters in terms that the listeners can understand
23 and we have a standard format of some 20-25 minutes, 30
24 minutes of presentation of the technical material, different
25 technical material, and then open up the phones for questions.

1 We cover all technical subjects and we deal almost entirely
2 with only technical matters. Once in a while political
3 issues become involved, but we make an effort to stick to
4 the technical parts.

5 Q And apparently the -- do I gather that the subject
6 of nuclear power is addressed on that particular program?

7 A It has been, yes. We've had several. That
8 generally comes under my organization. Two of us produce
9 the show; I'm one of the producers. We've dealt with high
10 level nuclear waste in some detail. We've had people from
11 Bechtel, Rockwell as guests. We make every attempt to
12 present both sides of the issue at the same time and attempt
13 to point out the differences. There are certain areas of
14 agreement and there are certain areas of legitimate dis-
15 agreement. We try to spell these out as best we can for
16 our audiences.

17 Q Does the Los Angeles Federation of Scientists
18 have a position on nuclear power?

19 A Not formally, but I think if one takes all of
20 the technical issues that we deal with and looks for
21 unanimity of the members, I think there would be pretty
22 complete unanimity on the nuclear power question, nuclear
23 weaponry, along with nuclear power plants. We are very
24 much concerned that the proliferation of nuclear phenomenon
25 in our society, which we believe to be a mistake. I think

1 that is a fairly good description of the views of our members.
2 There are other subjects where there isn't such unanimity.
3 But I think on that one there is.

4 Q Would it be unfair to characterize the Los
5 Angeles Federation of Engineers, including yourself, as
6 being anti-nuclear?

7 A Yes, I think so.

8 Q It would be unfair or fair?

9 A No, I think it is fair to say we are anti-nuclear
10 power. Let's put it that way. We are very much in favor
11 of nuclear medicine, which some of our members are engaged
12 in.

13 Q And have you been engaged in other nuclear
14 proceedings in opposition to licensing of one kind or
15 another, either you personally -- well, first of all, you
16 personally?

17 A Other nuclear proceedings?

18 Q Yes.

19 A Not yet. I probably will be in the licensing of
20 UCLA's nuclear reactor. I intend to, but that is a ways
21 downstream.

22 Q You contemplate participating in opposition to
23 its relicensing?

24 A Yes.

25 Q Have you been active in any other proceedings

1 before the NRC or any other regulatory body concerned with
2 nuclear power?

3 A Yes. I testified before the California Assembly
4 on nuclear safety after Three Mile Island. I was invited
5 by Assemblyman Mel Levine to participate in those hearings.
6 I went to Sacramento and did so.

7 Q You haven't appeared in this proceeding before,
8 have you?

9 A No, sir.

10 Q Looking at your biography which you attached to
11 your direct testimony, Dr. Plotkin, to save time, apparently
12 you got your undergraduate degree Colorado, electrical en-
13 gineering, is that correct?

14 A Two undergraduate degrees; one in electrical
15 and one in aeronautical.

16 Q Okay. Yes. Three years later you get the
17 aeronautical engineering and then ultimately a PhD in
18 electrical engineering, the University of California at
19 Berkeley, is that correct?

20 A That's correct. I worked for a year in between
21 those two bachelors degrees.

22 Q Okay.

23 A At Los Alamos, I might say, doing work on nuclear
24 phenomenon.

25 Q You say you worked at Los Alamos?

1 A Yes. Electronic instrumentation for nuclear
2 experiments.

3 Q Was that in the instrumentation or was that in
4 the nuclear aspects?

5 A A little of both. The primary emphasis from my
6 part was the electronic instrumentation. But this interfaces
7 with the nuclear phenomenon and entails several courses on
8 the subject, et cetera.

9 Q Have you had any formal coursework or training
10 in the area of transportation?

11 A No formal coursework, no. It's all what I've
12 learned in that area and have submitted testimony for, has
13 all been based upon on-the-job training, so to speak.

14 Q Other than formal education, formal coursework --
15 and you understand the distinction -- have you had any other
16 type of still structured education but perhaps not within a
17 registered university or learning institution?

18 A No. As I said, it is on-the-job training. I
19 worked for many years on highway automation. Part of the
20 high speed ground transportation group at TRW. I designed
21 the Century Expressway, the preliminary design for the
22 Century Expressway, which was a highspeed roadway for
23 senators and congressmen to get from Boston to Washington
24 quickly. At any rate, you know, I've done a considerable
25 amount of transportation work. As I say, that's been done

1 without the benefit of the formal civil engineering courses
2 that you are referring to.

3 Q You've had no courses, then, in traffic flow
4 theory or highway capacity analysis?

5 A No. I've done that work. As I say, that work
6 is done. As a systems engineer, one has the job, one learns
7 the material without the formal background. And in my
8 practice I have two highway engineers as associates.

9 Q In precisely which projects have you been involved
10 in with respect to roadway design in your experience?

11 A Well, specifically the initial work that I did
12 with highways was in fact 1962, when I was at Hughes Research
13 Labs in Malibu. As far as I know, I am the first one to
14 have proposed the use of infrared radar to prevent all
15 rear-end collisions on freeways.

16 Q My question was what projects have you actually
17 worked on with respect to design of roadways.

18 A I'm trying to lead to that, because that provides
19 highway design material for automation of the highways,
20 specifications for traffic flow can be increased and then
21 based upon the background I acquired at Hughes, that led to
22 employment on specific highway work at TRW under, as I say,
23 high speed ground transportation contract.

24 Q Did you work on anything that was built?

25 A No, nothing was built.

1 Q So you've never worked on a project that was
2 constructed?

3 A No, sir.

4 Q Okay. The types of projects that you worked on,
5 they were research of some kind, is that correct?

6 A Development. Nothing unknown in what we were
7 doing. It wasn't research. It's all development.

8 Q Precisely what was it you were developing?

9 A Developing the techniques and the requirements
10 for, in that particular project, automation of the highways.
11 They were talking about -- the project was high speed high-
12 ways. My work involved lower speed highways. I published
13 much material in that vein.

14 Q And what did you do specifically on that project?
15 What was your function?

16 A This was a rather large job. Specification of
17 equipment, specification of how it was going to relate, how
18 the -- the human factor interrelation between the equipment
19 and the people, the expected increase in traffic flow that
20 one could obtain with this equipment, first under complete
21 automation conditions and then backing off on gradual
22 implementation of, say, infrared radar and how the traffic
23 flow increases from the 1800 that is normally assumed up
24 to 3600, which is what the system is designed for.

25 Q Which system are you talking about? The system

1 this project was working on?

2 A No. I specified how the present highways can
3 be automated. I-5 can be automated. You may not know that,
4 but it can be. And it is relatively easy to do.

5 Q And what was your -- okay, assuming it can be
6 automated, what was your function in determining that
7 automation?

8 A The equipment and how that equipment would be
9 implemented and what results it would have, including the
10 safety aspects.

11 Q Other than the work on that particular system,
12 what other transportation systems have you worked on?

13 A Well, I've done a large amount of highway
14 design analyses. That is a result of my present private
15 practice, which is about -- about half of which is composed
16 of accident analyses, many of those being highway accidents.
17 I've given lectures to traffic engineers on the derivation,
18 the basis for some of the cookbook formulas that are in the
19 California Highway Department planning manuals, for example.
20 In my book, I specify certain deficiencies in that planning
21 manual. There aren't very many. That is a very good work.
22 So I've done a certain amount of highway work.

23 The traffic flow parts, that goes back to the
24 TRW and the high speed highway work. That is background for
25 it and acquisition of the basic knowledge that is involved.

1 Q What is your present practice with respect to
2 transportation?

3 A Analysis of accidents, primarily.

4 Q What kind of accidents? Automobile accidents?

5 A Well, yes. Automobiles, motorcycles, trucks.
6 Highway accidents.

7 Q For what purpose?

8 A Personal injury cases. My clients are attorneys.

9 Q What portion of your work is involved in -- this
10 is investigation for automobile accidents?

11 A Yes, sir.

12 Q What portion of your work is involved in that?

13 A What portion? In terms of highway?

14 Q What percentage of your work, how much of it --

15 A About half my practice is accident work and, of
16 that, about half are automobile accidents and then, of those,
17 maybe half again have to do with something having to do with
18 the highways.

19 Q Have you had occasion to evaluate highway
20 capacities?

21 A Yes, sir.

22 Q Did you do so with respect to Highway 5?

23 A Yes, sir.

24 Q In the area of San Clemente?

25 A I guess I don't understand the question I've been

1 answering yes to some things. I guess I didn't know what you
2 had in mind.

3 Q Well, have you done any particular studies with
4 respect to the highway capacity of highway I-5 in the area
5 of San Clemente?

6 A I assumed it was similar to all other highways.

7 Q You assumed that?

8 A Yes.

9 Q You did not do any particular study of the highways
10 in that area?

11 A No. I didn't investigate Highway 5 as compared
12 with Highway 10 or something else. I took Wilbur Smith's
13 material on that. I took a lot of material from Wilbur
14 Smith which I am beginning to question at the moment;
15 nevertheless, that's what we did.

16 Q So your level of investigation, for instance,
17 at least on Highway 5, then is whatever it is you found in
18 the Wilbur Smith study.

19 A Almost entirely. Not quite. The list of on
20 ramps Mr. Polido supplied, for example, and I have a list
21 of them here.

22 Q When did you do this study?

23 A Over the last month, month and a half.

24 Q Will you describe for us precisely what it was
25 you did? Take us through the steps of your analysis.

1 A It's pretty hard to remember everything. It
2 begins first with a reading and an analysis of the Wilbur
3 Smith study and a determination of its adequacies and in-
4 adequacies, specification of particularly the most glaring
5 errors -- or omissions, shall we say, rather than errors.
6 I wasn't able to really determine the accuracy of their
7 answer. I sort of accepted that on good faith. I'm not
8 so sure that that was proper; nevertheless, I had accepted
9 the six and a quarter hours as being the optimum time possible
10 to evacuate, in spite of the glowing errors, like the phone
11 call problem that they haven't addressed and the obvious
12 decrease in traffic flow that one is going to have from
13 this mass of people attempting to evacuate. But given
14 optimum conditions and giving the one evacuation drill every
15 six months, the development of equipment for the police offi-
16 cers on the on ramps, the training of police officers, all
17 of the things that are required, then theoretically at the
18 end of the line one might say well, one might be able to get
19 those people out in six hours, if necessary.

20 ///

21

22

23

24

25

T11 k1 1 Q Have you reviewed the testimony of either of
2 Mr. Roper of Caltrans or of Captain Killingsworth, I believe
3 it was -- Chief Killingsworth of the Highway Patrol?

4 A No, I haven't. Is that Mr. Dave Roper?

5 Q Yes.

6 A Oh, I know him, yes.

7 Q You haven't reviewed their testimony in any event?

8 A No, I haven't.

9 Q Well, they would -- my understanding of their
10 testimony is that the kinds of things that you are talking
11 about are pretty much ordinary occurrences for their organiza-
12 tions, is that -- would you --

13 A I don't know about -- when Mr. Roper was in charge
14 of the commuter computer, he had no understanding whatsoever
15 of the human factors involved with people carpooling. I can
16 say that with assurance. We had much contact at that time.
17 So, I don't know what he is doing now, and what he has testi-
18 fied here in these hearings, but I certainly wouldn't accept
19 anything he would testify to on face value, let me tell you.

20 Q So you did not do any particular -- you did not
21 do a site specific study of the area to be evacuated around
22 San Onofre?

23 A Now, as I said, I have relied on Wilbur Smith
24 Study for that acquisition, primarily, and I gave them credit,
25 which I am questioning whether I should have, that what they

k2

1 determined was an optimum -- an absolute optimum evacuation
2 time. That is what I did, and I have relied on them for
3 their compilation of basic data. I have to rely on somebody.
4 I can't do everything myself, as you have indicated before
5 you thought I should.

6 Q What about the calculations of conditions other
7 than the ordinary -- the peak periods, the adverse weather --
8 did you do any particular investigation of how conditions
9 would change under those circumstances?

10 A Yes, we did -- as I say -- an overall systems
11 engineering analysis, and there are certain gross effects
12 that one should be considering, in my view, in our view, and
13 there are certain second order effects which might look as
14 though one is being complete, and so forth, but they are
15 completely irrelevant. A good part of the second order
16 effects that were analyzed in that Wilbur Smith Study are of
17 that nature. I think that one can -- well, let me just say
18 what we did. We took these adverse weather conditions and
19 coupled that with the possibility of accidents and said that
20 they kind of go together. Given a rather severe inclement
21 weather, one has slippery conditions, one has accidents under
22 slippery conditions, and particularly when people are stressed.
23 I can't emphasize enough the importance of the human factor
24 aspects that were completely neglected in the Wilbur Smith
25 Study.

k3

1 Q How did you quantify these various factors, for
2 instance adverse weather, what was your assumption, or what
3 kind of a factor did you use in coming to your evaluations?

4 A Well, we didn't put in specific numbers, but if
5 you want some, you know --

6 Q I don't want any now. I want to know what you
7 did then.

8 A No, what I am saying is that we considered
9 sufficient amount of rain to contribute to an accident in much
10 the same way that the psychological stress will -- of the
11 emergency will also contribute to an accident. These are
12 possibilities. I am not saying they are necessarily going
13 to happen, but as a systems engineer attempting to do an
14 honest study of the real live problem that would be presented
15 in the event of a serious accident, one can expect certain
16 kinds of behavior, and that behavior and the stress on those
17 people creating accidents is something that should be anti-
18 cipated and should be included in the study and wasn't.

19 Q So you didn't quantify peak periods and you did
20 not quantify adverse weather, is that correct?

21 A Not in the -- I quantified the weather and the
22 conditions to the extent that two highway lanes would be
23 shut down. Is that the kind of quantification you have got
24 in mind, or are you looking at millimeters per hour of rain-
25 fall? I don't understand the question.

k4

1 Q Well, you appeared to take exception to a 15
2 percent reduction in traffic factor in the Wilbur Smith Study
3 on account of adverse weather conditions. What factor would
4 you apply for adverse weather conditions?

5 A 77.8 percent.

6 Q And what is the basis for 77.8 percent?

7 A It would be the shutting down of two lanes due
8 to accidents that -- severe enough accident that will shut
9 down two lanes.

10 Q And what is the basis for assuming an accident
11 shutting down two lanes?

12 A That is a reasonable engineering judgment on my
13 part of what most -- of what might likely occur under the
14 stress of the situation and what I believe should be con-
15 sidered in the design of the evacuation system in order to
16 do a -- what is called a good engineering job -- with good
17 engineering principles.

18 Q So you applied a might likely occur standard to
19 your evaluation. On what basis do you have this -- what is
20 the probability of this accident occurring under these situa-
21 tions? Do you have any way of quantifying these events?

22 A Qualitatively yes, quantitatively, no. Quali-
23 tatively what happens is the normal human factor behavior
24 that we see on crowded freeway conditions quite regularly
25 in which the traffic is stop and go and -- this is one

k5

1 accident scenario in which traffic is stop and go. One car
2 stops, the one behind is able to stop with some relatively
3 large space between its vehicle and the next. Because of the
4 human factor dynamic response to the situation the vehicle
5 behind him can't stop as quickly. He only begins to stop
6 when he sees the car in front of him stopping. It is the
7 normal accordion pile up. Eventually you get to the point
8 where the last car, the fourth or fifth car can't stop at
9 all and piles in that we have a rear-end collision.

10 Now, given a rear-end collision which is highly
11 likely in this kind of a situation, then what happens as
12 people come onto the -- and are leaving the area and they
13 are coming onto the stopped traffic, the cars veer out, and
14 again, just the same conditions prevail from a human factor
15 standpoint as prevailed for the first case that the accident
16 occurred. Cars veer off. The first one veers off very
17 easily. The second one comes a little closer to the one in
18 front. Closer and closer and pretty soon a car actually hits
19 the last car of this first accident. So now we have this
20 second accident; the second car trying to veer off winds up
21 in the lane beside, or a lane over, and we have got two lanes
22 blocked.

23 Given two lanes blocked, which is a reasonable
24 scenario that one should consider in any kind of a systems
25 analysis, then one has to calculate the flow at that point.

k6

1 Q Do you have any --

2 A A similar kind of --

3 Q Go ahead.

4 A -- accident -- another scenario that gives the
5 same result is a jackknife trailer. There are a lot of
6 diesel trucks going through that area, and given one, say
7 earlier in the accident, a jackknife, that will tie up two
8 lanes, I believe. Now, there may very well be a number of
9 other scenarios that produce the same result, but I have
10 given you two, and that was sufficient for us to proceed
11 with our study.

