

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

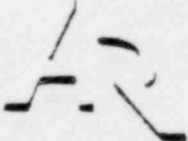
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DOCKET NOS. 50-361, OL
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1 UNITED STATES OF AMERICA
2 NUCLEAR REGULATORY COMMISSION
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5 In the Matter of: :
6 SOUTHERN CALIFORNIA EDISON COMPANY, et al. : Docket Nos.
7 (San. Onofre Nuclear Generating Station, : 50-361 OL
8 Units 2 and 3) : 50-362 OL
9 -----X

10 Orange County Ballroom 2
11 Marriott Hotel
12 700 W. Convention Way
13 Anaheim, California

14 Tuesday,
15 September 22, 1981

16 Evidentiary hearing in the above-entitled
17 matter was resumed, pursuant to adjournment, at 9:10 a.m.

18 BEFORE:

19 JAMES L. KELLEY, Chairman
20 Atomic Safety and Licensing Board

21 DR. CADET H. HAND, JR., Member

22 MRS. ELIZABETH B. JOHNSON, Member
23
24
25

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C O N T E N T S

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WITNESS

DIRECT

CROSS

REDIRECT

RECROSS

VOIR
DIRE

Irving Lyon (resumed)

by Ms. Gallagher 9686

by Mr. Pigott

9749

9817

9678

Marilyn Ditty

by Ms. Gallagher 9832

by Mr. Casey

9859

- - -

P R O C E E D I N G S

(9:10 a.m.)

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3 JUDGE KELLEY: On the record. Well, we adjourned
4 last night in the midst of some discussion of health effects,
5 medical services, and we left some open questions that I think
6 we ought to try to tie up first before we resume.

7 Mrs. Gallagher, we invited you to try your hand at
8 a revision of Dr. Lyons' materials in the light of our stated
9 interest in immediate health effects and our belief that we
10 ought not to address long-term effects.

11 I have since had an occasion to take a better
12 look, and at least as to the exhibit, I would think it would
13 be pretty hard to do, since it seems to talk about cancer
14 exclusively, but in any event, we did invite you to try, and
15 so how did that work out?

16 MS. GALLAGHER: In looking at the statement of
17 Dr. Lyon, it indeed was intended to address the more long-term
18 effects. However, it does also attempt to address the
19 problem of dose, which is applicable to short-term radiation
20 sickness, and so I have deleted references to cancer and I
21 think it needs enough of it intact to make it worth something.
22 I am not sure at this point how much.

23 JUDGE KELLEY: That is what we were shooting at,
24 to see if that would be the result. Have you been able to copy
25 it?

1 MS. GALLAGHER: I did not get to a xerox machine,
2 but I don't think it would be that difficult to do it here,
3 if that is --

4 JUDGE KELLEY: You mean you could just say, and
5 that we could all take our copy out and follow you along?

6 MS. GALLAGHER: Yes.

7 JUDGE KELLEY: Well, let us just do that. Hold on
8 just a moment, find mine. Okay.

9 MS. GALLAGHER: Okay, beginning on page two.

10 JUDGE KELLEY: Of the statement?

11 MS. GALLAGHER: Yes. The fifth line from the
12 bottom, beginning with "The results of this study," delete
13 that, and delete everything down to the second line from the
14 bottom, "in the course of evacuation."

15 JUDGE KELLEY: That is just one long sentence,
16 right?

17 MS. GALLAGHER: Yes. And then on page three,
18 third line, "my independent study," beginning with that, down
19 to the sixth line, "due to the postulated accident."

20 JUDGE KELLEY: Also one sentence.

21 MS. GALLAGHER: Also one sentence. Okay, then
22 about in the middle of the page, it says, "my conclusions show
23 that under conditions in which evacuation is undertaken
24 shortly after the release of a plume, cancer deaths would be
25 extensive," delete -- I wasn't sure if my option was only to

1 delete or also to substitute, because in terms of our figures,
2 we have been able to make some conversions to radiation illness
3 from these figures, and if I am allowed to just delete cancer
4 deaths, I could insert in that place radiation illnesses.

5 JUDGE KELLEY: Okay.

6 MS. GALLAGHER: Then on page four -- well, actually,
7 beginning at the bottom of page three, the paragraph, "In
8 determining the amount of radiation damage to the human body,
9 factors which are considered are the particular," and there is
10 a typo there. We have "are about twice." "particular
11 radionucleides to which one is exposed, the length of time of
12 the exposure, the age and general health of the exposed
13 person," delete "and the period of latency for the particular
14 kind of cancer."

15 Then in the middle of the page, delete all of the
16 references to the conservatisms.

17 JUDGE KELLEY: Where is that? Beginning where?

18 MS. GALLAGHER: Beginning, other reasons for
19 underestimates.

20 JUDGE KELLEY: And going how far?

21 MS. GALLAGHER: And going down to "a multiplication
22 of health damage in succeeding generations."

23 JUDGE KELLEY: Is that the whole -- no. I am not
24 clear yet. Is it the whole paragraph?

25 MS. GALLAGHER: Yes.

1 JUDGE KELLEY: The middle paragraph is out?

2 MS. GALLAGHER: Yes. And likewise, the final
3 paragraph.

4 JUDGE KELLEY: All right.

5 MR. PIGOTT: The last paragraph is out?

6 MS. GALLAGHER: Yes.

7 JUDGE KELLEY: To the end.

8 MS. GALLAGHER: Yes.

9 JUDGE KELLEY: Right. Well, we are on page five.

10 MS. GALLAGHER: Yes.

11 JUDGE KELLEY: Well, why don't we in the course of
12 the morning absorb this, and not attempt to comment right now.
13 I think it needs to be looked at. Well, let us be specific.
14 How about some comment from the parties after lunch as to
15 whether they agree with this editing or whether they feel that
16 it should be -- about whatever their views are.

17 MR. PIGOTT: It hasn't been offered yet anyway.

18 JUDGE KELLEY: I think we can assume it will be.

19 MR. PIGOTT: Yeah. Yes, it will, I am sure.

20 JUDGE KELLEY: I just don't want to take the time
21 now to debate it.

22 MR. PIGOTT: Well, is -- one further clarifying
23 question on page two, part of the deletion was including the
24 word "plume" with an asterisk, the asterisk I believe goes to
25 a series of calculations at the end on page five. I assume

1 that the footnote on the end of page five also goes?

2 MS. GALLAGHER: That really is -- I mean, it is a
3 basis for determining the volume of the plume, and without that,
4 you are going to, you know, not have that information.

5 MR. PIGOTT: But the plume language is deleted.

6 JUDGE KELLEY: That is right, and so is the foot-
7 note on page five, as far as I understood.

8 MS. GALLAGHER: Well, actually, there are probably
9 other references to the plume that I could shift to. Okay,
10 on page three, at about ten lines from the bottom, protection
11 from exposure to gases in the plume, if I may, I will put an
12 asterisk there, and say see page five, and that way we don't
13 lose that footnote.

14 JUDGE KELLEY: And the footnote is just a
15 calculation of --

16 MS. GALLAGHER: Of volume, which doesn't appear
17 elsewhere in the study.

18 JUDGE KELLEY: When you say volume, you mean --

19 MS. GALLAGHER: In cubic meters.

20 JUDGE KELLEY: -- in cubic feet, or meters? Okay,
21 that seems reasonable.

22 MS. GALLAGHER: Okay. Then as far as the working
23 study, which I believe was --

24 JUDGE KELLEY: That is Exhibit 10?

25 MS. GALLAGHER: Yes, Exhibit 10, page one is all

1 right as far as I can see. Page two is all right. Page
2 three is all right. The attached xeroxed pages are -- they
3 are mixed. The calculations having to do with doses can be
4 converted to radiation illness figures as well as to rems per
5 person.

6 Well, rems per person is still a radiation dose
7 thing, so it does not really apply exclusively to cancer. Then
8 we would just delete overall health injuries to adults and
9 selected sector -- subjected to airborne releases.

10 JUDGE KELLEY: Let me make sure I follow it. Now,
11 exactly where does this --

12 MS. GALLAGHER: And so that is at page four, at
13 following the -- see attached xerox pages five through ten.
14 At page four, and it is underlined. It says "overall health
15 injuries to adults in selected sectors subjected to airborne
16 releases.

17 JUDGE KELLEY: Everything on four after "overall
18 health injuries?

19 MS. GALLAGHER: Yes.

20 JUDGE KELLEY: What about -- then one goes to page
21 eleven, is that right?

22 MS. GALLAGHER: Yes, and at page eleven, again, it
23 probably isn't salvageable in these terms, because -- I mean,
24 it could be converted, but it -- the thrust of it really is
25 towards --

1 JUDGE KELLEY: I certainly thought it was to show
2 cancer.

3 MS. GALLAGHER: Well, it was, but I am trying to
4 point out that there is a conversion process that can be used
5 for dose that has other implications.

6 JUDGE KELLEY: Okay, well, I am not prejudging it,
7 but -- so you are saying that eleven would be out?

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1 MS. GALLAGHER: Yes.

2 JUDGE KELLEY: Okay. Now what are you saying --
3 perhaps you said, but I'm not sure I'm clear -- with regard
4 to the xerox page calculations?

5 MS. GALLAGHER: I believe they go only to doses.
6 If there are -- may I read them over during the break and if
7 there are out and out references to cancers, you know, it
8 goes without saying that I won't try to get those in.

9 JUDGE KELLEY: Okay. So we'll leave open the
10 question of the xerox pages until after the break. With that
11 information after the break we will have GUARD's proposed
12 revision of these two documents and we can hear from the
13 parties after lunch about their reactions, their positions
14 on whether these documents should be admitted.

15 MR. PIGOTT: What about -- we're not through,
16 are we?

17 JUDGE KELLEY: Well, what were you going to say?

18 MR. PIGOTT: I was looking at Exhibit No. 11 and
19 also the exhibit with the -- Exhibit 3 and I believe it is
20 9, with the three graphs.

21 JUDGE KELLEY: Okay. I was focusing on the ones
22 that Mrs. Gallagher was going to mark up, but let me see what
23 these others look like.

24 MR. PIGOTT: I'm just asking whether or not they
25 are also subject to modification.

2

1 JUDGE KELLEY: What is 3 again?

2 MR. PIGOTT: Three is that one superceded table

3 from a draft of -- the supplement to the draft.

4 JUDGE KELLEY: That's the draft environmental

5 statement, NUREG 0400-something?

6 MR. PIGOTT: No. It's one table from a draft

7 of the supplement. And it was later superceded.

8 JUDGE KELLEY: I understand.

9 MS. GALLAGHER: That one was admitted for purposes

10 of the risk analysis, which was the 4 percent.

11 MR. PIGOTT: It was admitted for the sole purpose

12 of showing what Dr. Plotkin looked at and no more than that,

13 not for the truth of what is stated there.

14 MS. GALLAGHER: Right.

15 JUDGE KELLEY: That was Dr. Plotkin's exhibit.

16 MR. PIGOTT: But I thought it was also being --

17 strike that. That one was also referred to, I think, by

18 Dr. Lyon when he was on the stand.

19 JUDGE KELLEY: I think we'll get to that. Right.

20 Now No. 9 is also one of Dr. Plotkin's -- initially one of

21 Dr. Plotkin's exhibits. I frankly am a little unclear. Has

22 No. 9 been offered?

23 MS. GALLAGHER: No. 9 will be offered again and

24 for Dr. Lyon.

25 JUDGE KELLEY: At the appropriate time.

3
1 MS. GALLAGHER: Yes. We could go through my
2 impression of what is admissible for purposes of not dealing
3 with long term effects.

4 JUDGE KELLEY: Just a moment.

5 (Pause)

6 JUDGE KELLEY: Well, as long as we have raised
7 it and you do intend to introduce it, perhaps you could --
8 let's speak to it now and perhaps we can resolve any dispute.

9 MS. GALLAGHER: No. 9, the first graph which is
10 labeled Radiation Dose Factor is acceptable for purposes of
11 dealing with radiation alone.

12 JUDGE KELLEY: I'm sorry. Could you repeat that,
13 please?

14 MS. GALLAGHER: The first graph, which is labeled
15 Radiation Dose Factor, and it says "weighting factor versus
16 effect of time", that has only to do with dose and so that
17 should be acceptable.

18 JUDGE KELLEY: Dose from what? Is this an acci-
19 dental release dose?

20 MS. GALLAGHER: This is a curve of postulated
21 releases, from NRC data.

22 JUDGE KELLEY: From an accident of some kind.
23 Now can we tie this down? Which accident is this?

24 MS. GALLAGHER: It is the selected range of
25 accidents that NRC has arranged along some kind of distribution

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1 curve. There is PWR 1 through 9.

2 JUDGE KELLEY: This is an amalgam of 1 through 9,
3 as it were?

4 MS. GALLAGHER: And it is a 1 percent release
5 between PWR 1 and PWR 9.

6 JUDGE KELLEY: And is this in the environmental
7 statement or where did it come from?

8 MS. GALLAGHER: Yes. It's from the final envi-
9 ronmental statement.

10 JUDGE KELLEY: The FES.

11 MS. GALLAGHER: Yes.

12 JUDGE KELLEY: Can you give me a page reference?

13 MS. GALLAGHER: It appears in both the draft and
14 the final. It is Table 7.3 and it is labeled Summary of
15 Atmospheric Release Categories Representing Hypothetical
16 Accidents in a PWR.

17 JUDGE KELLEY: Okay. We've tied down just what
18 it is. Counsel will have their opportunity to object, if they
19 wish, to its use. So that's the first one. And the second
20 one is what?

21 MS. GALLAGHER: The second one is labeled
22 Radiation Dose Versus Evacuation Time, and that, again, is
23 merely a dose projection.

24 JUDGE KELLEY: Does this also have an NRC source
25 or is this --

5

1 MS. GALLAGHER: Also. All of our figures are
2 from NRC sources.

3 JUDGE KELLEY: Okay. And can you nail down just
4 precisely what that is from?

5 MS. GALLAGHER: The same table. And also the
6 dose manual, the Nuclear Regulatory Guide 1.109, Dose
7 Calculation Manual, I believe.

8 JUDGE KELLEY: But it is in the FES, the same
9 table?

10 MS. GALLAGHER: Yes.

11 JUDGE KELLEY: Okay.

12 MS. GALLAGHER: No. 3 we will not offer.

13 JUDGE KELLEY: That's a cancer curve, right?

14 MS. GALLAGHER: Yes.

15 JUDGE KELLEY: Well, that's helpful to know what
16 this is. Do we at this point -- and forgive me for asking;
17 I did this yesterday, a day I wasn't remembering too well --
18 are any of Dr. Lyon's exhibits in at this point or have they
19 been offered? Have we gotten to the exhibits?

20 MS. GALLAGHER: No, I don't believe they have been
21 offered.

22 JUDGE KELLEY: They were numbered, I know. You
23 numbered them early on. But we haven't gotten to the
24 identification.

25 MS. GALLAGHER: Right.

6
1 JUDGE KELLEY: Well, it seems to me we may be a
2 little premature in having argument on this now because we
3 might be able to lay a little more groundwork for where we
4 are going and where this might fit before we speak to that.
5 But we have at least clarified exactly where Exhibit 9 came
6 from.

7 Now Exhibit 11, the title would suggest would not
8 be in by virtue of our ruling on long term effects.

9 MS. GALLAGHER: That's correct. We have another
10 11, though, a substitute 11. It is from the New England
11 Journal of Medicine and it is called "Fetal Radiation Syndrome
12 from an Accidental Nuclear Excursion".

13 JUDGE KELLEY: Is that distributed?

14 MS. GALLAGHER: I will distribute it now.

15 JUDGE KELLEY: Okay.

16 (Pause while the documents are distributed.)

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1 MR. PIGOTT: Is this to be identified as an
2 exhibit?

3 MS. GALLAGHER: This is Exhibit Number 11. It
4 is a substitute for the previous number 11.

5 MR. PIGOTT: Can we just call it 12?

6 MS. GALLAGHER: Oh, sure.

7 JUDGE KELLEY: Does that make things simpler --

8 MR. PIGOTT: It is a little easier.

9 JUDGE KELLEY: We will call it 12, right.

10 Okay, another question that we raised yesterday
11 and left with you overnight is the question whether it is
12 appropriate or permissible to -- in the context of a case
13 like this, to postulate the occurrence of a very serious
14 radiological accident -- the kind of accident that might
15 have once have been described as a class nine accident in
16 order to test the adequacy of the arrangements that have
17 been made for medical services.

18 Mrs. Gallagher, I raise the question that way
19 because I understand that that -- I think that is a fair
20 statement of what you would like to do. Isn't it your
21 position that you are postulating a serious accident with
22 large releases and high -- and I am choosing these words
23 sort of neutrally -- high exposure rates in the EPZ in order
24 to test the adequacy of medical services. Is that a fair
25 statement?

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1 MS. GALLAGHER: Well, it is a fair statement if
2 it is understood that the accidents that we are postulating
3 are well within the range of postulated accidents that the
4 NRC itself has dealt with. This is not -- these are not
5 class nine accidents.

6 JUDGE KELLEY: Let's -- but let's see if we can't
7 nail down -- we got a legal issue before us, and I think
8 I understand the thrust of some of the parties' positions,
9 but in order to argue about this as clearly and precisely
10 as we can, let's nail down first just what accidents you have
11 got in mind.

12 Now, in the first place, let's not unduly muddy
13 the water with the term class nine. The Commission withdrew
14 that term. It never was a very clear term. It is no longer
15 a term of the Board. And let's stick with the term serious
16 radiological accidents, the Board would say of low likelihood
17 without going any further.

18 MS. GALLAGHER: That is a fair description.

19 JUDGE KELLEY: Now, okay. That is a fair
20 general statement. Now, with reference to the testimony
21 that -- well, would be in your exhibits already and what
22 you would propose to adduce here further, is there a
23 specific accident that you are using as a reference point?

24 MS. GALLAGHER: There is not one specific
25 accident. There is that table that uses and amalgam of

k3

1 accidents, as you said. We are within serious accidents
2 that are postulated by the NRC and do appear in the FES.

3 JUDGE KELLEY: I understand that. There is no
4 quarrel. Everybody will stipulate that they are there.
5 And the question, I think -- the question then is, are they
6 appropriately used in this fashion? Now, the amalgam acci-
7 dents -- could you explain that a little more for our bene-
8 fit? Is this an average of -- this is all the way from the
9 most horrendous accident you can think of to a fairly minor
10 accident, is that correct?

11 MS. GALLAGHER: No, I believe our witness could
12 speak to that --

13 JUDGE KELLEY: Fine.

14 MS. GALLAGHER: -- better than I can.

15 JUDGE KELLEY: That would be fine. Could you
16 tell us, when we look at that curve that is a representation
17 of releases from accidents all the way from TWR one to nine,
18 is that an average of releases, or just what is it?

19 WITNESS LYON: No, what we did is -- my name is
20 Irving Lyon, and I am appearing as a subpoenaed witness for
21 the Intervenors.

22 MR. PIGOTT: This is not testimony, however?

23 JUDGE KELLEY: No, this is explanation so we
24 can -- we are leading up to a legal argument on what one
25 does with accidents in this context.

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1 WITNESS LYON: What I did was refer to the
2 table giving the fraction of core inventory released for
3 different release category accidents, and looking at those
4 numbers I selected a one percent release level as being
5 more or less representative of the entire range of accident
6 categories that are listed.

7 For example, if you look at the xenons and
8 cryptons that are released, the noble gases, for PWR one,
9 they list a 90 percent release of the core inventory. For
10 radioiodines on that same line, a 70 percent release and so
11 on, and the releases go very low down, to about three times
12 ten to the minus three for the rare earth group, of which
13 lanthanum is a rare example.

14 If you then look at PWR nine, which would be
15 one of the other bounds of the accident categories under
16 consideration, and far less serious, then you see very low
17 percentages all the way across, so that when you get to the
18 rethenium and lanthanum groups, there is essentially no
19 fraction that is released.

20 Looking at those numbers as a whole and arbi-
21 trarily selecting one percent, I felt that I was within the
22 envelope defined by PWR one and PWR nine.

23 JUDGE KELLEY: Is this an attempt, and let me
24 just say that my -- this is an area where I am groping. I
25 am not an accident analyst at all. The Board members are.

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1 Why don't you ask the questions?

2 Is it fair to say that the releases that your
3 calculations produce here, for purposes of postulating an
4 accident are in the middle, between the worst case and the
5 fairly common case?

6 WITNESS LYON: Since the individual levels of
7 the various groups of radionuclides vary from very high
8 levels of fraction of core inventory release for PWR one,
9 to very low levels, the point at which one percent resides
10 for each group of radionuclides varies in each of those
11 columns --

12 JUDGE KELLEY: Okay.

13 WITNESS LYON: -- so that if, for example, one
14 percent falls within the distance between PWR six and PWR
15 seven for the noble gases, it may fall in the distance be-
16 tween PWR four and PWR three for the radioiodines. It may
17 fall as it does for the cesium rubidium group in the range
18 between PWR three and PWR four, so it falls at different
19 points throughout the various groups, but it is never at the
20 highest and never at the lowest, so it is well within the
21 envelope of postulated accidents in this range. Most of
22 them would appear to be -- with the exception of the noble
23 gases, in the range of about PWR three to four. And for the
24 noble gases in the range of PWR six to seven.

25 JUDGE KELLEY: But as a result of all this --

k6

1 let me ask the question in a different way. If you were
2 then going to analyze the likelihood of a certain kind of
3 radiation injury, say radiation sickness requiring hospital-
4 ization, do you have some person rem number, six miles out,
5 that is a single number, or do you have nine different rem
6 numbers?

7 WITNESS LYON: No. We have a single number that
8 we have used and calculated from this approach, and I will
9 be able to demonstrate later, I am sure to the Board's satis-
10 faction, that this number is very consistent with the NRC's
11 own estimates.

12 JUDGE KELLEY: It is a single composite, if you
13 will --

14 WITNESS LYON: Yes.

15 JUDGE KELLEY: -- accident. Okay.

16 MR. PIGOTT: If I might point out, Mr. Kelley,
17 that the accident set forth in table 7.3, and the people at
18 the Staff's table know this better than anyone, the accidents
19 pointed out at 7.3 PWR one through PWR nine, are all what
20 would previously have been referred to as class nine events.
21 They are the very severe, low probability events. If one
22 goes to the discussion behind the table, it is there set
23 forth pretty clearly that what they are doing in this chapter
24 in this whole section, 7.1.4.2, discusses these severe acci-
25 dents heretofore frequently called class nine accidents can

k7

1 be distinguished, et cetera, so what Dr. Lyons is talking
2 about is a spectrum of accidents all right, but it is a
3 very -- it is a spectrum of the very severe accidents. It
4 is not a spectrum of all the accidents to be considered for
5 emergency planning purposes.

6 JUDGE KELLEY: Fine.

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1 DR. LYON: May I comment on that?

2 JUDGE KELLEY: Yes.

3 DR. LYON: That is correct. However, in the text
4 of the final environmental report, there is the statement that
5 these accidents which have low probability, the probabilities
6 may be off by factors of a hundred or so. So, while that may
7 still leave them as low probability accidents, the purpose of
8 our using this kind of information is not to define what kind
9 of accidents will occur, but we are assuming that in the worst
10 case accident, we have a certain kind of result which we have
11 to plan for in the emergency situation, and that is what we
12 are attempting to demonstrate.

13 JUDGE KELLEY: Okay. Well, I think what I wanted
14 to do initially was nail down just what accident you are
15 talking about, and I think that that seems reasonably clear to
16 me.

17 Well, you are the proponent, Mrs. Gallagher, and
18 I -- we have laid out at least the accidents. Why don't I
19 turn to the other parties and let them speak to the legal
20 question that is posed, and then you will have a chance to
21 reply and the Board will deal with it.

22 The issue as we see it is whether postulation of
23 an accident of this nature is appropriate in considering the
24 adequacy of the arrangements that have been made for medical
25 services in this case. Mr. Pigott?

1 MR. PIGOTT: Certainly. Let me back up just
2 slightly so that I am sure I am in the -- have a complete
3 story as to what we are dealing with here. We have, I believe
4 on the record yesterday a determination that this evidence
5 would not be admissible under emergency planning contention
6 number one, and we are therefore looking to whether this
7 testimony can be squeezed in under emergency planning
8 contention number 2(d), which refers to the arrangements for
9 medical services for contaminated and injured individuals,
10 10 CFR 50.47(b)(12).

11 I think as a introduction to determining whether
12 or not this particular accident, as explained to us by Mrs.
13 Gallagher and Dr. Lyon is appropriate for consideration under
14 this issue, we should perhaps go back and attempt to determine
15 what it is that is intended under 10 CFR 47 (b)(12), and I
16 would direct the Board's attention to NUREG 0654, which may not
17 be an absolute regulation, but as the footnote to the
18 regulations indicate, it does set forth the criteria to be
19 used in evaluating emergency response plans.

20 And --

21 JUDGE KELLEY: What footnote is that?

22 MR. PIGOTT: That is footnote number 1, I believe,
23 in 10 CFR 50.47(b).

24 JUDGE KELLEY: It may sound like nitpicking, but --

25 MR. PIGOTT: No, this is an important nit. This

1 footnote is an important part of these regulations, and I
2 think we should be clear on what they mean.

3 JUDGE KELLEY: It says these standards, meaning the
4 (b) standards, are addressed by a specific criteria in NUREG
5 654.

6 MR. PIGOTT: Correct. And I am not saying they are
7 a part of the regulations. I do say, however, that the
8 Commission intended these guidance -- these criteria to be
9 rather particularized guidance, but that is only one aspect,
10 I think. There is more to look at.

11 Looking at the language alone, we are talking about,
12 on the face of the language in 12, we are talking about
13 arrangements for contaminated injured individuals. We are
14 also talking about emergency responses. We are not talking
15 about long-term responses.

16 So, if one looks only at the language of the
17 regulations, I believe you can construe from there that you
18 are looking at emergency responses for contaminated injured
19 individuals. Now --

20 JUDGE HAND: It is not "an" individual. It is
21 contaminated, injured --

22 MR. PIGOTT: Contaminated, injured individuals.

23 JUDGE HAND: Thank you.

24 JUDGE KELLEY: That is kind of inartful, isn't it?
25 There isn't even a comma in there. Is that two kinds of

1 individuals, contaminated and radiation-injured?

2 MR. PIGOTT: I think it is one person, an injured
3 and contaminated, contaminated-injured individual.

4 JUDGE KELLEY: And only one? No, you can't mean
5 that.

6 MR. PIGOTT: No, it is individuals plural.

7 MS. GALLAGHER: One is easier.

8 MR. PIGOTT: Then when one --

9 JUDGE KELLEY: Do you mean it is only by
10 contamination?

11 MR. PIGOTT: For these arrangements. I think if
12 you go to Appendix E, you will find general arrangements for
13 a more general type of a requirement for arrangement, but I
14 think when we are looking at these regulations, and when you
15 are looking at Section 12, you are looking at the contaminated
16 injured person, the person who has sustained some kind of a
17 non-radiation-related injury, possibly radiation, purely
18 radiation, but is also contaminated, and for that person you
19 have to have some kind of a special arrangement in order to
20 be able to treat them.

21 But we are not talking about general contamination
22 to the whole population, which is where I was going to go to
23 next.

24 JUDGE KELLEY: Okay, go ahead.

25 MR. PIGOTT: And that, I think, is shown on page

1 six of NUREG 0654, which is a section entitled planning basis.
2 If we take a look at the top on the left-hand side, it says
3 that NRC policy statement of October 23, 1979, 44 Federal
4 Register 61123, directs the NRC Staff to incorporate the
5 guidance in the report into emergency preparedness documents.

6 They are there referring to the guidance as --
7 referred to on the previous page, NUREG 0396. NUREG 0396 is
8 above simply a guidance document. It is a policy document,
9 which was adopted under that Federal Register notice, that is
10 referred to on page 6 of NUREG 0654. Now, when we go to --

11 JUDGE KELLEY: I am afraid you are losing me.

12 MR. PIGOTT: Okay.

13 JUDGE KELLEY: I am sure if you go slow enough,
14 I will be able to follow.

15 MR. PIGOTT: Going to page five, and see, they
16 refer to 0396.

17 JUDGE KELLEY: Right.

18 MR. PIGOTT: 0396, as further stated on page six,
19 is a policy statement of the NRC.

20 JUDGE KELLEY: Of the Commission itself.

21 MR. PIGOTT: Yes, that is the Federal Register
22 notice that is referred to, 44 Federal Register 61123.

23 JUDGE KELLEY: Do you have a copy of that notice?

24 MR. PIGOTT: I do not have the copy of that with
25 me. I can get it. However, so that that particular NUREG --

1 and perhaps Staff can confirm this -- goes above simply a
2 Staff guidance document. It has been adopted as a policy
3 document, and the Staff was told to put together their
4 emergency planning regulations according to the criteria set
5 forth in that policy document, and that is why it is
6 referred to here as a planning basis.

7 Now, when we go to 0396, and they also have a
8 section entitled, "Recommended planning basis."

9 JUDGE HAND: Did you mean 0396?

10 MR. PIGOTT: Yes. And 0396 has some specific
11 examples of -- I refer to page 14 of the document, and read:

12 "The EPZ guidance does not change the requirements
13 for emergency planning. It only sets bounds on the planning
14 problem. The task force does not (underlined) recommend
15 that massive emergency preparedness programs be established
16 around all nuclear stations -- nuclear power stations. The
17 following examples are given to further clarify the task
18 force guidance on EPZ's," and I won't read them all, but for
19 instance:

20 "No construction of specially equipped fallout
21 shelters; no special radiological medical provisions for the
22 general public; no new construction of special public
23 facilities for emergency use."

24 I think that especially the one, no special
25 radiological medical provisions for the general public is

1 again indicative of the fact that we are expected to be
2 dealing with a very narrow segment of the population for
3 planning purposes, the injured contaminated persons directly
4 involved in an accident, not the general public as a part of
5 your pre-planning.

6 So, ending that particular portion of the argument,
7 I would say that if we have an issue as it is stated under
8 50.47(b)(12), it is a rather restricted group of people that
9 we are looking at to see whether or not we have arrangements.
10 We are looking at arrangements for those people who would be
11 injured and contaminated.

12 But what is more important in the context that
13 the Intervenors are trying to put it, is that it is one thing
14 that it is not. It is not a requirement to prepare, plan, and
15 build facilities for potential damage to the general public,
16 which is, I think not unfairly, the thrust of the Intervenors'
17 attempt here.

18 Now, moving on to the accident to be looked at, and
19 I think it is clear that the accident they are looking at is
20 some combination or -- I am not really sure what it is yet.
21 Maybe we will get to have to look at it. But it is certainly
22 not a wide spectrum of accidents. It is a combination,
23 apparently, of very severe low probability accidents, and I
24 would direct the Board's attention now to the paragraph
25 starting in the middle of page six of NUREG 0654.

1 Where it says specifically: "No single specific
2 accident sequence should be isolated as the one for which to
3 plan, because each accident could have further different
4 consequences, both in nature and degree," and if one reads on
5 in that same section, towards the end of it, it becomes very
6 clear that what we are to plan for, the Applicants are to plan
7 for, is a broad range of accidents, starting from the -- what
8 used to be referred to as design basis accidents, but with
9 some consideration, although not necessarily specific pre-
10 planning for the severe low probability accidents, and for
11 that reason, we would submit that predicating emergency
12 planning requirements on the low probability very severe
13 accident that has been postulated by the Intervenors is
14 beyond the scope or the contemplation of the requirements of
15 the regulation, subpart b(12) that we have been discussing.

16 JUDGE HAND: Mr. Pigott, this seems to add up to
17 the fact that your interpretation of the regulations is that
18 you must plan only for design basis accidents. Is that
19 another way to say it? That these that go beyond the design
20 basis, such as the table that we mentioned, this table 7.3
21 from the FES, that these are beyond the sorts of things that
22 the regulations require you to plan for, in terms of
23 emergency planning?

24 MR. PIGOTT: I wouldn't want to say flatly that
25 we are only looking at design basis accidents, because that has

1 a -- that limits the scope of -- I think that there are areas
2 where you looked -- where you look beyond that, but you look at
3 it in a wide -- in a wide range.

4 For instance, in coming to the 10-mile radius on
5 your EPZ, that essentially assumes that for most accidents,
6 that there is no immediate fatality within that 10-mile area,
7 but they are not totally disregarding the very low probability,
8 very severe accidents, and -- but those are the ones where
9 they say that once you have this kind of planning in place,
10 then you can take care of it on an ad hoc kind of a basis, so
11 they are not disregarded, and so you can't say just flat out
12 that you are confining yourself to design basis. You are
13 considering these large accidents, but you are not designing
14 your emergency preparedness for these large low-possibility
15 accidents.

16 JUDGE HAND: In other words, you might evacuate
17 for a very minor accident, and you would for a very large
18 accident, so that the extent that the evacuation plan is in
19 place, the preparedness is in place.

20 MR. PIGOTT: That is correct, for all ranges of
21 accidents.

22 JUDGE HAND: Yes.

23 MR. PIGOTT: But I think it is pretty --

24 JUDGE HAND: But you are not extending, then, the
25 thing that I gather you are objecting to, is the possibility

1 that we might conclude there would be some thousands or
2 hundreds of thousands, or something, of people, needing
3 decontamination, and that is the kind of thing that you are
4 saying that you can't prepare for, you have not planned for.

5 MR. PIGOTT: That is right, nor are we required
6 to plan for.

7 JUDGE KELLEY: Now, just a comment on the last
8 comment. I suppose that -- and I think I -- I am sure my
9 colleagues will speak up if I am departing at all from our
10 common understanding, but I don't think I am. Even assuming,
11 assuming for the moment that you got into proof of a very
12 serious class 9 accident in which there were lots and lots of
13 contaminated injured people, beyond the capabilities of
14 readily available hospitals and clinics and the like.

15 I think we as a Board are not suggesting that one
16 goes out and one builds clinics and buys pills, and whatever
17 else, for the worst conceivable accident, and has hospital
18 beds lying in wait just in case that might happen. That is
19 not the direction in which, I think, we would want to go in
20 exploring this kind of an issue. So that, I think, is a
21 straw man, to suggest that that would have to be done. Is
22 that fair?

