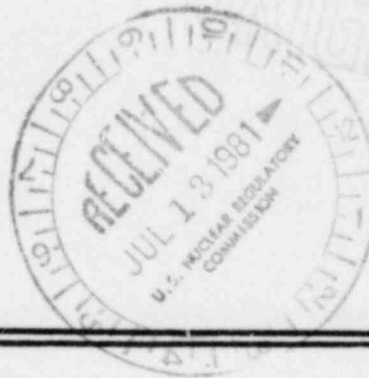


NUCLEAR REGULATORY COMMISSION



In the Matter of:

SOUTHERN CALIFORNIA EDISON COMPANY, ET AL.)
(San Onofre Nuclear Generating Station,) DOCKET NO's
Units 2 and 3) 50-361/362-OL

DATE: June 29, 1981 PAGES: 2101 - 2327
AT: San Diego, California

*TRO1
S
1/0
ADD:
M. MOE / OGC 881 SS
S. Mikhailov / OPE H1007
original for
A. McNameara*

ALDERSON  REPORTING

400 Virginia Ave., S.W. Washington, D. C. 20024
Telephone: (202) 554-2345

8107140048 810629
PDR ADDCK 05000361
T PDR

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

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

-----x		
In the Matter of:	:	
	:	
SOUTHERN CALIFORNIA EDISON COMPANY, <u>ET AL.</u>	:	Docket Nos.
	:	
(San Onofre Nuclear Generation Station,	:	50-361 OL
Units 2 and 3)	:	50-362 OL
	:	
-----x		

Stardust Room
Stardust Hotel & Country Club
950 Hotel Circle North
San Diego, California

Monday, June 29, 1981

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

BEFORE:

JAMES L. KELLEY, Esq., Chairman
Atomic Safety and Licensing Board

DR. CADET H. HAND, JR., Member

MRS. ELIZABETH B. JOHNSON, Member

1 APPEARANCES:

2 ON BEHALF OF THE APPLICANTS, SOUTHERN CALIFORNIA
3 EDISON COMPANY, ET AL.

4 DAVID R. PIGOTT, Esq.
5 JOHN A. MENDEZ, Esq.
6 Orrick, Herrington & Sutcliffe
7 600 Montgomery Street
8 San Francisco, California 94111

9 CHARLES R. KOCHER, Esq.
10 Assistant General Counsel
11 Southern California Edison Company

12 JAMES A. BEOLETTO, Esq.
13 Southern California Edison Company

14 ON BEHALF OF THE APPLICANTS, CITIES OF RIVERSIDE
15 AND ANAHEIM:

16 DANIEL SPRADLIN, Esq.
17 Rourke & Woodruff
18 1055 North Main Street, Suite 1020
19 Santa Ana, California 92701

20 ON BEHALF OF THE INTERVENOR, A. S. CARSTENS:

21 RICHARD J. WHARTON, Esq.
22 U.S.D. School of Law
23 Alcala Park
24 San Diego, California

25 A.S. CARSTENS
2071 Caminito Circulo Norte
La Jolla, California 92037

GLENN BARLOW
Consultant on Geology
Friends of the Earth

1 APPEARANCES: (Continued)

2 ON BEHALF OF THE REGULATORY STAFF:

3 LAWRENCE J. CHANDLER, Esq.
4 Deputy Assistant Chief Hearing Counsel
5 Office of Executive Legal Director
6 Nuclear Regulatory Commission
7 Washington, D.C.

8 JAMES DAVIS
9 State Geologist
10 California Division of Mines and Geology

11 HAROLD EISENBERG
12 Deputy Attorney General
13 State of California

14 ROBERT H. MORRIS
15 Geologist, Deputy Chief for Reactor Programs
16 Office of Environmental Geology of
17 U.S. Geological Survey
18
19
20
21
22
23
24
25

1		<u>C O N T E N T S</u>			
2	<u>WITNESSES</u>	<u>DIRECT</u>	<u>CROSS</u>	<u>REDIRECT</u>	<u>RECROSS</u>
3	H. Gary Greene				
4	By Mr. Chandler	2126			
5	By Mr. Pigott		2142		
6	Michael P. Kennedy				
7	By Mr. Chandler	2128			
8	By Mr. Pigott		2142		
9	Michael P. Kennedy (recalled)				
10	By Mr. Wharton	2220			
11	By Mr. Pigott		2268		
12					
13					
14					
15					
16					
17	<u>EXHIBITS</u>		<u>FOR IDENTIFICATION</u>	<u>IN EVIDENCE</u>	
18	<u>Intervenor's</u>				
19	3		2264		2319
20	3(a)		2319		2319
21					
22					
23					
24					
25					

P R O C E E D I N G S

(9:10 a.m.)