12 Q And these are what you would call reasonable
13 possibilities, is that right?

14 A That is correct.

15 Q And again, did you have any quantification for
16 these reasonable possibilities?

17 A No, it is qualitatively determined. Engineering
18 judgment that it is a highly likely occurrence. And it can-
19 not be quantified, I might add. We can't very well have an
20 evacuation drill and then go out and find out how many rear
21 end collisions we are going to have, in order to then do the
22 study, you see. You can't -- you see -- one of the essential
23 ingredients involved behind those kinds of -- is the psycho-
24 logical stress on the people that are evacuating during an
25 emergency. This creates behavior of people which cannot be

k7

1 measured except under the actual conditions. So the quanti-
2 tative numbers you are asking cannot be determined.

3 Q Well, for instance now, if I look at Mr. Brothers'
4 testimony, he refers to a study published by the highway
5 research board in 1970 on the "Environmental Influence of
6 Rain on Freeway Capacity," which concluded that capacity of
7 freeways during rain can be expected to be between 81 and 86
8 percent of dry weather capacity. Apparently they could
9 quantify some of these things. Are you saying that --

10 A Oh, no -- yes --

11 Q -- nobody can quantify these kinds of things?

12 A Oh, of course they can, and they -- in that
13 study, which you don't have, they specified so much rain.
14 You know, light rain is what they are talking about, I am
15 sure, because under heavy rain the highway capacity is re-
16 duced much more than that.

17 Q What is it reduced to?

18 A I don't know. Those studies have been done.
19 There are studies under cloudburst conditions, what happens
20 to the freeway flow. It goes down to maybe 10 percent of
21 what it is under normal conditions.

22 Q In any event --

23 A And given light rain, there is very little effect.
24 You know, the traffic doesn't slow down hardly at all under
25 light rain conditions. So, one has to quantify not only the

k8

1 reduction in traffic flow, but also the amount of rain and
2 now we are only talking about normal conditions, you see.
3 None of those studies have been done under emergency condi-
4 tions. And that is a factor which cannot be neglected.

5 Q In any event, some people can quantify?

6 A They can come up with numbers for anything they
7 want. You can't come up with a half hour evacuation time if
8 you want, which would be satisfactory, and give near complete
9 protection to the people. It may not be right, but you can
10 say anything you want.

11 Q Well, are you inferring that the Wilbur Smith
12 Study is not an honest engineering attempt at the evacuation
13 times that would be necessary in the question postulated?

14 A Well, I can say definitely it is only a partial
15 study. It is totally inadequate. It is only, as I said
16 before, about 35 percent of the -- approximately -- of the
17 effort that is required by the subject matter, and whether
18 it is an honest study or not, I don't know. It may not be.

19 Q Do you have any basis for that?

20 A It is not possible to separate dishonesty from
21 incompetence, and when one does not include all of the --
22 I think Wilbur Smith as a company has sufficient background
23 in traffic matters and evacuation plans to be expected to
24 take into account all of the pertinent factors which they
25 didn't do, and I think that as a company they should have

k9

1 known better.

2 Q Than what?

3 A Than to have left out the factors that I men-
4 tioned before, the fact that the traffic flow is going to
5 reduce considerably as the cars que up, that they need --
6 they have to maintain a higher speed on the freeway than
7 would naturally occur, and therefore they need training
8 program and controlled on ramps that are positively controlled.
9 They need -- they should have caught that phone call error
10 that is in there. The fact that they have got a number of
11 people -- I think it is 4,000 and something that have to
12 phone in in order to get transportation. Well, they have
13 eight telephone lines, two and a half minutes per call --
14 makes something like 24 or 25 hours for those people to make
15 their calls. That is something that has to be taken care of
16 in some manner.

17 Then -- well, let me --

18 JUDGE KELLEY: I am not clear on what you are
19 referring to. Can you tie this to a page?

20 MS. GALLAGHER: I believe he is tying it to the
21 people without transportation who are required to phone --

22 WITNESS PLOTKIN: Yes, I am talking about number --
23 Exhibit Number 7 and list number two -- A2 is what I am re-
24 ferring to, in which potentially seven percent of the people,
25 according to their study -- now, again, I can't address

k10

1 myself to the validity of their numbers. I am not -- I
2 haven't been privileged as to how they got them. I would
3 like to be. The other numbers I would like to know in that
4 study. At any rate, taking a population -- you know, the
5 number comes out where 4,000 calls have to be made, and if
6 one figures two and a half minutes per phone call, which is
7 not unreasonable, and there are eight telephone lines, then
8 it takes 22.75 hours to make those calls. That can probably
9 be handled in some other way. I am just saying that is an
10 obvious error in the study, which was not caught by any of
11 the reviewers.

12 BY MR. PIGOTT:

13 Q Well, the seven percent was the number of house-
14 holds within the area that did not have access to an auto-
15 mobile, is that not correct?

16 A I don't remember.

17 Q Well, do you remember whether the seven percent
18 applies to total individuals or total households?

19 A I don't remember at the moment. I copied down
20 the numbers and I have given you the numbers. If they are
21 wrong we can go back over the numbers.

22 Q Well, what is the --

23 A If it is a different number, we can deal with
24 that different number. I am just saying that -- pointing
25 out that -- it wasn't -- I am not in the position to really

k11

1 review their study critically because I don't have access
2 to their computer program, their calculation, anything. So
3 that I can't really testify to the validity of their six
4 hours even.

5 Q Well, you seem to have enough information to
6 allege that they are dishonest in their work.

7 A I am saying there are things -- I didn't say they
8 are dishonest. They might just be incompetent. I am saying
9 they have enough background to have included all of the --
10 all of the kinds of things that we included in our study.
11 There isn't anything we did that is secret and that they
12 couldn't have done.

13 Q Well, we haven't seen it yet, so we really don't
14 know. This seven percent, was it significant enough for you
15 to determine how it was used in the study?

16 A I have a list of phone calls that are required --

17 Q What do you --

18 A -- based on that. Out of that study, seven per-
19 cent -- it is listed, as I say, in number seven, list two,
20 it is A2. If I misinterpreted their study, then all right.
21 So be it. We will change the numbers according to the way
22 it should be interpreted. You can correct me.

23 Q Should not that figure be reduced to a household
24 figure, rather than an individual figure?

25 A Perhaps. I am not so sure that those people

kl2

1 without cars are not living by themselves, however. And I
2 don't have the study to refer to as to exactly -- and I don't
3 remember. The sentence -- and the material contains that
4 number.

5 MS. GALLAGHER: Perhaps Mr. Pigott, you could
6 refer him to the page in the study.

7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

1 BY MR. PIGOTT:

2 Q That would be on page 22 of the --

3 A Okay.

4 Q -- Exhibit 132, which is the revised revision 2
5 of the analysis that was submitted into evidence.

6 A All right, well, just very roughly, taking the
7 44, 50 persons they say need -- and they are saying that
8 there is 2.34 persons per household, approximately 2,000
9 phone calls then are required, so reducing my number by half,
10 we come out with like 11, 12 hours are required to make the
11 phone calls.

12 That doesn't include the time to pick them up and
13 evacuate the area.

14 Q Okay, I am reading on, then, the next line, that
15 this estimate also includes, as you mentioned, the people who
16 are residents of nursing homes, which are also addressed as
17 special institutions and specially taken care of, is that not
18 correct?

19 A Yes.

20 Q Do you have any knowledge as to the number of
21 people who may be in those kinds of institutions in the area?

22 A No, sir.

23 Q How about -- it also includes the school age
24 children who would specially taken care of. Did you consider
25 that in your criticism?

2
1 MS. GALLAGHER: Excuse me. I think there is some
2 misunderstanding, Mr. Pigott. That figure is numbers of
3 households without transportation. It has nothing to do with
4 schoolchildren. There is, in addition, another factor that
5 tends to expand the numbers, which is that 34 percent of the
6 households only have one car, and many of those people --
7 cars may be expected to be out of the area at the time the
8 accident happens, so --

9 MR. PIGOTT: I understand your desire to testify.
10 I do on occasion myself. But I think your witness has
11 answered that that 4500 would be decreased by a factor of --

12 MS. GALLAGHER: Well, I object. I think you are
13 confusing him by bringing in schoolchildren and nursing home
14 populations.

15 MR. PIGOTT: We are looking at page 22 of the
16 report, where it discusses how these figures were used.

17 MR. MC CLUNG: Does it say schoolchildren there?

18 MR. PIGOTT: Yes.

19 WITNESS PLOTKIN: It says special institutions
20 which are included elsewhere include many school age children.

21 BY MR. PIGOTT:

22 Q So we have reduced it for households. We have
23 reduced it for children in school, and we have reduced it for
24 the aged in institutions, is that correct?

25 A That is not clear at all. This -- as I say, you

3
1 know, it is not explained adequately. It is not clear exactly
2 how many phone calls have to be made, and that part, as I say,
3 is a -- something that one might -- one might revise, once one
4 realizes the problem, and it wasn't realized. It is minor
5 compared to the other criticism I have.

6 Q Certainly not the 4,363 calls that you cite in
7 your list number 2, is it?

8 A It might well be, by the time we got done
9 finding -- figuring out what they really meant here, and what
10 those numbers really refer to.

11 Q Did you attempt to investigate whether or not
12 prearranged transportation had been arranged for many of
13 these people, where it would be anticipated they would have
14 trouble getting to transportation?

15 A I don't remember.

16 Q You don't remember whether you investigated that?

17 A I didn't -- there was mention made of that, as I
18 recall. I can't testify to every sentence and every sentence
19 and every number that is in this study.

20 Q I am only asking you about the ones that you made --
21 that you took exception to.

22 A I took exception to the fact that -- that it
23 appeared very much as though a large number of phone calls are
24 required, and they only have eight telephone lines to make
25 those calls, and there has been no provision for allowing for

1 that, is the thing that occurred to me, and that is all I am
2 commenting on.

3 Q Looking at your next comment, B on page 14, are you
4 there referring to what would be called confirmation time, in
5 the business of these kinds of studies?

6 A Confirmation time?

7 Q I just gathered the thrust of your complaint that
8 they haven't allowed time to confirm that the evacuation has
9 taken place, is that essentially --

10 A No, I am commenting that there is additional --
11 after the phone call is made, it takes additional time to go
12 pick them up then. That is a lot different than people in
13 the same household getting their things together and then
14 piling in the automobile and leaving, that takes a certain
15 amount of time.

16 It takes another amount of time for the person to
17 have to make a phone call to get transportation, then pack
18 their things together, then the vehicle arrives and picks
19 them up, but that same vehicle can be expected to carry many
20 people, not just the one, and then that vehicle has to go to
21 another household, pick up another person at another household,
22 et cetera, until maybe a bus of 30 or 40 people is filled.

23 That takes a lot more time than just simply one
24 car and one household leaving with the family. These kinds of
25 matters, you know, are -- have to be expanded upon.

5
1 Q Did you consider the -- did you consider the
2 arrangements and the information that has gone out predesigna-
3 ting the pickup areas for transportation of this type?

4 Are you aware of it?

5 A I am aware that mention was made, but I saw no
6 detailed plans of that, and no detailed technique for going
7 about it, no organizational procedure for handling transients,
8 people moving in and out of the area.

9 Q So, you -- well, then you haven't --

10 A So forth.

11 Q Have you --

12 A There are some problems, is all I am saying.

13 Q Have you reviewed the information pamphlet that
14 has been circulated to the people in the San Clemente-Dana
15 Point-Capistrano area on this subject?

16 A No, I have not seen it.

17 MS. GALLAGHER: I might mention that when Dr.
18 Plotkin wrote his testimony, that pamphlet did not exist.
19 That was brought to the hearing.

20 MR. PIGOTT: Well, I think the record will
21 reflect --

22 WITNESS PLOTKIN: I might expand a little bit,
23 back here on page 24, we notice that 34 percent of the
24 households have access to only one vehicle, et cetera, and
25 that there is 3100 persons who may require transportation

1 assistance. That means that is another group of people to be
2 added to those known in the first place that require phone
3 lines to get through, and et cetera, so there is a -- all I am
4 trying to point out, without being as quantitative as Mr.
5 Pigott would like me to be, that there is a telephone problem
6 here.

7 BY MR. PIGOTT:

8 Q Well, I am taking a look at what is on your list
9 number 2, in item B. Is that still referring to what you call
10 the telephone problem?

11 A No, that is another problem. That has to do with
12 this mandatory evacuation and again, a minor point, are
13 authorities committed to evacuating everybody, or are they not?
14 Supposing a person chooses not to evacuate. One would have a --
15 are we going to have a law that says they have to evacuate?
16 Can a person choose to remain in the radioactive environment
17 against their -- or against the law, but to their will? We
18 have similar laws with regard to drugs and so forth. This is
19 a very fundamental -- you know, perhaps a civil rights question
20 as to what we are going to do, and we also have to allow,
21 which apparently was, as I recall, was done in the study, to
22 make a house to house investigation to find out whether
23 people are actually alerted.

24 It is always possible that sirens go off, and
25 someone is sleeping, and is a very heavy sleeper, or uses

7
1 earplugs while they sleep, something of the sort, and isn't
2 awakened, and doesn't evacuate. The authorities have a
3 responsibility to go door to door and check that out. Well
4 that takes a certain amount of time. It also takes --
5 involves a certain number of people. Now --

6 Q Is it your understanding of NUREG 0654 that this
7 is a study to be added -- or this is a factor to be added to
8 the evacuation time, if you know?

9 A I don't know. It should be, though.

10 Q But you don't know.

11 You mentioned that you have applied some kind of
12 a systems approach. Is that a particular model?

13 A No, it is a particular type of approach, which I
14 gather you want me to explain.

15 Q No, I would like first of all to know whether or
16 not it is documented. Is it a standard approach? Is it
17 something that one could find in some kind of a transportation
18 reference book?

19 A I don't know. It is something I have been using
20 for years, and have explained -- you will find a very good
21 explanation of it with the California Department of Corrections
22 in their automatic security system for new prisons that I
23 wrote, in which systems engineering approach versus the
24 operations analysis approach is spelled out in some detail.

25 Now, that is something I have done, which isn't

8
1 readily accessible, but whether or not that occurs in any
2 textbooks or not, I don't know.

3 Q No, I am -- I want to know the approach that you
4 have applied specifically to this evacuation problem. Is
5 that some kind of a documented approach, program, system, or
6 is this just some way that you approach a problem?

7 A It has to do with how the problem is approached
8 and how one goes about it. One way provides a better system
9 than the other way.

10 Q Is this something that is unique to you in the
11 transportation area, or --

12 A No, I am sure it isn't. It is general.

13 Q Well, where would it -- could we find it
14 documented somewhere?

15 A I just referenced a document that I know of.

16 Q That has nothing to do with transportation,
17 though, does it?

18 A It has to do with systems. This is a
19 transportation system.

20 Q As applied --

21 A Systems are approached in the same way, regardless
22 of the kind of system, and one can analyze them on that basis,
23 and I have done that many many times over the years in many
24 many different, seemingly different contexts.

25 Q How did you apply it in this instance? Can you

1 describe it?

2 A Well, it is a matter of simply the -- obtaining a
3 complete picture, not just one type of -- not just one
4 scenario, Wilbur Smith took one scenario, an optimum one at
5 that, and then attempted to analyze it, and more or less
6 adequately.

7 What we did is simply first of all, a systems
8 engineering approach involves a functional analysis. One
9 puts down -- one forgets what one has to do, but simply
10 addresses the -- what has to be done, and that -- pardon the
11 expression, involves health effects, and what one has to do.

12 What one has to do is evacuate in about a half hour
13 and I think that from an engineering standpoint, that is
14 impossible, so --

15 MR. PIGOTT: I would move to strike the last
16 portion of the answer. I don't believe that it is relevant
17 to the issue that this witness is testifying on, concerning
18 the necessity to evacuate within a half an hour.

19 JUDGE KELLEY: Any comment?

20 MS. GALLAGHER: I object, because I think that it
21 is -- Mr. -- Dr. Plotkin's opinion as to the relevance of the
22 time, and we are not going to hear the case on health effects,
23 perhaps, but he still has a right to his opinion on its
24 relevance as to the time estimate.

25 JUDGE KELLEY: It is marginal. I will overrule

1 the objection.

2 BY MR. PIGOTT:

3 Q Would you proceed? So far you have described what?

4 A Well, how one goes about the problem, so the
5 object is of course minimizing the evacuation time, and it is
6 essential. Then the next thing is to consider all the
7 different aspects.

8 I have alluded to the general approach throughout.
9 There is no one answer to evacuation time, and there is not
10 going to be. There is going to be a range of answers, depend-
11 ing upon certain conditions, that one might specify the range
12 of conditions that might prevail, and then with each specific
13 set of conditions, determine the evacuation time most likely,
14 but in -- that is the kind of result that is going to occur
15 from this kind of a problem if it is done right, and the
16 systems engineering approach, if you will, addresses it in
17 that manner, so we attempted to take this overall look.