23 JUDGE JOHNSON: Yes.

24 JUDGE HAND: Uh-huh.

25 JUDGE KELLEY: But it remains whether some

1 consideration -- one can debate and we will hear some further
2 debate about whether one ought to consider serious actions.

3 Mr. Pigott, I must say that it is true, is it not,
4 that these emergency planning regulations are an outgrowth,
5 in a broad sense, of TMI?

6 MR. PIGOTT: No question.

7 JUDGE KELLEY: A very serious accident.

8 MR. PIGOTT: More serious than had been --

9 JUDGE KELLEY: Anybody ever thought would happen.
10 Maybe that is a little bit too strong, but --

11 MR. PIGOTT: I think that is too strong.

12 JUDGE KELLEY: Okay.

13 MR. PIGOTT: We have a habit of doing that in here
14 don't we; I do, anyway.

15 JUDGE KELLEY: I do, too.

16 MR. PIGOTT: It is an outgrowth of TMI, and it is
17 to factor in a consideration of the very severe accidents, and
18 I think that is being done, and has been done, but I guess
19 what I object to is the apparent attempt to predicate our
20 planning on some combination accident in the very severe low
21 probability area, which is pretty clearly where it has been
22 taken from when one addresses table 7-3 in the final
23 environmental statement.

24

25

tp5-1

1 JUDGE KELLEY: Well, it might be in part to
2 predicate planning; it might be in part simply to put the
3 cards on the table so that the Board decides this case,
4 however they are going to decide it, in the light of the
5 available, relevant information, some of it suggesting
6 injuries in the wake of the serious accident.

7 MR. PIGOTT: That is the background against
8 which NUREG 0654 and all our planning is done. It is done
9 based on the kinds of accidents set forth in Chapter 7. I
10 guess if you really focus that what Intervenors to me are
11 trying to do is to contest or to litigate the consequences
12 in Chapter 7 of the final environmental statement. We are
13 not really back to talking about emergency preparedness.

14 JUDGE KELLEY: All this Board is interested in is
15 emergency preparedness.

16 MR. PIGOTT: Well, I think all the Intervenors
17 are interested in is the impacts under Chapter 7 of FES.

18 JUDGE KELLEY: Just one other question that I
19 have. In your interpretation of subpart 12 I understood you
20 to say that it was really only concerned with contamination
21 problems and people who would be contaminated as a result of
22 accident and that is at least not very likely to be the
23 general public. Is that provision really addressed to plant
24 personnel?

25 MR. PIGOTT: It would probably be plant personnel,

2
1 given the realities of the situations, or somebody who might
2 be in the very near vicinity to fall into that category,
3 because I think, as we've had testimony, the radiation has
4 to be very high and very severe before it alone requires
5 hospitalization and treatment. If one is looking for injured
6 and contaminated, perhaps somebody could be injured in that
7 traditional sense in the area of a plume and fall into that
8 category. But I think primarily it would be people very
9 close to the reactor that would be subject to taking advantage
10 of those arrangements.

11 But to the extent a member of the general public
12 is contaminated and injured and needs hospitalization, then
13 obviously that pre-planning works in their favor. They are
14 going to go to the same kinds of hospitals and take advantage
15 of the same kind of treatment facilities.

16 JUDGE KELLEY: But you are saying-- I know you
17 had extensive testimony here from Dr. Linnemann and I believe
18 somebody else and I'm still trying to get at this idea of
19 medical arrangements for the general public in the event of
20 a serious accident and a large release. Are you saying that
21 you don't have to make any arrangements at all for the general
22 public let's say five miles away?

23 MR. PIGOTT: Not as -- no. No particular arrange-
24 ments for the general public for that decontamination. That
25 is correct. Now we factor that into our evacuation planning

3
1 and we certainly consider it as a matter of responsibility,
2 but I don't believe that there is a specific regulatory re-
3 quirement that we preplan contamination facilities for the
4 general public.

5 JUDGE KELLEY: Well, quoting the law at each other
6 again, 5047(a)(1) speaks of a finding, on-site and off-site
7 emergency preparedness provides a reasonable assurance that
8 adequate protective measures can and will be taken. That
9 is the overall standard that we are to apply and the overall
10 finding that we've got to make. And then we are told to look
11 at standards in (b), and (b) speaks generally of contaminated
12 individuals. I would have thought that meant the general
13 public, from the context.

14 MR. PIGOTT: There is provision for the general
15 public, certainly, by way of the off-site, all the different
16 kinds of plans and communications and other procedures that
17 are discussed in there. But when you get to the specific
18 question of do we have a requirement to provide for decontam-
19 ination of the general public as a part of our preplanning,
20 I think my answer is still in the negative. Not in a hospital.

21 Again, I can only point you once again to page
22 69 in NUREG 0654, which is the evaluation criteria for meeting
23 Section (b)(12). It does not call for that kind of arrange-
24 ment. It calls for organization with local hospitals, first
25 aid capability on-site. You know, they are easily read but

4
1 they certainly do not go to or contemplate a requirement of
2 general decontamination.

3 JUDGE KELLEY: Mr. Hoefling?

4 MR. HOEFLING: Yes, Mr. Chairman. The Staff
5 would comment that we should approach this question by looking
6 at the issue that we have in controversy, which is Contention
7 2(d), and examine that issue to see what its scope is. We
8 are talking about 5047(b)(12). The contention reads:
9 "Arrangements for medical services for contaminated and
10 injured individuals." To appreciate the scope of that issue,
11 which the Staff would argue is narrow, I would point the Board
12 to Appendix E, Part 50, Section 4, Content of Emergency
13 Plans, E, Emergency Facilities and Equipment. And I think
14 a reading of those subparagraphs would be helpful.

15 Subparagraphs call for equipment for the -- I'm
16 reading Subparagraph 3 -- facilities and supplies at the
17 site for decontamination of on-site individuals; 4, facilities
18 and medical supplies at the site for appropriate emergency
19 first aid treatment.

20 JUDGE KELLEY: Let me catch up with you. Is that
21 4-11?

22 MR. HOEFLING: That is IV(e), Emergency Facilities
23 and Equipment. I am reading Subparagraph 3. Subparagraph
24 4, Facilities and medical supplies at the site for appropriate
25 emergency first aid treatment. Subparagraph 5, arrangements

5

1 for services of physicians and other medical personnel
2 qualified to handle radiation emergencies on-site. Six,
3 arrangements for transportation of contaminated injured
4 individuals -- the language of the planning standard --
5 from the site to specifically identify treatment facilities
6 outside the site boundary. Arrangements for treatment of
7 individuals injured in support of licensed activities on
8 the site at treatment facilities outside the site boundary.

9 Now I realize that the contention is framed in
10 a context of planning standard 5047(b)(12). But Appendix
11 E here, under Content of Emergency Plans, and under Emergency
12 Facilities and Equipment, does set out the kinds of facilities
13 and equipment that must be in place to have an adequate
14 emergency plan and it speaks to the type of a situation
15 where an individual receives a radiation injury, contamination,
16 complicated by an injury, and it speaks of that in terms of
17 on site. Now certainly if those arrangements are in place
18 and we have a substantial radiation injury those facilities
19 would be available to individuals off-site as well.

20 I raise this reference to Appendix E to illuminate
21 what the planning standard would require which, in the Staff's
22 view, is a much more limited requirement than being advocated
23 by GUARD that there be some type of in-place medical arrange-
24 ments for dealing with tens of thousands of people.

25 I would go on to comment --

6
1 JUDGE KELLEY: I think it is helpful that you
2 point this out. This list of matters under IV(e), now is
3 that -- my question is it seems to be keyed to the on-site
4 plan. Have you got a similar laundry list for what off-site
5 plans are supposed to contain?

6 MR. HOEFLING: No. I think that --

7 JUDGE KELLEY: That whole section talks about
8 the site, so obviously it makes sense that it would refer to
9 the site.

10 MR. HOEFLING: That's true. And I think the
11 reference that I pointed out in one of the subparagraphs to
12 the contaminated injured individuals speaks in the context
13 of planning standard (b)(12).

14 JUDGE KELLEY: It uses the same phrase.

15 MR. HOEFLING: Uses the same phrase.

16 JUDGE KELLEY: Is it your understanding of the
17 Staff's position that contaminated injured individual is one
18 and the same person or are there two different kinds of
19 injured people involved there?

20 MR. HOEFLING: Well, I think that we are dealing
21 with an individual who has received an injury complicated by
22 radiation. Now I think that the term is broad enough to
23 include an injury with a contaminated wound or just an exces-
24 sive radiation dose without a wound.

25 JUDGE KELLEY: And someone who has gotten an

7
1 excessive dose would be covered?

2 MR. HOEFLING: I would argue yes.

3 JUDGE KELLEY: Not necessarily contaminated.

4 MR. HOEFLING: That's correct.

5 JUDGE KELLEY: Okay. Two different people.

6 MR. HOEFLING: Right.

7 I go on to discuss --

8 JUDGE KELLEY: I would like to stick with you
9 just a minute now. I don't know what to make exactly of this
10 IV(e) that you have cited. I think it is a helpful citation,
11 but does this go beyond the site plan? It doesn't appear to.

12 MR. HOEFLING: The Staff would argue that we do
13 have these regulations in place and they are quite specific
14 as to what is required in terms of emergency facilities.
15 True, it speaks to what emergency facilities are required
16 to be in place under the auspices of the applicant, but the
17 regulations are definitive with respect to that point. And
18 the Staff would argue that that limits or in effect bounds
19 the emergency facilities that are required under the
20 Commission's regulations.

21 JUDGE KELLEY: So that if you have facilities
22 at the site for people injured at the site, that's all you
23 need?

24 MR. HOEFLING: No, at the site and other facilities
25 arranged to handle individuals injured at the site, as I --

8
1 JUDGE KELLEY: Site injuries.

2 MR. HOEFLING: Yes.

3 JUDGE KELLEY: Not public injuries.

4 MR. HOEFLING: That's correct.

5 JUDGE KELLEY: Okay. Go ahead. I'm sorry.

6 MR. HOEFLING: I would go on to --

7 MR. PIGOTT: Excuse me, before you leave that
8 point, Mr. Hoefling -- I'm sorry -- is the question whether
9 or not Appendix E goes beyond the site?

10 JUDGE KELLEY: I guess that's one way. I'd like
11 to know the answer, whether that is the question or not.
12 Does it?

13 MR. PIGOTT: Or whether you are limiting it
14 simply to the one set of sections that Mr. Hoefling was
15 reading from.

16 JUDGE KELLEY: I am simply noting that here is
17 E and here's a bunch of things you are supposed to have and
18 one of them is decontamination and things that seem to speak
19 to subsection 12. But then I look at the whole section and
20 it seems to apply only to the site. My question is, is
21 there some inference, then, that you don't have these things
22 off-site? If it came right out and said the only place you
23 need them is at the site, then it would be pretty clear.
24 But it is just an enumeration. It doesn't seem to speak one
25 way or the other to what off-site plans ought to have.

9

1 MR. HOEFLING: Well, the Staff would argue that
2 Appendix E is the Commission's regulation or a portion of
3 the regulation dealing with emergency planning.

4 JUDGE KELLEY: Yes.

5 MR. HOEFLING: It speaks to the question of
6 injured contaminated individuals and it speaks to it in the
7 context of what is required on-site and off-site for an
8 individual injured on-site. We would argue that the inference
9 is there that the Commission's regulations are limited to
10 that degree.

11 JUDGE KELLEY: Okay. I think that is a perfectly
12 respectable argument to make.

13 MR. HOEFLING: I would go on to comment with
14 respect to some language in 0396, the planning basis. The
15 Staff would not hold the planning basis out as a policy
16 statement of the Commission, but I think it is clear that
17 the Commission placed high reliance on 0396 in directing the
18 Staff to develop planning standards in conjunction with it
19 and, consequently, it is a useful and important vehicle in
20 exploring the breadth of the Commission's regulations and
21 the planning basis.

22 And I would read from Appendix 3-3 in 0396 as
23 follows: "The task force had to decide whether to place
24 reliance on general emergency plans for coping with the
25 events of Class 9 accidents for emergency planning purposes

10

1 or whether to recommend developing specific plans and organ-
2 izational capabilities to contend with such accidents. The
3 task force believes that it is not appropriate to develop
4 specific plans for the most severe and most improbable Class
5 9 events. The task force, however, does believe that
6 consideration should be given to the characteristics of
7 Class 9 events in judging whether emergency plans based
8 primarily on smaller accidents can be expanded to cope with
9 larger events. This is a means of providing flexibility of
10 response capability and at the same time giving reasonable
11 assurance that some capability exists to minimize the impacts
12 of even the most severe accidents."

13 I would argue that what 0396 is stating there is
14 the proposition that the planning basis should provide a
15 capability to be expanded on an ad hoc basis to cover the
16 consequences of a most severe Class 9 accident, but that
17 specific plans need not be in place to cope with those
18 accidents. And I would concur in Mr. Pigott's reference,
19 page 6 -- excuse me -- to page 15 of 0396, wherein it is
20 stated that no special radiological medical provisions for
21 the general public are contemplated within the planning
22 basis.

23 JUDGE KELLEY: Let me just get real clear on
24 that. Are you saying that the emergency plans in this case
25 do not need to contain any provision of any kind addressed to

11 1 medical services for the general public?

2 MR. HOEFLING: Well, I would answer that by saying
3 that the emergency plans do require that certain types of
4 medical services be in place for dealing with on-site indiv-
5 iduals. That capability would be available to the general
6 public. With respect to a capability beyond that to deal
7 with massive decontaminations, I would say that no special
8 facilities would need to be in place. I would argue that
9 the planning basis should be such that it could be expanded
10 to handle that type of a situation and I think we saw some
11 of that in the testimony of Dr. Linnemann, where he explained
12 that if we do have a decontamination problem with the
13 general public the planning basis could be expanded to
14 basically have the members of the public who are monitored
15 and found to be contaminated to remove their clothing and
16 shower at the relocation centers.

17 But that is an expansion of the planning base.
18 It is readily achievable. In answer to your question, no
19 specific requirement for advanced detailed planning with
20 regard to the general public.

21 ///

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23

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T6 k1

1 JUDGE KELLEY: Expansion of the planning base
2 means you take what you have got and you build on it and
3 expand it?

4 MR. HOEFLING: Right. Given the circumstances
5 that you have at hand.

6 JUDGE KELLEY: Okay.

7 MR. HOEFLING: And given the expertise of the
8 individuals who are --

9 JUDGE KELLEY: You say that is readily done?

10 MR. HOEFLING: I am saying that from a reading
11 of Dr. Linneman's testimony with respect to the use of the
12 showers at the relocation centers and the removal of clothing,
13 that would appear to be a readily workable expansion of the
14 planning base and it is consistent with a reading of 0396
15 which the Staff has presented to the Board.

16 JUDGE KELLEY: But the offsite plans have nothing
17 in them about medical treatment of any kind? Or they don't
18 need to, right?

19 MR. HOEFLING: Right.

20 MR. PIGOTT: Mr. Chairman, I have now the policy --
21 the NRC policy statement with respect to NUREG 0390 -- I am
22 sorry -- 0396. I have got the wrong number. 0396 is what
23 we are speaking of, and the NRC policy from the copy of the
24 policy statement just came out of the CCH publication. The
25 NRC concurs in and endorses for use the guidance contained

k2

1 in the task force report. In endorsing this guidance the
2 Commission recognizes it appropriate and prudent for emer-
3 gency planning guidance to take into consideration principal
4 characteristics such as nuclides released in distances likely
5 to be involved, in parens, of a spectrum of design basis and
6 core melt accidents. While the Commission recognizes that
7 the guidance may have significant -- and it goes on. But it --
8 and I will provide a copy of this to the Board if they so
9 desire. But I --

10 JUDGE KELLEY: I would like to see that. Is
11 there any exclusive reference to medical services in 396?

12 MR. PIGOTT: Yes. I was just going to refer
13 back to that. Page 15 of 0396 --

14 JUDGE KELLEY: No, no. I meant in the Commission's
15 policy statement.

16 MR. PIGOTT: No, no. It is a very short --

17 JUDGE KELLEY: You basically read it just now,
18 right?

19 MR. PIGOTT: It is one page. It goes --

20 JUDGE KELLEY: The operative --

21 MR. PIGOTT: -- on a little further.

22 JUDGE KELLEY: I would like to just take a look
23 at it, yes.

24 MR. PIGOTT: But it is post-TMI, and it concurs
25 in and endorses the guidance, and that guidance, as I read

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1 before, says no special radiological medical provisions for
2 the general public. So for the specific question, the 0396
3 as adopted by the Commission is rather specific, and I
4 believe that that has been followed in 0694.

5 JUDGE KELLEY: But the Commission didn't sign
6 off at that point, right? I mean, they read 396, or at least
7 portions thereof, and they said go and develop rule making.
8 Isn't that what the sequence was?

9 MR. PIGOTT: Oh, not -- I don't think so. I
10 think that -- there was a task force -- there was a great
11 deal of consideration. These were adopted as the guidelines
12 and then the Commission Staff was told to go provide the
13 regulations in line with --

14 JUDGE KELLEY: I understand. But they were
15 at the stage where they were developing rules. They didn't
16 have rules yet.

17 MR. PIGOTT: Yes.

18 JUDGE KELLEY: Okay.

19 MR. PIGOTT: But they had developed policy.
20 And I guess -- and in the federal register notice over the
21 document that came out adopting the new regulations, they
22 do in fact refer to the same -- specifically this same
23 policy statement in 20396 in the preamble that this is a
24 part of the overall process.

25 JUDGE KELLEY: Just one other question.

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1 Mr. Hoefling, what are we to do with 5047A1 which requires
2 us to make a finding that adequate protective measures can
3 and will be taken with regard to offsite people, if there
4 aren't any arrangements for medical services of any kind?

5 MR. HOEFLING: I would argue that what that con-
6 templates is that there is in place the planning base that
7 meets the planning standards that are identified in the
8 regulation, and that if that planning base is in effect it
9 can be expanded on an ad hoc basis. The capability exists
10 for its expansion on an ad hoc basis, that a particular
11 situation would be responded to in a manner to provide rea-
12 sonable assurance.

13 JUDGE KELLEY: Reasonable assurance -- we don't
14 have to be assured, I assume, that nobody will be injured?
15 Right? I mean, we can assume that there will be injuries?

16 MR. HOEFLING: I think we can assume that there
17 will be exposures.

18 JUDGE KELLEY: You don't think we can assume
19 that there can be injuries? I am trying to get to what --
20 how we are going to make this finding, and part of the pur-
21 pose of this proffer of testimony is to give us some indica-
22 tion of what injuries might be in the event of a serious
23 accident.

24 MR. HOEFLING: Well, I think that what is con-
25 templated here is that there is in place an emergency plan

k5

1 that could respond to a particular situation.

2 JUDGE KELLEY: But these plans don't have any
3 provision for medical services because they don't need to,
4 I am told.

5 MR. HOEFLING: That is true, but these plans
6 have provisions for qualified and trained organizations to
7 have open lines of communication, to have certain expertise
8 on their staffs, and provide a basis for given a particular
9 situation to make judgments and to deal with the situation,
10 and that, the Staff would argue, is the basis on which the
11 Board could find that there would be reasonable assurance
12 that the public would be protected. Not that --

13 JUDGE KELLEY: Absolutely protected -- let me
14 just make this point. Can't I approve these plans believing
15 that it is possible that there could be a serious accident
16 in which a lot of people are injured?

17 MR. HOEFLING: Certainly.

18 JUDGE KELLEY: Fine.

19 MR. HOEFLING: Certainly.

20 MR. PIGOTT: I think you can take as a base the
21 chapter seven of the FES which showed the contemplated range
22 of accidents and probabilities as the basis against which
23 you judge your assurance, and it is a --

24 JUDGE KELLEY: The more improbable the accident --

25 MR. PIGOTT: The less you have to worry about it

k6

1 JUDGE KELLEY: -- the more injuries we can
2 tolerate in the finding.

3 MR. PIGOTT: I wouldn't go so far as to make
4 that kind of policy statement. That would appear to be what
5 follows. The lower probability, higher severity accidents
6 are more tolerable from a policy standpoint.

7 JUDGE KELLEY: Mrs. Gallagher?

8 MS. GALLAGHER: Yes, I would like to turn back
9 to the regulations, please, Appendix E, which I believe does
10 refer both to onsite and offsite populations. Looking at
11 IV, it is clear that that whole section refers only to the
12 Applicants' plan.

13 JUDGE KELLEY: Just a minute. Let me follow you
14 step by step.

15 MS. GALLAGHER: At page 55411 --

16 JUDGE KELLEY: You have got different pages than
17 I do.

18 MS. GALLAGHER: I am sorry. Appendix E, Roman
19 numeral four, and let's look at the introductory paragraph
20 which says, the Applicants' emergency plan shall --

21 JUDGE KELLEY: Okay.

22 MS. GALLAGHER: -- contain, and then everything
23 that follows, --

24 JUDGE KELLEY: Okay.

25 MS. GALLAGHER: -- it is true, is strictly for

k7

1 the Applicant. However, prior to that --

2 JUDGE KELLEY: Where are your lead in words,
3 the Applicants' emergency plan --

4 MS. GALLAGHER: Roman numeral --

5 JUDGE KELLEY: Okay, I see it.

6 MS. GALLAGHER: Roman numeral four. And every-
7 thing that follows. I agree, refers only to Applicants' plan.

8 JUDGE KELLEY: Okay.

9 MS. GALLAGHER: However, there is language back
10 in Roman numeral two talking about the preliminary safety
11 analysis report that would seem to make this appendix apply
12 also to the general public within the EPZ. Looking at C
13 which says protective measures to be taken --

14 JUDGE KELLEY: Let me catch up with you again.
15 This is under where? The PSAR?

16 MS. GALLAGHER: Roman numeral two.

17 JUDGE KELLEY: Okay. Right.

18 MS. GALLAGHER: Letter C, protective --

19 JUDGE KELLEY: Right.

20 MS. GALLAGHER: -- measures to be taken within
21 the site boundary and within each EPZ to protect health and
22 safety in the event of an accident, procedures by which
23 these measures are to be carried out, et cetera.

24 Then skipping down to E, provision to be made
25 for emergency treatment at offsite facilities of individuals

k8

1 injured as a result of licensed activities. I do not believe
2 that that refers only to onsite workers. It says individuals
3 injured as a result of licensed activity. I must say that
4 I am surprised to hear the NRC attorneys saying that there
5 is not responsibility for the public health. I would think
6 that most of the public thinks that the NRC does serve as a
7 guardian of the public health, and I don't believe that it
8 is reasonable to expect absolute protection either. That is
9 not what we are talking about here.

10 One of the purposes of this hearing is to test
11 the ability of the plans to expand on an ad hoc basis. We
12 can't do that unless we look at serious accidents, and one
13 of the problems in this hearing as I see it is that we don't
14 hear any evidence from the Applicants about serious accidents,
15 and there is no way to test that.

16 I don't believe Mr. Pigott can speak for the
17 local jurisdictions when he says that there is no obligation
18 to provide medical care for the public health and safety
19 under the regulations. I believe that the local jurisdiction
20 planning basis on L1 in the NUREG 0654 clearly -- on page
21 69 of 0654 clearly makes it the responsibility of the licen-
22 see, the state and the local jurisdiction to -- it says each
23 organization shall arrange for local and back-up hospital
24 and medical services having the capability for evaluation
25 of radiation exposure and uptake --

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1 JUDGE KELLEY: I am sorry. Where are you now?

2 MS. GALLAGHER: Page 69 of NUREG 0654.

3 JUDGE KELLEY: So am I, but --

4 MS. GALLAGHER: Okay.

5 JUDGE KELLEY: Oh, it is the very first one?

6 MS. GALLAGHER: Yes.

7 JUDGE KELLEY: Okay.

8 MS. GALLAGHER: Including assurance that persons

9 providing these services are adequately prepared to handle
10 contaminated individuals. So -- and it is checked in the
11 licensee column, the state column, and the local column.
12 It is clearly a general public health consideration.

13 I would like to point out that Dr. Linneman is
14 a contracted person, the licensee's contracted person. He
15 is not a public health spokesman, and so his perception of
16 the task might be slightly different than a public health
17 spokesperson.

18 Also, turning to page six on the -- it seems
19 that we all refer to page six of NUREG 0654.

20 JUDGE KELLEY: There is something there for
21 everybody.

22 MS. GALLAGHER: Yes, on the planning basis.
23 Again, that no specific accidents even should be isolated,
24 and we did not isolate a specific accident sequence. We
25 used a range. Truly, we did use a range of serious

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1 accidents. But we felt that that is appropriate for our --
2 in our position as Intervenors, since the Applicants are
3 not doing it. And I guess finally I would just like to say
4 that if our concern with serious accidents is unfounded,
5 then it should go to the weight of the evidence, and not to
6 the admissability. I think that it is necessary to hear for
7 a full record a broad range of concerns. And I don't agree
8 that it is -- that one can test the adequacy of planning
9 by only looking at the less serious accident.

10 JUDGE KELLEY: This has been a helpful discussion
11 of a rather difficult issue. Let's take a 15 minute coffee
12 break. Off the record.

13 (Whereupon, a brief recess was taken.)

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1 JUDGE KELLEY: Back on the record. The Board
2 has considered further, as we had previous to this discus-
3 sion, the legal questions that we argued before the break
4 and, like a lot of questions in a case like this, there
5 unfortunately is no clear answer that one can point to with
6 confidence and move on. We have to do the best we can with
7 no very direct guidance on the subject. But we have made
8 our decisions on the questions discussed for the purposes of
9 this case at least.

10 The initial -- there were really two legal
11 questions here. One was whether Subpart (b)(12) of the
12 emergency planning rule speaks at all to off-site general
13 public medical arrangements or whether it is really just
14 directed to on-site contamination type accidents. While
15 it can be and in fact was debated both ways, we do not
16 believe that that provision is necessarily confined to on-
17 site injuries and we think it is intended to extend some
18 degree of protection to the general public. And we are
19 prepared to hear evidence on what the Intervenors believe
20 those arrangements ought to be.

21 Beyond that, there was the question of whether
22 it is proper to postulate a serious accident as a means of
23 testing the adequacy of arrangements or indicating what
24 arrangements ought to be. We believe that in the circumstances
25 of this case that it is appropriate to postulate such an

2
1 accident. Intervenors GUARD described and their papers also
2 describe to some extent what their accident hypothesis is
3 and it will be open to the Applicants and the Staff, if they
4 wish, to probe that further on cross examination. I'll turn
5 in a moment to a couple of items of additional information
6 I think we need in order to go forward.

7 As to our rationale for our decisions on these
8 two legal questions, we're just going to provide a brief
9 indication as we have done in the past for the record this
10 morning and we may well spell it out in greater detail later.
11 As to the first point, though, it seems to us that the rule
12 itself does not limit the subpart in question to on-site
13 type injuries. The natural reading of the language, it seems
14 to us, extends offsite and to the public at large. The
15 general background and history of that rule also supports
16 that conclusion.

17 As to the postulation of accidents, that is at
18 bottom what goes on in NRC regulation to test any proposal.
19 Now in some circumstances where the Commission holds a rule-
20 making in an effort to develop some safety standard, they
21 may very well consider a broad range of accidents and come
22 up with a specific standard and then thereafter one does
23 not get into accident scenarios, one just decides whether
24 or not you comply with the rule. There is an obvious logic
25 to that approach.

1 We don't think that that's the kind of rule that
2 we are dealing with here. We mentioned in our pending
3 referral order the fact that we rejected a contention that
4 attacked the ten mile EPZ rule and we rejected it because it
5 seemed to us the Commission must have considered the ranges
6 of accidents and decided that ten miles was enough. So we
7 did not allow a contention that called for a zone much larger
8 than that.

9 But one looks in vain in this rule, the emergency
10 planning rule, for anything specific beyond ten miles. The
11 rest of it is cast in terms of adequacy and reasonableness
12 and sufficiency and words like that. It just seems to us,
13 then, that we have to figure out what that is on a case-by-
14 case basis. If the Commission had somehow been able to decide
15 what adequate medical arrangements are and had spelled it
16 out, then we would just be looking at whether the proposals
17 here met those standards. But we don't see anything like
18 that in the rule and, since it is not there, we think it is
19 proper for us to look at it.

20 Turning to the -- as I understand it, Mrs.
21 Gallagher, and correct me if I am wrong, what you basically
22 are interested in doing is eliciting testimony from Dr. Lyon
23 about various kinds of effects and consequent medical needs
24 off-site, is that right? That is a very shorthand description,
25 but let me tell you what I'm getting to. You did tell us

1 earlier today and we got into a little bit of detail on your
2 postulated accident, which is sort of an average amalgam of
3 1 through 9 and we established where that is. What I have
4 in mind is we need to know, it seems to me, a couple of
5 additional things and maybe something else will come up, but
6 what you are assuming about evacuation, whether it is avail-
7 able or possible or whether it is not, and some notion of,
8 if the evacuation is taking place, how long it is going to
9 take. And also some notion of what you are assuming about
10 the effectiveness of taking shelter. And I believe in your
11 study you did advert to each of these considerations and
12 perhaps some others.

13 Let me stress that we don't want to dwell on
14 these at great length. We're not here to try accident
15 likelihood or any of these things. We just want a backdrop
16 from which we can proceed into what we are interested in.
17 But we have to know something and I think it is only fair
18 to the parties who will be cross examining to know what
19 these basic assumption parameters are. I guess the only
20 other qualification is that in postulating accidents the
21 Board would need to be satisfied that it is, while perhaps
22 a low likelihood, at least something that a reasonable person
23 would concern themselves with. Okay.

24 MS. GALLAGHER: Did you want me to comment on
25 that?

1 JUDGE KELLEY: Let me just finish a couple of
2 other points and then we'll get back. We may have other
3 comments, too, from other counsel. We said yesterday and
4 we want to stress again today, and I think that we all
5 understand it, we are focusing on emergency services and not
6 on long term effects, that is to say, not on cancer or what-
7 ever genetic effects may evolve, simply because we think
8 that's what that section is all about, immediate emergency
9 services.

10 To restate again what we covered yesterday, that
11 involves as we understand it contamination cases, it involves
12 acute radiation -- is that the right term -- radiation to the
13 point of perhaps you need to be hospitalized. Now you
14 referred to one other thing yesterday, at page 9589. I had
15 asked you about whether those first two were it and you said
16 -- Mrs. Gallagher said -- if you can, for example, mobilize
17 medical services to make some meaningful distribution of
18 radioprotective drugs you may prevent a lot of thyroid cancer.
19 I wasn't aware that that was something we could do.

20 I'm trying to get a handle on a sort of spectrum,
21 hopefully fairly narrow and specific, of the kinds of things
22 we are talking about under the general heading of emergency
23 medical treatment. Could you explain a little more what you
24 have in mind?

25 MS. GALLAGHER: Yes. There are certain things

1 that can be done to mitigate the effects of radiation prior
2 to receiving the dose, such as radioprotective drugs. We
3 would consider these in the area of emergency medical
4 services.

5 JUDGE KELLEY: Like potassium?

6 MS. GALLAGHER: The potassium iodide, which pre-
7 vents uptake of radioactive iodine. Other kinds of mitigating
8 effects would take place after exposure, such as decontamin-
9 ation, to prevent, again, uptake by whatever organ of the
10 body, of the contamination so that you get long range effects,
11 which we are not going to talk about, but we are going to
12 talk about the immediate need to decontaminate in order to
13 mitigate and we are not going to put in evidence of what will
14 happen if you don't.

15 The third group would be what we would call
16 radiation illness, acute radiation illness, which is not
17 distinct from contamination, by the way. It is the result
18 of a large dose of radiation and its immediate effects on
19 the body.

20 So those are the three classes of medical services
21 that we would contemplate.

22 JUDGE KELLEY: Okay.

23 MS. GALLAGHER: In regard to the question of
24 whether we intend to deal solely with off-site issues, the
25 answer would be no, because the medical services for, for

1 example, a population of workers of perhaps 2,000 workers
2 might well tend to stress the capacities of the hospitals
3 with whom they have made arrangements. I think that would
4 be part of the issue. The other part, of course, would be
5 the public health.

6 And then in regard to the issue of whether we
7 intend to use scenarios in which there has been sheltering
8 and other kinds of protective measures, such as evacuation,
9 I would point to the distinction between the table at 7.3
10 of the final environmental statement and the table in the
11 draft, which is 7.1.4-4 and point out that really one of the
12 substantial differences and I think really the only really
13 crucial difference between those two tables is that the
14 earlier one in the supplement, draft supplement FES, addresses
15 itself to situations in which no protective actions have
16 been taken. Therefore, the casualties are much larger.
17 The second one, in the final environmental statement, addresses
18 itself to casualties in which protective actions have been
19 taken and the consequences are mitigated.

20 Having said that, I would also like to propose
21 that as a basis for having both tables admitted in ' dence
22 at the appropriate time. When I talk to Dr. Lyon. because
23 he is going to be dealing with the differences between the
24 two tables and explicating them for us and has done some
25 indeper`ent calculations to validate the figures of the NRC.

1 JUDGE KELLEY: What is your assumption whereby
2 evacuation is not available?

3 MS. GALLAGHER: It wasn't our assumption. It
4 was an assumption of the table. There is a footnote on the
5 table that says no protective actions have been taken, that
6 these figures assume the kind of injuries you would have if
7 nothing were done.

8 JUDGE KELLEY: But the Staff isn't proffering
9 that. They did it in the impact statement and now we are
10 here this morning and I might just note, as you well know,
11 the Board is concerned about an earthquake-type scenario
12 where you lose at least temporarily the availability of
13 evacuation. The status of that is well known.

14 MS. GALLAGHER: It might be useful for that kind
15 of inquiry.

16 JUDGE KELLEY: I am wondering how reasonable it
17 is, short of postulating the earthquake issue, which we are
18 all waiting to hear about, in this setting.