1
2
3 JUDGE KELLEY: Good morning. We'll reconvene
4 now on this Monday morning.

5 We had an interesting limited appearance
6 session on Saturday. Some of you who have been participants
7 but weren't there on Saturday missed an interesting day.

8 I think you left a little early, Mr. Pigott.
9 The high point came around 4:00.

10 MR. PIGOTT: I thought it was a little late.

11 (Laughter)

12 JUDGE KELLEY: We saw the birth of a new hit
13 single called "We have to get her on line." Well it was
14 an interesting day

15 Our business today will be pretty much taken up
16 with Staff witnesses, Greene and Kennedy who are here with us,
17 I understand.

18 Just two or three procedural housekeeping type
19 matters to spend a few minutes on and then we can get to
20 them.

21 At the close of Friday's session, we heard from
22 both the Intervenor and the Staff on the question of a
23 subpoena to Dr. Luco and I indicated I'd have a ruling on
24 that this morning.

25 I don't quite yet. One, I'd like to read the

rp2
1 transcript of the presentations Friday. Do we have
2 transcripts this morning from Friday? I don't see mine.

3 In any event, apart from studying that, I did
4 think I'd like to talk to Dr. Luco concerning primarily his
5 degree of willingness or unwillingness to come.

6 He's at Scripps; is he not?

7 MR. WHARTON: Yes, I believe he is.

8 JUDGE KELLEY: Do I normally just get him on
9 the phone by just calling Scripps?

10 MR. CHANDLER: I believe so. I at one time had
11 his phone number. I don't believe I have it with me. I
12 will take a look.

13 JUDGE KELLEY: But Scripps is the place, in any
14 event, for a business contact?

15 Last week we had a limited appearance by a
16 Mr. David Phifer and he gave us some information about the
17 possibility of faulting up on Camp Pendleton and I believe
18 it was planned over the weekend for representatives of all
19 parties to go to this area and take some sort of survey
20 look at the area he was referring to.

21 Mr. Chandler, did that take place?

22 MR. CHANDLER: Yes, sir, it did. The Staff's
23 geologist, Mr. Cardone, I believe Mr. Barlow and representa-
24 tives from the Applicants did in fact go to Camp Pendleton
25 with Mr. Phifer. I understand there was a rather extensive

3
1 tour conducted at that time. I think it would be premature
2 to say the Staff has concluded any evaluation of the
3 information it obtained at the time. The Staff has requested
4 the Applicants to undertake some further look at some of
5 the features that were observed at the time. We will advise
6 the Board when the Staff's review of this new information
7 has been completed.

8 JUDGE KELLEY: Could you give us at least a
9 rough idea as to when that might happen?

10 MR. CHANDLER: I'm not sure what date has been
11 requested of the Applicants to submit the additional
12 information. It would take some time for Staff review
13 thereafter. I can't give you anything more certain than
14 that at this time.

15 JUDGE KELLEY: Just as an outside parameter,
16 I would think we would want to know early on whether this
17 is something of significance or even great significance or
18 of no significance.

19 Is it at all realistic from this vantage point
20 to think that we might know that in a few weeks?

21 MR. CHANDLER: Is Mr. Cardone here?

22 There he is.

23 Assuming, Mr. Chairman, that the information is
24 provided by the Applicants as expeditiously as I have every
25 reason to believe it would be, I expect we certainly can

1 provide the Board with some further information within a
2 few weeks.

3 JUDGE KELLEY: Let me skip over to Mr. Pigott.
4 You had a representative there also?

5 MR. PIGOTT: Yes, we had representatives at
6 the visit and would agree with what Mr. Chandler said.

7 Exception: We might delete it from a few weeks
8 down into days, perhaps by the time this session is
9 completed.

10 JUDGE KELLEY: By "this session", you mean the
11 end of this week?

12 MR. PIGOTT: No. I'd probably be thinking the
13 end of -- a preliminary report perhaps by the end of this
14 week, but I think there are -- for instances, there were a
15 number of structures that were discussed. From my under-
16 standing of what has gone on, several of these probably
17 can be discussed and put away, as it were.

18 There is one, I believe, which will require
19 some additional investigation and that may take a little
20 more time but even that should not be too extensive.