18 We want the best time. We want the worst time, and
19 what most likely is in the middle. Then there is going to be
20 a range of releases of accidents, that are going to have
21 certain effects. There is going to be a range of factors
22 affecting the people in the area, which in large measure
23 will be dependent upon the actions taken previously by the
24 local governments, and the local authorities. How much
25 training are these people going to have in evacuation? Are we

1 going to have classes once a month, once every two months to
2 instruct people? Are we going to keep track of the transients,
3 people moving in and out of the area, to make sure that they
4 are taught or given instruction as to how they are to behave
5 in an emergency?

6 How about the police officers and these onramps
7 we have talked about? The control of traffic, that is also
8 essential. People have to be comfortable that they will be
9 able to evacuate the area in a small length of time, given
10 certain very controlled actions on their part. I might make
11 reference to the recent law in California that requires fire
12 drills once a year in high rise buildings, and for the same
13 reason. If people are left to their own devices to evacuate
14 a high rise building in case of a fire, times are short.

15 Q How did you come up with 28 hours as the worst
16 case?

17 A Yes. 28 hours, very basically takes first of all
18 the crowded traffic conditions and accidents, which I gave
19 two scenarios before, reduced two lanes.

20 Stop and go traffic, this -- these cars are trying
21 to get out and they are backed up solid, and also assume no
22 control of the onramps, which is not so unreasonable, and
23 therefore we have stop and go traffic just like going into
24 downtown L.A. at eight o'clock in the morning. There will be
25 zero over the crowded sections. There will be zero to 15 mile

1 per hour travel, averaging seven and a half miles an hour. We
2 took an average speed of seven and a half miles an hour, went
3 to the standard traffic flow diagrams, picked off the
4 vehicles per lane hour one can expect for seven and half miles
5 an hour, it turns out to be 800.

6 That is 800 vehicles per lane hour, there is going
7 to be two lanes open, that is 1600 cars per hour. The Wilbur
8 Smith study used 7200 cars per lane hour. Or excuse me, 1800
9 cars per lane hour, four lanes, 7200 cars per hour to arrive
10 at a six and a quarter hour evacuation time. What we did is
11 scale -- assuming that they did their work properly, which may
12 be an assumption -- we then scaled that time by this reduced
13 traffic flow, and one arrives at a 28.1 hours.

14 Q How about one week? How did you come to that?

15 A Okay, that was -- that is the worst worst case.
16 That is a case in which there is no roadways out. People are
17 confined, and given roadways completely destroyed, then how
18 long is it going to take for people to manage to get out a
19 certain amount of repair to the roads sufficient to get the
20 people out, et cetera, and one week was just a reason -- seemed
21 as though that would be a reasonable endpoint. We could just
22 as easily have picked five days instead of seven, or eight or
23 nine days, and it just would have extended the curves out.

24 You find that -- that the -- well, I am not
25 supposed to talk about the effect of these things, so I will --

1 Q Well, in coming to this evacuation planning, you --
2 these scenarios, you -- you did have an area to be evacuated,
3 did you not, the 22-degree sector, twenty-two and a half
4 degree sector?

5 A Well, that -- you are getting into the material
6 that was ruled out, I thought.

7 Q No, I am getting into the geographic area, a
8 geographic slice of pie, as it were, from the reactor to the
9 ten-mile zone, on a 22-degree arc, is that not the area that
10 you attempted to evacuate?

11 A That was our plume, which I thought we weren't
12 supposed to discuss?

13 JUDGE KELLEY: No, the question is --

14 WITNESS PLOTKIN: I am happy to discuss it. I
15 am delighted, but nevertheless --

16 JUDGE KELLEY: I don't believe he is talking
17 about plumes at all. He is talking about an area of the EPZ
18 in which a lot of people live, and you can answer it, I
19 believe.

20 WITNESS PLOTKIN: Oh, well, that was our plume --
21 all right. We took a plume 22 and a half degrees in a
22 northwesterly direction, and that incorporates the entire
23 population of -- we used 89,350, which again we got from --

24 BY MR. PIGOTT:

25 Q That includes Camp Pendleton.

1 A No, it doesn't.

2 Q Where did you get that figure?

3 A Your friend Wilbur Smith's. Page four, and -- well,
4 mine is somewhere. All right, given page four, and we look
5 it and added up the resident population of San Clemente, San
6 Juan Capistrano, Capistrano Beach and Dana Point, added to
7 that the transient population of San Clemente, San Juan
8 Capistrano, Capistrano Beach, Dana Point, Doheny State Beach
9 and San Clemente Beach.

10 If you add up all those little numbers, you come
11 up with 89,350 as being the population that has to be
12 evacuated to the north.

13 Q How wide is that twenty-two and a half degree
14 sector at its widest point?

15 MR. MC CLUNG: Are you asking for a mileage, or --
16 what are you --

17 BY MR. PIGOTT:

18 Q Yes, some kind of geographic marker, yards, meters,
19 miles. I think it is roughly two miles.

20 MS. GALLAGHER: Excuse me, what is it relevant to,
21 this particular question?

22 JUDGE KELLEY: Is that an objection?

23 MS. GALLAGHER: I was just trying to determine
24 what direction the question is taking. You know, if he --

25 JUDGE KELLEY: Are you asking me to do something?

1 MS. GALLAGHER: I was really asking Mr. Pigott.

2 JUDGE KELLEY: Fine. Mr. Pigott, what is going on?

3 MR. PIGOTT: Approximately 3.9?

4 WITNESS PLOTKIN: Yes.

5 JUDGE KELLEY: Three point?

6 WITNESS PLOTKIN: Nine miles.

7 JUDGE KELLEY: Okay.

8 BY MR. PIGOTT:

9 Q Did your systems approach to this consider that
10 maybe you didn't use your automobile, you just walked out?

11 A Not at all. That is inadequate. It is not a
12 proper way to evacuate. One has to get further away than that.

13 Q So you ruled out as an evacuation possibility
14 simply walking out from under whatever plume may be there?

15 A That is correct. If it is important enough to
16 evacuate, it is important enough that one has to use some kind
17 of automobile or bus to get out.

18 Q What did you postulate as the earthquake scenario
19 for your study?

20 A Earthquake scenario was a serious accident
21 coupled with a destroyed freeway.

22 Q Well, I am not interested in the accident. I just
23 want to find out what it is that -- if you did it this way,
24 what you postulated as being the earthquake that destroyed the
25 highway system, and whether or not you did any kind of a study

1 to determine what earthquake would cause what level of damage,
2 did you do that at all?

3 A Well, just what I mentioned before. You know, a
4 6.6 Richter scale earthquake is sufficient to destroy the
5 freeway, and that is --

6 Q And a six point --

7 A -- not an unlikely situation.

8 Q Where was the 6.6 earthquake occurring?

9 A That was going to occur near the plant.

10 Q You mean near the city, near where the destruction
11 takes place?

12 A Well, in the area. I don't -- I don't understand
13 what you are driving at. I would be happy to -- you know, I
14 am not trying to be evasive. I am trying to --

15 Q Well, doesn't it make a difference how close you
16 are to the earthquake as to how much damage is done?

17 A Oh, yes, of course. Well, we are not -- we are
18 not specifying exactly -- pinpointing the place the earthquake
19 is going to occur, and by how much, and so forth. We are
20 talking about a possible catastrophe, and that as an engineer
21 we would have to plan for.

22 Supposing we planned for one that is 4.2 miles
23 from the plant, and it turns out it happens to be 5.3 miles
24 from the plant, and does something different? You know, we
25 are not planning for that. You can't specify things in that

1 way anyway.

2 Q All I want to know is whether or not you tried to
3 do.

4 A Of course not. We postulated what the end -- what
5 the worst worst case might be as it relates to evacuation
6 plans.

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

tp13± 1

2 Q But you did not relate it to any particular
3 earthquake. You just said it was all destroyed by an
4 earthquake.

5 A I related it to the San Fernando earthquake to
6 see whether or not, you know, just to make sure what we were
7 doing was somewhat relevant and somewhat plausible. Since
8 we did have an earthquake of that magnitude here, you know,
9 in San Fernando Valley. It's not unlikely that one could
10 have an earthquake of that magnitude near San Onofre. And
11 if we did, then it might be that -- may be that the highway
12 would be destroyed. It also might be that a serious nuclear
13 accident would result as well. This is certainly a possibil-
14 ity one shouldn't do without.

15 Q Did you look at the San Fernando earthquake to
16 determine how close the damage was to the earthquake event
17 itself?

18 A Not really, but it was some distance away. The
19 highway that crumbled was some distance from I know the
20 Pacoima Dam, and the Pacoima Dam suffered accelerations
21 well in excess of anything anybody has ever recorded for
22 earthquakes. There were 1.2 - 1.3 G accelerations in that
23 dam.

24 Q You don't know how far this damage that you were
25 referring to, though, was from the fault that the earthquake
occurred on?

2 1 A Not precisely. But it is of the order of several
2 miles.

3 Q Several miles from Pacoima Dam?

4 A No. I think the section of freeway that -- I
5 think these high accelerations almost had to be near the
6 center of the earthquake. I didn't relate things in that
7 way. I'm just trying to -- I checked enough and have done
8 enough earthquake work to know that what we did was reasonable.

9 Q What earthquake work have you done?

10 A Calculated the effects of an earthquake on UCLA's
11 nuclear reactor and the crumbling of the building, what kind
12 of an earthquake is required to cause the UCLA's Boelter Hall,
13 the section above the reactor, to fail, and then what effect
14 that would have on the reactor itself and then, of course,
15 the surrounding community.

16 Q Anything other than that particular study?

17 A There may have been other work in the past.
18 That's all I remember at the moment.

19 Q What was it that was damaged in the San Fernando
20 earthquake that you make reference to?

21 A The freeway was destroyed at one section.

22 Q The flat freeway or was it an overpass or what?
23 Do you know?

24 A A little of both, as I recall. Well, that's
25 not the only thing, come to think of it. There's the

3 1 earthquake that just happened near Humboldt Bay in which the
2 freeway collapsed. That was a straight section. And that
3 was an earthquake way out in the ocean.

4 Q Well, I don't think we've answered the initial
5 question, and that is what portions of a freeway or overpasses
6 were damaged in the San Fernando earthquake, if you know.

7 A Support structure was damaged.

8 Q Support to what?

9 A Support to the freeway was fractured so that the
10 freeway came down and there was no longer any roadway for
11 vehicles to go over.

12 Q Okay. Was this in one location?

13 A One location, yes.

14 Q Any other locations where you know that the
15 freeway was shut down, apparently, by the earthquake?

16 A Are you talking about San Fernando?

17 Q Yes.

18 A None that I know of. But that doesn't mean there
19 weren't any. I just haven't investigated that earthquake in
20 that kind of detail for looking for that kind of information.

21 Q So to the best of your knowledge, there was one
22 bridge knocked down during the San Fernando earthquake of
23 6.6 magnitude?

24 A Yeah. There was one freeway section in northern
25 California that collapsed due to an earthquake of the -- I

4 1 forget the Richter number -- it was 7.2 or 3, I believe, that
2 was something like 20, 30, 50 miles out into the ocean.

3 JUDGE KELLEY: 7.2? Is this recent?

4 WITNESS PLOTKIN: Yeah. This was two or three
5 years ago, I believe. I don't remember. You know, all we
6 did in this study was attempted to determine something that
7 was reasonable for an endpoint to our evacuation study.
8 This whole thing is oriented not for earthquake analysis
9 but for evacuation study analysis.

10 BY MR. PIGOTT:

11 Q Did you make any real attempt to quantify the
12 length of time it would take to get out after your assumed
13 earthquake?

14 MS. GALLAGHER: Excuse me. What do you mean by
15 "real attempt"?

16 MR. PIGOTT: Well, he said it could have been
17 anything. It could have been seven days, five days. I want
18 to know if he tried to quantify it.

19 WITNESS PLOTKIN: No. It turned out that by the
20 time we got to that point it didn't make any difference.
21 People were all dead anyway, prematurely.

22 MR. PIGOTT: I wonder if we could take a break,
23 Mr. Chairman. The copies that were marked out as being struck
24 are available and we should perhaps review that to make sure
25 we are dealing with the correct body of testimony.

5

1 JUDGE KELLEY: I think that's a good idea.
2 Fifteen minutes, then. Back at about 25 of.

3 (A brief recess)

4 JUDGE KELLEY: We're back on the record. The
5 Staff, Mr. Hoefling has distributed to us a xerox copy of
6 a marked up copy of Mr. Plotkin's testimony. The markup
7 indicates the Staff's opinion of what of this testimony
8 should be stricken, pursuant to its objection and the
9 Board's sustaining of the objection. I think it is clear.
10 I appreciate your taking care of this. Then the next ques-
11 tion is what comment the parties have, if any, on Mr.
12 Hoefling's markup.

13 MR. PIGOTT: Applicants would concur with the
14 markup of Mr. Hoefling.

15 JUDGE KELLEY: Mrs. Gallagher, this brings down
16 to concrete form the motion. Comment on that?

17 MS. GALLAGHER: Yes. In looking at NUREG 0654
18 J, Protective Responses, I see everywhere in the evaluation
19 criteria reference to protective actions. When we are
20 talking about time estimates, on page 63 of 0654, it says
21 Time estimates for evacuation of various sectors and distances
22 based on a dynamic analysis time motion study under various
23 conditions for the plume exposure pathway emergency planning
24 zone, see Appendix 4 and, the next page, page 64, under
25 Evaluation Criteria, M, the basis for the choice of recommended

6 1 protective actions from the plume exposure pathway during
2 emergency conditions. This shall include expected local
3 protection afforded in residential units or other shelter
4 for direct and inhalation exposure, as well as evacuation
5 time estimates.

6 I read that as requiring in considering time
7 estimates a connection to be made to a choice of protective
8 actions. The deleted material that Staff has marked up on
9 Dr. Plotkin's testimony, at page 4, line 1 -- excuse me,
10 page 3, line 1, we have done that, essentially that. Looked
11 at the plume exposure EPZ under certain accident scenarios
12 and his conclusion was that under many possible accident
13 scenarios for which persons responsible for choosing the
14 appropriate protective measure might conclude that evacuation
15 is the protective measure of choice, evacuation would in
16 fact expose the evacuating populations to unacceptable levels
17 of radiation, causing injury and death.

18 I take that to be the base for the choice that
19 one makes. I would again ask the Board to consider the
20 appropriateness of our talking about health effects, if not
21 health effects, at least radiation effects. And you can
22 draw your own conclusions as to their health consequences.
23 I think they are perfectly relevant to the basis for choices
24 of protective actions and I don't think it is possible to
25 consider protective actions without considering the basis.

7 1 JUDGE KELLEY: Are there --

2 MS. GALLAGHER: And in the regs we reference --
3 we were very careful in trying to preserve this issue of
4 health and safety. I will say that we were aware that this
5 is a controversial area and we were very careful and under-
6 went many discussions about how this was to be done. We
7 did consider that it remain within our contention, both
8 by a reference to Section 5.47(a)(1), which says -- talks
9 about reasonable assurance that adequate -- whatever
10 "adequate" means -- protective measures can and will be
11 taken in the event of a radiological emergency, and also down
12 in (a)(10) -- (b)(10), which says a range of protective
13 actions have been developed for the plume exposure pathway
14 EPZ for emergency workers and the public. Guidelines for
15 the choice of protective actions during an emergency, consis-
16 tent with federal guidance, are developed and in place and
17 protective actions for the ingestion exposure pathway
18 appropriate to the locale have been developed.

19 We did retain that within our contention. We
20 retained (a)(1) and (b)(10) and that is contained in the
21 guidance in NUREG 0654.

22 JUDGE KELLEY: Mrs. Gallagher, I really did not
23 have in mind we would reargue the motion we decided a while
24 back. What I am really after here is your view of the
25 Staff's proposed implementation of that objection. Now I

8 1 think you make a point about the first section that is
2 marked for deletion. Actually, I think the stronger point
3 turns upon the preceding page, lines 27 and 28, in the
4 sense that although the statement points in more than one
5 direction it does seem to focus on time estimates, which is,
6 after all, what Mr. Plotkin has been talking about this
7 afternoon and he is certainly here to testify about that.

8 Passing that for the moment -- well, I really
9 don't think we should go back over that ground. We made a
10 ruling and the ruling is in the record. It is perfectly
11 obvious that there is a relationship between risks and
12 radiation and evacuation, but you can look at that from
13 different angles. You don't have to look at all of them at
14 once. We are reading that contention as not encompassing
15 the risk health effect aspect of the matter. Over your
16 objection. Understand that.