19 MS. GALLAGHER: Well, I think it would be most
20 reasonable in the context of the earthquake issue, of course.
21 I can see other applications which could be if evacuation
22 were for some reason delayed beyond the point of being
23 meaningful. In other words, if I may just refer to our
24 figures in Exhibit -- the graphs -- there is a point at which
25 after exposure to a plume for a week there is a break and

1 then thereafter radiation becomes, you know, successively
2 less. I would guess that the optimum time for evacuation
3 would be within that first week, if you are going to think
4 about evacuation as providing any kind of protection. If
5 you were not able to evacuate for any reason for a long period
6 of time, you know, that would be a situation in which you
7 did not take that protective measure.

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1 JUDGE KELLEY: Okay. Well, I think -- you know,
2 we could reflect our concerns -- our basic concern right now is
3 to get a clear record. If you get numbers, there will be so
4 many injuries. We would like to know whether to rely on that,
5 but at the same time keeping a focus on facilities and on
6 that end of it, rather than on accident scenarios, and maybe
7 about all we can say now is that we are concerned about those
8 matters, and we are best off to, with the basis of the rulings
9 we have given, and the understandings that we have tried to
10 indicate, to go ahead, and it may be a rocky road, but we
11 will see how it goes.

12 MS. GALLAGHER: I would like to just make one
13 more statement in support of the idea of using the two graphs,
14 or the two tables.

15 MR. PIGOTT: I am going to object to that. Let
16 us get to it when we have got something in front of us.

17 MS. GALLAGHER: It will just take half a minute.

18 JUDGE KELLEY: Well, my point is that I think we --
19 I raised it, and you and I started talking about it in the
20 abstract, and I think it is not a good way to solve the
21 problem. Let us hear, when the time comes, I am sure there
22 will be some objections, and then we will hear Counsel and
23 we will decide what we decide.

24 MR. PIGOTT: Is this -- if I might ask for some
25 clarification, is all of this that we have just heard from

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1 Mrs. Gallagner within the contention 2(d), is that the Board's
2 ruling, or are we into a new area? I --

3 JUDGE KELLEY: We are into 2(d) as far as I know.

4 MR. PIGOTT: And this is not to be construed, now,
5 as apparently an evaluation of chapter 7 of the final
6 environmental statement? This is purely emergency services?

7 JUDGE KELLEY: We are litigating 2(d).

8 MR. PIGOTT: Okay.

9 JUDGE KELLEY: And everything that is brought
10 forward should fit within 2(d), subject to the Board's rulings
11 on the scope of 2(d). So, are we ready for Dr. Lyon?

12 MS. GALLAGHER: Yes.

13 JUDGE KELLEY: Let me add one point -- are we about
14 ready for Dr. Lyon?

15 MS. GALLAGHER: Yes, we are ready.

16 JUDGE KELLEY: Okay. I have one point to make.
17 Dr. Lyon testified last evening for a while, and I directed
18 that objections be withheld, and that they could be made at a
19 later point. We now have the text of the transcript. Let me
20 make a suggestion, and I will certainly be happy to hear
21 counter-suggestions, and that would be that Counsel review
22 the transcript, and we can set aside some time later on to
23 hear objections to portions of that -- of that testimony.

24 I don't see a need for immediate action on it, and
25 perhaps today's testimony may put a different slant on the

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1 whole thing. Would it be satisfactory to Counsel to defer for
2 the time being their right to object to yesterday's testimony,
3 and with the understanding that today when Dr. Lyon resumes
4 the stand, people will object and we will rule on objections,
5 and do it the usual way? Any problem with that, Mr. Pigott?

6 MR. PIGOTT: I can defer the argument on the
7 continuing objections from yesterday's testimony. That is no
8 problem. I am going to ask for voir dire of Dr. Lyon before
9 he proceeds with direct testimony.

10 JUDGE KELLEY: That seems reasonable. Mr. Hoefling?

11 MR. HOEFLING: I have no problem with that approach.
12 I take it objections to Dr. Lyon's testimony would be proper
13 only if they exceeded the scope of the Board's ruling?

14 JUDGE KELLEY: Yes.

15 MR. HOEFLING: Presently --

16 JUDGE KELLEY: Right, yeah.

17 So, if Dr. Lyon can resume the stand, we will
18 begin with Mr. Pigott, who -- begin with voir dire from Mr.
19 Pigott, and Mr. Hoefling, if you want to.

20 Whereupon,

21 IRVING LYON

22 the witness on the stand at the time of adjournment, resumed
23 the witness stand and, having been previously duly sworn, was
24 examined and testified further as follows:

25

VOIR DIRE EXAMINATION

BY MR. PIGOTT:

Q Dr. Lyon, your doctorate is in physiology, is that correct?

A Yes, it is.

Q Do you hold any licenses or registrations from the State of California?

A No, I do not.

Q You are not licensed, then, in any way, to treat individuals?

A No, I am not.

Q The research or the work that you are doing at the Veterans' hospital now, could you describe what that is? Is that related to people?

A It is definitely related to people, but it deals specifically with experimental cancers in animals. The results deal with people in the sense that there is a cancer unit at the hospital, and the results that we produce in our research as well as that of cancer researchers throughout the country and the world are made use of when appropriate.

Q But you are doing animal research, is that correct?

A I am working with animals, and I am talking about the application of our results potentially to human cancer.

Q In your previous employment, were you at any time involved with the treatment of individuals, or was it also

5 1 having to do either with animals or biochemistry?

2 A Yes, I was involved with a case involving a
3 resistant -- vitamin-D-resistant rickets in humans. I was a
4 part of the research team that published papers specifically
5 on that condition at Presbyterian-St. Luke's Hospital, in
6 Chicago.

7 Q Did that have anything to do with radioactivity?

8 A It certainly did. It was based on radioactivity
9 studies of humans. We were measuring bone accretion rates
10 with radioactive calcium and with strontium.

11 Q Did you have -- did it have anything to do with
12 radiation, or was that tracer-type work?

13 A It had to do with radiation, in that the patients
14 were monitored by X-rays, which were taken in relation to the
15 time course of the study.

16 Q The disease, however, was that radiation-related?

17 A The disease could be radiation-related, yes, it
18 could be caused by radiation.

19 Q Was the disease radiation-related?

20 A It was not clear in this case. We did not know
21 the history to the point where we could determine what the
22 cause of the vitamin-D-resistant rickets was.

23 Q Was radiation exposure in any way explored during
24 this treatment?

25 A It was not used by the team directly with this

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1 patient, but I am talking about previous history.

2 Q Was there anything besides the use of X-rays that
3 was radiation-related in this treatment?

4 A Yes, there were some scans that were done, and
5 also radioactive isotopes were used to monitor the accretion
6 rates. That is how you determine them, the traces.

7 Q And were you the person that did this treatment,
8 or were you just on the team?

9 A I was on the team, and I helped prepare the doses
10 that were injected into the people, and helped monitor what
11 were the results, as a member of that team.

12 Q Was this in any way related to acute radiation
13 syndrome?

14 A I said I had no way of knowing that, because the
15 previous history would have to have dealt with that.

16 Q Well, you must have explored that history, did you
17 not?

18 A Yes.

19 Q And did it indicate such an acute radiation
20 exposure?

21 A Not so far as I know, but that history has to go
22 back so far, and I don't know how far back it went.

23 Q So you have never been involved in the treatment
24 of an acute radiation exposure?

25 A I don't know how to answer that, because my work,

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1 and the results of my work, have been used in such cases,
2 because my work dealt specifically with the effect of
3 radioactivity in depressing bone cell activity involved in
4 the removal of bone and the replacement of bone.

5 Q Well, that is a lot of words, but you haven't done
6 it, is that correct?

7 A My work was involved -- used -- my results were
8 used in such cases, yes.

9 Q Did you do such treatment?

10 A No, I did not.

11 Q Have you in any way been involved in the
12 administration -- hospital administration?

13 A No.

14 Q The teaching courses that you apparently gave,
15 were they in treatment? Were they treatment-related?

16 A They were to the extent that members of the class
17 were MD's, in some cases.

18 Q But you were treating a non-treatment type of a
19 course?

20 A I was not involved in treatment. What I was
21 involved in was teaching MDs some of the basic principles on
22 which they would formulate treatment with their patients.

23 Q Basic biochemistry?

24 A Biochemistry, biophysics, yes, physiology, so on.

25 Q But you have not been involved in any kind of

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1 administration of a hospital, or any other emergency-type
2 facility?

3 A Only to the extent that I was a member of the staff
4 of the department of orthopedic surgery, and participated in
5 the matters of the department.

6 Q Have any of your positions involved organization
7 or arrangement of local or backup hospital or medical services?

8 A No.

9 Q Have you ever been involved in organizing and
10 providing for first-aid capability anywhere?

11 A Yes.

12 Q Where?

13 A When I was in the armed forces, I was injured, and
14 I was in the hospital, and when I was recuperating, I asked
15 the hospital staff to please make use of my capabilities, and
16 my background and training, and they put me in the laboratory,
17 and I worked alongside with hospital staff personnel in
18 working with cases involving armed forces personnel who were
19 injured.

20 Q Did you ever have anything to do with -- well,
21 have you ever been involved in transportation or otherwise
22 treating victims of radiological emergencies?

23 A Yes, in the armed forces, I did accompany people
24 who were brought to the hospital.

25 Q What was that? What did you do?

9
1 A There were specifically burn victims that
2 suffered very severe burns in our battery as a result of an
3 explosion of an ammunition dump, and I was one of the people
4 who took them into the hospital, and stayed with them, and
5 conferred with the hospital staff on the circumstances in
6 which the accident occurred.

7 Q I am sorry. I asked if it was with respect to
8 transporting victims of radiological accidents.

9 A I didn't hear the word "radiological." I am
10 sorry.

11 Q With the word "radiological," what is the answer?

12 A No, I have not participated in that kind of effort.

13 Q Okay, so your work does not involve -- has not
14 involved the treatment of individual patients?

15 A That is correct.

16 Q And it has not involved administration of hospital
17 services?

18 A That is correct.

19 MR. PIGOTT: Mr. Chairman, I am in a position
20 where I think I have explored the qualifications with respect
21 to what has been indicated as a direct testimony discussion,
22 but short of the exhibits, especially the graphs that have
23 been put in, and the calculations of radiation from accidents,
24 I am rather loathe to go into that particular portion of the --
25 of a voir dire, until those documents are before us, and if I

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1 might reserve that perhaps as the basis for admission of those
2 Exhibits when they come along, I would ask for permission to do
3 so.

4 JUDGE KELLEY: Granted.

5 MR. PIGOTT: Okay. And that would conclude my
6 voir dire of Dr. Lyon, and I would submit that Dr. Lyon is not
7 competent to testify in this proceeding with respect to
8 certainly the criteria that are specifically outlined in
9 NUREG 0654, as guidance for application of 10 CFR 50.47(b)(12),
10 and I do not -- I would also submit that Dr. Lyon is not
11 qualified to discuss the treatment of radiation victims as
12 individuals, that he is a researcher, he is a researcher in
13 the area of apparently animal research, that none of his
14 experience qualifies him to comment on the treatment of
15 individuals.

16 JUDGE KELLEY: Comment?

17 MR. HOEFLING: Yes, Mr. Chairman, I think --

18 JUDGE KELLEY: Let me clarify it. Are you saying
19 that we should not allow testimony at this point, or --

20 MR. PIGOTT: Well, I would -- I would say that
21 yes, I would say that he is not competent to testify, for
22 instance, on a continuation of the things we have heard from
23 Dr. Lyon and Ms. Gallagher yesterday on treatment of
24 individuals and types of treatments for cancer patients. The
25 man is -- it is clearly not his area, and I anticipate that

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1 that is where the continued direct examination would go. If
2 we were arguing concerning yesterday's transcript, I would be
3 using the same voir dire as a part of the basis for a motion
4 to strike, that he was not competent to make the statements
5 that were made yesterday, as a part of the objection to
6 yesterday's transcript, but to put it in some kind of
7 context, yes, that is my objection, that he is not competent
8 to testify with respect to radiation effect on individuals,
9 their treatment, and how services might be handled within the
10 exclusion, or the plume exposure area.

11 JUDGE KELLEY: Mrs. Gallagher?

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T9 k1 1 MS. GALLAGHER: I would like to address a few
2 questions to Dr. Lyon.

3 DIRECT EXAMINATION (Resumed)

4 BY MS. GALLAGHER:

5 Q Dr. Lyon, have you read extensively in the field
6 of human physiology?

7 A Yes, that is my field.

8 Q And have you read extensively and studied the
9 effects of radiation on the human body?

10 A Yes, I certainly have.

11 Q And have you explored in your reading the treat-
12 ment required to cope with radiation injuries?

13 A Yes, I have, and that is very different from
14 prescribing for an individual who is suffering from some
15 sort of radiation injury, which I do not pretend to do, and
16 have not pretended to do here. I am talking about the kinds
17 of treatments which are available, and this is common
18 knowledge to anyone, whether an MD or not. who is familiar
19 with this general field.

20 I can state very specifically that when I was
21 in ORINS, the Oak Ridge Institute of Nuclear Studies, we
22 talked about these, and the Staff did not include MDs who
23 talked to us about them.

24 MS. GALLAGHER: I would just say that I believe
25 Dr. Lyon's background and training make him competent to

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1 address the scope of treatment of radiation injuries. It
2 will not be for him to comment on the individual capacities
3 of the facilities that are local, but he is going to set what
4 kinds of treatment would be necessary, and it would be for
5 us to produce other evidence as to whether they are available.

6 MR. HOEFLING: Mr. Chairman, may the Staff com-
7 ment? What the Staff sees happening here is that Mr. --
8 Dr. Lyons, excuse me --

9 MS. GALLAGHER: It is Dr. Lyon.

10 MR. HOEFLING: Dr. Lyon -- excuse me again --
11 was to be proffered to present testimony with respect to
12 contention one and the proffer was being made in the area
13 of health effects and potential cancers resulting from
14 ionizing radiation, and what has happened is that his prof-
15 fered testimony is in the process of being converted to
16 attempt to fit under contention 2(d), which speaks to
17 arrangements for medical services, and from the Voir Dire
18 conducted by Applicants, I think it is clear that Dr. Lyon
19 is not qualified to speak to the provision of medical ser-
20 vices for contaminated and injured individuals, and I think
21 the whole background that brought us here makes it clear
22 that his testimony is simply not appropriate to that issue.

23 JUDGE KELLEY: If one takes the view, Mr. Hoefling,
24 that adequacy of arrangements is fairly explored under this
25 contention, and that that in turn would be affected by the

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1 number of people who need treatment, are you quarreling with
2 Dr. Lyon's qualifications to speak to that?

3 MR. HOEFLING: I don't --

4 JUDGE KELLEY: He has admitted he is not a
5 hospital administrator, so getting off into that kind of
6 area is perhaps beyond his scope. So --

7 WITNESS LYON: Mr. Chairman, I have also admitted
8 I am not an MD and I do not practice medicine, nor have I
9 ever done so.

10 JUDGE KELLEY: Okay.

11 MR. HOEFLING: I quarrel with judgments that
12 Dr. Lyon might make as to what medical services are necessary,
13 and unless -- until we have an appreciation for what medical
14 services are necessary, we can't test arrangements.

15 JUDGE KELLEY: Off the record briefly.

16 (Discussion off the record.)

17 JUDGE KELLEY: Back on the record. Well, we
18 will give a ruling and then break for lunch. We have before
19 us a motion by the Applicant supported by the Staff and
20 opposed by the Intervenors not to allow Dr. Lyon to testify
21 on the basis of a lack of expertise in the areas that we are
22 concerned with. The broad area is arrangements for medical
23 services, and it does appear that some aspects of this such
24 as hospital administration, Dr. Lyon doesn't have expert
25 background. On the other hand, Dr. Lyon does have an

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1 impressive technical background, and while there are some
2 aspects of our concerns that we are not entirely satisfied
3 he is qualified as an expert, we do think he will have some-
4 thing to tell us on this subject, and we do want to learn
5 what he can tell us.

6 So what we have decided to do is to allow the
7 direct testimony presentation through question and answer
8 form, and I expect we will have questions -- I expect we will
9 have objections to various questions. We are also going to
10 allow, however, and this is a departure from the usual
11 practice, we are going to reserve the right to any party that
12 wants to exercise it, to strike at the conclusion of the
13 presentation of direct and also allow additional Voir Dire
14 if it seems appropriate as a predicate for such a motion.

15 So this will enable us to move forward and learn
16 what we can.

17 It is a quarter to twelve. Why don't we stop
18 till one o'clock. Are you still available, Doctor?

19 WITNESS LYON: Yes. Mr. Chairman, may I ask a
20 favor? For those of us who cannot afford to eat on site and
21 must go offsite, could you extend the lunch period for
22 another half hour? It would be a little more convenient,
23 and I for one would be willing to extend the time in the
24 afternoon if necessary?

25 JUDGE KELLEY: Well, I am going for an hour and

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1 fifteen minutes as it is. How far offsite do you need to
2 go?

3 WITNESS LYON: Well, yesterday, and I think we
4 would go in a similar area today, we found it very difficult
5 to get back on time. That is all I can tell you.

6 JUDGE KELLEY: Well, I am reluctant to go more
7 than an hour and fifteen minutes. There are -- a lot of
8 these places aren't that great on the street here, but there
9 are some that are close. Okay. One o'clock.

10 Off the record.

11 (Whereupon, the hearing was recessed, to reconvene
12 at one o'clock.)

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

1:10 p.m.

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3 JUDGE KELLEY: Back on the record. Mrs. Gallagher,
4 is Dr. Lyon ready to resume the stand?

5 MS. GALLAGHER: Yes, he is.

6 Whereupon,

7 IRVING LYON

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

11 DIRECT EXAMINATION (Resumed)

12 BY MS. GALLAGHER:

13 Q Dr. Lyon, to frame the issues that you are going
14 to be dealing with, would you please define the difference
15 between acute effects of radiation and latent effects, just
16 briefly?

17 A In very simple terms, acute refers to immediate
18 or short term effects and latent refers to delayed or long
19 term effects.

20 Q And how does that relate to radiation injuries?

21 MR. PIGOTT: Are we talking about injuries to
22 people?

23 MS. GALLAGHER: To people.

24 MR. PIGOTT: I would object on the question of
25 whether or not he is qualified to make that kind of a deter-

1 mination. Nothing in the examination showed that Dr. Lyon
2 had any background or experience in effects of radiation
3 on people.

4 WITNESS LYON: These are defined definitions
5 available in the open literature beyond the medical litera-
6 ture to anyone interested in dealing with radiation problems.

7 JUDGE KELLEY: Go ahead for now.

8 MR. PIGOTT: Could I ask for a source, then, as
9 we get these definitions so that we know whether we are
10 getting, as the witness states, some kind of a general defini-
11 tion from a treatise or whether we're getting his opinion
12 on things?

13 WITNESS LYON: These definitions are so widespread
14 that almost any of the literature dealing with health effects,
15 in the AEC literature, the NRC literature, the ERDA litera-
16 ture, the DOE literature will define these things. These are
17 also defined in our course at ORINS, the Oak Ridge Institute
18 of Nuclear Studies. This is standard stuff. It is non-
19 medical information.

20 JUDGE KELLEY: Go ahead.

21 BY MS. GALLAGHER:

22 Q Okay. You may proceed. I'm sorry. Would you
23 please define the distinction that you made between acute
24 and latent effects in terms of radiation injuries?

25 A Well, when one is contaminated on the outer

1 surface of the body one of two things can happen. Either
2 there can be an immediate effect due to the contamination,
3 if the contamination level is high enough, or there can be
4 a delayed effect -- delayed in the short term sense, not a
5 long term latent sense as we talk about in the developing
6 of cancers and leukemias -- if one does not take immediate
7 steps to remove the contamination. So it relates very
8 directly to the level of contamination on the outer surface
9 and what ameliorative measures are taken to get rid of that
:0 contamination to forestall the development of effects later
11 on, whether they be in the short term or the long term.

12 Q And how would the radiation injuries, in just
13 general terms, be defined in terms of categories of medical
14 treatment?

15 MR. PIGOTT: I must object now as to asking this
16 witness for categories with respect to medical treatment.
17 Absolutely no showing that this is his area at all.

18 WITNESS LYON: Mr. Chairman, if I may be
19 permitted --

20 JUDGE KELLEY: Just a moment. Normally we
21 simply let counsel argue these objections. We may ask you
22 for some help but initially at least, Mrs. Gallagher, can
23 you comment?

24 BY MS. GALLAGHER:

25 Q In your public health experience are there any

1 levels of treatment which could be described as preventive?

2 A Yes. There --

3 MR. PIGOTT: Could we have a ruling on the
4 objections? We are obviously getting into --

5 JUDGE KELLEY: We had a question and then you
6 shifted. Did you withdraw the prior question?

7 MS. GALLAGHER: No. I chose to try to rephrase
8 it.

9 MR. PIGOTT: Well, I still have the standing
10 objection of this gentleman, this witness talking about
11 treatment of individuals. There is nothing in his background
12 that shows that he is competent to do so.

13 JUDGE KELLEY: You asked some questions to that
14 effect and you elicited some answers. I'd like to try a
15 question or two of my own, if I may.

16 I understand you are not a doctor.

17 WITNESS LYON: Yes.

18 JUDGE KELLEY: What would you cite in your back-
19 ground or training or experience to qualify you to speak to
20 categories of medical treatment, for example, or would you
21 concede that that is beyond your expertise?

22 WITNESS LYON: Where I work at the VA Wadsworth
23 I am the designated radiation safety officer for my labora-
24 tory and have been so for over two years. In connection
25 with that position and responsibility, I have had a lot of

1 interaction with the radiation safety officer for the hospital.
2 These matters are non-medical determinations of issues and
3 understandings that are very general. They have nothing to
4 do with the election of specific treatment, medical treatment,
5 or whether or not specific medical kinds of procedures are
6 available.

7 JUDGE KELLEY: And where, may I ask, given the
8 answer to this question, where are we going in the near term
9 in the questioning?

10 MS. GALLAGHER: The information that Dr. Lyon will
11 provide now was information that I provided to you earlier
12 which was not testimony, had to do with the need for preven-
13 tion, the need for decontamination, the need for care of
14 radiation injuries. That is all I am trying to elicit from
15 him.

16 JUDGE KELLEY: All right. I am going to overrule
17 the objection, subject to the possibility of a motion to strike
18 at the end, in light of where this all takes us.

19 MR. HOEFLING: Mr. Chairman?

20 JUDGE KELLEY: Yes.

21 MR. HOEFLING: The Staff would raise a concern
22 at this point. From what Dr. Lyon has just indicated here,
23 he seems to be speaking about certain procedures which I
24 think in his terms were "non-medical" and I question whether
25 that kindof testimony is properly within the issue which

1 speaks to medical services. We can't have it both ways. We
2 are either talking about medical services or we are not in-
3 side the scope of the issue.

4 MS. GALLAGHER: I believe there is a distinction
5 between offering a witness to talk about categories of
6 medical treatment and offering a witness as a medical expert.

7 MR. HOEFLING: He has indicated that the particu-
8 lar procedure was not a medical one. It is not within the
9 category of a medical procedure.

10 MS. GALLAGHER: We are not talking about the
11 procedure. I believe we are talking about the categories.

12 JUDGE KELLEY: It appears to have some bearing
13 on the subject. I must say that, you know, we can sit in
14 here for days and wrangle about this or we can go ahead and
15 find out what the man has to say. And that might not take
16 quite as long. So in the interests of getting at least far
17 enough into the presentation to make a judgment one way or
18 the other, I would suggest that we go ahead and make objec-
19 tions to questions, but bear in mind that there doesn't seem
20 to be any end to the points that can be made about this and
21 there may be some value in simply finding out what this
22 witness has to say, subject to a motion to strike.

23 Proceed.

24 BY MS. GALLAGHER:

25 Q Dr. Lyon, will you please define the categories

1 of medical treatment that would be necessary in the event of
2 a serious nuclear accident?

3 A I think that there are possibilities in two
4 categories. Basically, those possibilities after exposure
5 and those possibilities before exposure. The possibilities
6 before exposure could include the use of certain kinds of
7 drugs and medicines that would mitigate or lower the potential
8 damage that might occur as a result of exposures and subse-
9 quently. Those kinds of procedures that could be used after-
10 ward would depend primarily upon an assessment of what the
11 particular kind of damage would be, and that would be a
12 medical assessment.

13 For example, one would suspect that radiation or
14 radiological triage would have to be used by physicians in
15 order to distinguish between those who are beyond help,
16 those who could take immediate help, and those who could use
17 delayed help, without specification at all of what medical
18 procedures could be used or are available.

19 Q And are any of these categories in the area of
20 emergency kinds of services?

21 A Yes. I think that both the kinds of things that
22 could be done prior to exposure would be appropriately con-
23 sidered as one kind of emergency procedure, especially in
24 circumstances where the nature of the facility and its
25 operation could, on the basis of what is being done there,

1 lead to some particular kinds of problems.

2 So that if workers or people close in to a plant
3 were at or near a facility or beyond the boundary of the
4 facility in the EPZ where certain activities going on at
5 that plant could lead to exposure, one prudent kind of
6 treatment might be the availability of materials that could
7 mitigate subsequent exposure.

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1 MR. PIGOTT: I trust the record reflects a con-
2 tinuing objection, but I will not press on every question.

3 JUDGE KELLEY: Yes, it does.

4 MR. HOEFLING: Likewise for the Staff.

5 BY MS. GALLAGHER:

6 Q What about medical services such as -- categories
7 of medical services such as decontamination and radiation
8 -- ss? Are those in the nature of -- would those be
9 required? Are those among the categories of medical services
10 that would be required?

11 A Clearly if there is going to be some effective
12 emergency planning it would have to take into account a
13 possibility that people might be contaminated or suffer
14 radiation injury and that therefore certain kinds of steps,
15 whatever they may be as defined by the medical profession
16 involved, would have to be prepared for.

17 Q And are those services that must be given immed-
18 iately or soon after exposure, or are they the kind of
19 services that can be deferred to some later long-range dates?

20 A I think that would be a medical decision, but I
21 think there is also a common rule that goes beyond just
22 medical knowledge, that the sooner you get to some remedial
23 kind of procedure, the better your chances are for what may
24 happen subsequently.

25 Q We have subpoenaed a medical witness to talk

1 about available medical treatment. What I would like to
2 elicit from you is what kinds of demands there will be for
3 such services.

4 MR. PIGOTT: Objection. I'd like to know the
5 basis of this demand.

6 MS. GALLAGHER: Okay.

7 JUDGE KELLEY: I think you need to spell out what
8 you are assuming in order to raise the question. Is that
9 the thrust of your point?

10 MR. PIGOTT: Yes.

11 WITNESS LYON: Well, what I would like to --

12 MR. PIGOTT: Excuse me. Could we have a ruling
13 and then questions?

14 JUDGE KELLEY: I'll sustain the objection to the
15 question as asked because it doesn't contain enough in the
16 way of parameters so that we can judge what the witness is
17 responding to.

18 BY MS. GALLAGHER:

19 Q You have talked about categories of treatment
20 that might be required. What kinds of numbers of people
21 might be requiring these services and how would one arrive
22 at these numbers?

23 MR. PIGOTT: I'm going to object to that question.
24 There has been no basis or foundation laid for this man's
25 expertise or showing that he has any kind of connection with

1 the kinds of calculations that are being called for at this
2 time. I realize we are trying to defer things to the end,
3 but I think we have sort of moved from an area previously
4 discussed and on which I did the voir dire earlier into I
5 think in anticipation of the proposal of some of the exhibits
6 that we have seen, and now I'd consider it into a new area
7 that I think is appropriately approached from the legal
8 standpoint.

9 JUDGE KELLEY: Well, let me see if we are at
10 least on, if we are understanding the same bases. We did
11 hear a legal argument earlier on two things, one of which
12 was whether it is proper to hypothesize some accident in order
13 to test the adequacy of medical arrangements. We ruled
14 that it was proper. Then it is a question of which accident.
15 They have already indicated that they've got a particular
16 accident in mind. If I understand your question, it is to
17 the effect that, given -- and one question I would ask you,
18 is the accident you described earlier a premise of this
19 question?

20 MS. GALLAGHER: Yes, it is.

21 JUDGE KELLEY: So you are saying given that
22 kind of an accident and given some other assumptions that
23 I gather the witness would supply, he would then give some
24 range of numbers about cases or injuries. Is that where we
25 are headed?

1 MS. GALLAGHER: We are headed in that general
2 direction. I misspoke when I said it was the very same
3 accident. It is actually in the -- it comes from figures,
4 NRC figures, again, and from the final environmental state-
5 ment, again.

6 JUDGE KELLEY: Well, in order for this testimony
7 to be meaningful we do have to know specifically what accident
8 is being talked about, isn't that right?

9 MS. GALLAGHER: May I ask the witness --

10 JUDGE KELLEY: Wouldn't you agree?

11 MS. GALLAGHER: Yes. I would.

12 JUDGE KELLEY: And I thought from the earlier
13 discussion that I understood which accident you had in mind.

14 MS. GALLAGHER: Our original intention was to
15 try to introduce Dr. Lyon's own study and the Los Angeles
16 Federation of Science study, which did deal with the accident
17 that we are talking about this morning. Since we are not
18 now dealing with latent effects, some modification of figures
19 has been required which we rely on the same tables. Now we
20 are talking about a PWR from 1 to 4.

21 JUDGE KELLEY: Well, I think that is important.
22 I don't think your question is intelligible unless -- or
23 that it will get us anywhere unless we know what action we
24 are talking about.

25 MS. GALLAGHER: Okay.

1 JUDGE KELLEY: Would you restate it in the light
2 of this discussion?

3 BY MS. GALLAGHER:

4 Q Dr. Lyon, if you were to hypothesize an accident
5 based on the figures in the final environmental statement
6 between PWR 1 and PWR 4, how would you arrive at an estimate
7 of the demand for medical services based on radiation exposure?

8 MR. PIGOTT: I would have to object now. I think
9 we are into this new area of the ability and the competency
10 of this witness to evaluate accidents such as proposed by
11 counsel, to evaluate the accidents to come up with the numbers
12 and consequences that she is calling for.

13 JUDGE KELLEY: Let me be sure I understand
14 exactly what the objection is. He is not here as an expert
15 on nuclear power accidents and I don't think he has been
16 asked that.

17 MR. PIGOTT: I don't think so either.

18 JUDGE KELLEY: Okay. What is it that you think
19 this question calls for that you think he lacks expertise
20 on? I'm not precisely sure.

21 MR. PIGOTT: The call of the question is the
22 number of persons to be injured in his opinion, various
23 levels of injury, it sounds like, for treatments based on
24 the accidents PWR1 through 4 from some undefined source as
25 yet -- assuming from the environmental statement. My objection

1 is that this person is not qualified to evaluate or has not
2 been shown to be qualified to evaluate those PWR incidents
3 that have been referred to such that he can get to the call
4 of the question, the final conclusions that are being reached.
5 It involves at least a couple of three steps to be able to
6 answer that question and there isn't any showing that he can
7 handle at least the first couple of steps.

8 He has to be able to evaluate those answers to
9 come up with the answer to Mrs. Gallagher's question.

10 JUDGE KELLEY: Well, let's take it step-by-step,
11 then. He doesn't need to know about how accidents happen in
12 nuclear power plants, correct?

13 MR. PIGOTT: Nobody is asking for that.

14 JUDGE KELLEY: Okay. But I just want to break
15 it down then, if there are several steps, and just where does
16 this break down. So we have in the FES and various other
17 Staff sources releases that can be anticipated from certain
18 types of accidents, correct?

19 MR. PIGOTT: No.

20 JUDGE KELLEY: Not correct?

21 MR. PIGOTT: I don't think so. I think that --

22 JUDGE KELLEY: I would agree with you. If we
23 don't know what the release is, we've got a problem. Then
24 we've got nothing to talk about. I thought we knew that.

25 MS. GALLAGHER: May I refer you to Table 7.3 from

1 the FES, which is already in, I understand, and it was our
2 Exhibit No. 2, Chapter 7, includes Table No. 7.3.

3 MR. PIGOTT: I believe that shows release
4 categories.

5 MS. GALLAGHER: Summary of Atmospheric Release
6 Categories Representing Hypothetical Accidents in a PWR.

7 JUDGE KELLEY: Well, doesn't it give, as I read
8 it, a fraction of the core inventory released? Isn't that
9 the amount released?

10 MS. GALLAGHER: Yes.

11 JUDGE KELLEY: Category 1, is that xenon-krypton?

12 MS. GALLAGHER: Yes.

13 JUDGE KELLEY: Nine-tenths, 90 percent.

14 MR. PIGOTT: There are so many other factors,
15 the timing, the --

16 JUDGE KELLEY: Let's take them step-by-step. If
17 we can't get there, we'll forget it. And there are steps.
18 That is absolutely right. But let's take them one at a time.
19 When you say you want to talk about a PWR 1-4 you were looking
20 at these releases and you are doing a sort of averaging of
21 the four accidents, just as you described earlier you were
22 going to talk about 1 through 9?

23 WITNESS LYON: Yes.

24 JUDGE KELLEY: Okay.

25 MR. PIGOTT: Excuse me. This is an average of

1 those four accidents, not any one accident?

2 JUDGE KELLEY: I believe we discussed that this
3 morning, that concept, with respect to 1 through 9.

4 MR. PIGOTT: Except now we have changed accidents
5 so that's why I'm asking.

6 JUDGE KELLEY: Different accident, different
7 average. Right.

8 MR. PIGOTT: But it is still an average of four
9 accidents?

10 JUDGE KELLEY: The same concept is being used?

11 WITNESS LYON: If I can state what I did, I will
12 tell you very explicitly how I came to these figures.

13 MR. PIGOTT: Well, you're not going to -- excuse
14 me.

15 JUDGE KELLEY: Well, let us -- bear with us, if
16 you will.

17 WITNESS LYON: Yes. I think for the moment your
18 statement is approximately correct.

19 JUDGE KELLEY: I won't say it.

20 (Laughter)

21 JUDGE KELLEY: Okay. Something about good enough
22 for the government, but I won't say it.

23 MS. GALLAGHER: Did you mean a range rather than
24 an average?

25 JUDGE KELLEY: Is that a better word?

1 MS. GALLAGHER: Yes.

2 WITNESS LYON: Yes.

3 JUDGE KELLEY: All right. So there are your
4 releases. So you've got a release. Then that means these
5 fission products are out in the atmosphere.