17 MS. GALLAGHER: I understand. May I have some
18 clarification then? Is it possible to refer to radiation
19 without referring to it as a health risk, as simply a given?
20 I mean, we may disagree about the effects of irradiation,
21 but I think if we are talking about time we are talking about
22 irradiation and I need some clarification about whether the
23 whole subject of irradiation is to be kept out of this
24 hearing.

25 JUDGE KELLEY: Well, you put the Board in a

9 1 difficult spot to sort of rule in advance on whatever may
2 come up. You are going to be talking about a lot of differ-
3 ent problems. I don't think we are in any position to sit
4 here this afternoon and answer that question in any very
5 helpful way. I don't think that we would say from this
6 posture that radiation is out. I don't know what kind of
7 case you plan to put on with regard to the subcontention
8 about adequacy of medical services. We had testimony here,
9 as you will recall, two weeks ago on that subject from a
10 health physicist who testified about various kinds of injuries
11 and the like in relation to that subject, adequacy of medical
12 service. That is an example. Maybe that will come up.
13 Maybe you want to address that. I don't know.

14 So I would not say that irradiation in any way,
15 shape, form or context is out of the hearing. No. But
16 we'll just have to take it as it comes up. What we have
17 said so far is that in Contention 1 in today's context we
18 do not believe that health effects are before us.

19 Now with that understanding of the Board's
20 position, do you have any further comment on the Staff's
21 proposed deletions, recognizing, of course, that you don't
22 agree with the proposals?

23 MS. GALLAGHER: It guts our testimony. I don't
24 know what else to say.

25 JUDGE KELLEY: Very well. The Board believes

10 1 that the material on page 2 at the bottom, the sentence
2 beginning with the words "Based on my analysis...", line
3 27, line 28, turning to page 3, through line 6, ending with
4 the words "unacceptable levels of radiation", should not be
5 deleted because it speaks more to the accuracy of the time
6 estimate and what deciding officials might do with them.
7 It does indeed contain the word "radiation" but we think
8 that on balance that this language is fairly within the
9 contention and should not be stricken.

10 We would strike line 7, the last four words,
11 "causing injury and death". Beyond that, the Board agrees
12 with the Staff's markup and is granting the motion to strike
13 the testimony which is marked for deletion.

14 MR. PIGOTT: Excuse me. If I might suggest, Mr.
15 Chairman, perhaps the Board could put its own markings on
16 that testimony; we could then get copies and have it inserted
17 into the record so everybody would know precisely what has
18 been deleted and what has not on the record.

19 JUDGE KELLEY: The only change that we are
20 making -- well, okay. We can do that. We'll just take a
21 copy and make that one change and then it will be bound
22 into the record. So that brings us back to the resumption
23 of your cross, correct?

24 MR. PIGOTT: Yes. I have just a few more ques-
25 tions.

11 1

BY MR. PIGOTT:

2 Q Dr. Plo+kin, with respect to the bridge that
3 was damaged during the San Fernando earthquake, do you know
4 whether or not that bridge overpass, whichever it was,
5 was actually in service at the time of the earthquake?

6 A I don't really know. But along that line, I
7 understand there were eight sections that were actually
8 destroyed.

9 Q Eight sections of the freeway?

10 A Yes. That's what I was told during the break
11 by someone.

12 Q Do you have any independent knowledge of that?

13 A No. As I say, that was irrelevant to our study.

14 Q And you don't know whether or not the bridge
15 under consideration was in fact under construction at the
16 time of the earthquake?

17 A No, I don't really know. As I say, it is
18 irrelevant. We took the point that it is possible to get a
19 reasonably severe earthquake that will cause freeways to
20 collapse. I know of two instances. Whether or not they are
21 fully satisfactory, I am not sure. But it is certainly a
22 reasonable conclusion in order to then pursue an evacuation
23 study.

24 Q Are you aware of a report by the United States
25 Environmental Protection Agency in June of 1974 entitled

12 1 "Evacuation Risks and Evaluation"?

2 A No, sir.

3 Q You wouldn't be aware, then, of their finding
4 that accidents occur at a lower rate during evacuations
5 than during normal times?

6 A I haven't seen that. It sounds kind of backwards.

7 Q In your evaluation of highway 5 and your pro-
8 jection of possibilities for closure of two lanes, did you
9 assume those two lanes to remain closed throughout the
10 period of the evacuation?

11 A Yes, sir. The reason for that has to do with
12 the fact that they might be cleared but then other accidents
13 would occur in the process. Also, there is, if memory serves,
14 a section of Wilbur Smith's study assumed towing vehicles,
15 emergency towing would be available. That's not something
16 one would normally anticipate. I'm not saying it couldn't
17 be made that way, but certainly in any careful study one
18 wants to include the fact that they wouldn't be and in this
19 anticipated section that we are talking about, there would
20 be no emergency vehicles available.

21 Q Did you take -- strike that. How did you use
22 the Pacific Coast Highway as a vehicle for evacuation?

23 A Pacific Coast Highway has two lanes available,
24 one of which could be expected to be not in use due to an
25 accident. That leaves one lane available and all the south-

1 bound traffic coming into the area would be rerouted at the
2 San Juan Capistrano interchange that comes down into Pacific
3 Coast Highway and up. That is a very smooth section right
4 there to take the southbound traffic and run it back up
5 north on Pacific Coast Highway, taking the Dana Point
6 residents with them as they go. The number of vehicles
7 involved are more or less the same as the ones going north
8 on Highway 5. So the one has pretty balanced flow under
9 those considerations.

10 Q Is that a diversion over and above the diversion
11 that the Caltrans and CHP would propose to locate at what
12 is called the Golden Triangle, where 605 and 5 come together
13 -- 405, I'm sorry, and 5 come together?

14 A Yeah. I think what we are talking about is a
15 delay between a half hour CHP number in the Wilbur Smith
16 study and what may be a more realistic number of an hour and
17 a half to two hours. We're talking about not only CHP people,
18 but also Caltrans people getting out with their equipment,
19 you know, arrows, lights, and so forth. They have also a
20 number of people that will be trying to come down and pick
21 up their families and they have to be allowed through. So
22 there is considerable flow, I would think, southbound,
23 which again, given two hours, say, of traffic flow and I
24 think -- yes, we used three-quarter traffic capacity; 1200
25 vehicles per lane hour for four lanes. Add those to the

1 number of vehicles one can expect from Dana Point and going
2 -- exiting through say one lane of Pacific Coast Highway
3 and we come up pretty much with the same time for evacuation
4 as one does for the main body evacuating over I-5. And
5 again, the same numbers for accident conditions as non-
6 accident.

7 Q You never reviewed the testimony of Chief
8 Killingsworth, did you?

9 A No, sir.

10 ///

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

T14 k1

- 1 Q You mentioned you have done a study at UCLA with
2 respect to effects of earthquake. Who did that study?
- 3 A I did.
- 4 Q What was the purpose of the study?
- 5 A It is going to be used eventually -- be refined
6 considerably between what it is now and the NRC hearings on
7 the relicensing of UCLA's nuclear reactor.
- 8 Q What is the point of the study?
- 9 A The point of the study is to show the reactor is
10 very vulnerable to earthquake damage.
- 11 Q And what are the findings of your study to date?
- 12 A They haven't been concluded, but in general it
13 shows that the radioactive material inside the reactor is
14 going to be released to the surrounding population.
- 15 Q Has anybody reviewed that study?
- 16 A Not yet.
- 17 Q Has it been published? It has not been published?
- 18 A No, sir.
- 19 Q Has it been released to anybody?
- 20 A No, sir.
- 21 Q Has anybody seen it other than you?
- 22 A Yes.
- 23 Q Who?
- 24 A A few people. Mr. Dan Hirsch, Mr. Tom Emnias.
- 25 Q Are these people in your L.A. Federation of

k2

1 Scientists?

2 A Yes, sir.

3 Q Other than that study, have you done any study
4 in the area of earthquake damages?

5 A Not that I can recall at the moment.

6 Q I believe you mentioned spontaneous evacuation
7 as a factor to be considered. How did you consider that in
8 coming to your conclusions?9 A I added that -- I took the number of people to
10 be evacuated -- this 89,350, of which -- some of which are
11 from Dana Point. But Dana Point is not going to be evacuated
12 on I-5, according to the plan that we thought was best.
13 People from Dana Point would be evacuated up Pacific Coast
14 Highway. But on the other hand there will be people that
15 will be voluntarily evacuating that will go out on I-5, and
16 we thought that a reasonable -- just reasonable engineering
17 judgment would be that those numbers would be about the same,
18 so that in our 28 hours and 14 hours, we considered a popula-
19 tion evacuation -- a number of people being evacuated as
20 being 9,350. Now, if that number is a little more or a little
21 less than -- that will change the time proportionately. It
22 is a linear relationship.23 Q I guess I wasn't clear. In one of these exhibits,
24 the one -- your exhibit number 5, page seven, which, if you
25 recall, was put into testimony for the limited purpose of

k3

1 showing what you relied on in making your study --

2 A Which one is this? Is this the geographical one?

3 Q It is the one from the geographical review.

4 A Okay.

5 Q Okay, do you have the section?

6 A Yes.

7 Q All right. The thrust of my previous question
8 was to find out how you had used that particular reference
9 in your study.

10 A Yes.

11 Q And how did you use it, if you did?

12 A Well, 39 percent of the population voluntarily
13 evacuated.

14 Q What does that have to do with the 28 hours in
15 one week and the other numbers that you came up with?

16 A Well, it just has to do with the fact that the
17 estimate we used as to the numbers of people that will be
18 evacuated on I-5 will be very nearly the 89,000, even though
19 we have taken some 10,000 out of that group and have them
20 evacuating on Pacific Coast Highway. You see, if you take --
21 which I hadn't done before -- on page seven, if you will
22 notice down on the table top of the page -- no, it is the
23 bottom, more than 15 miles percentage of -- well, it is
24 households, but they are talking about 13 percent evacuated
25 after 15 miles. If we take 13 percent of 89,350 we come out

k4

1 with 11,615, which is not much different than the 10,500 from
2 Dana Point, so the -- it is more confirmation to our original
3 judgment that the number of people voluntarily evacuating
4 north of the EPZ will be pretty much the same as the number
5 of residents in Dana Point.

6 Q Well, is it your believe that Dana Point is not
7 within the EPZ?

8 A No, Dana Point will not be evacuated on I-5.
9 Dana Point should be, in our judgment, evacuated on Pacific
10 Coast Highway, and all other areas evacuated on I-5.

11 Q Well, what is your understanding of the evacuation
12 plan that has been proposed? What happens -- where do the
13 people in Dana Point evacuate -- which routes do they use,
14 if you know?

15 A I don't understand.

16 Q Well, you are making -- all right. You have
17 reviewed Mr. Brothers' evacuation study.

18 A What is it -- Mr. Brothers'?

19 Q Well, Wilbur Smith.

20 A Yes.

21 Q You have evaluated that. Where did -- how do the
22 people in Dana Point evacuate that area under that plan, if
23 you know?

24 A I think they evacuate on Pacific Coast Highway,
25 the same as I was.

k5

1 Q Have you read Mr. Brothers' testimony in this
2 proceeding?

3 A I have seen sections of it. Ms. Gallagher pointed
4 out a couple of sections to me. I haven't really read it,
5 though. I can't really comment on his testimony in detail.

6 MR. PIGOTT: No further questions of this Witness.

7 JUDGE KELLEY: Mr. Hoefling?

8 FURTHER RECROSS EXAMINATION

9 BY MR. HOEFLING:

10 Q Just a question, Dr. Plotkin, with respect to
11 your consideration of human factors. As I understand your
12 testimony, and correct me if I don't characterize it correct-
13 ly, you believe that in an evacuation context, there would
14 be a tendency to have a higher rate of accidents on the high-
15 ways than in a normal context. Is that correct?

16 A That is correct.

17 Q Let me test that with a hypothetical. If you
18 were directed to evacuate your home and you bundled your
19 family and children into your car and apparently from your
20 testimony you attribute significance to using this vehicle
21 to evacuate the area, would you tend to be more careful or
22 less careful in your driving habits?

23 A It depends on the personality and --

24 Q You, sir. I am looking for your opinion. Your
25 own --

k6

1 A Oh, me personally?

2 Q -- personal evaluation, right.

3 A I can't say. I can't answer it whether I would
4 be more careful or less careful. I would be in more of a
5 hurry and I would be more alert. You know, I would be exert-
6 ing a lot of effort. I would be anxious to get away, and so
7 I will be very concerned. I won't be as relaxed and easy-
8 going as normal. I would be very excited. And I would also
9 drive faster, and I would attempt to -- if I say -- in the
10 traffic hole, I would tend to go for it, where under more
11 normal circumstances I would not. And whether or not that
12 is safer or less safe, will simply depend on this balance
13 between my being more alert and my being more in a hurry and
14 driving faster. I would drive more recklessly than normal.

15 Q Thank you. That is all.

16 JUDGE JOHNSON: Dr. Plotkin, I think you made
17 the statement, correct me if I am in error, earlier that the
18 Wilbur Smith Study is not as specific as you would like in
19 defining its database.

20 WITNESS PLOTKIN: No, I don't believe -- I be-
21 lieve you misinterpreted me. It --

22 JUDGE JOHNSON: Would you correct me, please?

23 WITNESS PLOTKIN: I hadn't addressed the ques-
24 tion of how specific they were with the database because I
25 didn't question it. It may be that I would conclude that.

k7

1 But I haven't examined the presentation of their database,
2 even though I used it. What I was questioning was the in-
3 adequacy of scenarios and considerations that were in that
4 study. This is the thing that I criticized, that it was
5 not nearly as complete as it should have been, and the
6 techniques for the calculations. For example, how did they
7 arrive at six and a quarter hours? Where did that come from?
8 I mean, that was the result of calculations. As I understand
9 it now, there was a computer study involved here, in which
10 a computer did all that and arrived at six and a quarter
11 hours.

12 Well, I have my calculations which I am willing
13 to share, and so of course, I would like to see theirs. I
14 would like to see this computer study, and because I have
15 done enough computer work myself to know how these things
16 are done, and it -- the computer can do no more than the
17 mathematician or programmer that puts -- feeds the material
18 in. The big thing with a computer is that it counts one
19 and one and gets two in a millionth of a second. And that
20 is all it does, and what it -- from there on, it is what we
21 can do that the computer reflects. So that computer program
22 is not some magic that comes out of a machine that gives
23 you accurate answers just because it is a computer. It is
24 giving you the things that the mathematician that put the
25 data into it would have given us if they had time to do the

k8
1 calculations. The computer does the calculations in a small
2 fraction of the time it takes us to do them by hand. And
3 that -- I would like to see how that was done.

4 JUDGE JOHNSON: Then you are saying you have no
5 quarrel with the database of Wilbur Smith's studies as you
6 interpret it?

7 WITNESS PLOTKIN: At this time I have no quarrel
8 with the database, no.

9 JUDGE JOHNSON: At what point in time did you
10 prepare your direct written testimony?

11 WITNESS PLOTKIN: Very recently. You know --

12 JUDGE JOHNSON: How recently?

13 WITNESS JOHNSON: I don't know what the date is
14 on here. August 25th, August 24th. This is -- our work has
15 been done very recently. It is -- as I say, it has been
16 done -- we haven't had the time to devote to it that we would
17 like to. I would like to have a -- I would like to present
18 this body with something similar to this Wilbur Smith Report
19 that is done the way we thought it should be done, but we
20 can't do that.

21 JUDGE JOHNSON: Thank you.

22 JUDGE KELLEY: A question in the same vein, just
23 so I am clear. We do have your testimony and you had an
24 exhibit listing some assumptions. Now, when you refer to
25 your study, you spoke from time to time of -- not just of

k9

1 yourself but of us or we. Is this the L.A. Federation's
2 committee on evaluation time study? Is that --

3 WITNESS PLOTKIN: That is a good title for it,
4 yes.

5 JUDGE KELLEY: I didn't -- it is in your testi-
6 mony. I didn't make it up. I am glad you like it.

7 WITNESS PLOTKIN: I was giving you credit for
8 something that --

9 JUDGE KELLEY: It is all yours.

10 WITNESS PLOTKIN: There were -- four of us were
11 involved in this, this particular work.

12 JUDGE KELLEY: All right. And are you here in
13 this proceeding as a spokesman for the committee, or are you
14 speaking for yourself?

15 WITNESS PLOTKIN: Well, both. You know, I --
16 could be considered a spokesperson for the group. It is a
17 very informal group without any formal head. But it is both,
18 and I am speaking for myself as well.

19 JUDGE KELLEY: Who are the third -- what, three
20 other members in this committee?

21 WITNESS PLOTKIN: Yes, there was Miguel Polido
22 who is here.

23 JUDGE KELLEY: Right.

24 WITNESS PLOTKIN: And Dr. Lyon, who is here,
25 and Dr. Jack Jennings --

k10

1 JUDGE KELLEY: I think you --

2 WITNESS PLOTKIN: And myself.

3 JUDGE KELLEY: -- mentioned those names before,
4 and maybe I am just repeating, but the study in terms of its
5 being reduced to writing, it is your testimony in the exhi-
6 bit, there isn't -- when you said you wish you had the time
7 and the money to do something like Wilbur Smith, which you
8 haven't been able to do, but what we do have to look to is
9 the testimony and the exhibit and then your testimony today
10 on the examination, is that right?

11 WITNESS PLOTKIN: Yes. Yes, that is the end
12 result of the calculations.

13 JUDGE KELLEY: Your -- I think you called it
14 worse, worse case. Let me just get back to that for a moment.
15 And that is where you thought it might take a week for people
16 to evacuate, and that was also the earthquake damage scenario,
17 I believe --

18 WITNESS PLOTKIN: Yes.

19 JUDGE KELLEY: Is that --

20 WITNESS PLOTKIN: That is correct.

21 JUDGE KELLEY: -- basically correct? Did you --
22 in arriving at a figure of a week, did you examine the
23 capability of either Caltrans or whoever else might be
24 available to repair, and how fast they can do that kind of
25 th'ng? I mention it because we had a witness from Caltrans

k11

1 in the last session who did describe, not at great length,
2 but to some extent the San Fernando '71 earthquake, and what
3 that did, and he left the impression that they were capable
4 of reacting quite rapidly, and I believe he said they had
5 at least a lane open within a matter of hours, notwithstand-
6 ing a lot of damage, so I wonder if you -- could you consider
7 how quickly they could react and not put things back in their
8 original shape, but put them in such a shape that people
9 could use the roads?

10 WITNESS PLOTKIN: Yes, of course. San Fernando
11 didn't involve the nuclear reactor, and part of this is not
12 just an earthquake. We are talking about earthquake combined
13 with a severe nuclear accident, and I don't think it reason-
14 able to expect to think workers are going to come in to work
15 on that highway in the midst of a radioactive plume that is
16 causing severe -- that as long as they are in it will cause
17 severe -- exposes them to severe radiation, so that in this
18 worst, worst case, we didn't think the roadway would be pre-
19 pared --

20 JUDGE KELLEY: Because the workers wouldn't
21 come out?

22 WITNESS PLOTKIN: Yes. Just considering, you
23 know, the human factor aspect of the situation and -- as I
24 have tried to indicate, we are only looking for an endpoint
25 in our analysis, you know. In this evacuation, are we going

k12

1 to talk about -- are we going to look for one or two months
2 to evacuate the area as an endpoint? That is certainly not
3 so. And something longer than a couple of days -- two or
4 three days is certainly an endpoint. So somewhere between
5 maybe two days and two weeks, there would be a reasonable
6 endpoint in which to place on the study and one week seemed
7 reasonable, and as I say, we didn't consider the highway
8 would be repaired in the fashion that the Caltrans is probab-
9 ly capabl repairing if they need be in emergencies, just
10 because of the worker exposure.

11 JUDGE KELLEY: Okay. Just one other question
12 which may well be in the realm of health physics, but I do
13 want to --

14 WITNESS PLOTKIN: Be careful.

15 JUDGE KELLEY: -- ask you. I will be very
16 cautious. But, we were talking earlier about options and
17 Dr. Hand said, well, why not walk? And you said they can't
18 do that. And so I am wondering why?

19 WITNESS PLOTKIN: Oh, because --

20 JUDGE KELLEY: Is it a health physics reason?
21 Is it a radiation reason?

22 WITNESS PLOTKIN: Yes, yes. For the same reason
23 sheltering is not a viable option, or shouldn't be a viable
24 option in the accidents that we are considering. That is
25 another little problem that is in here that lends to

k13

1 indecision and so forth, but sheltering is not adequate in
2 the kinds of accidents we are talking about. Evacuation is
3 the only option.

4 JUDGE KELLEY: Evacuation in some kind of vehi-
5 cle?

6 WITNESS PLOTKIN: Of course, yes. Not walking.

7 JUDGE KELLEY: You might be interested to know
8 that the Marines say they are going to walk out.

9 WITNESS PLOTKIN: The Marines --

10 JUDGE KELLEY: We had a witness here --

11 WITNESS PLOTKIN: -- you know, I am sure there
12 are a lot of individualists who aren't going to listen to
13 the instructions and so forth, and they are going to do
14 something --

15 JUDGE KELLEY: Okay.

16 WITNESS PLOTKIN: -- different that what is
17 considered in their best welfare.

18 JUDGE KELLEY: Any redirect, Mrs. Gallagher?

19 MS. GALLAGHER: Yes, please.

20 JUDGE KELLEY: Okay.

21 REDIRECT EXAMINATION

22 BY MS. GALLAGHER:

23 Q Dr. Plotkin, in reviewing the transcript of
24 these proceedings in regard to the testimony of Mr. Bryant
25 Brothers at page 8042 in these proceedings, do you recall

kl4

1 the assertion by Mr. Brothers that they had reduced the
2 efficiency of the evacuation by a factor of 25 to 30 percent?

3 A Yes, ma'am.

4 Q Okay. In analyzing the time estimates, in your
5 opinion, did they actually apply such a reduction factor to
6 this study in any way that you can determine?

7 A Well, I was --

8 MR. PIGOTT: I am going to object until we have
9 a basis as to how he evaluated -- whether or not he in fact
10 evaluated what Wilbur Smith and Mr. Brothers did.

11 JUDGE KELLEY: Could you repeat that question,
12 please?

13 BY MS. GALLAGHER:

14 Q In analyzing the Wilbur Smith and Associate
15 estimates, which -- did you do that?

16 A Yes.

17 Q Okay. In your opinion, was such a 25 to 30 per-
18 cent reduced efficiency for human factors applied to their
19 results? Did you find evidence for it in their data?

20 A No, ma'am, I did not. I could not find that
21 reduction applied. They did use the 15 percent at some
22 point, I recall.

23 Q And were you able to see the 15 percent reduction
24 for adverse weather applied to their data? That is another
25 question --

k15

1 A I don't recall exactly which page it is on or --
2 I couldn't find it if I had to, but I am under the impression
3 that the 15 percent is included somewhere --

4 Q Yes.

5 A Although the 25 or 30 is not.

6 Q You were not able to find --

7 A And then comparing that 25 or 30 with our own
8 viewpoint, ours would be 77.8 percent, as I testified before
9 earlier.

10 Q That was for the weather. But I am talking about
11 for the human factors.

12 A The human factors as well.

13 Q The human factors as well?

14 A We, in our -- you know, in our understanding,
15 the effect of human factors and the way the whole evacuation
16 scenario is going to take place with accidents, is not
17 much different than would be with very bad inclement weather.

18 Q If they had used this 25 to 30 percent reduced
19 efficiency for human factors, where would you expect to
20 find it in the study? Would it be -- would you expect it to
21 be contained within the computer model?

22 A It could be. The computer is certainly capable
23 of multiplying and dividing.

24 Q M-hmm.

25 A So that -- you know, or one can simply apply that
factor by hand and come up with a longer evacuation time.

T15 k1 1

Q In your opinion is a lane flow of 1,800 vehicles per lane hour an appropriate measure to use in the context of an evacuation?

A Not at all. That is maximum traffic flow under ideal conditions.

Q What speed?

A 35 miles an hour.

Q And is that the regular traffic flow measurement that Wilbur Smith has used throughout the study?

A Yes, ma'am.

Q What is the relationship between evacuation time and radiation received?

A It is linear. What is -- what was nice about the results we came up with -- all the relationships are linear. Double the evacuation time, double the hazard. And the --

MR. PIGOTT: I am going to move to strike the last question and answer on the grounds they exceed the scope of the issue as previously defined.

JUDGE KELLEY: Sustained. It is a health physics question.

MS. GALLAGHER: I was raising it as a -- without commenting on the cancer incidence as a fact that was determined in the study.

JUDGE KELLEY: Well, what was the point? I don't

k2

1 that we need to plow this any further --

2 MS. GALLAGHER: Yeah, I --

3 WITNESS PLOTKIN: The linear relationship --

4 JUDGE KELLEY: The question that was asked was
5 objected to. It was sustained. Let's move on.

6 BY MS. GALLAGHER:

7 Q Okay. In your opinion, when if ever, is shelter-
8 ing an appropriate protective choice?

9 MR. PIGOTT: Objection. There is no foundation
10 laid that this person is capable of answering that question.
11 I think it also exceeds the scope of the issue.

12 MR. HOEFLING: Staff would join in that objec-
13 tion. I think we are beyond direct.

14 JUDGE KELLEY: Sustained. It is beyond direct.
15 You are on cross.

16 BY MS. GALLAGHER:

17 Q How many members of Los Angeles Federation of
18 Scientists are there? I don't mean just the committee, I
19 mean the general membership?

20 A It is about -- I would say 40, 45 active members.
21 There are some 80 to 100 on a small mailing list, and there
22 are about 4 or 500 on our extended mailing list.

23 Q If I-5 were automated, could you achieve the
24 Wilbur Smith time estimate, in your opinion?

25 MR. PIGOTT: Objection. I believe this goes

k3

1 beyond the scope of the cross and direct. It is speculative.

2 MS. GALLAGHER: You raised the issue,
3 Mr. Pigott -- yes, I believe you did.

4 JUDGE KELLEY: I will allow the question on the
5 automation of I-5. It has been at least touched upon in
6 this discussion.

7 WITNESS PLOTKIN: Well, automation implies some-
8 thing more than is achievable, but if hypothetically the
9 vehicles could be automated, then the evacuation -- much
10 less time -- about half would be required.

11 BY MS. GALLAGHER:

12 Q You are talking of half of the 6.5 --

13 A Yes, yes. We are talking about 3,600 vehicles
14 per lane hour instead of 1,800 under fully automated condi-
15 tions. One second headway between cars.

16 JUDGE HAND: But you said that wasn't achievable?
17 What did you say about it?

18 WITNESS PLOTKIN: That is not achievable, because
19 all vehicles cannot be equipped with infrared radar.

20 JUDGE HAND: Then why are we talking about it?

21 WITNESS PLOTKIN: We are talking about automa-
22 tion of the freeway.

23 MS. GALLAGHER: Maybe we are looking at
24 ranges of protective actions.

25 JUDGE HAND: If we can't get there, why bother?

k4

1 JUDGE KELLEY: Well, I think we are a little
2 unclear, at least in my mind -- I don't know what an auto-
3 mated highway is, and you indicated it was infared equipment?
4 On cars?

5 WITNESS PLOTKIN: Yeah, it --

6 JUDGE KELLEY: Could you just briefly tell us
7 what an automated highway would be?

8 WITNESS PLOTKIN: It means that all equipment
9 would be capable -- would have devices that sense the dis-
10 tances between their vehicle and the one in front. It can
11 also automate the steering so the vehicle can steer itself.
12 That is easy to do.

13 JUDGE KELLEY: It is automatic pilot down the
14 road sort of a thing? Just like --

15 WITNESS PLOTKIN: That is right.

16 JUDGE KELLEY: -- an airplane?

17 WITNESS PLOTKIN: Yeah.

18 JUDGE KELLEY: Okay. Thank you.

19 BY MS. GALLAGHER:

20 Q If the on-ramps were automated, would it be
21 reasonable to expect that you might be able to achieve the
22 1,800 vehicles per lane hour?

23 MR. PIGOTT: I am going to ask for an explanation
24 of what automated means in this context, given the last
25 question.

k5

1 MS. GALLAGHER: It means controlled -- well, I
2 will defer to the Witness.

3 WITNESS PLOTKIN: Yes, the kind of control that
4 is required would be, you know, automatic gates of some sort,
5 and then one might begin to achieve the 1,800 per lane hour.
6 We have to control the vehicles coming on so the speed is
7 maintained at 35 miles an hour. Once the speed gets to be
8 less than 35 miles an hour, then the traffic flow, the num-
9 ber of cars per lane hour reduces, and it reduces almost
10 linearly. It is not quite linearly, it dips. But it
11 is fairly linear coming down.

12 So, if we can control the vehicles coming on,
13 we have eight on ramps in four lanes, and assume automatic
14 gates, some that will allow the cars out of those gates
15 coupled with the velocity sensors to know the velocity of
16 the traffic flow, then one can begin to achieve the 1,800
17 and get close to perhaps six or seven hours -- assuming
18 that number was correct of their study.

19 JUDGE HAND: What happens on an automated high-
20 way when you have a couple of cars run out of gas?

21 WITNESS PLOTKIN: Okay, you get --

22 JUDGE HAND: The car in back gets so close to it
23 and stops and can't move until somebody moves the one in
24 front?

25 WITNESS PLOTKIN: No, if a car stopped under

k6

1 automated conditions, everything stops. The automatic equip-
2 ment functions within a tenth of a second to operate brakes,
3 as compared to human reaction, which varies between three-
4 quarters of a second and one and a quarter seconds, so all
5 the cars stop. Under -- with gas or some kind of disabling
6 effect on the automobile, the automobile has to be able to
7 get out of the way, so a true automatic highway is only on
8 lane, and that is if we really -- there is a difference be-
9 tween automating the present highways and building a complete
10 automatic highway.

11 A complete automatic highway built from scratch
12 as the century expressway that I designed, that was only
13 one lane, and increased traffic flow is achieved by having
14 the cars drive close together, and in context of the -- of
15 automating of present highways, then the automatic equipment
16 functions and the human driver is the back-up system. So
17 once the car runs out of gas, the human driver takes over
18 and tries to get through and tries to get out of the way.

19 JUDGE JOHNSON: How?

20 WITNESS PLOTKIN: How? By cutting in front of
21 the car on the side and gradually --

22 JUDGE JOHNSON: Without ramps?

23 WITNESS PLOTKIN: No, the car doesn't stop
24 immediately when it is out of gas. It coasts for quite a
25 ways.

k7

1 JUDGE JOHNSON: Under some conditions, yes, sir.

2 WITNESS PLOTKIN: And if it doesn't coast and
3 does stop, then the freeway is jammed up and then the 3,600
4 vehicles per lane hour is not achieved. The whole -- that
5 particular lane comes to a stop under the condition you
6 propose.

7 The same thing happens here. You know, we
8 are talking about evacuating under the Wilbur Smith plan,
9 and running out of gas is another -- that is a possibility
10 I hadn't thought of for lanes being shut down.

11 BY MS. GALLAGHER:

12 Q I had just a couple more questions.

13 JUDGE KELLEY: Okay.

14 BY MS. GALLAGHER:

15 Q When there is queing at on-ramps, how does that
16 serve to slow down the traffic flow rate?

17 A Oh, it puts pressure on the highway for more
18 vehicles than the highway can hold -- when the highway will
19 allow to traversal -- that is maximum conditions.

20 Q Okay. And --

21 A It is continually crowding up of vehicles as
22 they are coming on from the on-ramps.

23 Q A kind of simple fact, but for people who are
24 not mechanically inclined, is connected with what I call
25 pipe physics, could you explain where the constraints in

k8

1 speed are located on a freeway?

2 MR. PIGOTT: I am going to object. I believe
3 this goes far beyond the scope of the cross examination.
4 We are back into some kind of new area -- I don't recall
5 at least that it was examined.

6 MS. GALLAGHER: It has to do with the maximum
7 speed on a highway and how they are maintained and why is
8 the Wilbur Smith Study lane rate not realistic.

9 MR. PIGOTT: I never asked him about that.

10 MS. GALLAGHER: You asked him --

11 JUDGE KELLEY: You indicated you were about
12 through, right?

13 MS. GALLAGHER: Yeah, this is my last question.

14 JUDGE KELLEY: Fine, then, go ahead and ask it.

15 MS. GALLAGHER: Okay.

16 JUDGE KELLEY: It is the last question rule.

17 (Laughter)

18 MS. GALLAGHER: Oh boy. Can I have another
19 choice?

20 BY MS. GALLAGHER:

21 Q Do you understand the question? I am trying --

22 A Yeah, I think so. The reason 35 miles an hour
23 is the speed for maximum traffic flow is because at that
24 speed people are comfortable driving on the average two
25 car lengths behind the car in front, and now, as one

k9 1 increases the speed on the highway, people aren't very
2 comfortable and they fall back, and the space increases
3 so that the number of vehicles that pass a given point per
4 lane hour decreases.

5 Also, when the speed slows down, then the cars,
6 while they may drive a little closer together, they don't
7 drive proportionately closer together, so then also the
8 number of cars traversing a particular point per lane hour
9 decreases, and it is almost linear. People will drive so
10 close and then they won't drive any closer to the car in
11 front of them.