6 MR. PIGOTT: No, that doesn't necessarily mean
7 that. At any particular time. First of all, I would ques-
8 tion whether or not you can average four individual sequences
9 in any way, shape or form or, for that matter, if this man
10 is technically competent to average any four of these
11 accidents.

12 BY MS. GALLAGHER:

13 Q Dr. Lyon, are you averaging these?

14 A No.

15 MR. PIGOTT: What are you doing with them? That
16 is the --

17 MS. GALLAGHER: That's what we would like to hear.

18 WITNESS LYON: That's the word that I suggested
19 to the chairman, that it was not average, but range. There
20 is a very different approach here.

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T12 kl

1 JUDGE KELLEY: All right. Now, we can get to
2 the fine tuning of what you are doing here. We have got a
3 release -- when this says release, does this mean a release
4 to the atmosphere? That is how I would read it.

5 MS. GALLAGHER: Yes.

6 JUDGE KELLEY: Then the next step, Mr. Pigott,
7 is that do we get into where the wind is blowing?

8 MR. PIGOTT: No, I think we probably missed the
9 first step, and that is when it initiated, how long before --
10 what kind of credit has been given between how long between
11 the initiator and the time you are reaching some kind of a
12 core melt situation, the period of time between the melting
13 and the breach of the containment -- I mean, none of these
14 things that he has got.

15 JUDGE KELLEY: I don't think --

16 MR. PIGOTT: And they are important because they
17 are -- because they affect what is in the atmosphere -- when
18 and over what period.

19 BY MS. GALLAGHER:

20 Q Dr. Lyon, are the things that you -- that
21 Mr. Pigott is referring to things that have already happened?
22 Are they a given, once you have an atmospheric release?

23 A Right. I would like to show how specifically
24 I tied together and related the information in table 7.3 to
25 the information in table 7.4 so that I can get to the numbers

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1 and discuss the basis of the use of the numbers.

2 JUDGE KELLEY: Here is the problem that it seems
3 to me we have got. We are really here to concern ourselves
4 with the adequacy of medical arrangements, and not the exact
5 way power plant accidents occur. On the other hand, we don't
6 want to pause at something so ridiculous it is not worth
7 thinking about. So we have to give some kind of a look as
8 to how this all happened. I suppose we could take official
9 notice of the fact that one way or another it is conceivable
10 that there is a serious accident at the power plant causing
11 high levels of radiation, a good ways away from the plant.

12 But that doesn't give you anything very precise,
13 unfortunately. Bearing in mind your concerns and pointing
14 out the obvious that you will have your opportunity at cross-
15 examination and you can probe assumptions at some length, I
16 still think we would benefit from moving ahead and finding
17 out, at least at this stage, what Dr. Lyon's approach was,
18 and I think that was the question.

19 MR. PIGOTT: My objection, of course, was still
20 to his basic qualifications to do what he is attempting to
21 do.

22 JUDGE KELLEY: Let's find out what he is going
23 to attempt to do, and it is not going to be to analyze acci-
24 dent scenarios, I assume, and then we can take a look at the
25 objections. So I will overrule it for now. You can offer --

1 you can make it again a little later. Go ahead.

2 BY MS. GALLAGHER:

3 Q Do you remember the question?

4 A Would you please ask it again?

5 Q Okay. Referring to the table at -- in the Final
6 Environmental Statement, table 7.3, how does one arrive at
7 a calculation of the numbers of people who, because of
8 exposure to atmospheric releases of radiation, will require
9 medical services?

10 A As I understand it, I had the obligation to see
11 whether or not there was some linkage between information
12 given in 7.3 and information in table 7.4. And that linkage
13 I believe, may be correctly defined as follows. That if one
14 looks at the release categories for PWR one, two, three and
15 four --

16 JUDGE KELLEY: Excuse me, Doctor, it might be
17 well to go a little slow here so we can follow you. 7.3
18 was the release numbers.

19 WITNESS LYON: Okay.

20 JUDGE KELLEY: 7.4 -- we are --

21 WITNESS LYON: We are not there yet.

22 JUDGE KELLEY: Just a moment. Maybe we can just
23 look at it.

24 MS. GALLAGHER: It is at page 7-18 in the Final
25 Environmental Statement.

1 WITNESS LYON: Well, they are looking at 7-11.

2 JUDGE KELLEY: Okay. Go ahead.

3 WITNESS LYON: Okay, well, in looking at table
4 7.3, you will observe that the fraction of core inventory
5 released is highest for PWR one, two, three and four for
6 xenons and kryptons, the noble gases. You will also observe
7 that the only other numbers there in those categories, at
8 least for one and two, and possible one, two and three, that
9 are significant, by comparison, are for radioiodines for the
10 cesium and rubidium group, and for the tellurium antimony
11 group. However, those are likely to cause damage by inhala-
12 tion or ingestion more than contamination or radiation in-
13 jury to the external body. Therefore, I considered pri-
14 marily the releases that would apply to the noble gases.

15 And I assumed for my purposes that I wanted to
16 get a range of rems of exposure that would lead to contamina-
17 tion or external injury, acute radiation injury, by using
18 the numbers four categories, one, two, three and four, for
19 the noble gases. That is a 90 percent release for one,
20 90 percent release for two, 80 percent release for three,
21 and 60 percent release for four.

22 In order to be able to do that and relate the
23 information in table 7.3, to the information in table 7.4,
24 which gives the actual numbers according to NRC Staff's
25 estimates, I felt I also had to look at the probability per

1 reactor per year for PWR one, two, three and four. And as
2 you see there, the numbers range from something like 5.1
3 times ten to the minus eight, seven times 10 to the minus
4 six, 2.3 times 10 to the minus six, and 2.1 times 10 to the
5 minus 11, namely arranged from a low of two times ten to the
6 minus eleven to a high of seven times 10 to the minus six.
7 I then used that range to enter table 7.4, the first column,
8 giving the probability of impact per year, and using that
9 range I could see that the numbers that might be applicable
10 would be the numbers in the last three rows corresponding
11 to 10 to the minus six, 10 to the minus seven, and 10 to the
12 minus eight.

13 The numbers that are given there for persons
14 exposed over 200 rems in the second column, will read,
15 2,000 person or 10 to the minus six probability, 31,000
16 persons or 10 to the minus seven probability, 100,000 persons
17 for 10 to the minus eight probability. That is the number
18 of people estimated to be exposed at a level of over 200
19 rems. Okay?

20 I looked similarly at the next column which is
21 headed persons exposed over 25 rems. again for the three
22 horizontal categories, 10 to the minus six, 10 to the minus
23 seven, and 10 to the minus eight. And you see there that
24 the numbers for 10 to the minus six are 190,000 persons.
25 The next line is 1,100,000 persons, and the next line is

1 2,000,000 persons.

2 JUDGE KELLEY: Do you read those two columns
3 of 225, are those both whole body doses?

4 WITNESS LYON: I am assuming that they are, yes.

5 JUDGE KELLEY: They don't say otherwise, so one
6 would, I guess.

7 WITNESS LYON: No.

8 JUDGE KELLEY: I asked the question --

9 WITNESS LYON: More correctly, since we are
10 dealing only with noble gas exposure, they would have to be
11 external doses.

12 Now, the next thing that I looked at was --

13 JUDGE KELLEY: So far, is it correct that --
14 maybe I don't follow this exactly, but other than -- I won't
15 call it averaging, but you took a range --

16 WITNESS LYON: Right.

17 JUDGE KELLEY: -- one through four -- have you
18 done anything so far other than read the NRC's table?

19 WITNESS LYON: Yes, I did. I took the range
20 of release values in that .6 to .9 range --

21 JUDGE KELLEY: Yeah.

22 WITNESS LYON: -- for the categories one, two,
23 three and four --

24 JUDGE KELLEY: Yeah.

25 WITNESS LYON: -- and did an independent analysis

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1 and calculation to determine what the level per person of
2 rem dose would be, and I found that my range of calculation
3 was from 130 to about 300, which brackets nicely the 200 rem
4 range and tells me that the NRC's estimate of 200 rems is the
5 correct figure. That it is usable.

6 So I did an independent check of the numbers in
7 that table.

8 JUDGE KELLEY: Okay, go ahead.

9 WITNESS LYON: Okay. Having done that and as-
10 sured myself that the information given in 7.4 was reliable
11 and could be used, the next problem was to look at the range
12 of numbers given by the NRC Staff for numbers of persons
13 exposed over 25 rems to the numbers of persons exposed for
14 200 rems or more, and to recognize that according to the
15 Federal Radiation Council in its publication, I believe
16 number five, May, 1961, table 1, they note that acute radia-
17 tion effects like radiation sickness and immediate short-term
18 effects will begin to occur at 75 rems exposure, which is in
19 the middle of that range, or somewhere in that range. So
20 again, there is confirmation that if we look at numbers of
21 persons in that range of exposure between 25 and 200 or more,
22 we are in fact looking at people who very likely would come
23 down with acute radiation sickness or very short term effects
24 that would be due to contamination, and it is contamination
25 because we are looking primarily and exclusively at the noble

1 gases, which are assumed not to cause internal doses because
2 they are chemically inert. and therefore we are dealing with
3 external exposures only.

4 Now, having made that connection, then one is,
5 I felt, obliged to look at those numbers and see what would
6 be an equitable estimate for the number of people who in
7 effect might be considered candidates for acute radiation
8 effects, were there an accidental release from the plant.
9 And I came up with an estimate that I think is reasonable
10 and that is, we are looking at something like a range of
11 about 60,000 persons having this kind of effect due to the
12 accident to something like maybe 250 to 300,000 such persons.

13 Now, since the EPZ only contains 89,350 people,
14 I am assuming that at least half to two-thirds or more might
15 very well be candidates in a major accident of the categories
16 we are considering for acute radiation effects that would
17 include contamination and acute radiation injury.

18 I then proceeded from that point to say to my-
19 self, what kinds of things would these people have to have
20 in order to help mitigate their effects, and we were looking
21 immediately at decontamination procedures and other remedial
22 procedures that hopefully would minimize any potential long-
23 term effects and would constitute the true kinds of efforts
24 that would have to be maintained in an emergency planning
25 situation. And that was the basis for my estimate.

1 So the only thing that I contributed here in-
2 dependently was a check on the numbers that the NRC Staff
3 has arrived at and convinced myself that those numbers are
4 correct, and then using their numbers in the FES, estimated
5 roughly what order of magnitude we are actually dealing with
6 in terms of numbers of people who might be injured.

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1 JUDGE KELLEY: Parameters, like meteorology --
2 I mean, I have read the FES. I am not a student of its
3 every line, and I don't know whether or how -- which way
4 the wind was blowing when we got into these tables. From
5 what you said, though, I gather you were basically looking
6 at the tables -- did you factor in at all -- attempt to
7 factor in meteorological conditions?

8 WITNESS LYON: What we assumed, of course was,
9 and I might add that I could take into effect some additional
10 acute fatalities which, in my description to you I did not
11 take into effect, but which would have to be added in in
12 terms of people who would need immediate care. That is
13 another big number, and we can talk about that too in detail
14 if you like.

15 But in terms of what we looked at, we looked at
16 are 22 and one half degree pie cut up to 10 miles from the
17 source of the emissions, and the population therein, and said
18 these are the 89,350 people that would be potentially avail-
19 able to exposure. We also allowed in our definition that
20 there would be a one hour free period for the covering of
21 that area with a semi-infinite cloud of the radioactive
22 material, the noble gases' specific effect, and said that
23 thereafter, as evacuation is occurring, people are being
24 irradiated. And if you do that, you come out with the
25 numbers that are very close to what I estimated for you,

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1 something like about half to two-thirds or three-quarters
2 of the number of people in the EPZ, maybe even more. I would
3 say those are minimum numbers.

4 JUDGE KELLEY: What is your time frame for
5 evacuation?

6 WITNESS LYON: We are allowing six and a quarter
7 hours according to the Wilbur Smith analysis. We are allow-
8 ing one hour for material to spread over that pie cut, and
9 no injuries occurring in that hour. We are allowing for
10 evacuation beginning in the next hour and running for six
11 and a quarter hours thereafter, so that at six and a quarter
12 hours all the people in that pie cut will have been evacu-
13 uated.

14 JUDGE KELLEY: When you reference your study,
15 we haven't ruled on this yet, the admissibility of exhibit
16 10, is that -- what you just said is exhibit 10 minus long
17 term effects?

18 WITNESS LYON: Yes, it has nothing to do with
19 long term effects. You see, when I --

20 JUDGE KELLEY: But Exhibit 10 talks about cancer.
21 That is why I put it that way.

22 WITNESS LYON: No, but it also talks about dose,
23 and the dose can be applied either to cancers --

24 JUDGE KELLEY: Okay.

25 WITNESS LYON: -- or acute radiation injury.

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1 JUDGE KELLEY: But your various assumptions
2 are in Exhibit 10?

3 WITNESS LYON: Yeah. But let me --

4 JUDGE KELLEY: Six and a half hours for evacua-
5 tion --

6 WITNESS LYON: Yeah.

7 JUDGE KELLEY: -- for example.

8 WITNESS LYON: But let me say one further thing,
9 and that is when I made my estimate of 150 or 130, to about
10 300 rems for the range that the NRC specifies as 200 rems
11 here in table 7.4, I went to regulatory guide 1.109 and used
12 the specific dose factors that are given there for the noble
13 gases. That is how I got my independent calculation. So
14 using NRC's own dose factors for the noble gases, and using
15 the figures that are in 7.3 for the percentage of the core
16 inventory released, I was able to come out with an assessment
17 of the 200 number and verify that it is indeed in the right
18 range.

19 JUDGE KELLEY: Now, you may have said this, but
20 let me ask you -- say it again if you have -- in terms of
21 our focus here on the adequacy of medical arrangements, you
22 have referred to contamination and radiation sickness and so
23 forth, do you have an estimate of the number of people in
24 that portion of the EP? -- you talk about 22 degrees?

25 WITNESS LYON: 22 and a half degrees is

k4 1 considered a sector which is defined as 1/16th of 360 degrees.

2 JUDGE KELLEY: And is that drawn right out of
3 the Wilbur Smith study, the sector?

4 WITNESS LYON: I can't answer that. I think --

5 MS. GALLAGHER: I believe that the pie shape is
6 not co-congruent with the Wilbur Smith sector. It tracks
7 the evacuation route.

8 JUDGE KELLEY: I am just trying to be clear
9 about exactly where we are in the EPZ.

10 WITNESS LYON: If you start with the left hand
11 boundary of the sector looking in a northerly direction from
12 the plant north, the left hand boundary of the pie cut runs
13 right along the coast up to ten miles. It swings an arc
14 which is indicated yesterday about four miles, and then you
15 have the other side of the pie cut.

16 JUDGE KELLEY: All right.

17 WITNESS LYON: And there --

18 JUDGE KELLEY: That is in Wilbur Smith?

19 WITNESS LYON: I don't know.

20 MR. PIGOTT: He said no. I think --

21 MS. GALLAGHER: The pie cut --

22 JUDGE KELLEY: Yeah.

23 MS. GALLAGHER: -- is a 22 and a half degree
24 sector. I do not believe that it is exactly on the same
25 lines as the Wilbur Smith. It is within the EPZ, however.

k5

1 JUDGE KELLEY: Who cut the pie? Wilbur Smith
2 didn't do it. I mean, I am just trying to nail down what
3 we are talking about.

4 WITNESS LYON: Well, Mr. Chairman, yesterday
5 Dr. Plotkin specified exactly that the pie cut was one that
6 covered the area that I just indicated, and that it was
7 taking into account with the moving of wind from the south-
8 easterly to the northeasterly direction. Northwesterly.

9 JUDGE KELLEY: I understand. What I just --

10 MS. GALLAGHER: To answer your question, it was
11 done by the Los Angeles Federation of Scientists' Committee.

12 JUDGE KELLEY: And is this an exhibit that is
13 in evidence in the case?

14 MS. GALLAGHER: Yes. It --

15 MR. PIGOTT: Objection. It is not in evidence.

16 MS. GALLAGHER: It is not in evidence yet. It
17 is our exhibit which has been identified.

18 JUDGE KELLEY: Okay, I just -- if we are talking
19 about numbers we just have to know just exactly what we are
20 talking about, that is all. And you do have an exhibit
21 you will offer later, and if it is objected to, we will see
22 where that goes.

23 MR. PIGOTT: I might say --

24 JUDGE KELLEY: Within -- excuse me, yes.

25 MR. PIGOTT: I was going to say that is the

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1 purpose of my objection at this time because it is -- having
2 read the information so far, it is obvious to Applicants
3 that what is happening is that we are getting on the record
4 the conclusions of the exhibit and the so called study with-
5 out the niceties of going through the basis and the way it
6 actually -- the way the study was actually performed to
7 reach those conclusions, and I object to that kind of a
8 procedure. We are getting conclusions without any foundation
9 and without any basis, without any competence, without any-
10 thing. We are just getting nothing but bald conclusions and
11 assertions and I object to that kind of approach to the
12 testimony.

13 JUDGE KELLEY: And you are getting them all
14 subject to a motion to strike after we find out whether the
15 Witness can be helpful to us in deciding this case.

16 All right. Doctor, I understand what you mean
17 by the sector and the population of that sector is how much?

18 WITNESS LYON: 89,350 people.

19 JUDGE KELLEY: Now, did you have an estimate of
20 the number of people in that sector who would require some
21 kind of medical treatment?

22 WITNESS LYON: The estimate that I came to was
23 somewhere from about 60,000 to three quarters or nearly all
24 of the people in the EPZ. That sector as defined, for our
25 purposes as the EPZ. That population number --

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1 JUDGE KELLEY: 60,000 to all would be the range?

2 WITNESS LYON: Yes.

3 JUDGE KELLEY: And this -- what kinds of -- I
4 just said medical treatment of some kind. Can you be more
5 specific as to what you think their injuries would be?

6 WITNESS LYON: Well, since we are confining our-
7 selves essentially --

8 JUDGE KELLEY: To the immediate short term?

9 WITNESS LYON: Right. Then we are talking about
10 lessening the potential mid-range and long-term effects by
11 getting contamination off the body for external exposure,
12 and for the possibility of giving some kinds of drugs or
13 other treatments that would tend to lessen the subsequent
14 internal uptake of radioactive materials on the outside of
15 the body, and as I said before --

16 JUDGE KELLEY: Well, taking them one at a time,
17 to require contamination, or to be in such a condition that
18 decontamination would be advisable, do you have any estimate
19 as to how many people would need decontamination?

20 WITNESS LYON: I think the larger number of
21 people, certainly, would need decontamination to one degree
22 or another. That, of course, is a procedure that I have
23 dealt with personally in my work over the years, and also
24 as the radiation and safety officer in our laboratory with
25 the use of equipment and decontamination procedures.

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1 The other person would include people who would
2 have to be assessed by medical experts as to whether or not
3 they were at risk beyond just mere contamination to longer
4 term injury unless certain kinds of treatments were insti-
5 tuted, whatever those treatments may be. And as I indicated
6 earlier, that does not include an estimate of acute fatali-
7 ties and since we are dealing with a large number of people
8 exposed, any persons who would be exposed at levels that
9 could ultimately lead to acute fatalities would have to be
10 a general distribution curve and would involve more or less
11 50 percent of those people dying and 50 percent not dying,
12 with no one knowing ahead of time which specific individual
13 may ultimately die. Now since acute fatalities may range
14 over a period of hours, days or weeks after exposure, there
15 is no way of knowing initially how to decide who should be
16 hospitalized and who should not. And that would put an
17 additional burden on whatever facilities are available and
18 whatever medical procedures may be used.

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1 BY MS. GALLAGHER:

2 Q Dr. Lyon, when people are admitted, say, to an
3 emergency room for assessment of radiation, is there a way for
4 the -- from your experience as a radiation officer, do you
5 have an opinion as to whether there is a way to assess the
6 dosage that they have encountered?

7 A I have read documents that deal with acute
8 radiation exposure, that have been published by the Atomic
9 Energy Commission, by medical personnel, in cases where
10 people have been exposed and died, and where people have been
11 exposed and recovered, and I know that one of the things that
12 is critical to any kind of subsequent medical assessment or
13 medical treatment that may be prescribed is a determination of
14 what the dose was, and what radioactivity or radionucleides
15 were involved, and in those cases where criticality accidents
16 have occurred, which have been described in detail by the
17 Atomic Energy Commission, and I have the description here,
18 and the reference, and what was done as well as to people who
19 were taken care of as acute radiation-exposed individuals in
20 general hospitals, I know that it becomes critical to know and
21 reconstruct where the worker was at the time of exposure, the
22 nature of the exposure, exactly the geometry of how it occurred,
23 what the doses were, and so on, in order to be able to know
24 how to treat that individual.

25 So, if people are coming in or are being brought

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1 in because of contamination, and because of acute radiation
2 injury, it will become almost impossible -- in my view -- to
3 take tens of thousands of people and be able to assess each
4 one, and imagine the circumstances under which they were
5 exposed, and what they were actually exposed to.

6 Now, maybe one -- I don't know about this -- maybe
7 one can assume that given the nature of the release that one
8 can anticipate, one could ahead of time determine that
9 certain procedures would have to be followed. I would hope
10 that that might be the case to lessen whatever the ultimate
11 impact may be, but I can envision circumstances in the EPZ
12 where the dose -- and what kind of dose and how it was
13 sustained and degree of sheltering, if any -- would be
14 critical to determining what kinds of medical procedures would
15 have to be used.

16 Q So that it would become important to have some
17 close communication between people at the source of the
18 exposure, and people who took the dose?

19 A Right.

20 Q What -- from your knowledge as a physiologist,
21 what types of health injuries would one expect to see, and
22 what I am trying to get at is the types of general categories,
23 again, of medical treatment that will be required.

24 Will there be a need, for example, for laboratory,
25 blood bank, that sort of service?

3g 1 A In the case of the data given in 7.4, we are
2 dealing with persons exposed to over 200 rems, persons exposed
3 to over 25 rems, and acute fatalities. Those are the three
4 major categories that we have to be concerned with, in terms of
5 numbers of people to be treated.

6 In terms of past history of acute fatalities, or
7 even high levels of exposure that ultimately do not result in
8 fatalities, and there is no way to know ahead of time which
9 individual is going to be in which category, people will have
10 to be hospitalized in order to be able to be treated
11 symptomatically and monitored closely to see the development
12 of the course of the consequences of the exposure, in order to
13 know what kinds of treatments to maintain, and there are
14 descriptions of that in these cases that I can refer to later
15 on.

16 Therefore, since these people may die within hours,
17 or days, or weeks, as has been the case in the past, in a
18 limited number of cases that have occurred, some sort of
19 medical treatment is going to have to be involved, and
20 assessments will have to be made to institute that treatment.

21 I therefore envision that there would have to be
22 trained personnel who are able to deal with acute radiation
23 poisoning, to levels that could result in fatalities, as
24 distinct from mere contamination or low-level radiation
25 injury. There would have to be instrumentation to monitor

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1 people to be able to tell what is happening as decontamination
2 procedures are applied, or as drugs may be applied to head off
3 later development of whatever is going to occur, and whatever
4 other treatments may be involved, so you have to have the
5 instrumentation to be able to give the medical staff the
6 basis on which they make whatever judgments they are going to
7 make.

8 These people have to be trained in the use of these
9 instrumentations, and have to be available and on hand to be
10 able to deal with whatever numbers are going to be imposing
11 upon the facilities that are available.

12 I think that the question of drugs would be an
13 important one, because the drugs we are talking about are not
14 common drugs, especially things like British anti-leucide (ph)
15 the drugs that are used to scavenge electrons, and mitigate
16 oxidant injury which is the result of radiation decay events
17 occurring in living tissue, so I think that that, too begins
18 to be a part of whether or not the facilities available are or
19 are not adequate.

20 Q What about the demand on laboratories, for example,
21 to assess the platelet counts, and the red blood counts, and
22 the white blood counts, and so forth?

23 A It is common knowledge that one of the key things
24 that happens in acute radiation poisoning that may or may not
25 lead to fatalities are conditions that affect the blood cells,

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1 such as anemia, thrombocytopenia, which is a technical term
2 meaning too few thrombocytes, and leucopenia, meaning a --
3 a term that means too few white blood cells.

4 What happens in acute radiation poisoning in fact
5 is -- and this is documented in the cases that I can refer
6 to, is that acute radiation poisoning can very easily, and
7 often does, if it is high enough radiation dose, lead to a
8 depletion of white blood cells so the blood cell count actually
9 goes down to zero.

10 Now, the white cells are critical in what prognosis
11 there may be for persons becoming well or not becoming well,
12 in this sense, that white blood cells are well-known to anyone
13 in any kind of biomedical research to be required as part of
14 the infection-fighting mechanisms that the body relies on.

15 They are critical elements of the immunoprotective
16 systems of the body as well, and if you deprive a person of
17 immunoprotective systems, and the ability to fight off
18 infections, these people can very often die and do die of
19 infections and lack of ability to fight off these infections
20 because they have no immunoprotection.

21 Q So during their hospitalization, they would need
22 to be protected from infection through some isolation?

23 A In the article in the New England Journal, which
24 anyone can read, and which I have read --

25 Q Which is our : mber 12, by the way.

1 A Yeah. The procedures that were used there were
2 bone marrow grafts and blood, so that you had to have a blood
3 bank able to supply fairly large amounts of blood and so on.
4 If you are talking about a single individual, maybe the
5 numbers are easily handleable. If you are talking about
6 hundreds, or thousands of individuals, I don't know what kind
7 of pressure that begins to put on the facilities. That
8 depends on what facilities are available.

9 But that, if you have a substantial number of
10 people irradiated at these levels, for radiation injury, there
11 is no question in my mind that you are going to need large
12 supplies of blood, and you are going to need all the kinds of
13 medical accoutrements that will be able to protect the
14 individual during a time when the body is going to be subject
15 to conditions where it can't fight infection or protect
16 itself by its normal mechanisms of protection.

17 Q Would that include isolation techniques?

18 A Absolutely. In the cases that we talk about in
19 the paper here, the people were brought into the emergency
20 room, and were put into an isolated corner of the room to be
21 kept away from other persons, because of physical contact
22 with the patient, between technicians, nurses, and the doctor
23 staff.

24 MR. PIGOTT: Mr. Chairman, the last half a dozen
25 questions have gone directly to treatment of individuals, which

7
1 I thought was the one area where we had perhaps established
2 that the gentleman has no competence to testify, and I really
3 must object to further questions along this line, and move to
4 strike.

5 I guess I would have to see a transcript to see
6 how many questions, but it is just going off into nowhere.

7 MS. GALLAGHER: Dr. Lyon, may I inquire about the
8 course --

9 JUDGE KELLEY: Excuse me. I do want to respond.

10 MS. GALLAGHER: Sorry.

11 JUDGE KELLEY: To Mr. Pigott. I think that the
12 thrust of his comment is -- appears to be well-taken in the
13 sense of treatment techniques, and we will have to see a
14 transcript later, and whatever motions made will be made, but
15 I think it would be wise to steer away from that.

16 BY MS. GALLAGHER:

17 Q May I inquire about the course that you have
18 taught most recently at UCLA on radiation, and inquire whether
19 in teaching students about radiation, you deal with subjects
20 such as the ones that have been inquired about today?

21 A Yes. The course deals with the nature of
22 radiation, and the nature of radiation injury, what
23 radionucleides are, what questions -- what the terminology
24 is when we talk about half-life, decay constant, when we
25 talk about the Roentgen, the rem, the rad, these are the terms

3
1 that are used, the Curie, what happens when low-level
2 radiation interacts with living tissue, what kinds of damage
3 can occur, and what the meanings are of calculations of doses
4 from dose factors, and so on, and how individuals can make
5 independent assessments on their own, depending on what faith
6 or confidence they have in the numbers they wish to use, to
7 arrive at their own conclusions about whether or not there
8 is a potential problem with low-level radiation.

9 In addition, I made it a point to bring in outside
10 speakers, each of whom was clearly pro-nuclear, and stated
11 their pro-nuclear position, and I did this to make sure that
12 the class had an overview of all aspects of the problem, so
13 that whatever my prejudices may or may not have been would not
14 be the guiding light in what was given to them in the course.

15 As a result, they were able to see what the
16 arguments were all around the issue, and make up their own
17 opinions about how to use the data. The data, by the way, that
18 were used in the course, came directly from NRC information
19 and numbers, came directly from DOE numbers, came directly
20 from ERDA numbers. There were no numbers that I used at all
21 that were numbers that I supplied from my own sources.

22 Q Turning to the article in the New England Journal
23 of Medicine, which is our number 12, would you please report
24 on the contents of that article?

25 MR. PIGOTT: Objection. There is no showing that

9
1 this man is competent to talk about an article from the
2 Journal of Medicine. The document is not in evidence. There
3 is absolutely no basis or any legal reason why he should be
4 allowed to comment on it in this proceeding.

5 MR. HOEFLING: Staff would join in that
6 objection.

7 JUDGE KELLEY: Was it your -- I assume it was
8 your thought to offer this article in evidence?

9 MS. GALLAGHER: Yes, we do intend to offer it in
10 evidence.

11 MR. PIGOTT: I would submit that it is totally
12 inadmissible on the grounds of the rankest type of hearsay,
13 with absolutely nobody here who can sponsor it with any kind
14 of -- with any degree of competence, and we should not be
15 subjected to questions -- or rather, interpretations of it
16 from equally incompetent witnesses.

17 BY MS. GALLAGHER:

18 Q Dr. Lyon, is this the kind of article that you
19 rely upon in your work?

20 MR. PIGOTT: If I could have a ruling before we
21 hear from the witness?

22 JUDGE KELLEY: You will get one. What is the
23 purpose of -- let me just tell you, as I think you know, over
24 the rather long history of this case, we have had a lot of
25 articles offered -- not too many, actually, because the lawyers

1 know that we don't particularly want them, and the reason is
2 that they are hearsay, and we can't cross-examine anybody on
3 them. We have not let them in with very few exceptions. So,
4 our predilection is to not admit evidence of this kind. It is
5 evidence, and I am not saying we couldn't do it, but as a
6 matter of discretion, we haven't done it.

7 Now, what is the -- is there some special
8 justification for this particular article being brought in?

9 MS. GALLAGHER: The purpose of this article is to
10 detail the complexity of medical management of radiation
11 injuries, even on a small scale.

12 JUDGE HAND: How does the dose that the victim in
13 this article receives compare to the doses that you are
14 suggesting people in the plume exposure pathway would receive?

15 WITNESS LYON: If I may answer, sir? This
16 article deals with a fatal radiation exposure to a worker in a
17 criticality accident, where the exposure was estimated to be
18 some 10 to 20 times the lethal dose, LD-5030. It also
19 demonstrates the kinds of almost human -- extra-human efforts
20 that have to be made in dealing with a single individual, and
21 so that my concern in talking about this article was that even
22 with people who are exposed to much lower levels, if you are
23 talking about large numbers of them, you may have a situation
24 in which heroic efforts would have to be applied in order to
25 be able to deal effectively with these people who are exposed.

11 1 JUDGE KELLEY: But is this not -- I gather from
2 your comment, Mrs. Gallagher, if I can try for a phrase to
3 describe it, is this an article that is hospital administration
4 oriented with respect to serious exposure?

5 MS. GALLAGHER: No, it is not hospital
6 administration --

7 JUDGE KELLEY: What did you say? I thought you
8 said something to that effect.

9 MS. GALLAGHER: No.

10 JUDGE KELLEY: I haven't read it, unfortunately,
11 but --

12 MS. GALLAGHER: No, it describes, in very
13 understandable terms, what one is dealing with, when one is
14 dealing with a radiation injury of this severity.

15 JUDGE HAND: Yes, it kills people.

16 JUDGE JOHNSON: Could I ask the witness to point me
17 to the reference on page 761, I believe, that presumably is the
18 basis for the case report in this? This may help a lot.

19 WITNESS LYON: If you are referring to
20 administrative features, which has been circled, that is
21 certainly one of the relationships that I see between this
22 article, only one, between this article and the question about
23 the ability to handle large numbers of people who may be
24 exposed.

25 JUDGE JOHNSON: Dr. Lyon, I think I asked for the

12 1 reference number on page 761, in which the radiation exposures
2 incurred in this accident are reported.

3 WITNESS LYON: This article is the reference for
4 what is discussed. I don't understand your question.

5 JUDGE JOHNSON: Let me try again.

6 The case report, starting on the first page of
7 this article, is that of a radiation injury purportedly
8 occurring in a U-235 recovery plant, correct?

9 WITNESS LYON: Yes, I believe it was.

10 JUDGE JOHNSON: Somewhere in the literature, the
11 radiation exposures that were incurred by this person were
12 reported, other than in this article you have here, I assume.

13 WITNESS LYON: I don't know that, but they are
14 reported in this article.

15 JUDGE JOHNSON: I was looking for the basis for
16 the radiation exposure numbers.

17 WITNESS LYON: Well, in this article, they refer
18 to this patient and say that this patient received some 10 to
19 20 times the dose that would be considered the LD-50 dose.

20 JUDGE JOHNSON: I understand that. Then you would
21 say that there is no literature quotation other than this
22 paper for the radiation doses reported from the Wood River
23 Junction incident?

24 WITNESS LYON: I don't know that, because the
25 Atomic Energy Commission gave a report earlier indicating what

1 they attributed, let us say six deaths attributable to nuclear
2 causes, and these were acute radiation exposure injuries.

3 JUDGE JOHNSON: That is all. Thank you.

4 JUDGE KELLEY: I think your question, Judge
5 Johnson, illustrates the problem, presumably Dr. Carras (ph)
6 or Dr. Stanberg could tell us about that.

7 JUDGE JOHNSON: Presumably they could.

8 JUDGE KELLEY: But they are not coming. How are
9 you doing on direct, in terms of what you wanted to cover?

10 MS. GALLAGHER: I think maybe we could finish up
11 in about 15 minutes, or so.

12 JUDGE KELLEY: Let us get a cup of coffee at this
13 point, take a 10 or 15-minute break. Off the record.

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1 JUDGE KELLEY: Back on the record.
2 We have pending an objection to the admission
3 into evidence of GUARD's Exhibit marked No. 12, entitled
4 "Fetal Radiation Syndrome from an Accidental Nuclear Excur-
5 sion". We are granting the objection and not admitting this
6 exhibit into evidence as substantive evidence of the matters
7 discussed in it. If it is appropriate at some point and
8 Dr. Lyon wishes to refer to this as a basis for a statement
9 he may wish to make then, as has been our practice in this
10 case, the exhibit could be marked or the document at least
11 identified and included in the record as showing the basis
12 for the statement, but not as independent proof.

13 So, Mrs. Gallagher?

14 MS. GALLAGHER: Yes. At this time I would like
15 to offer Dr. Lyon's statement with the markup, which has
16 deletions of anything having to do with cancer.

17 JUDGE KELLEY: Let me find my copy. Excuse me.
18 Okay. We took your suggested deletions earlier but deferred
19 comment by counsel. So I think at this point, we all have
20 in front of us the marked version of the statement. Mr.
21 Pigott, any objection to the statement as marked?

22 MR. PIGOTT: Yes. Taking the markings as given
23 and not addressing the balance of, first of all --

24 JUDGE KELLEY: Well, I assume you would concur in
25 any deletion and then the question I think I am asking you

2
1 is do you want to delete additional material.

2 MR. PIGOTT: I would oppose introduction of the
3 balance of the document in its totality. The document itself
4 does not go to the issue 2(d), taking into consideration the
5 earlier rulings of the Board. I believe it goes primarily to
6 health effects and, regardless of the deletions, I still think
7 it does not qualify as probative evidence under our issue.
8 Secondly, I don't believe that there has been any showing
9 that Dr. Lyon is competent to make the statements that have
10 been included in this document. They go to accident calcula-
11 tions and consequences of exposures which are beyond his
12 field, especially into the area of -- from what I understand,
13 Dr. Lyon is primarily in the area of research and animal
14 research and has not had experience in doses or treatment of
15 individuals. He has not had background with respect to cal-
16 culations, accident calculations. And on that basis, I would
17 think that the total document is inadmissible.

18 Now I assume we are talking only right now of the
19 statement of Dr. Lyon.

20 JUDGE KELLEY: Correct.

21 MR. PIGOTT: Thank you.

22 MS. GALLACHER: At the moment.

23 JUDGE KELLEY: Staff?

24 MR. HOEFLING: Yes, Mr. Chairman. As I had
25 argued earlier, what the Staff sees as happening here is

3
1 an attempt to take testimony which was shaped to deal with
2 Contention 1 and to, if you will, try to make it fit a
3 separate and unrelated contention. I don't think that the
4 markups that Mrs. Gallagher has provided to us do that. I
5 think we still have before us here basically a piece of
6 testimony that deals with health effects. On page 2 health
7 effects are referenced twice in the material that remains in.
8 On page 3 references to health effects and health consequences.
9 I don't think that Dr. Lyon is qualified to speak to medical
10 diagnosis and basically do not feel that this testimony
11 reaches the issue before the Board and would urge that it
12 be excluded.

13 JUDGE KELLEY: Mrs. Gallagher?

14 MS. GALLAGHER: This statement is a statement of
15 a respected health professional who teaches in schools and
16 has taught in medical schools. He has most recently taught
17 a class that deals with the teaching of dose assessment. He
18 is quite familiar with the calculations that are necessary
19 to do dose assessment. He is -- there is no medical diagnosis
20 implied or expressed in this document. It is offered in part
21 to include the calculation for the 22.5 degree sector plume.

22 The fact that it was prepared for one purpose and
23 has been adapted for another is really not -- it was beyond
24 our control. The point is that it is adaptable for the
25 other purpose. Radiation is radiation, whether you are

4
1 applying it to radiation illness or whether you are applying
2 it to cancer. We are not applying it to cancer. We are
3 applying it to the radiation illness because we want to
4 address the subject of the sufficiency of medical services.

5 JUDGE KELLEY: Given what we are doing here with
6 regard to Dr. Lyon's testimony, namely going through and
7 having direct and having cross and then leaving parties the
8 option of moving to strike later on, I don't see that time
9 is of the essence in ruling on this document because more
10 or less the same arguments are going to be made about portions
11 of the testimony. Does any party see any prejudice? Perhaps
12 I should have said that in the first place. But now that
13 you have all said something about this particular piece of
14 testimony and you are on the record, do you see any prejudice
15 in our considering these motions to strike and objections
16 all at once at the end? Any problem with that, Mr. Pigott?
17 We would defer admission.

18 MR. PIGOTT: No, that's fine. If you want to
19 defer a ruling on it and continuing objection to the testimony
20 that will probably be elicited from.

21 JUDGE KELLEY: I think we had better just consider
22 it all at once and have the transcript in front of us.

23 MR. HOEFLING: That is fine with the Staff.

24 MR. PIGOTT: I guess my only concern is that I
25 -- that we are lacking some finality and I have a terrible

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1 feeling that we are taking far more time on this particular
2 subject matter and witness than it may deserve. But that
3 of course is the Board's determination. But I really feel
4 we are stringing out some of these rulings that I would
5 think can be made based on the basis that has been shown so
6 far by Intervenors. I would think it is incumbent on them
7 to show that they have good probative, reliable evidence and,
8 if they don't, we should not be required to suffer through
9 extended periods of time determining it.

10 JUDGE KELLEY: Well, what we are doing here is
11 unusual. I know of only one other witness in the history of
12 this case where we've done something like it. If it is
13 strung out, it is strung out. I think we want to have the
14 overall picture before we try to rule on this.

15 MR. PIGOTT: That is only a consideration. I
16 have no objection to the Board's proposed procedure.

17 JUDGE KELLEY: Well, let's go ahead.

18 BY MS. GALLAGHER:

19 Q Dr. Lyon, earlier we referred to the final
20 environmental statement, which is already in evidence, Table
21 7.3 and 7.4, and in your discussion with Judge Kelley you
22 mentioned the numbers of people who would be exposed to radia-
23 tion injury and who would suffer various types of injury.
24 Would you please go over those numbers for the record?

25 A In Table 7.4 I was looking at the numbers in

6

1 columns 2 and 3 for persons exposed over 200 rems and persons
2 exposed over 25 rems that corresponded horizontally to the
3 probability of impact per year for accidents in the group
4 PWR 1, 2, 3, and 4. I made a scale down for the number of
5 persons involved to be approximate to that involved in the
6 EPZ of the sector that we looked at, 89,350 people, and
7 scaled up a little bit the fact that there would be a greater
8 concentration of radioactivity closer in to the plant at the
9 time of an accidental release than there would be farther
10 out, and came up with an estimate that we would be talking
11 about people who would suffer contamination and acute radia-
12 tion exposure in the range of some 60,000 people to perhaps
13 all of those in the EPZ as defined by the sector we chose.

14 In addition, I was referring to acute fatalities,
15 also estimated by the NRC Staff in Table 7.4 in column 4,
16 and there we are looking at a number which I think has to be
17 taken into account relative to the LD 50, the lethal dose to
18 50 percent of the persons. That is, if you have a certain
19 number of people exposed at a level where acute fatalities
20 will occur, one has to assume, if the number of persons
21 exposed is fairly large, as it is in this case, that there
22 is going to be a distribution of exposure levels and that,
23 therefore, for every person who dies ultimately by acute
24 exposure there will be another person who will be acutely
25 exposed but who will survive.

7
1 So we are looking then at the possibility that
2 we may have up to twice 30,000 persons who may require some
3 sort of medical help and aid as a result of acute exposure.
4 Since no one can tell ahead of time who will die and who
5 will not, the entire group who suffer acute exposure may have
6 to be hospitalized and treated for the fact that they are
7 acutely exposed.

8 Q Thank you. What experience do we have with
9 numbers of radiation injuries?

10 MR. PIGOTT: Who is "we"?

11 BY MS. GALLAGHER:

12 Q What experience is there historically dealing
13 with radiation injuries requiring medical treatment?

14 A Hiroshima, Nagasaki. And there, if you look
15 at the numbers in terms of acute fatalities, you have to
16 also take into account that people not only died of acute
17 radiation exposure but of blast and of heat effects and I
18 don't know how you would dissect out of that those who were
19 subject only to radiation injury that would parallel what
20 we are considering here. But in terms of magnitudes of numbers,
21 the numbers that we are looking at, that would be the only
22 situation that I could see that would be historically
23 comparable.

24 Q Would you please explain -- you mentioned before
25 criticality in terms of the radiation accidents that were

8
1 recounted in the article that is numbered but not admitted?

2 MR. PIGOTT: Can we perhaps get a ruling
3 cutting off discussion of criticality? On that one there is
4 absolutely no showing of competence to discuss criticality
5 of accidents.

6 JUDGE KELLEY: Does criticality mean lethal dose?
7 I'm not sure I know what the word means.

8 MS. GALLAGHER: No. Perhaps if we let Dr. Lyon
9 explain --

10 MR. PIGOTT: No.

11 JUDGE KELLEY: You asked the question; you must
12 know what the word means.

13 MS. GALLAGHER: Not necessarily.

14 JUDGE KELLEY: Well, what's the purpose of the
15 question?

16 MS. GALLAGHER: The purpose of the question is
17 partly to address the situation under which you would have
18 the need for facilities to treat radiation injury other than
19 a large release. Criticality can occur under circumstances
20 other than a large nuclear plant accident. In a small re-
21 search facility, for example.

22 MR. PIGOTT: I fear we are into accident analysis.

23 JUDGE KELLEY: I still don't understand what
24 criticality means.

25 MS. GALLAGHER: Okay. The point of the question

9
1 is to probe other reasons for requiring medical facilities
2 for treatment, such as injuries perhaps occurring to a
3 smaller number of people than -- now we have talked about
4 large numbers of the population.

5 JUDGE KELLEY: A smaller accident with much smaller
6 releases?

7 MS. GALLAGHER: Less widely disseminated, perhaps.

8 MR. PIGOTT: I still feel the question is calling
9 for discussion of accident analysis. Perhaps smaller acci-
10 dents. But I thought it was one thing that we had stayed
11 away from was this witness evaluating accident sequences.

12 JUDGE KELLEY: Well, I think we are staying
13 away from that. I'm just groping a little bit here. But
14 I suppose you could put on evidence directed toward a very
15 serious but also very unlikely accident and the Board might
16 conclude one thing or one set of things, and put on evidence
17 of a much smaller design basis, if you will, accident and
18 conclude something else. Is that where you are headed?

19 MS. GALLAGHER: Actually, it is much simpler than
20 that.

21 JUDGE KELLEY: It's even simpler than that? Okay.

22 MS. GALLAGHER: The question is meant to address
23 experience with numbers of injuries. We referred to the
24 article before without defining criticality and just for the
25 record I wanted to have Dr. Lyon explain that.

10

1 JUDGE HAND: Mrs. Gallagher, do you presume that
2 somehow people are going to be fiddling with nuclear
3 materials around in the EPZ and suddenly arrive at the moment
4 of criticality and expose someone?

5 MS. GALLAGHER: No.

6 JUDGE HAND: Well, I fail to grasp what criti-
7 cality has -- I understand what it has to do with that article.
8 But I don't see what it has to do with what is in front of
9 us.

10 MS. GALLAGHER: I'll withdraw the question.

11 JUDGE HAND: Thank you.

12 MS. GALLAGHER: I have no further questions.

13 JUDGE KELLEY: Okay. Cross examination by the
14 Applicants.

15 MR. PIGOTT: Subject to a ruling without pre-
16 judice to be renewed at the end of cross examination, I would
17 renew the motions that went with the I guess now motions to
18 strike in lieu of the objections that were made throughout
19 Dr. Lyon's testimony and that Dr. Lyon has consistently
20 testified in areas that are completely beyond his expertise.
21 He has discussed treatment. He has discussed accident analy-
22 sis. He has discussed probabilities, impacts and other
23 assessments that neither his education nor his experience
24 give any indication of any competence to address. I would
25 move to strike his oral testimony and the prepared statement

1 of Dr. Lyon which was earlier offered into evidence.

2 JUDGE KELLEY: A brief conference off the
3 record.

4 (Off the record discussion)

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1 JUDGE KELLEY: Back on the record.

2 The motion to strike is denied, subject to the
3 right of the Applicants to renew the motion following the
4 cross-examination.

5 CROSS-EXAMINATION

6 BY MR. PIGOTT:

7 Q Dr. Lyons, turning to table 7.3, which you referred
8 to earlier --

9 JUDGE KELLEY: Let me just add one point, perhaps --
10 I am sure you are bearing this in mind, but it is a little
11 bit out of the normal practice, much of your objections to
12 Dr. Lyon's testimony has been for want of qualifications in
13 particular areas, and feel free in the course of your cross,
14 if you want to at various points ask questions in the nature
15 of voir dire, go ahead.

16 MR. PIGOTT: Thank you.

17 BY MR. PIGOTT:

18 Q Looking at the -- looking at table 7.3, first of
19 all, the probability column, do you have any kind of a degree
20 in mathematics or statistics?

21 A I have had courses in mathematics and statistics,
22 but I have no degree in those areas.

23 Q Okay, at what level have you had courses?

24 A Well, I use fairly sophisticated statistical
25 analysis in my research all the time.

1 Q Is that a course? I mean --

2 A That is not a course. That is experience in
3 dealing with my research.

4 Q Well, you said you had courses. Could you tell us
5 what courses you have had?

6 A In math and in statistics.

7 Q At what level?

8 A Upper division, some courses in graduate level.

9 Q Then could you tell us what is the combined
10 probability of the PWR 1, 2, 3, and 4?

11 A It depends on how you want to use these. If you
12 want to use them additively, you would have to multiply the
13 probabilities together. If you want to use them as a range,
14 you don't have to multiply them together. You just simply
15 take the lowest and the highest, and say that that is your
16 range.

17 Q All right, what is -- all right, I believe you
18 gave us the lowest and the highest, but that would be -- just
19 for the record, what is the lowest probability one?

20 A Are you suggesting that I multiply them together
21 in order to get the lowest?

22 Q No, I am asking you to identify which of the
23 four accidents has the lowest probability, and what it is.

24 A PWR 4, 2.1 times ten to the minus eleven.

25 Q And the highest?

1 A The highest probability is seven times ten to the
2 minus six, for PWR 2.

3 Q And the additive?

4 A Well, since ten to the minus eight is so much
5 smaller than ten to the minus six, by two orders of magnitude,
6 and ten to the minus eleven is five orders of magnitude, no,
7 three orders of magnitude below -- five below six, that the
8 governing numbers there will be the sum of seven times ten to
9 the minus six and 2.3 times ten to the minus six.

10 Q So that would be approximately one times ten to
11 the minus fifth, is that right?

12 A It would be 9.3 times ten to the minus six, or
13 close to one times ten to the minus five.

14 Q So the additive -- minus five. So, the additive
15 probability would be one chance in 100,000 per year?

16 A That is approximately correct.

17 Q Would you turn to table 7.4?

18 A Yes.

19 Q Looking at the -- for instance, the column you
20 looked at for persons exposed over 25 rems, did you come to
21 any determination as to where those people were located for
22 purposes of putting together table 7.4?

23 A I would assume from the way the table is laid out
24 that that would refer either to the number of persons within
25 an envelope of eighty kilometers or beyond, so the difference

1 there would be eighty-kilometer differences, as for example
2 in the column 1, 2, 3, 4, 5, five over from the left, where
3 there are two numbers divided by a slash, one would be the
4 number that refers to what you would expect up to eighty
5 kilometers, and the number that is larger to the right of the
6 slashmark would go beyond that out to some unspecified
7 distance, and therefore the total, and coming back to the
8 column that you refer to, I am assuming that those numbers
9 therefore would refer either to the total or to something
10 like a distance of eighty kilometers out.

11 Q Persons beyond the EPZ?

12 A Yes. EPZ persons, plus people beyond.

13 Q Now, how did you use that to get to -- well, first
14 of all, is this study in any way, shape or form related to or
15 associated with what you have referred to in your -- in your
16 statement as your first study, and second study?

17 A Directly related.

18 Q Are they the same?

19 A No. They are related by virtue of the first two
20 studies. In order to come out with estimates of cancers which
21 we are not discussing here, I had to determine population
22 doses. When you determine population doses, that is the total
23 number of person-rem of exposure, how you want to use that
24 dose, or how you wish to apply it to what kinds of injury
25 then depends on the nature of the injury.

1 If I have, for example, just to make it simple,
2 100 person-rem of exposure dose, and I am assuming that 25
3 rem per person will give me some sort of an effect, then for
4 100 person-rem, I would have four such effects. Those effects
5 don't have to be cancers. They would be any effect you wish
6 to define.

7 Q What I am getting at is whether you read table 3
8 and table 4 together without going to any other document, and
9 I gather your answer is no. You rely in some part on your
10 earlier studies, is that correct?

11 A I relied on basically two things. One, on the
12 NRC Staff study, as summarized in 7.3 and 7.4, and two, an
13 independent assessment of my own and with other members of
14 the Los Angeles Federation of Scientists to determine whether
15 or not some of the parameters used by the NRC Staff were in
16 fact reasonable.

17 Q Is that what is referred to as you study, as the
18 study in the statement that you have submitted to this
19 proceeding?

20 A Which study do you refer to specifically?

21 Q The top of page three of your statement, "it used
22 my study as a model." Is that what was used?

23 A That was explained earlier, both by me and by
24 Dr. Plotkin, that we were referring to the fact that I did a
25 preliminary study as a model for a more extensive study done

1 by this committee in the Los Angeles Federation of Scientists,
2 of which I was a member, and still am, by the way, with three
3 other persons.

4 Now, the four of us used my preliminary study to
5 determine the more extensive study that resulted in our
6 estimates in that study in Exhibit Number 9, of what the total
7 number of person-remS might be under a variety of conditions,
8 especially the number of hours for evacuation time.

9 Q My question is very simple, and that is whether or
10 not you used this study in conjunction with tables 7.3 and 7.4
11 in coming to some of the numbers that you have given us this
12 afternoon. I would think it is either yes or no.

13 A It isn't yes or no in the sense that they are
14 related to each other in very specific ways. I also made an
15 independent study of either of the two that you referred to,
16 another one, to verify whether or not the 200 rem figure
17 given in column 2, in table 7.4, was or was not reasonable.

18 Q I am almost afraid to say it. Is there a third
19 study? Are you referring to a third study?

20 A No, just a calculation to determine to my own
21 satisfaction that the 200-rem figure given in the heading of
22 column 2, table 7.4, was or was not reasonable. I wished to
23 determine for myself in an independent way whether I could
24 accept a 200 number, 200-rem number, as a reasonable number.

25 Q Did you use these studies that you referred to in

1 your statement as a verification, then, of your conclusions
2 from table 7.3 and 7.4?

3 A Not for the calculation that I used to determine
4 whether or not the 200 number was reasonable.

5 Q Did you determine that the exposures in columns
6 1 and 2, and table -- in table 7.4 -- were as a result of
7 release of the noble gases in columns 3 and 4 of 7.3, for
8 PW 1 through PWR 4?

9 A The noble gases are listed only in column 3 of
10 table 7.3, and --

11 Q The iodides.

12 A -- the range -- I did not use the iodides at all,
13 just the noble gases, because the noble gases are assumed only
14 to cause external radiation, which would be the only pertinent
15 factor for contamination effects, and external radiation for
16 acute radiation effects.

17 When you look at iodine, you are then beginning to
18 look at internal effects, and potential longer-term effects.

19 Q Well, we are only looking -- I am only looking at
20 how you took the numbers right now, Dr. Lyons, and that is, did
21 you assume that all of these -- these radiations in columns 2
22 and 3 of the ten to the minus 6 through ten to the minus
23 eight probability scenarios came from the -- apparently just
24 the noble gases of PW 1 through PWR 4?

25 A As I explained earlier to the Chairman, I looked

1 at the numbers, the range of numbers from 0.9 for PWR 1
2 down through 0.6 for PWR 4.

3 Q Only.

4 A Only. That range of numbers.

5 Q Noble gases only.

6 A Noble gases only.

7 Q On what basis do you -- would you state, then, that
8 the figures you refer to in columns 2 and 3 of table 7.4 are
9 doses only from noble gases?

10 A Those figures embrace a range from 25 to 200 rems,
11 which would precisely be the range in which one would expect
12 contamination effects and acute radiation injury effects.

13 And those are separate, by the way, from acute
14 fatalities, which would require higher levels than 200.

15 Q So you are estimating that the doses came only
16 from noble gases?

17 A That is correct.

18 Q In the range of 25 to 200 rem.

19 A That is correct.

20 Q Well, as I look at table 7.3, I see a number of
21 other releases under --for other elements in the range, for
22 instance, especially of ten to the minus sixth. Barium and
23 strontium under the -- under PWR 7?

24 A If you look at two things, one the elements that
25 stand at the head of the columns across the table to the right

1 of xenon and krypton, which is in column 3, the head of column
2 3, you will observe that there are a number of elements
3 representative of certain groups of elements.

4 Q When you got to the effects of these doses, did
5 you assume --

6 JUDGE KELLEY: Excuse me. Had you finished your
7 answer?

8 MR. PIGOTT: I thought so.

9 WITNESS LYON: I was waiting so that I could
10 address him and complete my answer.

11 JUDGE KELLEY: I don't think he was through the
12 prior answer.

13 MR. PIGOTT: I am sorry. I wasn't looking, so I
14 didn't realize he was still -- continue, Dr. Lyon.

15 WITNESS RYAN: Would you repeat your last question
16 to me, please?

17 BY MR. PIGOTT:

18 Q I can't. If we have it on the recorder? I think
19 we are going two back.

20 JUDGE KELLEY: Can you go back?

21 MR. PIGOTT: Strike the line of questioning. I
22 will go with a fresh line of questioning.

23 JUDGE KELLEY: Never mind.

24 BY MR. PIGOTT:

25 Q Dr. Lyon, what training have you had in evaluating

1 releases and their consequent impacts on population?

2 A One of the periods of experience in this field
3 was when I was a special consultant to the State Energy
4 Commission.

5 My task was specifically that of evaluating the
6 DEIR's for Rancho Seco number 2, and for the San Joaquin
7 project, and in the process of evaluating these tomes, these
8 documents, I very laboriously went through them line by line,
9 word by word, table by table, figure by figure, in order to
10 come out with some assessment that I could give to the
11 Commission, both in technical terms and in lay terms, that
12 would explain what in my view were still problematic or
13 unresolved questions and issues that were relating to the
14 information given in the DEIR's.

15 Q Prior to the time that you did that, did you have
16 any training? What training did you have in that kind of
17 work?

18 A I suppose I would classify it as on-the-job
19 training for about 13 years.

20 Q What job?

21 A Working with groups, organizations, and so on,
22 dealing with these questions, concerned with these questions.

23 Q Had you had any formal training in it?

24 A No formal training.

25 Q Have you had any formal training in nuclear

1 engineering?

2 A I have had some formal training, if I refer to
3 the ORNL's course that I took down at Oak Ridge. That is
4 formal training.

5 Q A one-month course?

6 A A one-month course for biomedical researchers to
7 get the basic elements and principles of radiation, all the
8 terms, all the technology and so on to be able to understand
9 what they are doing in their work.

10 Q When was that taken?

11 A I believe that was in the early sixties. That was
12 years after I had had much practical experience with
13 radioisotopes as traces in my research, which I started back
14 in 1949.

15 Q So your training, then, is by avocation, then, is
16 that correct, for this accident analysis?

17 A In part avocation, in part vocation.

18 Q Have you had any training in -- with respect to
19 atmospheric dispersion of -- of radioactive releases?

20 A No, but on many occasions, I have calculated
21 error concentration values for radionucleides.

22 Q How about training in meteorology?

23 A I can read a meteorological map?

24 Q Anything above that?

25 A Enough to understand it.

1 Q What training have you had?

2 A Practical on-the-spot, on the -- you know, work
3 training. Working with them. In fact, I was the one who
4 discovered that for about 20 percent of the time the wind
5 blows near San Onofre here predominantly from southeast to
6 northwest right across the sector that we selected for the
7 EPZ, which was one of the reasons why we selected it.

8 Q Can you classify -- can you describe and classify
9 atmospheric stability?

10 A There are a number of systems that are used.
11 The Poizoi System (ph) uses a number of designations, and I
12 have a rough idea of what those mean.

13 Q Could you describe them?

14 A Not in detail, no. I am not a meteorologist, and
15 I don't pretend to be, but I am just saying that I can use
16 some of the information in a very practical way.

17 Q Which one did you -- which atmospheric stability
18 factor did you use in coming to this plume that you postulated
19 in this instance?

20 A I didn't.

21 Q What assumption was made with respect to
22 meteorology?

23 A We allowed for one hour for which -- during which
24 the spread of radioactive materials coming out of the stack
25 or from the source of the injury to the plant, to spread out

1 over out pie cut.

2 Q And then what happened?

3 A And thereafter, beginning at the end of that one
4 hour for distribution over that area, assembly -- there is
5 certainly a semi-infinite cloud type of dispersion, then we
6 looked at the kinds of effects that we would get as people
7 begin to evacuate the area over a period of 6.25 hours so
8 that at the end of that there were no persons left in the EPZ.

9 Q Well, did you consider then that the --
10 apparently the dispersion filled the pie container and then
11 just sat stagnant for the period of time?

12 A No, we assumed that it continued to come out over
13 that period.

14 Q Did it disperse?

15 A Not essentially, no.

16 Q Did the concentrations stay constant over that
17 period?

18 A We were looking at a mean concentration throughout
19 the 6.25 hour period.

20 Q Well, the release lasted 6.25 hours?

21 A No, the release was for one hour. You can take
22 the release for one hour, and you can calculate the number of
23 persons exposed, that is, the number of man-remS that you will
24 get, or you can look at the exposure hour by hour as the
25 people are leaving the area. The numbers that you come out

1 with is exactly the same.

2 Q Did you take the release as being a straight line
3 throughout the 6.25 hour period? A straight line --

4 A What do you mean by straight line?

5 Q A constant release?

6 A No, I said that the release was assumed to take
7 place over one hour, to fill the airspace over that pie cut.

8 Q And then nothing thereafter?

9 A Essentially, that was the situation.

10 Q And it filled the pie-shaped area and remained in
11 that form for how long?

12 A For 6.25 hours, and as I said, there are two
13 ways to look at that kind of assumption. One, you can look
14 at the total number of exposures in that first hour given
15 the concentration that you have over that pie cut, or you can
16 take the number of persons who would be exposed hour by hour
17 as they are leaving that pie cut, and calculate what it would
18 be.

19 If you take the number for the one hour, or you
20 take the number per hour for 6.25 hours, and add them up, you
21 come up with the same number of individuals exposed.

22 Q What was the time period assumed prior to the
23 release for the actual initiation of the accident?

24 A We allowed a latent time of one hour, the instant
25 the accident occurred, and then one hour for dispersion of

1 this material over the pie cut.

2 JUDGE HAND: And no exposure to people during that
3 period?

4 WITNESS LYON: No exposure to people during that
5 time? You get a free hour.

6 JUDGE HAND: And then you make the plume stand
7 still for six and a half hours?

8 WITNESS LYON: We are assuming that the concentra-
9 tion remains fairly constant during six and a quarter hours.

10 JUDGE HAND: It sounds like a most remarkable
11 situation, doesn't it?

12 WITNESS LYON: Well, you can look at it both ways.
13 In one case, that is one way to interpret it. The other is,
14 that that is the concentration that will affect decreasing
15 numbers of people as they move out of the area. The total
16 number of people exposed, and the level of exposure, comes
17 out to be numerically the same. We checked it both ways.

18 JUDGE HAND: Well, even granting that, you have
19 gotten into a situation where I think really can't be
20 defended on any logical grounds.

21 WITNESS LYON: How is it not defensible?

22 JUDGE HAND: Because you can't make a plume stand
23 still for six hours. The atoms don't all stop and sit and
24 wait for something to happen.

25 WITNESS LYON: We assume that that would be the

1 average concentration over that period.

2 BY MR. PIGOTT:

3 Q Do you have any basis in reality for that actually
4 occurring? In meteorology, anything?

5 A No more basis than the different designations
6 under the Poizoi System, which are all theoretical.

7 Q What about the height of the plume? What did you
8 assume to be that?

9 A Twenty meters.

10 Q On what basis?

11 A The roof vents that will release radioactivity
12 are about that height in 2 and 3.

13 Q And you assumed that the radioactive material
14 will not go above the height of the roof vents of the
15 reactor?

16 A The roof vents are almost at highway level when
17 you look at the actual site.

18 Q Well, I don't think that answers -- that doesn't
19 seem to be responsive. Do you assume --

20 A I think it is directly responsive.

21 Q Are you saying that the radioactive release did
22 not go above the level of the vent?

23 A What I am saying is that if they come out at a
24 20-meter height, which is at about highway height, which is at
25 about highway height, that they will loft an additional 20

1 meters above the highway, above the land surface, and cover the
2 pie cut within one hour.

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1 Q What is the physical basis for that occurring?

2 A I just told you that we had assumed that that
3 was a condition that would prevail on which we could make
4 our estimates.

5 Q Do you have anything in nature or physics that
6 causes that to be a realistic assumption?

7 A Just the right to use an estimate as anyone else
8 uses an estimate, including NRC Staff.

9 Q Was there heat released along with -- do you
10 assume any heat release along with the radioactivity?

11 A We're not concerned with the heat in terms of
12 the population dose.

13 Q How about the effect of the heat on the bouyancy
14 of the radioactive plume?

15 A We assumed a lofting effect that took it an
16 additional 20 meters up.

17 Q But no particular calculation?

18 A No.

19 Q I want to get back to the timing of this incident.
20 What did you assume or did you assume any particular initiator
21 of this event?

22 A No. We just were taking the assumption to begin
23 with that there is an accident that could result in a major
24 release.

25 Q Did you assume -- you did assume some evacuation

2 1 obviously, correct?

2 A The first thing that we looked at was the assumed
3 evacuation time of six and a quarter hours. And we said okay,
4 let's take that and look at it and look at the rate at which
5 people would in an orderly, undisturbed fashion leave that
6 piecut so that at the end of 6.25 hours there was no one left
7 in that piecut.

8 Q Did you consider there was any relationship to
9 when an accident would start and when evacuation or other
10 protective action might start?

11 A Yes. We allowed one hour for distribution of the
12 radioactivity coming out of the plant before any effects
13 would be assumed.

14 Q I understand you assumed that. But did you allow
15 for what might really happen in any kind of an accident
16 scenario?

17 MS. GALLAGHER: I object. This is a model we
18 are talking about.

19 MR. PIGOTT: I understand it is a model, but I
20 would like to find out if the model has any relationship or
21 nexus with reality.

22 WITNESS LYON: Yes, it does. Because all you
23 have to do --

24 JUDGE KELLEY: Excuse me. I have an objection,
25 I believe. The last question I felt did need to be tied

3
1 to something more specific. But you are testing a model,
2 trying to find out what the model is. So if you want to
3 restate the last one.

4 MR. PIGOTT: All right.

5 BY MR. PIGOTT:

6 Q From the time of the accident -- you apparently
7 did not consider when an accident initiator may actually
8 occur, did you?

9 A I don't understand that point, what you are
10 saying.

11 Q What about the time between scram and release?
12 Did you consider what that might be?

13 A No.

14 Q Do you know whether that would be an important
15 variable?

16 A I don't know what the length of time would be.

17 Q Do you know what occurs between a scram and release?

18 A Well, if you have --

19 MS. GALLAGHER: I object. I don't really see the
20 basis for these questions in testing the model. This model
21 Dr. Lyon has conceded that he did not consider it. I believe
22 your questioning is argumentative at this point.

23 JUDGE KELLEY: We did get an answer that the time
24 between -- I hate to say , but scram is when the reactor
25 shuts down, right?

4
1 MR. PIGOTT: When it trips, yes.

2 JUDGE KELLEY: The time between trip and release?

3 MR. PIGOTT: Yes.

4 JUDGE KELLEY: And he said he didn't consider
5 that, is that correct?

6 WITNESS LYON: Right. If you talk about the off-
7 gas time, the time of some 20 minutes or 30 minutes for delay
8 for gases to come out that may or may not be appropriate
9 under accident conditions. Maybe that system is put out of
10 commission as a result of the accident. I don't know.

11 BY MR. PIGOTT:

12 Q That's right. Whether it is or isn't important,
13 you simply just don't know.

14 A I don't know. But our model is a model that
15 allows for modifications that could take all of these vari-
16 ables into account.

17 Q Did you consider whether there would be any
18 decay going on between the time of the trip and the time of
19 release?

20 A Trip and release? No.

21 Q I would assume also -- well, did you calculate
22 what the plume power or the release would be from this
23 particular --

24 A In our extensive Los Angeles Federation of
25 Scientists model -- not the preliminary model that I used

5
1 as a guide to develop that model, but the extensive model,
2 we definitely took into account the rate of decay of the
3 individual radionuclides that were assumed to come out of
4 the core inventory at a 1 percent release level. There is
5 no way that you can make estimates that are reasonable
6 unless you take the half-life of the individual radionuclides
7 into account. And they were taken into account and that is
8 shown in our Exhibit 9, the equations that actually were
9 developed. Those equations are based upon the use of the
10 rate constant, the decay constant, and the half lives.

11 Q But nothing that happened between the trip and
12 the release?

13 A No.

14 Q Do you know whether or not it is feasible that
15 that period of time could be more than one hour? In fact,
16 do you know of any accident that would result in a release
17 in one hour?

18 A Neither way. More than an hour or less than an
19 hour.

20 Q And so neither would you be able to opine with
21 respect to the effective decay during such a period of time?

22 A Yes, that could be accounted for easily in our
23 model. That is another condition that could be accomodated
24 in the model. That is the beauty of the model that it allows
25 for any particular condition that one wants to look at.

6
1 MS. GALLAGHER: I would like to object on the
2 grounds of relevancy. The study that Dr. Lyon has done has
3 not been offered into evidence.