12 And then as the speed slows down, then everything
13 slows down and vehicles passing a given point per lane hour
14 is proportionately decreased.

15 MS. GALLAGHER: May I just rephrase it, because
16 that wasn't really what I intended. What I was trying to
17 get at is -- if you have a bottleneck on a freeway, what is
18 the maximum rate of speed on the entire freeway?

19 WITNESS PLOTKIN: Oh, the bottleneck is what
20 limits the flow. In this case it is Highway 5, because it
21 is four lanes, and there are eight lanes feeding in, plus
22 some above -- we didn't take into consideration on-ramps
23 beyond the EPZ, but then there are on-ramps feeding four
24 lanes, and consequently the four lanes are the bottleneck.
25 Cars will jam up. It will be like going into downtown L.A.

k10 1 at eight o'clock in the morning, and it will continue like
2 that as long as there is pressure from the on-ramps.

3 MS. GALLAGHER: That is all.

4 JUDGE KELLEY: Where would they bottleneck?

5 WITNESS PLOTKIN: Up to --

6 JUDGE KELLEY: Approximately.

7 WITNESS PLOTKIN: Up to where 405 and 5 come
8 together. At that point the bottleneck -- the cars -- we
9 then have eight lanes, with four lanes feeding eight lanes
10 and everything spreads out and the bottleneck gets freed,
11 but up to that point is a bottleneck.

12 JUDGE KELLEY: And the place where it frees up
13 is that north -- or at least beyond the EPZ?

14 WITNESS PLOTKIN: Yes, it is some, what is it,
15 seven, eight miles or so beyond the EPZ.

16 MR. PIGOTT: I believe he is referring to the
17 area he pointed out as the Golden Triangle by previous
18 witnesses.

19 JUDGE KELLEY: Yes. Do you have an estimate
20 about how tight that bottle would be, in your opinion?

21 WITNESS PLOTKIN: Yes, bumper to bumper.

22 JUDGE KELLEY: But would they stop or --

23 WITNESS PLOTKIN: Stop and go, this is what --

24 JUDGE KELLEY: Stop and go, bumper to bumper?

25 WITNESS PLOTKIN: That is right. And we

kll

1 estimate at seven and a half miles an hour average speed.
2 Stop, stop, speed up to 15 miles an hour, stop, accelerate
3 to 15 miles an hour, stop, et cetera. This is typical of
4 bumper to bumper traffic.

5 JUDGE KELLEY: You testified to that earlier.
6 When you say we estimate, that is where it is in the record,
7 it is your earlier testimony, correct?

8 WITNESS PLOTKIN: I don't know what is in the
9 record.

10 JUDGE KELLEY: Whatever you said today.

11 WITNESS PLOTKIN: Well, I have said that today,
12 a couple of times. I hope I have been clear. I don't mean
13 to reiterate and be redundant, but I just want my point of
14 view to get across.

15 JUDGE KELLEY: Okay. Dr. Plotkin, thank you
16 very much. We appreciate your appearance. You are excused.

17 (Whereupon, the witness was excused.)

18 JUDGE KELLEY: And let's take another ten or so
19 minute break. Off the record.

20 (Whereupon, a brief recess was taken.)

21 ///

22

23

24

25

1 JUDGE KELLEY: Back on the record. We will go
2 ahead until 5:30 or so this evening, depending upon exactly
3 where we are, but that is what we have in mind.

4 And I guess we are ready for the next witness,
5 Ms. Gallagher?

6 MS. GALLAGHER: Yes. I would like to call Dr.
7 Irving Lyon.

8 Whereupon,

9 IRVING LYON

10 was called to the witness stand and, having been first duly
11 sworn by the Chairman, was examined and testified as follows:

12 DIRECT EXAMINATION

13 BY MS. GALLAGHER:

14 Q Dr. Lyon, have you read the statement that has
15 been prepared as an overview of your testimony?

16 A Yes, I have.

17 Q And is it a true and correct statement in a
18 summary of work that you have done in preparation for this
19 hearing?

20 A Yes, with the exception of a few, I think very
21 minor, changes.

22 Q Would you please direct us to them?

23 A On page four, beginning with the middle paragraph,
24 other reasons, the second sentence in that paragraph, of
25 cancers are that I, rather than we, didn't consider the

1 internal effects.

2 Q Oh, Dr. Lyon, I made those changes yesterday.

3 A Oh, you did.

4 Q Yes.

5 A I didn't have it in my copy.

6 Q I am sorry, your copy is still --

7 A Okay. Then I think it is correct.

8 MS. GALLAGHER: Before proceeding with Dr. Lyon's
9 testimony, I would like to read into the record the exhibits
10 that accompany his testimony.

11 Exhibit number 10 is a working study of the health
12 effects of radiation from a nuclear accident over a twenty-
13 two and a half degree sector.

14 BY MS. GALLAGHER:

15 Q Was this prepared by you?

16 A Yes.

17 Q And the Los Angeles Federation of Scientists?

18 A Yes.

19 (Whereupon, the document referred
20 to was marked as Intevenor's
21 Exhibit No. 10 for identifica-
22 tion)

23 BY MS. GALLAGHER:

24 Q And Exhibit number 11 is an article from the
25 Bulletin of Atomic Scientists, or is it just the --

3
1 A I don't have it with me.

2 Q You don't have it with you. It is called Cancer
3 and Low-Level ionizing Radiation, by Dr. Carl Z. Morgan.

4 A Yes, I did refer to that.

5 Q September, 1978.

6 A Yes.

7 (Whereupon, the document referred
8 to was marked as Intervenor's
9 Exhibit No. 11 for identifica-
10 tion)

11 BY MS. GALLAGHER:

12 Q Dr. Lyon, would you please state your educational
13 background?

14 A I graduated with an A.B degree from the University
15 of California, Los Angeles, in 1942. I obtained my Masters
16 degree there in 1949 after returning from wartime service.
17 I then went to the University of California at Berkeley and
18 obtained my PhD in 1952.

19 Thereafter, I spent two years as a Rockefeller
20 Foundation Fellow at the Harvard School of Public Health and
21 the Department of Nutrition, where I did studies on
22 nutritional biochemistry and published some additional papers.

23 After that, I had some experience that was quite
24 varied, both in industry as a research biochemist, and in a
25 hospital in Chicago, Presbyterian St. Luke's Hospital as a

4 1 research biochemist in the department of orthopedic surgery.
2 That was at a time when I had a joint appointment both in the
3 hospital and at the University of Illinois college of medicine
4 in the department of biological chemistry, and thereafter, I
5 was a member of the staff in the department of biochemistry
6 at the Chicago Medical School, and after that a professor of
7 biology at Bennington College in Vermont.

8 After that, I spent close to two years abroad at
9 the University of Copenhagen, Institute of Biological
10 Chemistry A as a senior visitor in the laboratory of Dr. Hans
11 Using, Nobel Laureate. I returned to this country, and began
12 some private consulting in environmental health and nutrition
13 and was for a time special consultant to the State Energy
14 Commission in California, evaluating draft environmental
15 impact reports on proposed nuclear power stations in California
16 and after that I began working as an experimental researcher
17 in cancer at VA Wadsworth in West Los Angeles.

18 Q Have you worked with other members -- are you a
19 member of the Los Angeles Federation of Scientists?

20 A Yes, I am.

21 Q Have you worked with other members of the
22 Federation in studies of the health effects of exposure to
23 radiation following --

24 A Yes, I have.

25 Q Okay.

5

1 MR. HOEFLING: Mr. Chairman, is this an overview
2 that we are at now, or what is happening?

3 MS. GALLAGHER: No, this is direct examination.

4 MR. HOEFLING: Well, then I would --

5 JUDGE KELLEY: Let me get clear here, Ms.
6 Gallagher, Dr. Lyon is a subpoenaed witness, correct?

7 MS. GALLAGHER: Yes, he is.

8 JUDGE KELLEY: That was my understanding. But we
9 do have the statement here, which is in the nature of direct
10 testimony, is that a fair statement?

11 MS. GALLAGHER: Yes, and I will ask that it be
12 admitted. I prepared it for the convenience of the Board and
13 the parties.

14 MR. HOEFLING: Given that --

15 JUDGE KELLEY: I think that answers your question.
16 It is direct testimony.

17 MR. HOEFLING: OKay, well, then I would ask that
18 the answer be stricken, given that the issue of health effects
19 is, in the Staff's view, not relevant to the issue before the
20 Board.

21 MS. GALLAGHER: We have two contentions. Perhaps
22 Dr. Lyon's findings will prove to be relevant to our
23 contention having to do with the adequacy of medical services
24 in the event of a nuclear accident. I would like to be able
25 to explore some of the work that he has done, so that we can

6
1 apply it to that purpose.

2 MR. HOEFLING: I have looked at the handout
3 summarizing Dr. Lyon's testimony. I did not see that point
4 made in that handout.

5 MS. GALLAGHER: I will say that it was prepared
6 with the view of supplementing Dr. Plotkin's testimony, but
7 it can have multiple uses if we delete the references to
8 cancers.

9 JUDGE KELLEY: Well, I assume that the --

10 MS. GALLAGHER: We are going to be --

11 JUDGE KELLEY: I assume the statement was prepared
12 before the Board's ruling of this morning?

13 MS. GALLAGHER: Yes.

14 JUDGE KELLEY: Well -- yes, Mr. Pigott?

15 MR. PIGOTT: Applicants are just waiting until --
16 what I hear so far is a qualification of the witness, and I
17 believe when Mrs. Gallagher does move into the substance of
18 her direct examination, I would think that unless it is vastly
19 different from what is set forth in the statement of Dr. Lyon,
20 and the working study, which has been identified as Exhibit
21 Number 10, the Applicants will definitely have an objection
22 based on the grounds that were previously discussed this
23 morning with respect to Dr. Plotkin's testimony.

24 MR. HOEFLING: Let the Staff withdraw its motion
25 and we will see where this line of questioning goes.

7

1 JUDGE KELLEY: I think we should proceed for the
2 time being. I think in light of the Board's ruling this
3 morning, and the objections that parties are making, the
4 situation is a little bit complicated, and we will just have
5 to see -- see where things carry us.

6 But for now, why don't you go ahead.

7 MS. GALLAGHER: I would also like to reintroduce
8 an exhibit that was withdrawn for purposes of Dr. Plotkin,
9 which I would now like to reintroduce for identification, and
10 it is number 9, the Los Angeles Federation of Scientists
11 findings, because I believe that they will be relevant to the
12 issue of medical services, and the availability of medical care
13 in the event of radiation.

14 BY MS. GALLAGHER:

15 Q Dr. Lyon, did you participate in the formation of
16 two studies, one a preliminary study, and the other one the
17 study that was done with the Los Angeles Federation of
18 Scientists?

19 A Yes, I did. The first, excuse me, was a
20 preliminary study which I did on my own after I was asked if
21 I would evaluate or make some evaluation of the situation, and
22 as a result, I did this preliminary study, which served two
23 functions, one was to get a very preliminary and very gross
24 estimate of what was entailed, and second, which was more
25 important, was to define a model, an algorithm, if you will,

3 1 that would allow us as a group to do a much more detailed and
2 much more extensive study, taking into account many of the
3 parameters that I was not taking into account in the
4 preliminary study.

5 Q And in doing this particular study, what was your
6 source of data for radionucleides, for example, in the
7 proposed plume?

8 MR. PIGOTT: I am going to object until we have
9 some identification of a study that we are talking about.

10 MS. GALLAGHER: Okay.

11 BY MS. GALLAGHER:

12 Q I would call your attention to Exhibit Number 10,
13 Intervenor's number 10, called "Working Study of Health
14 Effects of Radiation from a Nuclear Accident over a Twenty-
15 Two and a Half degree Sector."

16 MR. PIGOTT: In that case, I will object to the
17 questions as going to a subject matter beyond the scope of
18 the present issue that is before us. Exhibit Number 10,
19 which has been reviewed, talks strictly of health effects of
20 radiation, and I believe -- I do not believe that that is
21 relevant to this issue.

22 JUDGE KELLEY: Mrs. Gallagher, just for clarity
23 in my mind, Dr. Lyon referred to two studies, a preliminary
24 study and then a more extensive study. Which is Exhibit 10?

25 MS. GALLAGHER: Exhibit 10 is the preliminary

9
1 study.

2 JUDGE KELLEY: Okay. Now, the other study that is --
3 that the doctor referred to, is that before us in exhibit form?

4 MS. GALLAGHER: That study is not before us in
5 exhibit form. It is before us in summary form as Exhibit 9,
6 which was previously not allowed into Dr. Plotkin's testimony.

7 However, now I am reintroducing it as evidence
8 supporting the need for medical services, adequate medical
9 services in contention number 2, rather than as strictly a
10 health concern surrounding evacuation in contention number one.

11 JUDGE KELLEY: Now, let me see, Mr. Pigott. You --
12 could you restate your objection?

13 MR. PIGOTT: I objected on the -- essentially I
14 objected on further questions going towards having to do with
15 Exhibit number 10, on the ground that Exhibit Number 10
16 discusses matters beyond the scope of the existing issue,
17 and is therefore irrelevant to this proceeding.

18 JUDGE KELLEY: When you use the phrase "existing
19 issue," which issue are you referring to?

20 MR. PIGOTT: I believe it is number one in this
21 proceeding.

22 JUDGE KELLEY: Well, why don't we go ahead at
23 this point and hear from Counsel on the question of whether Dr.
24 Lyon's testimony and exhibits is admissible under the
25 subcontention relating to adequacy of medical services. It

10

1 seems to me pretty clear that based on our ruling this
2 morning with respect to contention one and evacuation, that
3 testimony of this nature would not be admissible. There was
4 also a question, though, whether the prior witness was
5 qualified in this area in any event, and it appears that Dr.
6 Lyon does have a -- that this is his area, health physics.

7 Now, do I understand you, then, that Dr. Lyon
8 is now being offered by the Intervenors, under adequacy of
9 medical services?

10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

tp17

1 MS. GALLAGHER: Yes, because the thrust of his
2 work has been related to health issues and we do have some
3 concern that much of what is in the record already from
4 Applicants' witnesses relates to availability of medical
5 treatment and so forth for irradiated people. We would
6 like to complete the record on this count by having our
7 witness testify to, first of all, the level of radiation
8 that would occur without reaching the issue of cancers,
9 and talk about medical services available for dealing with
10 irradiation, which is why I asked the question earlier about
11 would questions concerning irradiation be admissible.

12 JUDGE KELLEY: And I think I responded that
13 under that subcontention one would assume so. That's about
14 as far as one can go until you hear what the question is.

15 MR. PIGOTT: Could I ask a clarification, just
16 to get it sort of on and off the record? The objection as
17 to this going beyond the scope of Issue No. 1, could I have
18 a ruling on that so that we then know that we are dealing
19 only with the other issue concerning medical services?

20 JUDGE KELLEY: Sustained.

21 MR. PIGOTT: Thank you. So we are now directing
22 ourselves to the other.

23 JUDGE KELLEY: Right. Mrs. Gallagher, and
24 again, I recognize that the Board ruled this morning when
25 you had already written a number of things, and Dr. Lyon

2 1 also, so that they are cast in a way that they might not be
3 2 cast had you known that ruling was forthcoming. But looking
4 3 -- and I am really looking quite honestly for the first time
5 4 at the prepared statement -- is it your view that, take the
6 5 prepared statement first, do you think that that is fairly
7 6 addressed to the adequacy of services contention?

7 MS. GALLAGHER: I believe it is in part. It
8 would have to be very carefully parsed to delete those sec-
9 tions that have to do with Contention No. 1. But I do
10 believe that there are certain parts of it that are relevant.
11 I'm not prepared to say at this point.

12 JUDGE KELLEY: I'm just trying to get an indica-
13 tion. We're dealing with a rather awkward situation, as
14 we all know. What about Exhibit No. 10? In your view, does
15 that speak primarily or at least in relevant part to adequacy
16 of medical services?

17 MS. GALLAGHER: It doesn't speak directly to
18 adequacy of medical services, but what it does is lay the
19 foundation for the need for medical services, which then
20 Dr. Lyon would be prepared to comment on. We have discussed
21 that.

22 JUDGE KELLEY: And you would elicit that on direct
23 by questioning?

24 MS. GALLAGHER: Yes.

25 MR. PIGOTT: I might suggest that I will be,

3 1 based upon the questioning to this point, perhaps Dr. Lyon
2 has been qualified as a health physics type person, but I
3 haven't heard any questions that would indicate that he is
4 qualified to determine adequacy of medical services.

5 JUDGE KELLEY: Well, that's something you may
6 well want to raise.

7 MR. PIGOTT: We may as well get all these things
8 out in the open

9 JUDGE KELLEY: I think that's right. Let's
10 get it all out and see if we can't come up with -- get
11 everything relevant on the table and we'll decide where to
12 go.