4 MR. PIGOTT: If I can respond to that, the study
5 maybe hasn't, but certainly the conclusions have. And if the
6 conclusions are to have any validity or invalidity we must
7 now explore that question. I would like to have found out
8 whether or not he was competent to have made those conclu-
9 sions to begin with and save this exercise. But you preferred
10 to put it on the conclusions and now we have to go back and
11 find out whether the conclusions have any basis.

12 MS. GALLAGHER: If I may respond to that, Mr.
13 Pigott, the conclusions have not been offered into evidence.
14 The conclusions that Dr. Lyon has testified to are from
15 the final environmental statement. They are totally inde-
16 pendent of the conclusions of the study.

17 JUDGE KELLEY: The objection is overruled. Mr.
18 Pigott is probing the premises underlying Dr. Lyon's statements
19 this afternoon on direct testimony.

20 BY MR. PIGOTT:

21 Q In your discussion of what would be necessary
22 from a treatment standpoint, did you assume that the radia-
23 tion was from anything except the noble gases?

24 A Just the noble gases.

25 Q And do they cause contamination? Radiation?

7
1 A External contamination, acute radiation effects.
2 I'm getting confused at this point because I don't know if
3 you are referring to Exhibit 9 or are you referring to my
4 referral of the figures in Table 7.3 and 7.4 of the FES.

5 Q Then you have reached the state I was in for
6 some period of time.

7 A But I did talk only about numbers coming from
8 the FES and not from Exhibit 9.

9 Q Then those are all the noble gases, right?

10 A In --

11 Q Only noble gases?

12 A In terms of the assessment that is given here in
13 7.3 and 7.4, just the noble gases. That was what I used in
14 order to determine whether or not the 200 rem figure was a
15 reasonable figure.

16 Q Well, do the noble gases contaminate the human
17 body?

18 A Yes, externally. That --

19 Q Can you wash them off?

20 A You can. That would be one of the procedures.
21 What I used in order to make the assessment as to whether
22 or not that number was reasonable was the dose factors for
23 exposure to a semi-infinite cloud of noble gases given in
24 1.109.

25 Q Well, what chemicals would you use to remove

8
1 those noble gases from the skin?

2 A Noble gases would not react with skin or any
3 other material unless they were at extremely high temperatures
4 and under very special conditions where special reactions
5 have been found for the nobles. So we are not looking at
6 combination. What we are looking at is potential entrapment
7 within clothing, for example, which could occur, and that
8 materials would have to be washed off the body. They would
9 not just simply evaporate away.

10 Q Well, could they be decontaminated by simply
11 taking off their clothing and discarding it?

12 A That might be one thing to do. That would cer-
13 tainly be a logical thing to do to start with.

14 Q When would it be necessary to go to these chelating
15 processes to decontaminate for these noble gases?

16 A Either in a prevention sense or if other materials
17 got into the body, which could also be the case.

18 Q What's the source of those other materials?

19 A The other radionuclides.

20 Q Well, I thought we only had the noble gases being
21 released.

22 A I used the noble gases only as a basis to
23 estimate whether the figures in the table 7.4 were reasonable.
24 The fact is that when they were reasonable on the basis of
25 just those alone I felt that any other contributors to

9 1 external contamination were well within the bounds that are
2 stated within that table.

3 Q Well, what are you telling us was released?
4 What --

5 MS. GALLAGHER: Would you please be more specific?
6 I think we are getting some confusion in the record because
7 you are not identifying when you are referring to Exhibit
8 No. 9, when you are referring to Exhibit No. 10, and when
9 you are referring to the tables, 7.3 and 7.4. Would you
10 please specify each time you ask?

11 JUDGE KELLEY: I believe that Exhibit No. 9 sort
12 of crept in a few minutes ago but that it hasn't otherwise
13 been involved this afternoon. I understand the testimony
14 to be directed to Dr. Lyon's study based on the NRC figures
15 and the two tables we are talking about and not upon Exhibit
16 9. Is that correct?

17 MR. PIGOTT: That is correct.

18 MS. GALLAGHER: May I ask what you mean by the
19 study based upon the tables? There isn't a study based upon
20 the tables. The tables stand on their own.

21 JUDGE KELLEY: Let me put it this way. I must
22 say that the use of the term "study" has gotten awfully loose.
23 It seems to be applied to what anybody happens to think
24 about something almost as opposed to what I normally think
25 of when somebody tells me a study has been done.

10

1 MR. GALLAGHER: That's precisely my objection.
2 And Mr. Pigott is eliciting testimony from Dr. Lyon that
3 he is calling a study and he is referring to the calculations
4 interchangeably and those are two different things.

5 JUDGE KELLEY: If I may just finish. We are
6 cross examining on Dr. Lyon's testimony this afternoon and
7 he has given us certain numbers. I believe the word "study"
8 got used from time to time but what we are really talking
9 about is what you have told us this afternoon. We are not
10 talking about Exhibit 9 at all.

11 WITNESS LYON: No.

12 JUDGE KELLEY: Right.

13 WITNESS LYON: And that was not a study.

14 JUDGE KELLEY: Right. These are your opinions
15 and your inferences based on --

16 WITNESS LYON: A simple calculation to see whether
17 or not the numbers in 7.3 and 7.4 were reasonable.

18 JUDGE KELLEY: And then the inferences that you
19 drew.

20 WITNESS LYON: And then beyond that I am saying
21 that not only would the nobles be involved in contamination
22 but all the other substances. All I had to do in my prelim-
23 inary example was to determine that the range was a reasonable
24 range. Once I did that, and looking at the corresponding
25 differences in core inventory and what fractions would be

11 1 released, I could see that contamination from the other
2 materials and acute radiation effects would be reasonable.

3 JUDGE KELLEY: Okay. Back to you, Mr. Pigott.

4 BY MR. PIGOTT:

5 Q Could you take just a minute and perhaps write
6 out that simple calculation for us?

7 A Yes. I have it right here. This is an example
8 using xenon 133. If you take the dose factor which comes
9 from Table B.1 in 1.109 for xenon 133, you come up --

10 Q Which column is that?

11 A Xenon 133 is listed as a nuclide about the
12 lower third of the first column and we were looking at the
13 number opposite that in the last column, which is the gamma
14 body dose.

15 JUDGE KELLEY: For the record, Doctor, that is a
16 Reg Guide?

17 WITNESS LYON: That is Nuclear Regulatory Commis-
18 sion Reg Guide 1.109.

19 JUDGE KELLEY: Thank you.

20 WITNESS LYON: The number given there for the
21 dose factor is 2.94e minus 04, which means 2.94 times 10^{-4}
22 and it is given in the following dimensions: millirems,
23 meters cubed per picocurie per year. If you now multiply
24 that by the factor one year divided by 8,760 hours per year
25 and by the factor of the core inventory of xenon 133, which

12

1 is 190 million curies and divide that by 10^9 meters³, which
2 was the volume of the airspace in our sector, and multiply
3 that by 10^{12} to convert curies to picocuries and multiplied
4 that by 1/1000 to convert millirems to rems, one comes out
5 for xenon 133 contribution per person to come out to 5.75 rems
6 of exposure.

7 One can do that similarly with the other noble
8 gases in Table 7.1.4-3 of the draft environmental statement
9 dated January, 1981, and that table is the same in the final
10 statement. There is no difference in those two tables. And
11 you can do that for krypton 85 and its corresponding core
12 inventory in millions of curies. You can do the same for
13 krypton 85m, the mother form, and its core inventory of 27
14 million curies. Similarly for 87, for 88, for xenon 133,
15 which we have just done, and for xenon 135. The sum comes out
16 to be 161 rems per person in the EPZ.

17 When I saw that figure, I reasoned that we are
18 talking about a number of around 200 and --

19 BY MR. PIGOTT:

20 Q Excuse me. What was the last result for xenon
21 133? What was the ultimate result?

22 A 5.75 rem.

23 Q Okay. Excuse me. Continue. And the result of
24 all?

25 A The combination? 161 rem.

13+ 1 Q And the period of exposure?

2 A That was the conditions that I have already
3 talked about.

4 Q One hour?

5 A Yes. It is per hour because we divided by 8,760
6 hours per year.

7 Q Okay. I don't think you finished your answer.
8 Excuse me.

9 A I used that, as I said, to see whether or not
10 the data given in Table 7.4 of the FES was a reasonable
11 number. And I concluded that it was and that therefore the
12 data given in that table, the other data, could be used.

13 Q Okay. So that was the calculation and that
14 confirmed that you could rely on Table 7.3, correct? And
15 7.4.

16 A Yes. And from that point forward you then have
17 to make a distinction of this quick check to see if the numbers
18 were reasonable and the effects on contamination and acute
19 radiation effects of all the radionuclides released from the
20 core inventory.

21 Q Well, that's what we are going to get to now.
22 Now how did you assume the rest of the releases that you
23 apparently -- constitute the dose?

24 MS. GALLAGHER: Now just to have the record
25 clear, Mr. Pigott, would you please be specific about which

14

1 calculation you are referring to.

2 MR. PIGOTT: It is whatever calculation he made
3 to arrive at the testimony we heard today.

4 MS. GALLAGHER: Well, that is not clear enough.
5 I object. Are we talking about the 60,000-plus population
6 figure?

7 MR. PIGOTT: I think that was the final figure
8 bandied about, yes.

9 MS. GALLAGHER: Okay. Dr. Lyons, would you please
10 tell what relationship that 60,000-plus figure has to any
11 previous studies that have been done by you or calculations?

12 MR. PIGOTT: Oh, I let you do the direct; let me
13 do the cross.

14 (Laughter)

15 MR. PIGOTT: Could we start over on that?

16 JUDGE KELLEY: Yes, I think we can.

17 MR. PIGOTT: Thank you.

18 BY MR. PIGOTT:

19 Q You explained your calculation for confirming in
20 your mind that the NRC's table is reasonable I believe is the
21 word you used. Now additionally you testified -- I am
22 speaking of oral testimony -- as to certain numbers of people
23 being affected and the types of radiation exposures they
24 would have received. Would you tell us how you calculated
25 those populations and those exposures?

15

1 A I looked at the numbers given in Table 7.4,
2 in columns 2 and 3, corresponding to the row from column
3 1 designated 10^{-7} and the row below that 10^{-8} , and accepted
4 those numbers for persons exposed over 200 rems and for
5 persons exposed over 25 rems as being an envelope including
6 a low estimate and a high estimate of the number of people
7 that would be affected. This is essentially contamination
8 and acute radiation effects, as opposed to the next column,
9 which gives numbers dealing with acute fatalities.

10 Looking, then, back only at columns 2 and 3, I
11 assumed that I could take essentially the midpoint of those
12 numbers, roughly 600,000, 500,000, decrease that by a factor
13 of 10 for the number of people in the EPZ, and increase it
14 a little bit by a factor to account for the fact that closer
15 in to the source of radiation and radioactivity you will have
16 higher dose levels and came to the conclusion that it was not
17 unreasonable to assume that the number of people who would
18 be affected by contamination and/or exposure to acute radia-
19 tion effects would be in the range of about 60,000 to
20 possibly all of the people in the EPZ.

21 That does not take into account, as I said, an
22 additional number of people that would have to be dealt
23 with with regard to acute fatalities.

24 Q But the first selection you had was a midpoint
25 of some number, is that correct?

16 1 A Yes.

2 Q That was the midpoint of what again?

3 A Of the low of 31,000 and 1.1 million in one
4 case and 100,000 and 2 million in the other case.

5 Q And that midpoint value would have been what?

6 A About 500,000 or 600,000. Actually, that is on
7 the low side if you consider the last line of the table. So
8 I was trying to be a little bit on the conservative side.

9 Q What made you choose the midpoint? Why the
10 midpoint? What is the basis for that?

11 A Federal Radiation Council Document, I believe it
12 is No. 5, dated May, 1961, Table 1, states that the lowest
13 radiation exposure that would result in what could be
14 classified as radiation, acute radiation effects, would be
15 about the range of 75 to 100 rems.

16 Q So you took a straight line between column 1 and
17 column 2 and lopped it off where you felt it was going to
18 reach how many rems?

19 A It was not that detailed. It was just looking
20 at those numbers and saying this looks like a reasonable
21 number to assume for that group of numbers.

22 Q And that's the total basis for that selection,
23 is that correct?

24 A For that part of the selection, yes.

25 Q And the next selection was?

17

1 A To decrease that number tenfold.

2 Q Because?

3 A Of the population difference with regard to
4 the number of people in the EPZ. And that was an arbitrary
5 reduction.

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1 Q Okay, was it your assumption then that the other
2 90 percent were outside the EPZ?

3 A What I was looking at -- I am answering your
4 question, please -- what I am looking at are two things,
5 that the dose that a person would receive would depend upon
6 the population dose, on the number of people, but it would
7 also depend upon the amount of radiation or the amount of
8 radioactivity they were being subject to. If you look at
9 average doses out to a very long distance, and compare
10 average doses over a shorter distance of that same long
11 sector, you would find that the average exposure closer in
12 would be much higher than farther out. So I had to do two
13 things. I had to reduce my estimate by some judgment about
14 the number of people that we were looking at in the EPZ, in
15 this case the sector we selected, and also that is adjusting
16 downward, and I used a factor of 10 to do that, and to
17 adjust upward slightly for the fact that these people
18 being closer in are going to have a higher dose.

19 So I said if it is on the basis of population
20 decrease alone, we are talking maybe around 60,000, 50,000.
21 If we are looking at the fact that they are closer in, you
22 may have to jack that up so that it is possible, and I said
23 that, we may be looking at a total number of individuals
24 suffering contamination and acute radiation exposure in the
25 range of some 50, 60,000 all the way up to the total number

k2

1 of 89,350 in our EPZ.

2 Q So you reduced it by a factor of 10 and then you
3 increased it?

4 A A slight bit.

5 Q What factor up was that increase?

6 A Well, if all of the people in the EPZ, 89,350,
7 were affected, and I was assuming that a lower figure would
8 be around 50 or 60,000, the factor would be 89,350 divided
9 by 50,000 or 60,000.

10 Q Roughly 50 percent.

11 A Less than that, but close.

12 Q Now, did you make an assessment or an estimate
13 as to the types of exposures they would receive, or what
14 they would be exposed to?

15 A I don't understand that question.

16 Q Well, they weren't exposed to -- are you assuming
17 they were exposed only to the noble gases still?

18 A No.

19 Q What are they exposed to?

20 A The whole range of core inventory at some
21 release level that is now in the -- comparable or compatible
22 with the categories PWR one, two, three, four.

23 Q Are they both exposed and contaminated?

24 A In terms of external effects, yes.

25 Q Did you give any credit for sheltering in your

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1 estimate?

2 A We looked at --

3 MS. GALLAGHER: In which study?

4 WITNESS LYON: Yeah.

5 MS. GALLAGHER: Or calculation or whatever.

6 BY MR. PIGOTT:

7 Q In your testimony did you give any credit for
8 sheltering?

9 MS. GALLAGHER: I object. I want you to be
10 more specific, please.

11 JUDGE KELLEY: He said in his testimony. I
12 thought we understood by now what that meant. It means what
13 he said this afternoon.

14 MS. GALLAGHER: In regard to what?

15 JUDGE KELLEY: In regard to numbers of people --
16 well, you simply said did you give any credit for shelter --

17 MR. PIGOTT: Yes.

18 JUDGE KELLEY: That was the way the question was
19 phrased. Right?

20 MR. PIGOTT: In your testimony, yes.

21 MS. GALLAGHER: I object to the question. It
22 is not clear.

23 JUDGE KELLEY: Do you mean -- well,

24 MR. PIGOTT: As to the --

25 JUDGE KELLEY: It is a little unclear.

k4

1 BY MR. PIGOTT:

2 Q As to the 60,000 plus you say were apparently
3 exposed and or contaminated, how did you consider sheltering,
4 if you did?

5 A The reason I was confused, and I want to explain
6 this and then come to your answer directly, is that I talked
7 about both the draft environmental statement and the final
8 environmental statement. The difference of table -- between
9 table 7.1.4-4 and table 7.3 and the corresponding tables
10 giving the summaries of experimental impacts and probabili-
11 ties differed in those two statements by the first one not
12 including protective actions including sheltering and evacua-
13 tion, and the second one clearly including sheltering and
14 evacuation. Since I based my estimates on NRC Staff's
15 detailed analysis given in summary in table 7.4 of the
16 final environmental statement, the answer to your question
17 is yes, sheltering and evacuation were considered.

18 Q To the extent that they were already included
19 in table 7.4?

20 A That is correct, by the NRC.

21 Q But over and above that you did not consider?

22 A No, I did not.

23 Q Did your testimony in any way estimate the
24 numbers of these people that would require various levels
25 of treatment? Each various level of treatment?

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1 A No, I am not dealing with treatment. I am deal-
2 ing only with numbers, numbers of persons that would be
3 involved in contamination and in acute radiation exposures.

4 Q So you are not going so far as to tell us --
5 their levels of contamination or radiation such that certain
6 types of treatment facilities may or may not be required?

7 A Not beyond the fact that we are dealing with
8 a range of between 25 rems of exposure and 200 rems of
9 exposure, because my estimates were based on those two
10 columns of figures given for the last two lines in table
11 7.4.

12 Q Well, I want to be very clear on this. Your
13 testimony does not state what kind of -- does not purport
14 to tell us in any way what types of radiation exposures
15 may have to be treated within -- as a result of your pos-
16 tulated accident?

17 A I repeat. I am looking only at the numbers that
18 are given in table 7.4, columns two and three for contamina-
19 tion and acute exposures for 10 to the minus seven, 10 to
20 the minus eight probability, and the additional figures
21 that correspond to those two lines in the next column for
22 acute fatalities, all of which are NRC estimates from which
23 I made my own estimates according to the method that I told
24 you about just a moment ago.

25 Q I take that to be a no to my answer --

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1 A I don't recall your question.

2 Q Well, I guess we have to do it again, Dr. Lyon,
3 and that is, you have given us numbers of people that are
4 exposed and or contaminated. Is that correct? 60,000 to
5 100 percent of the EPZ population?

6 A In the range of 25 rems to 200 rems exposure.

7 Q But you have not attempted to break down whether
8 that is all contamination or their various levels of radia-
9 tion sickness being experienced?

10 A No, it is a combination of either or both.

11 Q How do we tie that into the question of what
12 medical facilities or services are necessary within the EPZ?

13 A I feel it is my obligation to give you a reason-
14 able -- what I consider a reasonable estimate of the number
15 of people who would be damaged in a hypothetical situation
16 where we have an accident of considerable severity, whether
17 or not facilities are adequate is for someone else to state.
18 Whether or not certain procedures will be used is for some-
19 one else to state.

20 Q And you have expressed no opinion on what
21 facilities should be there or what levels -- or what treat-
22 ment capabilities should be there?

23 A In my opinion I have not.

24 Q And going back again to the probability of
25 these events, they would be the one in 10 to the minus fifth

k7

1 at best? That is the additive of PWR one through four, is
2 that correct? Looking at table 7.3? I think that was the
3 first --

4 A Yes, that was the addition of the probability
5 for per reactor per year for PWR two and PWR three category
6 of release, and I might point out that that is four one
7 reactor. If two reactors were involved, of course you would
8 have to double that.

9 Q Dr. Lyon, what was the purpose of all your
10 testimony concerning the various types of treatment -- your
11 discussion of chelating and British leucytes, or whatever
12 it was -- all those things. Given your last statement, what
13 is it that we are to make of all that discussion that we
14 heard yesterday afternoon and part of today with respect
15 to various types of treatment?

16 MS. GALLAGHER: I object. I don't know where
17 you -- I think you are trying -- I think that you are con-
18 fusing the Witness concerning what -- make a foundation for
19 this question.

20 MR. PIGOTT: I don't think you make foundation
21 for cross examination, Mr. Chairman. I think the subject
22 was addressed by the Witness and I think it is legitimate
23 for me to ask him what the purpose of that discussion was.

24 JUDGE KELLEY: Objection is overruled. The
25 topic before us is adequacy of medical services, and the

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1 Witness has just said that he doesn't know anything -- he
2 isn't here to speak about adequacy of medical services. I
3 think it is a legitimate question then to delve into the
4 purpose of his testimony.

5 WITNESS LYON: I don't know what you are getting
6 at. I really don't.

7 BY MR. PIGOTT:

8 Q Well, yesterday afternoon and part of today you
9 went into quite a discussion of chelation -- to pick out
10 one particular thing. Why was it you were telling us about
11 that?

12 A I think there is a distinction to be made between
13 a prescriptive description of what one does in certain cir-
14 cumstances, which is not my prerogative, but that of the
15 medical profession, and what is available in the literature
16 as a description of the kinds of procedures that may or may
17 not be used. The second, in my opinion, is information that
18 is available to the lay public as well who can understand it
19 in addition to physicians.

20 I do not prescribe. What I am saying is, is
21 that if there are certain kinds of procedures available, it
22 is a different question than the assessment to be made by
23 a doctor of what treatment should be used for a particular
24 case. And that is not what I was attempting to do.

25 Q Well, again, if I attempt to characterize the

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1 question I believe we are looking at here, what are the
2 appropriate medical facilities to have as a part of our
3 emergency planning, and are you telling us that we should
4 have these treatments? Where does it fit into our emergency
5 planning, Dr. Lyon?

6 A I was not telling you that we should have these
7 treatments. I was simply giving a description of the kinds
8 of things that I know may or may not be available. Whether
9 or not they are available, and whether or not they will or
10 will not be used, are decisions to be made by others who
11 have medical expertise.

12 Q And you are not making any recommendation in
13 this proceeding as to whether or not they should be available
14 as a part of Applicants' emergency planning?

15 A My sole role, as I see it, is to give reasonable
16 estimates of the numbers of people who may be damaged. The
17 decision as to whether or not, given those numbers, and
18 whether or not they are reasonable, which has to be assessed,
19 as to what that leads to and what kinds of procedures will
20 then follow, is up to others to decide, both with regard
21 to the actual physical facilities available and to what will
22 or will not be done. I think that what will or will not be
23 done and what is available to be done are two different
24 things.

25 Q You are not proposing or recommending any

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1 particular medical facilities or arrangements with respect
2 to this EPZ, are you?

3 A No, I am not.

4 MR. PIGOTT: No further questions.

5 JUDGE KELLEY: Let's take a break. Fifteen
6 minutes. Off the record.

7 (Whereupon, a brief recess was taken.)

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JUDGE KELLEY: Back on the record. Cross-examination by the Staff.

MR. HOEFLING: We don't have any questions, Mr. Chairman.

JUDGE KELLEY: Okay.

MR. PIGOTT: Applicant --

JUDGE KELLEY: I am sorry --

MR. PIGOTT: I will wait until the questioning is over before renewing my motion.

JUDGE KELLEY: All right.

JUDGE HAND: Dr. Lyon, I want to go back to your model. I don't understand it. You hypothesized that there is a release from the plant, and it takes an hour to fill this pie shape piece of the EPZ, which is essentially all of the population --

WITNESS LYON: At a 20 meter height.

JUDGE HAND: All right. And then you stop the plume, I take it. You got it there. Now you stop it and you now initiate evacuation and so for the next six and a quarter hours people are moving out of it and you calculated doses and this leads you eventually to your estimate of 60,000 or more people --

WITNESS LYON: No, sir. The model you refer to was the study that is in the piece of evidence that is now listed as Exhibit 9. That is where the condition that you

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1 spoke of applies. The 60,000 does not take those conditions
2 or those numbers into account at all. It deals only with
3 NRC's Staff estimates which are given in the final environ-
4 mental statement table 7.4

5 JUDGE KELLEY: Which condition was it -- I am
6 sorry, that you referred to?

7 JUDGE HAND: Well, I was trying to get back to
8 the condition of the accident that we had discussed earlier,
9 the circumstances where there was evacuation under the
10 presence of radiation.

11 WITNESS LYON: Well, I think we are looking
12 at two things, and I am trying to be helpful in clarifying
13 the distance between them. One is the information given
14 in Exhibit Number 9, which deals with the Los Angeles
15 Federation of Scientists' more extensive study in which the
16 condition you refer to was used. However, that is a separate
17 item entirely from the estimate that I just gave, which was
18 based entirely on NRC Staff data given in the final environ-
19 mental statement in table 7.3 and 7.4.

20 JUDGE KELLEY: There does seem to be some poten-
21 tial for confusion here, because I thought during
22 Mr. Pigott's cross examination there were several questions
23 back and forth on the topic of the plume and whether the
24 plume came out and stopped or kept going and so forth, and
25 I thought you referred to a condition where the plume went

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1 out over the wedge and stopped for six and a half hours.

2 WITNESS LYON: As I say, I did, and that referred
3 to Exhibit 9 only.

4 JUDGE KELLEY: Then I didn't understand that.

5 WITNESS LYON: The estimate --

6 JUDGE KELLEY: I thought Exhibit 9 -- Exhibit
7 9 is not in this case. That is the problem.

8 WITNESS LYON: That is right.

9 JUDGE KELLEY: And it never has been in the
10 case. Maybe it will get in, but it is not in now.

11 WITNESS LYON: Right.

12 JUDGE KELLEY: So what we are interested in now,
13 this afternoon, is your conclusions, your 60,000 and up, and
14 where that comes from, and what the model is from that.

15 WITNESS LYON: That is based entirely on NRC
16 Staff data --

17 JUDGE KELLEY: Okay.

18 WITNESS LYON: -- in FES tables 7.3 and 7.4.

19 JUDGE KELLEY: Okay. Well, let me -- I jumped
20 in Cadet, but I wanted to see what that earlier discussior
21 was about. Please resume.

22 JUDGE HAND: Well, I hang onto my comments about
23 the model that led to your -- what has been referred to as
24 Exhibit 9, where are these persons that get the 25 rem to
25 200 rem exposures? You are presuming they are in the EPZ,

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1 I take it.

2 WITNESS LYON: They are not only in the EPZ,
3 but they are in that pie cut or that area of exposure ex-
4 tending way out to 80 kilometers and beyond.

5 JUDGE HAND: So the figures you have been given --
6 now, I understand that if that is what it appears at table
7 7.4 --

8 WITNESS LYON: That is what I translated from
9 that table myself.

10 JUDGE HAND: And you have tried to backfit that
11 somehow to adjust to people in the EPZ?

12 WITNESS LYON: Right.

13 JUDGE HAND: Why -- do I misread the FES on page
14 7-19 where it talks about figure 7.4 or it talks about the
15 results of the calculations shown in this figure 7.4 reflect
16 the effect of evacuation within the 16 kilometer (10 mile)
17 plume exposure pathway EPZ only?

18 WITNESS LYON: I am sorry. I can't see where
19 you are reading, sir.

20 JUDGE HAND: It is -- I am sorry. It is in the
21 third paragraph from the top of the page. It is speaking
22 of figure 7.4.

23 JUDGE KELLEY: It is page 7-19, have you got
24 that page?

25 WITNESS LYON: Yes, I have.

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1 JUDGE KELLEY: Okay.

2 JUDGE HAND: And it is the third sentence in
3 that paragraph.

4 WITNESS LYON: The results of the calculations?

5 JUDGE HAND: M-hmm. They reflect the effects
6 of evacuation.

7 WITNESS LYON: M-hmm.

8 JUDGE HAND: Is that saying there is or isn't
9 exposure in the EPZ in this table?

10 WITNESS LYON: As I said, I am assuming that the
11 numbers given there by NRC Staff refer not only to people
12 in the EPZ, but beyond as well, because the EPZ itself
13 doesn't contain anywhere near a million point one people
14 or two million people.

15 JUDGE HAND: Oh, indeed. It is some hypothetical
16 population that extends out, the table shows, to 80 kilometers.

17 WITNESS LYON: That is what I said too, and I
18 assume that same thing.

19 JUDGE HAND: So how have your calculations
20 accommodated evacuation?

21 WITNESS LYON: These figures, as I understand
22 them, by NRC Staff include the protective actions of shelter-
23 ing and evacuation, and I was willing to accept these numbers
24 as reasonably correct on the basis, not of my study, but of
25 my simple calculation that showed me that the 200 rem figure

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1 for persons exposed at that level was a reasonable level of
2 exposure.

3 JUDGE HAND: Perhaps you and J are reading this
4 table differently. If we go on in that same paragraph --
5 I guess it is the next sentence, for the very low probabili-
6 ty accident, having the potential for causing radiation
7 exposure above the threshold for acute fatality at a
8 distance beyond 16 kilometers, it would be realistic to
9 expect that the authorities would evacuate persons at all
10 distances at which such exposures might occur. And the
11 next sentence says, then actual fatality consequences are
12 therefore reasonably expected to be very much less than the
13 number shown. I think that this table is looking at some-
14 thing rather different than what you have been looking at.

15 I have a very strong sensation that the data
16 you have been providing us, your estimates, are based upon
17 people being in the EPZ, being exposed, and not having been
18 evacuated.

19 WITNESS LYON: No, sir. That was -- those were
20 some of the conditions that applied to Exhibit 9 study,
21 which is separate from this. In accepting the numbers of
22 the NRC Staff, the 31,000 and 100,000 at the end of column
23 two and the 1.1 million and two million at the end of
24 column three, I am assuming, according to the FES, that
25 protective actions of evacuation and of sheltering are

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1 include. And what I was using those numbers for was that
2 given those conditions, what would be a reasonable number
3 of exposures to assign to the 89,350 people in the EPZ.

4 I took a factor of 10 to reduce that number, a
5 mean number, which I accepted as around 600,000 or so,
6 because the reduction of essentially one million down to
7 89,000 or essentially 100,000 is a factor of ten, and the
8 fact that we are dealing with people who are now closer in
9 to the source of the radiation would result in a slightly
10 higher dose, and so I raised that figure from the 60,000,
11 which was one tenth, based only on the population difference --

12 JUDGE HAND: You have explained all that before
13 and I don't have to hear it again.

14 WITNESS LYON: I am sorry.

15 JUDGE HAND: I guess that you can't answer the
16 questions that I am struggling for, and I guess eventually
17 the Staff perhaps can respond more clearly to what the in-
18 tent of table 7.4 truly is. It -- I think it is obvious we
19 are talking about low probability accidents. What is not
20 obvious to me is whether or not the people within the EPZ
21 are included in those exposures, or whether or not evacuation
22 in fact was involved, and I still have to believe that in
23 order to get to the point that we are exposing people in the
24 EPZ, we have to have an accident that we haven't had explained
25 to us. We have got to have people in the EPZ. We have to

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1 have had a release. There has to be exposure. And one of
2 the things that I was going to go back to was -- when I
3 first started speaking to you was the fact that your original
4 model which led to the figures in Exhibit 9 seemed to get
5 all of the contents that were going to be released from the
6 core out in one hour, and what I was going to ask you is
7 what sort of an accident will do that?

8 WITNESS LYON: Well, as I have explained, I am
9 not using the numbers that are derived in any way from that
10 kind of a scenario. What I am looking at are the numbers --
11 I am making estimates based on the NRC Staff's own data in
12 7.3 and 7.4 of the FES.

13 JUDGE HAND: Well, since we are not going to
14 talk about your first model in Exhibit 9, my question will
15 remain unanswered. But -- I just found the model peculiar.
16 I found it difficult to understand, and I had the sensation
17 that it was terribly unrealistic, that it was not a useful
18 model in terms of the kinds of accident scenarios that we
19 presume might occur and the probabilities for some of those
20 mights are expressed in some of the tables.

21 WITNESS LYON: Well, the only comment I can make
22 to that is that when we use the model and its consequences,
23 and agreed, the model is not part of the testimony in any
24 way, that I came out with numbers that did corroborate what
25 the NRC Staff has in its other columns, for example, the

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1 latent cancers, et cetera.

2 JUDGE HAND: I am still not sure we are all
3 talking the same language. I am finding it very difficult
4 to really understand what it is you have been telling us
5 and how I may use it, and how I can structure this in the
6 eventual decision that we will have to write, and I will
7 have to help write one of these days.

8 WITNESS LYON: Well, if --

9 JUDGE HAND: Do you -- just at the personal
10 level, if an accident has the possibility of -- in any given
11 year a chance of one in 100,000 of occurring, what kind
12 of planning do you think society ought to consider for that
13 kind of an accident?

14 WITNESS LYON: The first thing that I think I
15 would like to address in that question is the probability
16 of one in 100,000 with 500 reactor years of experience just
17 looking at the kinds of things that actuarial people look at,
18 there hasn't been any kind of experience to come out with
19 a number one in 100,000. And that is confirmed in the fact
20 that no one anticipated TMI, and yet the probability was
21 so low there and it occurred, and all I am saying is that I
22 have trouble with accepting the idea that the probabilities
23 listed here are realistic in terms of that kind of experience,
24 limited experience on the one hand --

25 JUDGE HAND: Well, can you --

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1 WITNESS LYON: -- and then accident experience
2 on the other.

3 JUDGE HAND: Dr. Lyon, can you go back to table
4 7.3 and show me where the TMI accident might fall on that
5 table?

6 WITNESS LYON: No, I cannot. I am just saying
7 that I think that all of those numbers are based on experience
8 which is so limited that I can't see the rationale for coming
9 out with those numbers.

10 JUDGE HAND: Do you think that the TMI accident
11 is encompassed in any way in the PWR one through --

12 WITNESS LYON: We have been --

13 JUDGE HAND: -- nine --

14 WITNESS LYON: We have been told that, that it
15 takes that experience into account.

16 JUDGE HAND: All right. Did you want to con-
17 tinue and tell me whether or not if something is considered
18 to be likely once in 100,000 times in any given year, what
19 kind of precautions we ought to take for such likelihood?

20 WITNESS LYON: I don't know how to answer that,
21 because I am still stuck at the point of how you determine
22 that kind of a probability.

23 JUDGE HAND: You won't accept that simply as a
24 given?

25 WITNESS LYON: Well, I don't know what to answer

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in terms of what you are asking.

JUDGE HAND: All right. Thank you.

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JUDGE JOHNSON: I am afraid I too have to show my confusion about what is model, what is NRC, and so forth. However, I believe you made the statement sometime earlier today that in your calculation in which you put the plume over the wedge shaped piece of the EPZ and let it sit there for six and a half hours, that it makes no difference whether people evacuate or whether they stay there for six and a half hours. They get the same dose. Is this correct?

WITNESS LYON: I understood that that was not going to be considered at all. I don't know what to say about that.

JUDGE JOHNSON: I am sorry. I thought I was quoting you.

WITNESS LYON: Yes, but I understood that that is not part of the estimate of numbers that I have been giving, which comes directly from the NRC data.

JUDGE JOHNSON: So you are telling us, if I understand at all, that your contribution to this issue that we are hearing is a confirmation of the numbers in the NRC table?

WITNESS LYON: It is more than that. It involves one verification to my own satisfaction that the numbers that are given in the table with regard to persons exposed over 200 rems that the 200 rem number is reasonable. That on the basis of the numbers given in that column and the

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1 next column and given the number of people in the EPZ and
2 the fact the EPZ is closer to the source of radiation in
3 the event of an accident, the one can make certain assump-
4 tions and modifications of the numbers in table 7.4 and come
5 out with a reasonable estimate of what the contamination
6 low radiation exposure would be to people in the EPZ.

7 I have further stated that there are certain
8 kinds of medical facilities and procedures that should be
9 available in the event of an accident of this order of
10 magnitude, without making any attempt in a health epidemio-
11 logical sense only, without making any attempt to state what
12 should clearly be the physicians prerogative to prescribe
13 for individual persons who are damaged.

14 JUDGE JOHNSON: And this is what we are -- all
15 we are supposed to hear from your testimony. Is that cor-
16 rect?

17 WITNESS LYON: Well, I understood that the
18 other material had been ruled out.

19 JUDGE JOHNSON: Thank you, sir.

20 JUDGE KELLEY: I too am concerned about tying
21 your testimony to the contention before us, namely the
22 -- what is the word -- the arrangements for medical services,
23 service, and I am a little uncertain about how your testimony
24 ties in with that. You have explained to us how you de-
25 rived the figures, 60,000 to 90,000 and split figures, 200

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1 rem in one column and 25 in another. That leaves us, it
2 seems to me, at least a step away from how we would make
3 any kind of judgment about adequacy of medical facilities.
4 You have enumerated certain kinds of facilities and treat-
5 ments, but -- let me give you an example. You had testified
6 that so many thousand people will be affected and will re-
7 ceive such and such a dose and will probably need this kind
8 of treatment and therefore you need so many clinics or
9 ambulances or doctors or whatever. That would speak direct-
10 ly to the contention, but I gather that given your expertise
11 are you not in a position to address that kind of a point?

12 WITNESS LYON: I think there may be confusion
13 on that point, and I think the confusion arises from my
14 reply to Mr. Pigott when he asked me about what kinds of
15 treatments ought to be available. What I was trying to
16 distinguish between are two different things. On the one
17 hand there are the decisions that a medical professional
18 person has to make about what the treatment ought to be for
19 a given individual considering the nature of the condition
20 or injury that person has suffered. I am not addressing
21 myself or my remarks to that position or those kinds of
22 things.

23 What I was saying earlier, and apparently it
24 has not been understood clearly, is that I do feel that I
25 have the ability and background to state what kinds of

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1 treatments ought to be available to treat people who have
2 these kinds of injuries in an epidemiological sense, that
3 what ought to be available in Orange County, what ought to
4 be available in Southern California, and whether or not they
5 are available is a question for others to answer, whether
6 or not what is available will or will not be applied to
7 specific individuals is a medical problem, and not my purview.

8 JUDGE KELLEY: Well, certainly the diagnosis of
9 any given person is --

10 WITNESS LYON: Right.

11 JUDGE KELLEY: -- is a doctor's job. But we are
12 looking at it along with the other parties as really planners
13 rather than doctors in individual cases.

14 WITNESS LYON: Right.

15 JUDGE KELLEY: Can you make any generalization
16 based on your 200 rem prediction about not merely that there
17 might be a need for some kind of treatment, but rather
18 given the numbers, how much of a need, or do you feel that
19 is something you can speak to?

20 WITNESS LYON: All right. From a general
21 planning point of view, with the understanding that I am not
22 making any attempt to prescribe what ought to be done in
23 specific individual cases, one can look at, let's say, my
24 estimate of 60,000 to say close to 90,000 people being
25 contaminated or suffering acute radiation sickness. It seems

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1 to me that a fair proportion of those people can be con-
2 taminated -- decontaminated relatively easily, and they can
3 be let go and they would be essentially free to go home
4 after the area was cleared of radioactivity as determined
5 by monitoring, and they would be okay.

6 JUDGE KELLEY: Would you even need a hospital
7 or a clinic or anything more than a shower?

8 WITNESS LYON: You would need perhaps showering
9 facilities and certainly monitoring devices and instrumenta-
10 tion and personnel able to use them effectively. I say
11 this from my own experience having been contaminated in the
12 laboratory and knowing that simply taking clothes off or
13 showering is not sufficient to remove radioactivity from the
14 skin.

15 One may in some cases have to scrub to a point
16 where you are almost scrubbing off the skin. So it is not
17 an easy job in all cases. It varies.

18 The other thing is that a fair share of that
19 number, and I don't know what number that might be a fair
20 share, may require some sort of treatment with medicines or
21 drugs or whatever to try to head off the possibility of the
22 development in the short term, or later on, some effects
23 which could be eliminated if this treatment is initiated
24 early on.

25 JUDGE KELLEY: When you say a fair share of that

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1 number, the number of 60 to 90?

2 WITNESS LYON: Yeah.

3 JUDGE KELLEY: Now, as to acute radiation cases,
4 does that involve people who had gotten a pretty hefty dose,
5 200?

6 WITNESS LYON: It would involve people essential-
7 ly who have gotten doses between 25 and 200 rems, which is
8 in the range where you have contamination likely and acute
9 radiation effects. That was defined in Dr. Linneman's
10 testimony and he gave the same range of numbers.

11 JUDGE KELLEY: You could have acute radiation
12 sickness at 25 or 30?

13 WITNESS LYON: Between 25 and 200 rems.

14 JUDGE KELLEY: Okay, but the low range might
15 be included?

16 WITNESS LYON: Well, it depends on the radio
17 sensitivity of the individual affected. A lower level
18 might affect a lower -- a higher radiosensitivity individual
19 comparable to a higher level affecting a lower radiosensi-
20 tivity individual.

21 JUDGE KELLEY: And given your numbers and given
22 the testimony that you have just given, do you have any
23 estimate of the -- in a gross sense, of the need for medical
24 facilities to treat these people?

25 WITNESS LYON: I think that if you assume

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1 anywhere from 25 to 50 percent who may be treated very
2 quickly and they are ambulatory and can go off on their own,
3 the remaining number would represent those who need something
4 more than just treatment that would be suitable for an out-
5 patient clinic person.

6 MR. PIGOTT: Excuse me, but is there any basis
7 for this most recent estimation? With due deference to
8 your line of questioning, this is all of a sudden a new
9 factor, a new dimension to Dr. Lyon --

10 WITNESS LYON: No, it isn't.

11 MR. PIGOTT: -- has --

12 WITNESS LYON: I am assuming that if you have
13 a range of exposures between 25 and 200 rems for a large
14 number of people, that you have got a more or less gaussian
15 distribution of doses for that population.

16 JUDGE KELLEY: What is the term? I am sorry.

17 WITNESS LYON: A gaussian distribution.

18 JUDGE KELLEY: I don't know what that means.

19 WITNESS LYON: That is a statistical --

20 MS. GALLAGHER: Bell curve --

21 WITNESS LYON: A bell shaped curve.

22 JUDGE KELLEY: A bell curve, fine.

23 WITNESS LYON: Yeah.

24 JUDGE KELLEY: All right.

25 WITNESS LYON: Of people having a range of

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1 doses within 25 to 200. That means that some will be on the
2 lower end of that range and some will be at the higher end.
3 And I am assuming that those at the lower end can be treated
4 with minimal kinds of efforts, and those at the higher end
5 with efforts that would be beyond minimum. And I am
6 defining minimal as something that could be done very quick-
7 ly and easily where people could then essentially walk out
8 of the facility okay as opposed to those who could not walk
9 out and had to be dealt with in a more extensive way. And
10 that does not take into account the acute fatalities, which
11 may be several thousand, and in that case, then you are
12 going to have to deal with the fact that no one a priori can
13 look at an individual and say, with that dose level, that
14 person will die and that person will not die.

15 JUDGE KELLEY: I remember your stressing that
16 before.

17 WITNESS LYON: And therefore you have to have
18 beds and more extensive kinds of treatments available, both
19 to treat symptomatically, and to follow the course of the
20 development of the condition and be able to deal with it as
21 it moves along.

22 JUDGE KELLEY: Would you have any estimate of
23 the -- in the 60 to 90,000 figure of the number of people
24 who might require hospitalization for more than a day or so?

25 WITNESS LYON: I think that certainly

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1 hospitalization for some significant fraction of the 60 to
2 90,000 would be one thing to look at. Another would be a
3 very definite need for hospitalization for some, let's say,
4 3,000 persons or so, 5,000 persons, who would be in the
5 category of either moving to acute fatality or a large expo-
6 sure, but would become well as a result of that. That is
7 looking at the LD 50 where half can be assumed to die and
8 half will recover.

9 And since acute fatalities often occur in periods
10 of hours, days or weeks, depending on the level of exposure,
11 that I am assuming that there would have to be facilities
12 available for some relative period of time -- corresponding
13 period of time.

14 JUDGE KELLEY: Thank you.

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1 JUDGE HAND: May I try again, Dr. Lyon? In
2 these numbers you have been giving is evacuation involved
3 at all?

4 WITNESS LYON: It is my --

5 JUDGE HAND: This 60,000 to 90,000, 89,000,
6 however many people there are, if you get them all exposed
7 did any of them evacuate?

8 WITNESS LYON: It is my understanding that the
9 NRC Staff in their compilation of the data in Table 7.4 took
10 into account that there would be shielding effects and there
11 would be evacuation. And I am making no different assump-
12 tions than just that those numbers include those variables,
13 those factors. And it was also my understanding that that
14 is fundamentally the difference of this table and the cor-
15 responding table that appeared in the draft, that there they
16 did not take sheltering and evacuation into account and that
17 here they did. And the numbers are correspondingly reduced.

18 JUDGE HAND: If you take some sort of credit
19 for sheltering -- and I am thinking now more specifically
20 about evacuation -- how do you get all of the people exposed?

21 WITNESS LYON: Starting with the numbers given
22 by the NRC Staff in Table 7.4, I looked at the low range,
23 some 30,000 to 100,000, and the high range -- numbers of
24 people -- 1.1 to 2 million, and --

25 JUDGE HAND: Now we are reaching out again to

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1 quite a few kilometers beyond the EPZ.

2 WITNESS LYON: Right. And so I reduced that,
3 assuming a 1 million figure to approximately 100,000 by a
4 factor of 10 for the population that would be exposed and
5 then also took the case into account that, since they are
6 closer in, they would be exposed to a higher average concen-
7 tration of radioactivity.

8 JUDGE HAND: And you don't know how those figures
9 accomodate evacuation or sheltering or any other protective
10 action?

11 WITNESS LYON: I don't know the degree of shel-
12 tering taken into account by NRC Staff and I am assuming
13 that evacuation is something analogous to what was proposed
14 in the Wilbur Smith study. But however long it takes, that
15 it was an effective factor in determining these numbers.

16 JUDGE HAND: All right. But if we do an evacua-
17 tion, in order to get the exposures and the kinds of numbers
18 you are proposing, very clearly that is going on during the
19 presence of radiation.

20 WITNESS LYON: That is probably involved in what-
21 ever calculations or assumptions that were used by the NRC.
22 I don't know.

23 JUDGE HAND: No, but I'm talking about your
24 calculations.

25 WITNESS LYON: My calculations don't apply. I'm

3 1 looking only at their numbers. I thought that Exhibit No. 9
2 and 10 had been ruled out. That was my understanding.

3 JUDGE HAND: And you tried reading with me the
4 material on page 7-19, that third paragraph.

5 WITNESS LYON: Yes.

6 JUDGE HAND: And my interpretation was that the
7 people in the EPZ were not exposed. I seem to have some
8 very fundamental problem with what you are telling us. You
9 have taken some figures that I think you have admitted you
10 weren't sure about their real meanings, you have extended
11 those figures. You admit they extend on out to 80 kilometers.
12 You backfit this to the EPZ and get exposure. You say we're
13 not talking about exposure during evacuation, you are simply
14 talking about exposure. I would assume that if we are getting
15 exposure there are people in the EPZ who are getting exposed
16 and I would suppose that there is not evacuation going on then.

17 WITNESS LYON: I think, sir, your question should
18 be addressed to the NRC Staff for their interpretation.

19 JUDGE HAND: No, I am addressing my question to
20 you, because you are telling us that within the EPZ there are
21 going to be these exposures. I want to understand the condi-
22 tions under which those exposures occur to that population
23 so that I can add to that some other probability figures.

24 WITNESS LYON: The conditions that went into the
25 determination of the number that appear in Table 7.4 are

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1 those assumed by the NRC Staff. I was willing to accept their
2 numbers in Table 7.4 as a basis for making my estimate.

3 JUDGE HAND: But you aren't sure about exactly
4 what either is in or not in in Table 7.4.

5 WITNESS LYON: Well, you appear to be telling me
6 that you have one interpretation of the third paragraph on
7 page 7-19 and there may be another interpretation, and I don't
8 know any more than you what that interpretation is by the NRC
9 Staff.

10 JUDGE HAND: And yet you feel free to use those
11 figures and move them back into the EPZ when the overall
12 estimate that is made is based on some 80 kilometers.

13 WITNESS LYON: I am assuming that that's what they
14 are looking at. They are looking at numbers that are going
15 way out beyond the EPZ. And the only confirmation figure
16 that I looked at in terms of my calculation -- not a model --
17 was to verify that the 200 rem exposure was a reasonable
18 number.

19 JUDGE HAND: Yeah, I know. There are ways having
20 figured that that you can go from there to latent cancer and
21 genetic defects and all sorts of things.

22 WITNESS LYON: But we're not talking about
23 latent cancer.

24 JUDGE HAND: They are idle exercises if they are
25 not carried out in a context that one can evaluate in terms

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1 of the likelihood of its occurrence.

2 WITNESS LYON: Which I believe that I have done
3 in using the NRC figures.

4 JUDGE HAND: You are telling me then that the
5 likelihoods that are cited here for those accidents are
6 acceptable?

7 WITNESS LYON: I think those are reasonable
8 numbers from which to make the estimates that I made. And
9 secondly, I feel the estimates I made were reasonable, given
10 these numbers.

11 JUDGE HAND: So that you are willing to agree
12 that maybe once in a hundred thousand years or some other
13 large number of times such an accident might occur and there
14 would be those injuries, that radiation damage to some number
15 of people?

16 WITNESS LYON: I'm not passing a judgment on the
17 probability of the impact per year. I'm only looking at
18 the envelope of doses that cover the range that I think
19 people would suffer contamination and acute radiation injury
20 effects.

21 JUDGE HAND: That's all.

22 JUDGE KELLEY: Redirect?

23 REDIRECT EXAMINATION

24 BY MS. GALLAGHER:

25 Q Dr. Lyon, as you understand it, is your testimony

6 1 offered to assess probability?

2 A No.

3 Q In arriving at the numbers of persons who would
4 be exposed to contamination, the 600,000 to 89,350 numbers,
5 did you rely upon your study or the study of the Los Angeles
6 Federation of Scientists?

7 A No, I didn't.

8 Q In speaking of your calculation which was performed
9 to verify or validate NRC figures, of what importance do you
10 consider that exercise to have been from a scientific point
11 of view?

12 A If I was to accept the figures that are given of
13 the envelope between 25 rems and 200 rems, which since latent
14 health effects, cancers and so on, were ruled out, we have to
15 now concentrate on, namely, contamination and acute radiation
16 effects, I had to have some feeling of confidence that that
17 range was a reasonable range to be dealing with in terms of
18 core inventories, types of accidents, and potential releases.
19 So what I did was tried to make an independent assessment of
20 whether or not these numbers were a reasonable evaluation,
21 a reasonable estimate.

22 Q And are you satisfied that they are?

23 A And I said that I did that calculation and was
24 satisfied that that estimate is reasonable.

25 Q And when you referred to your use of the noble

1 gases only, were you referring to your calculation done last
2 night to make an independent verification of the NRC figures?

3 A I am indeed.

4 Q Was this a scale-down operation to make the
5 environmental impact statement figures applicable to the
6 EPZ population?

7 A Yes.

8 Q While not attempting to speak as a medical expert
9 but recalling the general categories of treatment which might
10 be offered to persons exposed to radiation, both radiation
11 sickness and contamination, in your opinion, should there
12 be a range of medical services available to give exposed
13 persons treatment?

14 A Yes, indeed.

15 MR. PIGOTT: I'm going to object to that question
16 on the grounds that it is eliciting new sources of testimony.
17 We have gone over this on original examination and cross
18 examination, where he disavowed any such attempt, and I
19 object to eliciting further direct testimony on this subject
20 now.

21 MS. GALLAGHER: I'm merely trying to clarify the
22 record, which I believe was confused by Dr. Lyon's hesitancy
23 to assume a role which he knows he isn't qualified to assume,
24 that of a medical expert. He is offered here as a person to
25 state what the demand for services might be and to render an

1 opinion about the need for services.

2 WITNESS LYON: That was the burden of what I
3 was stating.

4 JUDGE KELLEY: Let me rule on the objection first.

5 WITNESS LYON: Sorry.

6 JUDGE KELLEY: The objection is overruled, subject
7 to the understanding that we'll keep it brief in this area,
8 since we have been over it to some extent. Go ahead.

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1 WITNESS LYON: What I attempted to do was to
2 explain from a public health point of view, an epidemiological
3 point of view the kinds of treatments and facilities that
4 should be available. I was not attempting to prescribe, in
5 the sense that a physician makes a determination with an
6 individual patient, and I think there is a clear distinction
7 between these two things.

8 BY MS. GALLAGHER:

9 Q Returning once more to table 7.4, and also to
10 table 7.1.4-4 --

11 MP. PIGOTT: I am going to object to reference to
12 the second -- to the second table. It is not an item in
13 evidence. There has never been any basis for it. There is
14 nothing to show the truth of the contents of that, and I
15 object to its use in coming to opinions.

16 JUDGE KELLEY: I believe Mr. Pigott is correct,
17 that that is not in evidence, at least.

18 MS. GALLAGHER: I wasn't attempting to get it
19 into evidence. I was going to clear up a question of --
20 the Board seems to have a question concerning protective
21 measures, and I was going to attempt to walk through some of
22 the numbers and draw comparisons.

23 JUDGE KELLEY: I am going to sustain an objection
24 simply because we are kind of up to our necks in confusion
25 here, and to get into the details of that table on top of the

1 ones we already don't understand will be, I think, a mistake.

2 BY MS. GALLAGHER:

3 Q Dr. Lyon, in your opinion, based on your review
4 of the tables that you have reviewed, has the -- is one of the
5 differences between the tables that there have been evacuation
6 or protective measures taken in the study that is in evidence?

7 A It is my understanding that the final environmental
8 statement, and the table 7.4 give figures that encompass the
9 functioning of protective actions, including primarily
10 sheltering and evacuation, that those numbers are the result of
11 contamination as mitigated by sheltering and evacuation.

12 Q And is it your understanding also that evacuation
13 planning must only be done within the ten-mile plume
14 exposure pathway?

15 A That was my understanding.

16 Q And is it your opinion that if there were an
17 accident that extended out to 80 kilometers, that logically
18 one would have to infer that you would have to evacuate
19 beyond 80 kilometers?

20 A Yes. That is reasonable to expect.

21 Q If you know, are there evacuation plans in place
22 that have any bearing on this case beyond the 10-mile EPZ?

23 A I can think of one very important factor for what
24 happens to people beyond the EPZ. If you have a given
25 number of medical facilities and capabilities available, and

1 people beyond the EPZ begin to saturate those capabilities,
2 that means that there is an additional pressure to provide
3 those capabilities for people within the EPZ, so I cannot see
4 how people beyond the EPZ, and whether or not they are to be
5 cared for, would be considered, or could be considered
6 completely separate from what happens to people in the EPZ.

7 I think there is this functional connection
8 between the two.

9 Q That wasn't quite what I asked you. I understand
10 it is getting late, and you have been on the stand all day.
11 What I asked was, if you are aware of evacuation plans beyond
12 the ten-mile EPZ?

13 A No, I have not heard of any such plans.

14 Q I will ask you what the impact of an accident
15 that does extend beyond the planning zone might have on
16 local facilities.

17 MR. PIGOTT: Oh, I am going to object. I don't
18 think there is any showing or any basis for leading into
19 this brand new area of exploration.

20 MS. GALLAGHER: It was one I had intended to
21 pursue.

22 JUDGE KELLEY: Could you try it again? I just
23 want to hear the question again.

24 MS. GALLAGHER: Okay.

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1 BY MS. GALLAGHER:

2 Q It is kind of parallel to the question of
3 spontaneous evacuation in a sense, if you will. What impact
4 might the need for large numbers of medical services that
5 extends perhaps even beyond the EPZ have on facilities
6 available for treatment of irradiated people within the EPZ?

7 A If there are --

8 MR. PIGOTT: Objection. Objection, beyond the
9 scope of the issue. Beyond the scope of the direct. Beyond
10 the scope of the cross. It is just a brand new area that
11 intervenors are -- have apparently just thought of.

12 JUDGE KELLEY: Beyond the scope of direct and
13 cross. Sustained.

14 MS. GALLAGHER: I have nothing further.

15 JUDGE KELLEY: Well, Dr. Lyon, it has been a long
16 day.

17 WITNESS LYON: Yes, sir.

18 JUDGE KELLEY: We appreciate your coming.

19 WITNESS LYON: Thank you.

20 JUDGE KELLEY: You are excused. Thank you very
21 much.

22 WITNESS LYON: Thank you.

23 MR. PIGOTT: I would move at this time to strike
24 the entire testimony of Dr. Lyons. I would incorporate some
25 of the arguments that have been made earlier concerning his

1 qualifications in the area of -- certainly not in -- nothing
2 in the way of accident analysis, no qualification by way of
3 appropriate treatment for individuals, no qualification with
4 respect to the provision of emergency facilities, hospital
5 facilities, health facilities generally.

6 Further, I do not believe that he presented any
7 probative evidence with respect to potential dose assessment.
8 I think that what we heard was Dr. Lyon personally come to a
9 conclusion that the NRC tables -- or NRC tables 7.3 and 7.4
10 in the final environmental statement were reasonable, and
11 beyond that, I think we got no more than unqualified guesses
12 with respect to what in fact may be a dose within the EPZ for
13 very low probability, high severity events.

14 I question the probative value of such statements
15 by Dr. Lyons. They are unconnected either to any studies
16 that were alluded to, and which I am frankly not sure were
17 used or unused, but in any event the estimates were totally
18 without any kind of a basis as to how he got there, other
19 than his particular judgment, which had never been exercised
20 in this kind of an exercise previously.

21 So, I would -- I would think it appropriate to
22 strike the entirety of Dr. Lyon's testimony.

23 MR. HOEFLING: Staff would --

24 JUDGE KELLEY: Let me just for the sake of clarity,
25 just -- it is the testimony --

1 MR. PIGOTT: And Exhibits.

2 JUDGE KELLEY: Exhibits. You had already moved
3 earlier on the statement and on Exhibit 9.

4 MR. PIGOTT: Yes, I believe I have made parallel
5 motions throughout.

6 JUDGE KELLEY: Okay. I just want to make sure
7 what your motion covers. I think that is it. Okay.

8 MR. HOEFLING: Yes, Mr. Chairman. The Staff would
9 observe that, in its mind, the state of the record is confused
10 and contradictory, and laden with unqualified and incompetent
11 testimony at this point from Dr. Lyon, and I don't mean to
12 suggest that he is not totally qualified and competent in his
13 area of specialty, but with respect to many of the
14 judgments he has made before us today with respect to the need
15 for medical services, interpretations of tables in the FES,
16 and the manipulation of numbers in that respect, statements as
17 to what his testimony, the purpose of what his testimony was
18 to serve, which I must confess appeared to me to be
19 contradictory at several points, I think we have a very
20 defective record here, and I don't see that it has any
21 probative value, and should not be considered by the Board
22 with respect to contention 2(d).

23 MS. GALLAGHER: Dr. Lyon has offered testimony
24 to address the question of the need for medical services in
25 this -- in the area of this nuclear power plant. He has not

1 attempted to delineate what shortfalls there are, because
2 he has not surveyed the local services.

3 He has attempted to give a sense of the potential
4 numbers of patients which might present themselves at local
5 facilities for treatment. This is an area of low probability,
6 that is conceded, but nevertheless, guidance for planning
7 says that whole range of accidents should be considered, and
8 they range from those of higher probability to those of
9 lower probability, including core melts.

10 I believe that it has been appropriate for this
11 evidence to be presented, and I would support its admission.

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1 JUDGE KELLEY: We will think about it overnight
2 and give you a ruling tomorrow morning.

3 Two or three things we'd like to bring up.
4 You might have some points too.

5 Let me ask. We are now one day off the pace
6 referring to the witnesses you had lined up. It's just
7 unfortunate that we didn't get to them today.

8 What do you propose for tomorrow?

9 MR. MC CLUNG: I'd like to speak to that first
10 by asking whether the Board is prepared to continue at all
11 this evening. Apparently we have one witness --

12 JUDGE KELLEY: Which witness do you have?

13 MS. GALLAGHER: It's Marilyn Ditty. She is
14 here and she is on kind of a limited schedule. She can only
15 be here today and then possibly Friday. Her testimony will
16 be rather brief.

17 JUDGE KELLEY: What is the subject?

18 MS. GALLAGHER: It has to do with a special
19 population, the senior citizen population in this area.

20 JUDGE KELLEY: What is your guess? About how
21 long on direct will it take?

22 MS. GALLAGHER: Fifteen minutes about. I don't
23 know. I'm always over-optimistic, but probably it might take
24 a little longer.

25 JUDGE KELLEY: Let me ask my colleagues.

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1 Well it's only five after 5:00, so, yes, we
2 can certainly go a while and perhaps finish with Ms. Ditty.

3 As long as we're on the subject -- we'll call
4 her in a minute.

5 So, if she is on this afternoon, what is
6 tomorrow?

7 MR. MC CLUNG: Okay. Then tomorrow I would
8 propose that we start with the witnesses that were scheduled
9 for today, and they wouldr't have taken all day. So that
10 will continue exactly the way it's listed.

11 There is one correction. It's Ms. Jan Goodwin,
12 not Mr. Jan Goodwin, if you have the schedule in front of
13 you.

14 JUDGE KELLEY: Okay.

15 MR. MC CLUNG: Then Dr. Ehling, who is a
16 subpoenaed witness from Orange County.

17 JUDGE KELLEY: You say that that probably
18 wouldn't take all day?

19 MR. MC CLUNG: That will not take all day.

20 JUDGE KELLEY: Do you think you could add
21 somebody that we --

22 MR. MC CLUNG: Yes. I'll get to that.

23 And then I would hope in the afternoon to call
24 Mr. Mecham, the city council person who was unable to
25 testify today. I will have to confirm that with him tonight

rp3

1 but I hope I can get him to do that.

2 And Carolyn Logue who was also supposed to
3 testify today. And that should better fill up the day.

4 And then Thursday will stay the same. And then
5 that one remaining witness that we have would then be
6 Mr. Carvalho. And he has advised me that it would be
7 difficult for him to testify before Monday. I just put that
8 on the record now. He could potentially --

9 JUDGE KELLEY: If we stay on this schedule, is
10 the Staff ready to start on Friday?

11 MR. HOEFLING: Yes.

12 JUDGE KELLEY: Okay. It looks pretty good.

13 Then you'll have to put Mr. Carvalho in next
14 Monday or whenever we can get him, with the understanding
15 that we will have one witness left from the Intervenors
16 to work in Monday.

17 MR. HOEFLING: We'll do that.

18 JUDGE KELLEY: A five-minute stretch and then
19 we'll go to Ms. Ditty.

20 (Brief recess)

21 JUDGE KELLEY: Back on the record.

22 Before going to the next witness, let me ask,
23 while it's still fresh in our minds, Mr. Hoefling, when we
24 get to putting your case on, will you have somebody who can
25 speak to the meaning and assumptions of the tables that we

rp4

1 discussed at such length today?

2 MR. HOEFLING: Yes.

3 JUDGE KELLEY: Thank you.

4 Okay, Ms. Gallagher, do you have your next
5 witness?

6 MS. GALLAGHER: Yes. But before we go on,
7 I need a clarification about -- I have offered the statement
8 of Irving Lyon in evidence and it was objected to by
9 Mr. Pigott. I need a clarification of whether I'm going to
10 get a ruling on that. I just don't want it to be passed by --

11 JUDGE KELLEY: Sure. You're going to get a
12 ruling on it tomorrow morning.

13 MS. GALLAGHER: Okay.

14 JUDGE KELLEY: You're going to get a ruling on
15 that, on Exhibit 9 and on the testimony as a whole.

16 MS. GALLAGHER: Okay. Thank you.

17 JUDGE KELLEY: All at once.

18 MS. GALLAGHER: I would like to call
19 Marilyn Ditty.

20 Whereupon,

21 MARYLYN DITTY

22 was called as a witness, and, after being duly sworn by the
23 Chairman, testified as follows:

24 JUDGE KELLEY: Thank you.

25 /////

DIRECT EXAMINATION

1
2 BY MS. GALLAGHER:

3 Q Would you please state your name.

4 A Marilyn Ditty.

5 MS. GALLAGHER: First I would like to make a
6 correction. Marilyn is noted as "R.N." and she has informed
7 me that she is not an R.N.

8 BY MS. GALLAGHER:

9 Q Would you please state your educational
10 background.

11 A Yes. I have a bachelors degree in education.
12 I have a masters of science and I have post-graduate work
13 from the Andreas School of Gerontology at USC.

14 Q What is the nature of your employment?

15 A I'm the executive director of the San Clemente
16 Seniors, Incorporated, and I also teach at the college in
17 the field of gerontology.

18 Q Please describe your clients.

19 A We serve the older population in the South
20 Orange County area which encompasses -- our total service
21 area encompasses the area from Saddleback Valley South to
22 San Clemente.

23 Q Where is Saddleback Valley South?

24 A It begins at El Toro Road. That's the service
25 area that we have geographically responsibility for.

rp6

1 Q Where is your office located?

2 A We have our primary office in the San Clemente
3 area and that's where we originated our service area.

4 Q What is the nature of the service that you
5 offer to your clients?

6 A It's a -- really a multiple-service organization
7 that encompasses multiple services for the older population
8 in the South County.

9 An example would be we operate currently four
10 nutrition sites. We have an adult day health care center
11 with a health care license. We operate a multi-purpose
12 senior center in the San Clemente area and many other
13 outreach services.

14 We do case management with the frail-at-risk
15 elderly in the San Clemente and the greater area there.

16 Q What do you mean by the "frail-at-risk elderly"?

17 A Well the definition of "frail-at-risk" is what
18 the government has defined through the Older American Act,
19 and the frail-at-risk are people that are still living in
20 their homes but they are, in many respects, dependent on
21 some form of a support system, whether it consists of --
22 they may be ambulatory but they may need a walker for
23 instance. They may be able to do limited cooking but, with
24 home delivered meals, they're able to stay in their home.

25 So, in their chosen environment, they are still

rp7

1 considered frail and at risk, but because of support
2 systems, they are able to stay there.

3 Q Among the frail-at-risk elderly, are there
4 persons who have psychological or emotional limitations?

5 A Yes. There are some that have what we call
6 some factors of senile dementia, for instance, in the
7 earlier stages, but those particular people are able to
8 still function in their home, in their community, with
9 some support. Perhaps a family member is living with them
10 or they may be attending a health care or out-patient
11 mental health center, so they're able to function in their
12 home.

13 Q Is one of the services that you provide day
14 care for the elderly?

15 A Yes. We have an adult day health care center
16 that has a health care license.

17 Q When you say health care license, is it licensed
18 as a home health agency or as a clinic or --

19 A It's a day care that's licens'd to provide
20 medical care -- medical treatment.

21 Q Are you generally familiar with the eiderly
22 population in and around the Emergency Planning Zone?

23 A I would say so. This is beginning my fourth
24 year in the greater San Clemente area, so I feel relatively
25 competent about that population.

rp8 A.

1 Q What is your client load?

2 A Last year the computer printout stated we
3 served about 4500 different, unduplicated seniors in that
4 service area. This year we anticipate serving closer to
5 about 7000 unduplicated.

6 Q Going back for a moment to the frail elderly,
7 what proportion of the elderly population -- well, first
8 let me ask you. Is there an age cutoff when you're talking
9 about elderly?

10 A The government requirements, because we operate
11 with so many subcontracts with governmental agencies, is --
12 the Older American Act guidelines are 60 and above and
13 that's the only criteria.

14 Q Do you know the population that would come
15 within the definition of "elderly" within the general area
16 of the Emergency Planning Zone?

17 A Well the City of San Clemente demographics are
18 a little easier because the rest of the area is unincorporated,
19 with the exception of parts of San Juan Capistrano and the --

20 The San Clemente area -- the 1976 demographics
21 had about a 23.9 percent factor that we used in all of
22 our statistical reporting.

23 Q Are you saying that 23.9 percent of the
24 population of the City of San Clemente is 60 and above?

25 A Yes.

rp9

1 Q And of that population, how many would fall
2 within the frail elderly?

3 A Well, according to our guidelines that we use,
4 we are willing to state that about 17 percent fall within
5 that frail-at-risk population.

6 Q So of the 27,000 citizens of San Clemente,
7 23.9 percent are elderly and, of those, about 17 percent
8 are frail elderly requiring some kind of support; is that
9 correct?

10 A Yes. That has been our experience.

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JUDGE HAND: Do you have a real number for that?

2 I mean, I could do the arithmetic if I sat here and worked
3 at it.

4 WITNESS DITTY: I pulled it out of the population
5 just quickly outside. The population that they gave for
6 San Clemente is 27,500. The 17 percent factor is 4,675.