13 MR. PIGOTT: As additional focus, I would suggest
14 that the criteria set forth on page 69 of NUREG 0654, Section
15 I, Medical and Public Health Support, state the standards
16 that must be addressed in order to come in under the issue
17 that the Intervenor are now attempting to address.

18 JUDGE KELLEY: What's that page again?

19 MR. PIGOTT: Page 69. And I believe the
20 contention tracks the regulatory language dealing with that
21 particular section.

22 JUDGE KELLEY: Okay. Thoughts from the Staff?

23 MR. HOEFLING: Well, Mr. Chairman, I was also
24 going to point the Board to the criteria in NUREG 0654. I
25 think they are helpful in illuminating the planning standard

4 1 and should serve as guidance as to what appropriate consid-
2 erations are for that planning standard.

3 JUDGE KELLEY: And the rule itself, the medical
4 sub-section is?

5 MR. HOEFLING: 5047(b)(2).

6 JUDGE KELLEY: Well, let me put a proposition,
7 subject to a better proposition. Mrs. Gallagher, as to the
8 prepared material, the statement and Exhibit No. 10, you
9 have indicated that you think that some but not all of those
10 papers properly come in under adequacy of medical services.
11 Would it be a sensible approach for you to take that home
12 and mark it up showing what deletions you think are appro-
13 priate and then we'll distribute that first thing tomorrow
14 morning, just like we did with the earlier piece and hear
15 from people?

16 MS. GALLAGHER: Certainly.

17 JUDGE KELLEY: What I'm working toward is make
18 good use of another hour this afternoon and hopefully find
19 out -- decide, basically -- where we go on this. Then for
20 now, Mr. Pigott indicated an interest in Dr. Lyon's background
21 with regard to facilities as opposed to health physics.
22 Perhaps you could adduce some of that information and Mr.
23 Pigott can do what he is going to do. And then, depending
24 on where we are, we might get into your direct examination
25 of this subpoenaed witness, subject to the possibility of

5 1 objection from time to time. Does that sound like a sensible
2 way to proceed this afternoon?

3 MR. FIGOTT: That sounds appropriate to me.

4 MS. GALLAGHER: Yes. That sounds okay.

5 MR. HOEFLING: Fine with the Staff.

6 JUDGE KELLEY: Okay. Well, let's do that.

7 BY MS. GALLAGHER:

8 Q Dr. Lyon, your doctoral degree is in physiology,
9 is that not correct?

10 A Yes. It is in mammalian and general physiology.

11 Q And you have taught at medical schools, is that
12 not correct?

13 A Yes. I've taught the standard medical school
14 program involved in biochemistry.

15 Q So as to issues having to do with biophysics
16 and biochemistry and bionutrition, do you feel that you are
17 as knowledgeable about health effects of radiation as most
18 physicians?

19 A I don't know what most physicians know about
20 health effects of radiation, but it has been a problem that
21 I have studied for more than 13 years as of this day.

22 Q Have you done a lot of research in the use that
23 -- that involved the use of radioactive tracers?

24 A All of my research can be correctly categorized
25 as in the fields of nutritional biochemistry and nutritional

6 1 biophysics and all of it has dealt with the use of radioactive
2 tracers in this particular field or fields of biomedical
3 research.

4 Q And is it not so that at one point you were
5 cited favorably by the former Atomic Energy Commission on
6 the effective biomedical use of radioactive materials?

7 A Yes, that is correct. I was among those first
8 listed by the Atomic Energy Commission as persons having
9 done work in the biomedical field with radioactive tracers
10 and used that work as illustrations of how these tracers
11 could be used effectively.

12 Q Without going into the substance of the two
13 reports or studies that are under consideration here, would
14 you state the purpose of the first study in terms of the
15 undertaking of the second?

16 MR. PIGOTT: Objection unless there is some
17 showing of relevancy to the issue before us.

18 BY MS. GALLAGHER:

19 Q From a reading of your preliminary study can it
20 be determined the kinds of patient loads that would be
21 visited upon a community around San Clemente following a
22 serious nuclear accident?

23 MR. PIGOTT: Objection again. No nexus to the
24 issue.

25 JUDGE KELLEY: Well, as I understand it, we are

7 1 probing Dr. Lyon's background with regard to the adequacy
2 of services and the question speaks to that, so I am going
3 to overrule the objection.

4 WITNESS LYON: Well, I looked at this problem
5 from a couple of points of view. As you know, one of them
6 was directed towards the total number of casualties or
7 health effects, which has been ruled out. But in view of
8 that ruling, there are other ways in which these studies can
9 answer the question with regard to adequacy of medical
10 facilities.

11 I assume that logically to determine whether or
12 not facilities that are available, for example, beds and
13 other facilities in given hospitals, would depend upon the
14 number of persons requiring the use of those facilities.
15 Unless one makes an estimate of the number of people who are
16 sick enough to require those facilities, there is no way to
17 know whether those facilities are adequate or inadequate.
18 So to get a handle on the number of persons that might be
19 involved as requiring the use of these medical facilities
20 one had to make, as I did, an estimate of the number of
21 cancer effects, health effects. And by doing that, we then
22 come up with a number which can then be matched against the
23 availability and adequacy of medical facilities to determine
24 in fact if they are adequate.

25

8

1 BY MS. GALLAGHER:

2 Q From a reading of your preliminary study, would
3 it be possible to come to a conclusion regarding the numbers
4 of decontamination facilities which would be needed?

5 MR. PIGOTT: I'm going to object. The question
6 has -- this is just such a flagrant attempt to put a round
7 peg in a square hole that just has nothing to do with the
8 criteria that are set forth on page 69 of NUREG 0654,
9 which discussed specifically of arrangements, talks about
10 on site first aid, lists and other types of arrangements,
11 and transportation. This is just a flagrant, backdoor
12 attempt to get in otherwise clearly inadmissible evidence
13 and I object to it.

14 JUDGE KELLEY: Well, of course 0654 is the Staff's
15 guide to compliance with the regulation. It is certainly
16 entitled to our attention, but it is not an exhaustive,
17 necessarily an exhaustive description of what is needed.
18 The rule itself speaks of -- provides that "arrangements are
19 made for medical services for contaminated, injured individuals."
20 Can't one argue that that includes how extensive the arrange-
21 ments are, Mr. Pigott?

22 MR. PIGOTT: No, I don't believe so.

23 JUDGE KELLEY: You don't believe so?

24 MR. PIGOTT: No. I think that the question at
25 No. 12 is the aspect of pre-preparation of services. To take

9 1 12 and -- subsection 12 -- and say that that opens the door
2 to evaluate the number of cancers from Class 9 actions,
3 which is where we are leading, I think is just not doing
4 justice to the meaning and intent of the whole set of
5 regulations. There is absolutely no way, in my mind, that
6 you can reasonably read into here that these arrangements
7 allow a discussion of cancer effects of Class 9 accidents,
8 and that's what clearly is before us in the exhibits and
9 the statement that has been given by Dr. Lyon.

10 MR. HOEFLING: Mr. Chairman, I would just comment
11 that we are talking here about contamination and injury, as
12 I see the contention. That is far more limiting than exposure
13 to ionizing radiation. I think we have had testimony from
14 Applicants' witnesses to the effect that when we are talking
15 about contamination we are talking about literally having
16 radiation, particulate radiation on you, and when we are
17 talking about injury we are talking about a wound with radia-
18 tion attached to it or imbedded in it. And that is what we
19 are talking about with respect to this contention. When we
20 get into health effects and ionizing radiation we are talking
21 about something that is far, far broader.

22 MS. GALLAGHER: May I comment?

23 JUDGE KELLEY: Yeah. Go ahead.

24 MS. GALLAGHER: My question was addressed to
25 contamination. It was not addressed to cancer, as Mr. Pigott

1 has said, and it was not addressed to any kind of semantic
2 distinction that the Applicants' witness may have put in
3 the record. It was addressed to contamination.

4 I believe that contamination is the result of
5 being in a plume. If you are going to offer medical services
6 for decontamination you better know how many patients you are
7 going to have.

8 ///

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

T18 k1

1 JUDGE KELLEY: Might there not be a distinction,
2 and I think several of you have already at least implied it
3 after all, this isn't an emergency plan. Emergencies take
4 place in a short period of time. People catch cancer in long
5 time periods. We are talking about contamination. I think
6 we can stipulate that. Wounds, I guess they came in at one
7 point. We are also talking about, I assume, sufficiently
8 heavy doses of radiation to require hospitalization.

9 WITNESS PLOTKIN: Right.

10 JUDGE KELLEY: And one can argue at great length
11 how likely that is, but it at least is a possibility. This
12 Board is concerned about getting into an absolutely meaning-
13 less debate over health effects, the resolution of which we
14 could contribute nothing. Generic issues that are totally
15 beyond our ability to do anything useful about. On the
16 other hand, we are concerned about whether these emergency
17 plans are adequate, whether they are sufficient, and some
18 such judgment with respect to some of these features seems
19 to me to be inescapable.

20 Mr. Hoefling, is the Staff saying that adequacy
21 is not before us? As I understand the Applicants to be
22 saying?

23 MR. PIGOTT: Adequacy of what? I am a little
24 uncertain as to what the Chairman is referring to.

25 JUDGE KELLEY: Oh, adequacy in the sense of,

k2

1 for example, numbers of hospital beds.

2 MR. PIGOTT: Certainly in the context of this
3 issue. Adequacy could be a consideration, are the arrange-
4 ments adequate; but I guess maybe I am guided too much by
5 having read the statement and the exhibits where they are
6 talking about 35 and 50 year periods for health effects,
7 and when one reads the testimony that is going to be pro-
8 ferred, one just can't get back, but this is just such a
9 strained attempt, that I guess I have problems addressing
10 the whole thing. It just doesn't fit. And when you say
11 adequacy, adequacy of arrangement, yes, if we could get down
12 to some kind of scenario that had some kind of meaning to
13 it.

14 JUDGE KELLEY: Let me ask Mrs. Gallagher for
15 GUARD, we indicated earlier we do see this as emergency
16 planning in the time sense of the word. It does seem to me
17 that long term cancer effects don't have much to do with
18 that in terms of medical facilities. Do you react to that?

19 MS. GALLAGHER: In the context of medical facili-
20 ties, they may have something to do with it if you can prevent
21 them. If you can, for example, mobilize medical services
22 to make some meaningful distribution of radioprotective
23 drugs, you may prevent a lot of thyroid cancers. You are
24 not going to know how far you have to be prepared unless
25 you have some idea of the kind of population that you are

k3

1 going to be dealing with. I don't think we have reached
2 the end state of the art as far as protective measures for
3 health concerns in the event of a nuclear accident. I think
4 there can be development. I think medical services could
5 comprehend things other than just washing people off with
6 soap and water or Clorex or peroxide.

7 They may include a range of sophisticated things.
8 I would like to hear what Dr. Lyon has to say about that.

9 JUDGE KELLEY: Off the record for a minute.

10 (Discussion off the record.)

11 JUDGE KELLEY: On the record. The Board has
12 considered this dilemma a little bit at least. We think that
13 late in the afternoon is not the time for broad rulings.
14 What we would like to do is proceed for a while this after-
15 noon, give you a tentative indication of our thinking on
16 this problem, which is that we are interested in hearing
17 testimony on the adequacy of medical services in the sense
18 of emergency medical services, because we think that is what
19 the rule is really concerned with, and that would include
20 such things as numbers of doctors and nurses and beds and
21 the like, that might be expected, given a fairly serious
22 nuclear accident.

23 We tentatively do not believe that long term
24 cancer and genetic effects are properly encompassed in this
25 question. Our thought is that it might be best this

k4

1 afternoon, Mrs. Gallagher tends to elicit testimony by
2 questions to Dr. Lyon -- just to get a better feel about
3 where we are and what Dr. Lyon can bring to us -- we are
4 going to ask counsel to just defer objections, at least for
5 the time being, with the right to object to a particular
6 question or questions probably tomorrow morning over a fresh
7 transcript, but we think it would be best to go ahead and
8 get some sense of what -- where we might properly go in this
9 direction, and that it would be better to not attempt to hear
10 a legal argument over each question this afternoon.

11 Does that sound like a reasonable approach,
12 Mrs. Gallagher?

13 MS. GALLAGHER: It sounds reasonable.

14 JUDGE KELLEY: Mr. Pigott?

15 MR. PIGOTT: It sounds fine to me. I will be
16 quiet on the ground -- let me have the --

17 JUDGE KELLEY: That is a lot to ask, I know.

18 MR. PIGOTT: I know. Let me have a continuing
19 objection rather than a deferral of the objection.

20 JUDGE KELLEY: So ordered.

21 MR. PIGOTT: With a ruling to come later.

22 MR. HOEFLING: Staff is satisfied with a con-
23 tinuing objection as well.

24 JUDGE KELLEY: Okay. Go ahead.

25 ///

k5

1 BY MS. GALLAGHER:

2 Q Dr. Lyon, you have reviewed Dr. Linneman's
3 testimony wherein he makes a distinction between the effects
4 of radiation which in his view are non-injurious, and
5 radiation which causes contamination. Do you have an opinion
6 on the validity of that kind of distinction?

7 A I think basically that people who are involved
8 in radiation radioactivity accidents will generally be
9 affected either by external radioactive particles or ma-
10 terials, or internally by what is inhaled or ingested, so
11 you have got the basic division about what contaminates by
12 residing on the outer surfaces of the body, and those
13 materials that may both reside on the outside and be taken
14 into the body by inhalation ingestion routes, and in terms
15 of the adequacy of emergency medical facilities, it seems to
16 me that we have to get some idea or some estimate of the
17 number of people who might be affected by external contamina-
18 tion in order to get an idea of whether or not the available
19 facilities are adequate to meet the emergency need.

20 So without dealing with any kinds of specifics
21 that require medical expertise, I think there are some very
22 well known procedures for removing external contamination,
23 and for treating people who have some evidence of acute
24 radiation sickness in such ways that hopefully will ul-
25 timately mitigate what the subsequent consequences will be,

k6

1 and the only other factor that I would hope I could deal
2 with would be my best estimate of the number of people who
3 might be involved in an emergency who would need that kind
4 of treatment, and then try to see whether or not it would
5 be matched with the availability of medical facilities in
6 the area to handle that number of persons.

7 Q Yes. So from a public health point of view,
8 would it be fair to say that many people who are in a severe
9 nuclear accident could receive radiation which has immediate
10 consequences in terms of the necessity of applying preven-
11 tive measures to mitigate the effects of that radiation?

12 A I think that that is correct. I also believe
13 from all the documents that I have seen, that it would be
14 not unreasonable to assume that depending on the severity
15 of the emergency, we might be talking anywhere from 10,000
16 or tens of thousands of people requiring more or less
17 immediate attention to as many as hundreds of thousands,
18 and --

19 JUDGE KELLEY: Excuse me. When you use that
20 number, Doctor, do you have in mind the area around this
21 reactor?

22 WITNESS LYON: I have in mind the supplement to
23 the draft environmental statement, NUREG 0490 in which
24 table 7.1.4-4 specifies the range of anticipated effects.
25 Now, while we don't want to talk about the effects, I can

k7

1 use the number of effects estimated therein to get some
2 idea as to the number of concomitant contamination cases
3 that might be involved, and based upon those numbers, I am
4 assuming that contamination could involve from 10,000 upward
5 in numbers of people, depending on the severity of the
6 accident.

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

T19
1 JUDGE KELLEY: That was the reason for my question.
2 I have an FES here. Maybe I can just just get a hold of --
3 excuse me.

4 MS. GALLAGHER: Chairman Kelley, it is in one of
5 the Exhibits, that -- the table is in one of the Exhibits that
6 was handed out. That is the final environmental statement,
7 and what I believe we are referring to is the supplement to the
8 draft from January, 1981, and that was --

9 JUDGE KELLEY: Okay. I have really got a simple
10 question, and I have barred the objections, and now I am
11 interrupting, but that is not good, but simply when I heard
12 the upper numbers of hundreds of thousands, and there just
13 aren't that many people around this reactor, and that is why
14 I asked you the question.

15 WITNESS LYON: Well, the draft statement of course
16 goes out to a 50-mile radius, and even beyond, giving numbers
17 within that radius and also totals, so if we are going to
18 look at the combined impact, it could run into very high
19 numbers.

20 JUDGE KELLEY: Go ahead. Okay.

21 WITNESS LYON: I am assuming, therefore, that if
22 we are looking at numbers in that range, 10,000 to 100,000 or
23 more, that we would also have to take into account the nature
24 of the kinds of decontamination procedures and treatment
25 procedures that would be available, and as I say, these are not

2
1 procedures that require medical knowledge. They are
2 procedures that are well known.