7 MR. CASEY: Okay, so 17 percent of the total
8 population?

9 WITNESS DITTY: Yes.

10 BY MS. GALLAGHER:

11 Q Oh, did you mean -- let me help to clarify and
12 maybe -- I maybe have confused the record. Did you mean
13 that of the entire population of San Clemente 17 percent of
14 the entire population of San Clemente's --

15 A Oh, no. No. I am sorry. I understand the
16 necessary -- of the 27,500, you take the 23.9 and of that
17 23.9 you take the 17 percent.

18 Q Okay.

19 A I am sorry for that.

20 JUDGE HAND: Okay. What is the final number
21 then?

22 WITNESS DITTY: That was the 4,675 that I came
23 up with. You can check --

24 JUDGE HAND: It doesn't sound right.

25 WITNESS DITTY: You can check my math, because

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1 I didn't have my calculator out.

2 MS. GALLAGHER: May we provide clarification
3 for that? In the future we will attempt to get -- I believe
4 the 1980 census figures have just come out. Can we provide
5 that tomorrow?

6 JUDGE KELLEY: Is that okay with you, Doctor?

7 JUDGE HAND: Sure.

8 JUDGE KELLEY: Yeah, fine.

9 MR. PIGOTT: It is 1,117 according to our calcu-
10 lations of those numbers.

11 WITNESS DITTY: That sounds right. I would have
12 to calculate it out, but I didn't take it -- break it all
13 the way out.

14 BY MS. GALLAGHER:

15 Q So that would be within the city of San Clemente,
16 and then in addition you mentioned that you service a popula-
17 tion of 4,000, but that extends beyond the borders of San
18 Clemente.

19 A Well, last year the statistics we used were
20 encompassing San Clemente, the Dana Point Capistrano Beach
21 and parts of San Juan area where we served 4,500 and something
22 in our service area.

23 Q What are the general characteristics of elderly
24 populations around the plant in regard to housing, for
25 example? I know that is a pretty broad question. Do many

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1 of them live in their own homes?

2 A Well, maybe I can preface this by saying that
3 my experience with the San Clemente population, and I have
4 served in other areas, in other communities, I have worked
5 in the San Diego area for almost six years with the older
6 population, is that there has been an earlier retirement
7 cycle in the San Clemente area that started about 1952, and
8 we have found that there is a larger proportionate number
9 of frail at risk seniors in, say, the San Clemente area
10 because of this earlier pre-retirement period. Whereas this
11 is not necessarily true of other parts of Orange County
12 where retirement started later.

13 Q Are you saying that people who reside in San
14 Clemente perhaps came there to retire years ago --

15 A Yes.

16 Q -- and --

17 A Yes. It had really been indicated as kind of a
18 retirement community starting back in 1952.

19 Q Can you give us an opinion about the transporta-
20 tion capability of the majority of seniors from your experi-
21 ence in the San Clemente area?

22 A In the San Clemente area the senior population
23 has difficulty as far as transportation. Number one, we have
24 a large at risk, frail population. We have one van that we
25 have been able to secure just for the San Clemente -- city of

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1 San Clemente area, and we are not really meeting the need
2 at all. We have ordered a second van which will be coming
3 after the first of the year, but the overall transportation
4 system is very poor in terms of accommodating the frail at
5 risk person.

6 Q Is there a good bus system in San Clemente?

7 A Yes, they have -- OCTD has fixed routes, and
8 they also have dial-a-lift service right now that we depend
9 on for bringing people in outside of the San Clemente area.
10 The dial-a-ride service started there in July. We have
11 found there has been a low ridership on the part of the
12 seniors because of the delay in waiting for the vehicle to
13 pick them up. And we are still experiencing about an hour
14 delay in picking people up.

15 Q Do the senior citizens generally have difficulty
16 getting to the fixed point bus routes?

17 A Yes, they do. Because they have difficulty --
18 you know, in San Clemente there are more hills that you find
19 and sidewalks is not as conducive -- it is more narrow. It
20 is more difficult for seniors to walk and you run into other
21 kinds of problems for seniors getting to fixed routes.

22 The other problem that is inherent in the com-
23 munity is that the overall layout of the city itself is not
24 easy for somebody to maneuver, and we have found -- we just
25 brought in a new van driver who has been lost for the last

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1 week trying to maneuver, so it is an inherent problem --

2 JUDGE HAND: Has he shown up yet?

3 BY MS. GALLAGHER:

4 Q You have spoken of the frail elderly. In general,
5 in your service area, what are -- what statement could you
6 make about the general health of the senior population?

7 A Well, only to add that this frail at risk group
8 would need to have support services, and medical is one that
9 has to be available to this population. We have found that
10 one purpose that we have in terms of our transportation of
11 the van is to get people to doctors appointments, to get them
12 to the hospital, and to see what is normally a once or twice
13 a week medical professional.

14 Q So that is -- that covers a large part of your
15 service -- duties?

16 A Yes.

17 Q In the event that there were a nuclear accident
18 at SONGS, how would the elderly in the EPZ be notified?

19 A Well, I understand that there is going to be an
20 alarm or a siren that is going to be used. I am not very
21 knowledgeable about the overall plan.

22 Q Do you anticipate that any of the seniors would
23 have difficulty in hearing the sirens?

24 A Yes.

25 Q What percentage of this population can be

k6 1 expected to receive notification via radio or TV?

2 A I am not sure. I don't know what percentage
3 they are hoping to reach.

4 Q Do you know whether all senior citizens have
5 television or radio in this area?

6 A Well, that is a difficult question to answer in
7 terms of all the people. We do know that there are people
8 who do not have telephones in the older population. They
9 are known to us. We do know that there are people in the
10 older population that do not have television or radio or
11 adapters for hearing problems, and so we would anticipate
12 that many would have some difficulty hearing or knowing of
13 an evacuation.

14 Q Are there any isolated populations which might
15 not receive notification of an emergency via the broadcast
16 media? By isolated I mean persons who live in perhaps, you
17 know, cul-de-sacs or more remote areas of the community who
18 do not have access to broadcast media?

19 A I would anticipate that there is a small percen-
20 tage of seniors that are so very dependent on family support
21 members that they would not be knowledgeable under any means
22 given the circumstances that you speak of. They are very
23 dependent on a family member who is away during the day
24 that would need to come to their aid or a neighbor that would
25 have to come to their aid to assist them.

k7

1 Q So some people tend to be what we would refer
2 to as home bound?

3 A Yes.

4 Q Okay. Are all housing arrangements for the
5 elderly identifiable as housing for the elderly?

6 A No. There would be no identification in terms
7 of large senior housing units. There is a retirement hotel
8 and there are some retirement areas and boarding care that
9 are known to us, and are known to the city in their planning.
10 But as far as individual residential homes, and I suspect
11 even some of the board and care -- there has been a prolifera-
12 tion of homes springing up which are taking in six or less --
13 a small group home licensure kind of thing -- that are not
14 known to the general population.

15 Q I was going to ask you, are you familiar with
16 the kind of care facility known as the licensed board and
17 care facility?

18 A Yes. We are.

19 Q And are you saying that not all of these are
20 known to the authorities?

21 A I would suspect that they are not all known
22 because of the increasing number of -- like board and care
23 homes. I found out about another one yesterday, for instance,
24 so there is more of a proliferation of this kind of housing
25 developing in that community because of the high cost of

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1 living and the lack of available housing for the older
2 populations.
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1 Q Describe what a board and care home offers,
2 what kind of service it offers.

3 A Well the guidelines for a board and care -- there
4 are two different guidelines. There's a small group home
5 and a large group home. Then there are those that have to
6 qualify for a community care license.

7 So, in looking at those three categories, the
8 typical kind is a small group home where you have six or
9 less people because the regulations are much more limited
(ph) 10 and you do not have to meet a lot of the Torletine require-
11 ments and facilities do not have to have certain adaptations
12 and this kind of thing.

13 So it's very easy, I would say, for someone
14 to have a group -- a small group home.

15 Q Did I understand you to say that not everyone
16 who opens a board and care home seeks licensing even though
17 they're required to?

18 A Well because right now the law is not very
19 tight on these small group homes and there has been some
20 issues addressing this and I really have no position on that
21 at all.

22 I would hate to have to think what would happen
23 to some of these people if they didn't have these small
24 group homes available.

25 Q For purposes of identifying the population your

rp2

1 agency serves, are you free to identify your clients to
2 authorities?

3 A. The population that we serve -- we have a
4 confidentiality clause that is required of our organization
5 and anyone that works in our organization. So we would not
6 be able to disclose the names and the addresses, and let's
7 say like medical conditions of those people unless they gave
8 us a written release stating that it would be permissible
9 and to who we could release the information.

10 Q. If someone were to come to you from the City
11 of San Clemente in an attempt to locate the elderly because
12 of the problems of board and care homes not being identifiable,
13 are you saying that you would not be able to give out names
14 and addresses?

15 A. We would have to get a written release from the
16 individual or a responsible family member.

17 Q. Regarding the public information program which
18 the Applicant is instituting, in your opinion, would the
19 posters, pamphlets and phone booth decals be well adapted
20 for use by the elderly populations around SONGS?

21 MR. CASEY: I'd object. Could we get a foundation
22 for her knowledge in this regard before we get into the
23 opinions?

24 JUDGE KELLEY: Sustained.

25 /////

rp3

1 BY MS. GALLAGHER:

2 Q Have you seen any of the public information
3 material that the Applicant is providing for public
4 education?

5 A I would have to say I have limited knowledge
6 of what their educational program is.

7 Q Do you anticipate any problems associated with
8 teaching some of the elderly about disaster preparedness?
9 And if so, what problems?

10 MR. CASEY: I'd object. I think it's calling
11 for speculation. She has limited knowledge of the programs
12 and now she is being asked to speculate on how effective
13 they'll be. I don't know. I object on that basis.

14 MS. GALLAGHER: I'll rephrase the question.

15 JUDGE KELLEY: All right.

16 BY MS. GALLAGHER:

17 Q Would you, in your role as -- I assume you
18 consider yourself an advocate for the elderly?

19 A Yes.

20 Q Would you, in your role as an advocate for the
21 elderly, attempt to teach some of them and not others about
22 disaster preparedness?

23 A Well I think I understand what your question is
24 asking.

25 There is a concern -- there would be a concern

rp4

1 on my part concerning the alarm or the reaction that an
2 older person might have to -- like planning for what might
3 be a disaster.

4 In my background and experience, it's been very
5 difficult for us many times to get seniors to participate
6 in fire drills, for instance, because they become very
7 apprehensive and there is an increased anxiety level because
8 many times older people begin to actually relate to what
9 is happening as being real as opposed to simulated.

10 So there are some concerns that I would have
11 about a percentage of that older population. Not about the
12 total older population but about some of them.

13 Q Yes. Would some of them forget what you told
14 them if you told them information?

15 A Very definitely. Very definitely, especially
16 those who are in the earlier stages like senile dementia
17 for instance.

18 Q In the event of a nuclear accident, do most of
19 the elderly have -- would most of the elderly have
20 independent transportation?

21 A No. I'd be willing to say that the greatest
22 percentage of them would not have independent transportation.

23 Q In your opinion, would --

24 JUDGE KELLEY: Could we clarify? Does that
25 mean own their own car or exactly what does it mean,

rp5

1 "independent transportation"?

2 MS. GALLAGHER: I would say own their own car.

3 WITNESS DITTY: That's how I interpreted that.

4 JUDGE KELLEY: All right.

5 BY MS. GALLAGHER:

6 Q In your opinion, would most of the elderly
7 require some sort of assistance in being evacuated in the
8 event of a nuclear emergency?

9 A I'm not sure how many you're talking about.

10 In some --

11 Q Well, let me rephrase it to be more clear.

12 A All right.

13 Q In your opinion, how many of the elderly would
14 require some sort of assistance in being evacuated?

15 A I feel safe in saying that this frail-at-risk
16 element would definitely need assistance. The other portion
17 of this older population could be asked to reach a designated
18 point which would be close and perhaps within walking
19 distance. And given some assurances that they would then
20 be moved from that point, I think there is that percentage
21 that could get there -- to a certain destination on their
22 own.

23 Q For example, some of them could walk to the
24 fixed bus routes.

25 A This is true.

rp6

1 Q Some of them -- perhaps those in walkers or
2 wheelchairs -- would not be able to navigate that.

3 A The only element that I can think of that might
4 alter that is the time of the day. This would be the only
5 factor that -- I've given this some thought -- obviously is
6 that in the evening the majority of the older population
7 will not go out, you know, either attended or unattended,
8 and this would be a factor.

9 Q You mentioned that they will not go out. Do you
10 mean by habit they do not go out?

11 A Primarily because of safety. They're concerned
12 about the evening hours. They're concerned about being able
13 to just see staircases and being able to move, maneuver
14 around safely.

15 So, we have found that in the evening time
16 there is a very small percentage of the older population
17 that will participate in ongoing activities.

18 Q I see. Under emergency conditions, they might
19 be motivated to --

20 A Well, they might be far more motivated.

21 Q Would you anticipate that this reluctance to
22 venture out in the evening might complicate the evacuation
23 process?

24 A At night?

25 Q At night. I'm sorry.

rp7

1 A. I think it would be a factor. I can't
2 anticipate how much of a factor, but it would be a factor.

3 Q. The assistance that would be required for
4 evacuation of the elderly, would it be limited to words,
5 prompting with words, or would there be other kinds of
6 assistance necessary?

7 MR. CASEY: Excuse me. Just for a point of
8 clarification, is this the frail-at-risk population that
9 you're referring to?

10 MS. GALLAGHER: No, because we're talking about
11 an elderly population. I don't think that --

12 Let me ask.

13 BY MS. GALLAGHER:

14 Q. Were your comments about the elderly who don't
15 like to venture out at night, for example, limited to just
16 the frail elderly?

17 A. No, no, no. I was addressing that to the total
18 population of older people.

19 Q. Would the reluctance to venture out at night
20 and the fear of going out at night be a factor in -- would
21 it complicate an evacuation in their opinion?

22 A. I think that it could be a factor. I can't
23 measure how great a factor it would be, but I think it would
24 necessarily be a factor that would have to be taken into
25 consideration for the population that you're asking to go

rp8

1 to a designated point.

2 The other frail-at-risk would have to have
3 door-to-door assistance.

4 Q I see. Of what importance to the wellbeing
5 of an elderly person is a regular routine?

6 A Well, I think that -- what I interpret your
7 question to be is that -- having some form of routine in
8 their daily living is what you're asking, and, of course,
9 I think that, as we have found -- as people get older,
10 they're more accustomed, they're more comfortable, to a
11 normal, expected -- you know, predictable routine in their
12 life. There's no question about that.

13 Q Would the disruption in the daily routine be a
14 problem in evacuating or relocating seniors, in your
15 opinion?

16 A Well I think that the relocation of any
17 population is going to be difficult. I think the older
18 population is going to have some peculiarities, you know,
19 that are analogous to that population. They're going to
20 need a lot of assurance. They're going to need some
21 stabilization as far as identification of where they are.
22 They're going to need a lot of reassurance.

23 I can't really venture beyond that.

24 Q I understand.

25 Are you aware of the May 13th drill that took

rp9

1 place?

2 A. Yes. Our organization was contacted for
3 participation and I had to be out of the area during the
4 morning and so I assigned staff members to assist and they
5 recruited I believe approximately 40 or maybe a few more
6 seniors from our active population. This group did not
7 encompass any of the frail-at-risk from our day care
8 center or any of the other centers. It was the active
9 population that participated.

10 Q. And what were they recruited to do?

11 A. To participate in a simulation evacuation.(sic)

12 Q. Do you have any knowledge of how that simulated
13 evacuation went?

14 A. Just the feedback from my staff. My understand-
15 ing is that there were some delays, that they had some
16 interruptions in the routine of what they had expected would
17 occur and that it took them a little longer to get to the
18 shelter than they had anticipated. This was all the comments
19 that I had received.

20 Q. Have you, in addition to comments that your
21 staff may have made, seen the Red Cross log regarding the
22 evacuation --

23 A. I just looked at it here today. I had an
24 opportunity when I came.

25 Q. What travel times were given for the relocation

rp10

1 from San Clemente to Irvine?

2 MR. CASEY: I'd object -- the Red Cross log --
3 let's get some foundation here of what we're referring to
4 and looking at.

5 JUDGE KELLEY: I think for that question, we
6 would need to have some paper in front of us.

7 If you have it available, okay.

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1 MS. GALLAGHER: Marilyn has it, but we don't
2 have copies for everybody.

3 JUDGE KELLEY: Well, perhaps you could read
4 what you are referring to. Can you tell us first exactly
5 what the document is?

6 MR. CASEY: Your Honor, we did have a Red Cross
7 witness here. He could have been questioned on this. It is
8 hearsay to this witness what is in that log, if that is the
9 direction of this questioning.

10 JUDGE KELLEY: What is the direction of the
11 question, Mrs. Gallagher?

12 MS. GALLAGHER: The direction of the question
13 was to address in a concrete fashion the very real delays
14 that were experienced in that exercise regarding the seniors.

15 JUDGE KELLEY: Well, are we going to read the
16 log or --

17 MS. GALLAGHER: Not the whole thing.

18 MR. CASEY: Well, it's not her log.

19 JUDGE KELLEY: True.

20 MR. CASEY: And we question her competence to
21 be able to present competent, you know, evidence based on
22 the fact that she didn't do that log. She can't explain it.

23 JUDGE KELLEY: Yes. I'm still unclear about
24 where we would go, because the witness, while an expert in
25 this area, she is not going to be asked to interpret the

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1 log, is she?

2 MS. GALLAGHER: No. She was just going to be
3 asked about -- and it is true, it isn't her log -- she was
4 just going to use it to refresh her memory about what the
5 delays were.

6 BY MS. GALLAGHER:

7 Q Were you back in the office in the afternoon?

8 MR. CASEY: I object. The witness has already
9 testified that she didn't do it. It was her staff. So we
10 are not refreshing her memory. She never had a memory.

11 JUDGE KEILEY: Sustained. I don't think this is
12 a proper line.

13 MS. GALLAGHER: Okay. I'll -- I won't pursue it.

14 BY MS. GALLAGHER:

15 Q What sort of staffing would you anticipate would
16 be required in relocation centers in order to meet the needs
17 of the elderly populations brought there?

18 A Well, I think you would have to, in your planning,
19 I think you would have to have someone with a, you know,
20 clinical social work background in the field of aging, like
21 a clinical gerontologist, for instance, would be able to give
22 you a lot of good information concerning planning and what
23 preparations to make.

24 Q Would you anticipate that a certain percentage
25 of the elderly in the centers might be inclined to wander

3 1 away from them unless they were watched?

2 MR. CASEY: That's just really -- it's not a very
3 probative question. I think it is speculative. Expect them
4 to wander away.

5 BY MS. GALLAGHER:

6 Q Relying upon your --

7 JUDGE KELLEY: The objection is overruled.

8 BY MS. GALLAGHER:

9 Q You may answer.

10 A Well, as I mentioned earlier, there is a percent-
11 age of this frail at-risk population, of the older population,
12 that is in the earlier stages, we know, of senile dementia,
13 which means there is a percentage of disorientation, the
14 people lose sight of what their reality base is. And this
15 could happen. There could be a few of the people, if they
16 were not monitored closely, could wander off. I would be,
17 you know, we have this experience in our adult day health
18 care center, where we must have security there for them or
19 they could wander off. And the same can happen to someone
20 in the relocation center.

21 Q And you mentioned before that a large part of
22 your service to this population is getting them to medical
23 care.

24 A Yes.

25 Q Would it be necessary to have some arrangements

4
1 for medical care in the relocation centers just in order to
2 take care of the needs of this population?

3 A I think ideally it would be great if you had
4 the medical records on this frail at risk population because
5 you would know immediately what you were dealing with, whether
6 you were dealing with dysfunctional kinds, chronic conditions,
7 you know, what you were really having to prepare for. That
8 would be ideal.

9 Q So you might anticipate that there might be some
10 problems in meeting their needs because you wouldn't have
11 a medical record available to you?

12 A Well, the emergency treatment, obviously. But
13 there are so many complicating conditions that you would not
14 have first-hand knowledge of.

15 Q And you are speaking of just the general health
16 needs of this at risk population.

17 A Yes. There are many chronic conditions that are
18 going to affect their medical treatment.

19 Q How many would require assistance in such things
20 as eating, personal hygiene, and the like at relocation
21 centers?

22 A I couldn't give you a figure. You would have to
23 have some assistance. If there were family members there
24 they could provide this kind of assistance to many of the
25 frail individuals. If not, there would have to be someone

5 1 there that would be assisting those. I couldn't give you a
2 percentage on that.

3 MS. GALLAGHER: I have no further questions.
4 Thank you very much.

5 JUDGE KELLEY: Cross examination. Mr. Casey, are
6 you going to handle this?

7 MR. CASEY: Yes. I'll conduct this cross
8 examination.

9 JUDGE KELLEY: Okay.

10 CROSS EXAMINATION

11 BY MR. CASEY:

12 Q Mrs. Ditty or Miss Ditty?

13 A Mrs.

14 Q Mrs. Ditty, Applicants are very concerned about
15 this area and much of your direct went to concerns. Have
16 you had an opportunity to review the plans for evacuation of
17 the populations within what we call the EPZ?

18 A No. I personally have not had that opportunity.
19 One of our board of directors members who is a safety engineer
20 has been, I understand, involved to some degree in this
21 procedure. He was directed by our board to be available.
22 Now I don't know how much assistance he has been.

23 Q But the plans are available to you?

24 A I have not seen them, no.

25 Q But they were available to the board of director

6
1 member that you were referring to?

2 A I believe he went to a couple of meetings where
3 they were presented, but I have not seen any paperwork on
4 that.

5 Q You said early in your testimony that you know --
6 I think you used the words "we know" -- of elderly who do not
7 have telephones, who do not have radios, televisions they
8 cannot use, et cetera. And later in your testimony you
9 referred to keeping of records which are confidential. When
10 you said "we know" does that imply that you do have -- you have
11 a list of many, if not all, of the elderly persons that you
12 were referring to in your testimony?

13 A I'd say our files are fairly complete in that
14 particular kind of questions that would need to be known.
15 I cannot say that we have reached all of that frail at risk
16 population. We know that there are people unknown to us out
17 there that we have not been able to serve.

18 Q And of course you intend to work with the City of
19 San Clemente to first of all identify these elderly people
20 and then to notify them, to make arrangements that would be
21 necessary under the special circumstances involved with an
22 evacuation.

23 A If we can have assistance with getting the confi-
24 dential releases. We had an opportunity to discuss this at
25 our last board of directors meeting and the safety engineer,

7
1 the retired safety engineer, recommended that possibly a
2 mailing that we might be able to do and get a confidential
3 release signed and additional information could be provided
4 at that time. We have indicated a willingness to help in
5 any way possible.

6 Q Is there if not a rule but a generally accepted
7 policy that in the event of an emergency that the confiden-
8 tiality clause would be waived and that you would use your
9 lists to help people in a real emergency?

10 A In an emergency situation where it is life-
11 impairing there is that possible release in the law.

12 Q Just a few more questions. Getting an idea,
13 do you expect -- you said earlier in your testimony that some
14 people relied on neighbors, other people had family members
15 that assisted them in their special needs. Do you have an
16 idea of how many people that would go to the relocation centers,
17 how many of your elderly population do you expect would go
18 to relocation centers and how many would have their own means
19 for care without having to go to the relocation center?

20 A In the active population other than this frail
21 at risk I do not have -- I could not give you an accurate
22 figure. We would have to reassess that group ourselves.

23 Q Do you have an opinion?

24 A I would say probably of that number of the
25 active seniors probably about 50-50.

1 Q You mentioned that a small percentage, you couldn't
2 really know, might not -- might have some chronic medical
3 problems, and they would be at this relocation center. Of
4 that group, how many would be unable to communicate, you know,
5 generally speaking, what their medical problems were?

6 A You are dealing with this frail, at-risk group,
7 primarily?

8 Q Yes, and then a small -- and then a --

9 A And then a small percentage of that -- in terms of
10 being knowledgeable of their medical history and knowledgeable
11 of what prescription drugs that they may be taking, I would
12 say there would probably be almost a three percent factor
13 that could not articulate that information.

14 Q Well, for the record, Mrs. Ditty, the Applicants
15 plan to work with your organization to address all of these
16 concerns, and if there is anything we can do to make that
17 communication better, we will.

18 A Fine. I would love to look at the plan, and would
19 be happy to work with you, and our board has agreed to do this.

20 Q Thank you.

21 JUDGE KELLEY: Staff?

22 MR. HOEFLING: No questions.

23 JUDGE HAND: Just one question, Mrs. Ditty.

24 Earlier in these proceedings, we were shown a poster or an
25 information sheet and an envelope and some cards that were

1 sent out to the households, I gather, that are in the ⁹⁸⁶³ service
2 district, that -- the power service district that includes the
3 EPZ, this area that the planning is for. Do you -- have you
4 seen those cards that residents were asked to respond to?

5 WITNESS DITTY: Yes, I have.

6 JUDGE HAND: Do you have any knowledge of how the
7 residents responded? The elderly residents that you are
8 involved with responded on having received those cards?

9 WITNESS DITTY: I could just give you my own
10 personal response, because of people that have asked for
11 assistance in filling out the cards, and information that has
12 come to my office, is that of the active seniors, there has
13 been a fair response.

14 The frail population, I would say there is a
15 questionable response that has come back, and this information
16 came out at our Board of Directors meeting last Wednesday,
17 and they were suggesting that we possibly mail additional
18 cards again, through our organization with our list known to
19 us, that might be of assistance in this survey.

20 My gut level feeling is that you have about ten
21 percent back of the senior population, if not less.

22 JUDGE HAND: Of all of the senior population, only
23 ten percent have responded?

24 WITNESS DITTY: Right.

25 JUDGE HAND: But there wasn't to be a response

1 unless special assistance was needed, was that correct?

2 WITNESS DITTY: I think that if they had to have
3 some kind of assistance, that they were to respond.

4 JUDGE HAND: And so what does the ten percent
5 apply to?

6 WITNESS DITTY: I would say that the ten percent
7 is probably reflective of a combination of active and frail
8 at risk, because it was not clear to them, many people thought
9 if they were going to another point of debarkation, that they
10 had to respond on that card. That was one point that was
11 not clear in their thinking, because this was asked for
12 clarification many times, where if in fact they determined
13 that they had to be taken by a bus, that that was assistance.

14 JUDGE HAND: Well, what part of this senior
15 population actually would need to be assisted, do you want to
16 go back and tell me that again?

17 WITNESS DITTY: Well, they did the calculations,
18 and they are saying like 1,117 would need probably door to
19 door assistance.

20 JUDGE HAND: All right, fine. And do you have
21 some feeling at least of how many of those people have made
22 their needs known?

23 WITNESS DITTY: Of that group, of that group, I
24 would be willing to say probably about ten percent, because so
25 many of them are unable to fill out those cards and return

4g 1 them without assistance, and unless there is a social worker,
2 or a case worker, or an outreach worker, or somebody assisting
3 them, or a family member taking that kind of interest, they
4 are not going to get it done.

5 JUDGE HAND: You have got 1,000 or so people who
6 need assistance who are all by themselves with nobody looking
7 over their shoulder?

8 WITNESS DITTY: No, I am not saying that, but I
9 am saying that to do a survey -- we have surveyed this
10 population before ourselves, and we had to send somebody to
11 the home to secure information from this population, and when
12 they did the 1980 census, the census takers came, and we did
13 a training session for them in the San Clemente area, because
14 this particular population is very difficult to get what we
15 consider good information on.

16 JUDGE HAND: And can you tell me, then, this ten
17 percent that did respond, this leaves 900 or so who haven't
18 responded, do you have any real basis for making that guess?

19 WITNESS DITTY: It is just because I have done a
20 lot of research in the area with the frail at risk since 1978,
21 and we have -- I have just found -- I should say I have found
22 that if you can get about ten percent response, that is pretty
23 normal in any kind of a survey with this particular population.

24 JUDGE HAND: Of this thousand or so people that
25 will need assistance, how many in fact are all by themselves,

5g 1 and don't have a family member, or aren't in a rest home, or
2 wherever they are? I mean, how many really are on their own?

3 WITNESS DITTY: I really couldn't give you an
4 exact number on that. I really couldn't give you that. Many
5 of them are supported by a family member that may not be
6 living there, and many of them have, you know, a family member
7 living in the home. I just don't have that kind of figure
8 for you.

9 JUDGE HAND: But I thought this was something you
10 have done a lot of research on.

11 WITNESS DITTY: In terms of mailing, I have done,
12 you know, this kind of research where you are mailing a
13 questionnaire to someone's home, who is frail and at risk,
14 and that questionnaire may sit there unless someone will assist
15 them in filling out even a simple card or a one-page
16 questionnaire, so the question I guess I have to ask is, you
17 know, who is going to assist them and has that card been
18 returned, and I would be willing to guess that only about ten
19 percent have been returned. Now, that is just me talking.

20 JUDGE HAND: Do you have any idea of how many
21 cards have been received by the City of San Clemente saying
22 that special assistance is needed?

23 WITNESS DITTY: I heard that of the total popula-
24 tion, about 2,000.

25 JUDGE HAND: That is more than you were putting

6g 1 in that elderly at-risk group.

2 WITNESS DITTY: Yes, I agree.

3 JUDGE HAND: Of the general population who are
4 not included in the elderly at-risk, how many people in San
5 Clemente would need assistance?

6 WITNESS DITTY: I wouldn't have that information?

7 JUDGE HAND: You don't know. And yet the return
8 to the City of San Clemente, as far as you know, is much
9 larger than I would have thought might have occurred from the
10 numbers you have given, because you said perhaps ten percent
11 of 1,000, or 1,100?

12 WITNESS DITTY: Well, I don't know that that 2,000
13 figure is exactly accurate. I heard that from one of the
14 fire department members. He indicated that they had had
15 approximately 2,000 return. When the Register newspaper
16 called, they said that there were only about 200 had been
17 returned, so I don't know for myself how many had been
18 returned first hand.

19 JUDGE HAND: We are not going to get the answer
20 from you today, either.

21 WITNESS DITTY: I can only guess secondhand what
22 I have heard.

23 JUDGE HAND: All right, thank you.

24 JUDGE KELLEY: Isn't that a fact that we could
25 determine for the record?

1 MR. PIGOTT: I think it might already be in the
2 record.

3 MR. MC CLUNG: I think it is in the record, but --
4 It is in the record as of three weeks ago, when
5 we were having testimony.

6 JUDGE KELLEY: And the cards were mailed out how
7 long ago? Some months, right?

8 MS. GALLAGHER: A couple months ago.

9 JUDGE KELLEY: Okay. Mrs. Gallagher, redirect?

10 MS. GALLAGHER: I have nothing further.

11 JUDGE KELLEY: Okay. Mrs. Ditty, thank you very
12 much. You are excuse. We appreciate your coming.

13 We would just like to cover one or two things
14 quickly, and then we can quit for the day.

15 We indicated on the subject of the issues for low
16 power, we indicated that we have some discussion today, and
17 that we would try to get it decided by tomorrow, and we are
18 going to stick to our decision tomorrow goal. It has been
19 kind of a long day, though, and I think for this evening, it
20 might just help us out a little bit if we just asked two or
21 three questions that you can think about the answers to over
22 the evening.

23 The first one is, oh, sort of a small question.
24 It really goes to the Applicants, but anyone else who wants to
25 comment. On page eleven of your memorandum, you say in the

1 text --

2 MR. PIGOTT: Is that the memorandum in support of
3 the motion?

4 JUDGE KELLEY: Yes.

5 MR. PIGOTT: Okay, thank you.

6 JUDGE KELLEY: You say, quote, "in addition, new
7 contentions must set forth, quote 'with particularity,' close
8 quote, the factual basis for the contention," and then you
9 give a citation, and just looking at those citations, I don't
10 find offhand the factual basis requirement, and perhaps you
11 could point me to that. That is just a small point.

12 On the first of the two issues, the 'interconnection
13 issue, we now have from the Staff an affidavit from Mr. Rood
14 to the effect that these facilities are not interconnected,
15 with the exception of two features which are discussed in the
16 SER. I believe the Applicants also just say that they are
17 just not interconnected.

18 And the question in our mind is, we could debate
19 good cause and timeliness and relevance and lots of other
20 things, is this an issue that could be laid to rest, in your
21 opinion, without much more than what we have got? In the
22 sense that it -- if it is not interconnected, and there is
23 nothing to suggest that it is, couldn't we just address this
24 on the merits in a matter of minutes? And if we can't, we
25 can't, but I would like to hear from you in that regard.

1 MR. PIGOTT: The Staff has -- oh, okay. Just a
2 question for now.

3 JUDGE KELLEY: Okay. On the question of the TMI
4 requirements, the various TMI requirements, Mr. McClung, let me
5 make sure I understand this, the initial letter that you wrote
6 stated, I guess this is from Mrs. Gallagher actually, but from
7 both of you, stated that contention with regard to satisfying
8 certain TMI requirements.

9 Then, when -- I believe on the telephone, you
10 mentioned this, though, and it is in your pleading also, what
11 you are really raising is the schedule for getting them done,
12 not their adequacy in the substantive sense, and the question
13 the Board has is, under the motion that the Applicants are
14 now putting before us, are there any changes in scheduling
15 with regard to these various TMI fixes? For example, is it
16 the case or not that the position may have been six months
17 ago, that you would do a certain thing prior to fuel loading,
18 and now you are saying that you will do it not at that point,
19 but later, at full power operation?

20 Is there any slippage here, in terms of
21 projections, and is there any health and safety -- and if there
22 is, is there any health and safety significance in your view
23 with regard to this slippage.

24 And those are just some points that we thought we
25 might usefully raise this evening, so that you could be

1 prepared to speak to them tomorrow, and let me say for now, we
2 will have some more discussion of this tomorrow morning,
3 including the answers to these questions, and other points you
4 may wish to raise, and we will still be trying to get this
5 resolved by the end of tomorrow.

6 Anything else that needs to be raised this
7 evening? Seeing no hands in the air, we will adjourn until
8 tomorrow morning at nine o'clock.

9 (Whereupon, at 6:16 o'clock p.m., the hearing
10 was adjourned, to reconvene at 9:00 o'clock a.m. September 23,
11 1981)

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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 22, 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)

Ruth Portune

Official Reporter (Signature)