3 For example, I was taught these procedures in a
4 course at Oak Ridge, which I attended at the Oak Ridge
5 Institute of Nuclear Studies many years ago as a standard part
6 of the course, in the use, and the proper use of radioisotopes
7 and so on for biomedical research.

8 Decontamination procedures, of course, the simplest
9 would be the removal of external contamination particles,
10 radioactive particles by showering, by removing clothes, by
11 showering, by scrubbing the skin, and by being monitored
12 continuously while showering goes on, to get to a stage where
13 it is considered that the particles have been removed from
14 the skin.

15 BY MS. GALLAGHER:

16 Q Dr. Lyon, in your opinion, when one is
17 decontaminating in that way, is it necessary to divert the
18 waste water?

19 MR. PIGOTT: Mr. Chairman, I really think that we
20 have reached the point where to use up the afternoon allowing
21 this on the record is really counterproductive. I would
22 really submit rather than go through a series of objections
23 and ask for a rescission of some previous rulings, that
24 perhaps we simply ought to adjourn until tomorrow and have a
25 chance to look at the papers that have been submitted, and go

3
1 through the qualifications after a ruling has been made,
2 because I would submit that Intervenors are taking advantage of
3 this quiet time to put in testimony that is well beyond anything
4 that is contemplated under this issue.

5 MS. GALLAGHER: I have a perfectly serious reason
6 for asking the question. If you are talking about diverting
7 waste water, you are talking about facilities. We know that
8 the medical facilities, from the record, do not contemplate
9 doing that. I -- they are sending water back to the plant,
10 and that sort of thing. I am trying to determine what kind of
11 facilities we have, and I believe that it is proper for me to
12 inquire to the method in which they will deal with
13 decontamination.

14 MR. PIGOTT: I just submit we have reached a
15 point of diminishing returns, Mr. Chairman.

16 JUDGE KELLEY: Let us proceed for another ten
17 or fifteen minutes, and then we will quit for the day.

18 WITNESS LYON: In addition to decontamination
19 procedures for external radioactive particles, there is also
20 the question related to this of the treatment of wounds that
21 have been contaminated by radioactive materials, and that too
22 would be more or less the same kind of procedure, although
23 there would be certain medicaments that might be applied that
24 could be useful

25

4
1 BY MS. GALLAGHER:

2 Q Useful to mitigate the effects of the radiation?

3 A The wounds, and -- yes, and the effects of
4 radiation as well as of the wounding itself. That is an
5 ingress route, a route by which the contaminant can reach the
6 innards of the body, and so it has to be dealt with very
7 carefully.

8 In other words, an externally contaminated wound,
9 if not treated properly, or not treated at all could wind
10 up being a factor for internal problems.

11 In addition, there are the questions, really, of
12 what one does with people who are suffering radiation sickness,
13 and I submit that if you have a sufficiently large number of
14 people who have been hurt by radiation, and are correctly
15 defined as having suffered some acute effect, that these will
16 include radiation sickness cases, a good number of them, and
17 this would require not only symptomatic treatment, that is,
18 treating what you see before you, as the situation unfolds for
19 each individual patient, but they have to be observed to see
20 that no further consequences begin to develop that are not
21 taken care of promptly.

22 So, that might require not only outpatient treat-
23 ment, it might require the use of a considerable number of
24 beds, at least for a short time, until the critical stages,
25 initial stages are gotten over, and the observations indicated

1 that no further kinds of treatment would be required.
2 Another thing that might be very much involved, and this would
3 again depend on individual cases as assessed by the
4 physician for incoming patients, would be whether or not
5 certain anti-cancer therapies would be required.

6 Now, while it is true that the cancer may develop
7 later on, if appropriate treatment is taken early in an acute
8 stage, it is quite possible to mitigate considerably what the
9 subsequent consequences may be, and this is therefore a very
10 important issue without getting into the question of long-
11 term cancer development.

12 For example, for the protection of the thyroid,
13 it might be very useful and important to give potassium
14 iodide tablets, or even better Lugull's solution, which is
15 commonly used to suppress thyroid uptake of iodine.

16 Chelation therapy may be a very important
17 adjunct that could be used in certain cases as -- depending
18 upon the physician's assessment.

19 Chelation therapy is not something that can be
20 done just simply where somebody walks in, and then five
21 minutes or ten minutes later walks out.

22 This may require hospitalization, and certainly
23 observation and follow-up.

24 Q Would you tell us in more detail, please, about
25 what chelation therapy is?

6
1 A Chelation refers to a process in which certain
2 complex organic molecules called ligands are used to bind
3 selectively certain inorganic or metallic elements, or non-
4 metallic elements, and chelation therapy, for example, has
5 been instituted in some cases of lead poisoning, where you
6 can pull the lead out of the body, usually by virtue of
7 excretion through the kidney in the form of urine by the
8 appropriate use of chelated -- chelating materials, EGTA,
9 EDTA, and others that have been developed.

10 The problem with chelating therapy, and why it is
11 not something where you walk in and walk out is because the
12 chelating procedure can also pull away from the tissues other
13 vital elements that are needed for normal metabolism.

14 And so, in getting the chelation therapy, a
15 patient has to be monitored continuously, and observed
16 closely to make sure that in the process of removing elements
17 that are not good for one's health, those that are
18 radioactive, that you don't also pull away simultaneously
19 nonradioactive elements that are required for normal healthy
20 metabolism, which will certainly occur.

21 Because the ligands, the chelating materials, do
22 not distinguish between radioactive and non-radioactive
23 atoms.

24 The other thing is that this initial therapy
25 might involve the use of anti-oxidants, or the use of

7
1 substances like British anti-leucide, which are substances
2 that are very necessary because one of the effects of
3 radiation is causing the formation of oxidized products, and
4 anti-oxidants would scavenge these products away so they are
5 not left around to do tissue damage, or cellular damage.

6 A British anti-leucide is a nucleofilic (ph)
7 material which will scavenge electrons, and electrons are
8 produced by radiation damage in cells and tissues. That is
9 one of the key ways in which it is produced and propagated.
10 If you can scavenge these away from the decay events that are
11 radioactive decay events taking place in tissues, you may be
12 able to save tissues, and thereby organs, and thereby human
13 beings.

14 So, it seems to me that these procedures have to
15 be available in anticipation of a possible emergency, and they
16 would require both facilities for people who could walk in off
17 the street, or be brought in and move out under their own
18 power, ambulatory people, as well as people who will walk in
19 and may have to be put into beds and observed and taken
20 through various treatments in order to be able to release
21 them subsequently after let us say a few days or even a week
22 or so.

23 Q Are you familiar with the literature around
24 chelation therapy? It is quite controversial, as I
25 understand.

8

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

A Well, I hav actually used chelators in my own research, so I am familiar with this, and the thing that, for example, a classic example of the need to monitor carefully what happens in chelation therapy, is a person who has suffered, let us say from mercury poisoning, you put in a chelating material which will bind the mercury, and the mercury is going to then be excreted in chelated form through the kidney, and if you pull out the material too fast so the kidney is passing large amounts, concentrations of mercury through the kidney tissue in order to get rid of it from the body, the kidney cells will be damaged, actually killed, and you can actually destroy a kidney, so that chelation therapy is, as I say, is not something that you do like just popping a pill, and hoping that it is going to suppress the amount of iodine that gets into your thyroid.

tp20-1

1 Q I know that this is a difficult question, but
2 what percentage of physicians is familiar enough with chela-
3 tion to carry it on responsibly in this area?

4 A There are a few chelation research centers
5 throughout the country and it is in a very highly experimental
6 stage at present and the only times it is used, like in
7 mercury or lead poisoning, is in life-threatening situations
8 because, in effect, there is nothing else that can be used.
9 It is not used routinely precisely because of some of the
10 basic problems that I have already pointed out.

11 Q In addition to the various physical problems
12 which you have sketched for us, in your opinion, might there
13 be large numbers of people coming to outpatient departments
14 fearful of having been contaminated who may or may not have
15 been contaminated?

16 A I think that there is a very high probability
17 that there will be physician, nurse, hospital overloads on
18 that particular ground itself, that people will be uncertain
19 about whether or not they require treatment, will therefore
20 go to a hospital hoping to get some sort of screening
21 assessment as to whether or not they need treatment, and
22 that would certainly occupy time and facilities in order to
23 make that determination. That could be a factor in overloading
24 and even swamping available facilities and personnel.

25 Q You mentioned before the furnishing of radio-

2 1 protective drugs for thyroid -- to prevent thyroid uptake.
2 If there is contamination of the -- is it proper to speak
3 of contamination of the thyroid gland if it has taken up
4 radioactive iodine?

5 A I don't see any problem with that. That's one
6 way to describe it and if communication is what you are
7 after that communicates the idea.

8 Q So if the thyroid has been contaminated, what
9 other treatment options are available at that juncture?

10 A The problem, basically, is this, that many of
11 the iodines -- not all of them, but many of the radioiodines
12 are short half-life materials. The uptake by the thyroid
13 is extremely fast. Once the material gets into the blood
14 supply, for example, or even inhaled -- iodine can be inhaled
15 as a gas and then picked up in the blood, transported to the
16 thyroid -- the uptake is better than 70 to 80 percent in two
17 passes of the circulation. That means two times 30 seconds.
18 So within one minute, some 70 to 80 percent of the iodine
19 in the body is going to be in the thyroid gland. The uptake
20 is just that fast. And studies have demonstrated this over
21 and over again.

22 So if the radioactive material is short half-
23 lived and it gets in that fast, what is going to happen is
24 that it is going to dump its radioactivity very, very
25 quickly and damage cells very quickly and early on. The only

1 thing that could happen thereafter in order to make the use
2 of K-iolubol (?) solution mitigating in any extent is to
3 start giving it as quickly as possible after exposure to
4 radioiodines and then to continue giving it for long period
5 of time so that as those cells may die and then be replaced
6 that the cells that are replaced are not going to start
7 carrying through the damage from cell to cell, which is a
8 possibility also, as well as a mother cell being contaminated
9 and then reproducing daughter cells that are damaged.

10 Q In case of contamination of a thyroid gland is
11 there any value in flushing fluids through the system?

12 A That would be pretty hard to do because one of
13 the first steps of uptake after iodine enters the gland is
14 the conversion from inorganic iodide to organic iodine.
15 The organification reaction takes place extremely rapidly.
16 The enzyme systems that are there that carry this procedure
17 out work extremely rapidly. So as far as flushing is
18 concerned, I don't think that that begins to be a meaningful
19 kind of system. What you are really doing by putting
20 non-radioactive iodine into the body is to let that iodine
21 in large enough concentrations that compete with the radio-
22 active iodine for uptake. So that initial uptake is not
23 going to be eliminated, but if a person is standing in a
24 situation where they can be continually taking in radio-
25 iodine, to be able to have the competition with non-radio-

1 active iodine atoms would be extremely important. So the
2 long term effects are not too sanguine. That is, the
3 prospects, the prognosis would not be too good. But it can
4 mitigate somewhat by giving these non-radioactive iodine
5 compounds over a long period.

6 Q Would the hospital facilities about need to be
7 concerned with determining such things as the I believe it
8 is called LD 30-50 or is it 50-30?

9 A LD 50-30. No, that is a term -- LD refers to
10 lethal dose, 50-30 means 50 percent of the people would be
11 affected by a lethal dose and would die within 30 days.
12 That is used also in animal studies. So the LD 50-30 is
13 for humans considered around 450 rems, but that is a one-
14 time exposure. If a large number of people receive that
15 level of exposure at one time, the LD 50-30 says that 50
16 percent of them will die from that exposure within 30 days.

17 Q Is there any way in examining the results of
18 the studies that you have participated in, is there any
19 way that LD 50-30 measures can be extrapolated for that
20 from those figures? I know that you haven't had a chance
21 to think about this previously.

22 A Well, if you look at the data in 0490, that table
23 7.1.4-4, there are acute fatalities and there is a number
24 given for the number of person rems of exposure, but it is
25 difficult to pull out of that table what number of person rems

1 could be assignable to acute fatalities and what number would
2 be assignable to latent fatalities, because both would be
3 affected by the person rem dose, the dose to the general
4 population exposed. So I can't know that you could pull that
5 kind of a figure or an estimate of what that value would be
6 from that particular set of data.

7 Q Nevertheless, it would be a significant --

8 A It would certainly be a factor that would result
9 in acute fatalities.

10 Q Yes. What is it that determines the amount of
11 injury to the body when it is contaminated?

12 A Whether injury is external or internal, it is
13 generally assumed to be in direct proportion to the amount
14 of radioactive decay energy that is given up and absorbed
15 by the tissue that is affected. So that the higher the
16 energy level, the higher the damage to be expected. There
17 are differentiation in terms. For example, one talks about
18 the amount of radiation that can be absorbed. The radiatio.
19 absorbed dose, the RAD, is one unit. The rem, the roentgen
20 equivalent in man, is the unit that defines the dose effect.
21 So they are not necessarily on a one-to-one ratio, but they
22 generally are assumed to be one-to-one for x radiation,
23 gamma radiation, and beta radiation. They are not one-to-one
24 for alpha particles, protons and neutrons.

25 JUDGE KELLEY: Excuse me. We'd like to wind

1 this down for the day. I would like to put a question to
2 counsel. You don't have to answer it now, but you might
3 think it over. One of the problems that we seem to have
4 in talking about this subject when we get into numbers of
5 people affected, you necessarily, it seems to us, have to
6 be talking about some kind of accident, that is to say, an
7 accident involving a certain volume of release resulting in
8 a certain level of radiation.

9 And what we would like to ask you, quite simply,
10 is what is your accident.

11 MS. GALLAGHER: That's our study.

12 JUDGE KELLEY: Well, maybe we can get to that
13 tomorrow, but it seems to us that to get a handle on this
14 we need to have some notion of what you are talking about.
15 Now I am not sure -- this is Exhibit 10, right?

16 MS. GALLAGHER: Pardon me?

17 JUDGE KELLEY: When you say your study, you mean
18 Exhibit 10?

19 MS. GALLAGHER: Well, that is the preliminary
20 study. The other one is contained in Exhibit 9, in terms of
21 those graphs. We have transparencies in addition to those
22 that we didn't submit in Exhibit 9. But the other study,
23 the Los Angeles Federation of Scientists study, is only
24 contained in the exhibits in the results, the graphs. But
25 I think Dr. Lyon's study would be sufficiently illustrative

1 of the process by which the numbers are obtained to warrant
2 some attention tomorrow.

3 JUDGE KELLEY: Well, we don't want to put the
4 emphasis on the wrong syllable. I think our focus here is
5 on the adequacy of facilities and numbers and doctors and
6 things like that, and certainly not accident scenarios. But
7 you have to have something in mind in order to talk about
8 this meaningfully or at least that is a question that we
9 would raise. I'm not sure that the other parties would
10 agree with that.

11 Mr. Pigott, do you think we have to postulate
12 some kind of accident to talk about this?

13 MR. PIGOTT: I'd like to defer the answer until
14 tomorrow.

15 JUDGE KELLEY: Okay. I think the Staff has
16 spoken to this in some papers in the past, but we -- and
17 you can defer it also -- would like to know what you think
18 we ought to be assuming if we are going to talk about this
19 subject.

20 MR. HOEFLING: Fine.

21 JUDGE KELLEY: Doctor, can you come back tomorrow?

22 WITNESS LYON: What time would that be?

23 JUDGE KELLEY: Nine.

24 WITNESS LYON: Yes.

25 JUDGE KELLEY: Are there other matters to be

1 raised before we break?

2 Mrs. Gallagher, you'll do a markup. Can you get
3 that xeroxed and then have it handed out first thing so
4 people can look at it?

5 MS. GALLAGHER: Yes, I will.

6 JUDGE KELLEY: And we will think about it some
7 more. I guess that's it for this evening. We are adjourned.

8 (Thereupon, at 5:20 p.m., the hearing was
9 adjourned, to reconvene at 9:00 a.m., Tuesday, September 22,
10 1981, in the same location.)

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

NUCLEAR REGULATORY COMMISSION

This is to certify that the attached proceedings before the
NUCLEAR REGULATORY COMMISSION

in the matter of: Southern California Edison Company, et al (San Onofre
Nuclear Generating Stations, Units 2 and 3)

Date of Proceeding: September 21, 1981

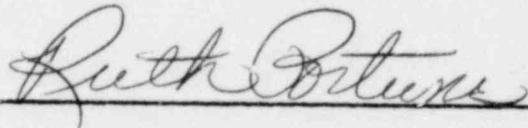
Docket Number: 50-361 OL, 50-362-OL

Place of Proceeding: Anaheim, California

were held as herein appears, and that this is the original transcript
thereof for the file of the Commission.

Ruth Portune

Official Reporter (Typed)



Official Reporter (Signature)