21 So actually I would hope that we could get a
22 preliminary report by Thursday to give the Board some idea
23 of where we are, but probably not a final report, as
24 Mr. Chandler says, for a couple of weeks.

25 JUDGE KELLEY: And were the Intervenors there too?

5
1 MR. WHARTON: Yes. Mr. Barlow attended that
2 particular session.

3 Our position would be also, since we have
4 Mr. Phifer listed as a possible witness for us contingent
5 upon review of data, which would also be contingent upon, I
6 would suppose, the review of NRC Staff, that we would have
7 some kind of preliminary report on Thursday, to get an idea
8 where the Staff is so we know if we're going to be going
9 forward with this part of it or whether we're just not going
10 to be going too far on it.

11 I don't know if Glenn has any comments on
12 Saturday or not or anything further that we would like to
13 do.

14 MR. BARLOW: I believe it was noted generally
15 amongst the group that went that it would have taken several
16 days to cover the ground that Mr. Phifer's maps covered
17 and we only went to certain spots. It was not a thorough
18 field trip. It only covered certain spots in it and it did
19 raise a lot of questions that need more research.

20 So we would hope that there would be a thorough
21 examination, including a lot of field work that was noted
22 as necessary to analyze the questions that were raised.

23 JUDGE KELLEY: Well I don't know if I need to
24 pursue this. I was going to ask you, though, if you sort
25 of covered part but not all of the ground, did you pick out

6
1 or did Mr. Phifer pick out those parts that he regarded as
2 most significant or most ominous, if you will?

3 MR. BARLOW: Well I think some very significant
4 places were visited; not all of the significant inter-
5 sections on his postulated fault map were visited. The
6 most significant part of it was along the Mission Viejo
7 Fault Zone in Horno Canyon. Several other places were not
8 visited. Some of them would require special permission
9 from the Marines that we didn't have.

10 JUDGE KELLEY: Well I think a preliminary report
11 of some kind would be helpful to give us a feel for where
12 you are and where you're going.

13 It ought to go without saying, but I'll say it
14 anyway, that we realize that geologic investigation
15 sometimes takes a lot of time and a lot of looking or
16 analysis or whatever, and it will just have to take whatever
17 it takes. But we would like to have some notion of where,
18 if any, this new information is going to take us. So whenever
19 you have something that you think would be useful to the
20 Board and the other parties, then we would be happy to see
21 it.

22 The other thing that came up on Saturday is
23 there were, I believe, three people who appeared as limited
24 appearance speakers who had worked on the Steam Generator 2
25 repair project at Unit 1. I'd just like to ask Mr. Chandler

7
1 -- now Unit 1 isn't before this Board. I think when
2 some information is brought to this Board we pass it on
3 even though it isn't within our jurisdiction.

4 Is this the kind of a thing that normally --
5 is Region 10 the California region?

6 MR. CHANDLER: Region 5, sir.

122
7 JUDGE KELLEY: Region 5. I believe Mr. Hansen
8 indicated that this was the type of thing that their INE
9 people would investigate.

10 Where are we on this?

11 MR. CHANDLER: Actually, Mr. Chairman, in
12 addition to the three individuals who did make limited
13 appearance statements, we identified a fourth individual
14 who is present who also was involved in the repair operation
15 at the steam generators at San Onofre 1. We provided this
16 information and points of contact for each of these
17 individuals to the investigation group at Region 5. I
18 understand they'll be in contact with each of these four
19 gentlemen and I'm hopeful to hear back at least some
20 preliminary indication sometime this week, hopefully
21 mid-week.

22 JUDGE KELLEY: That seems to be appropriately
23 pursued at the moment by the Region.

24 MR. CHANDLER: Yes, sir. Every allegation is
25 investigated by the Office of Inspection and Enforcement.

1 I would also point out that another individual
2 raised a number of questions concerning an inspection report
3 by the Region 5 office of Inspection and Enforcement and the
4 questions that that individual raised have been passed on
5 to the resident inspector who will be in touch with that
6 individual as well.

7 JUDGE KELLEY: Thank you.

8 One other thing that the Board wants to put
9 some information into the record about is the Board has
10 an informal arrangement with Professor Hiroo Kanamori at
11 the California Institute of Technology to assist us as a
12 technical consultant in this case. I will have later on --
13 I don't have right now -- for insertion in the record a CV
14 or resume which spells out his background in greater detail.

15 I do know -- or he tells me, at least, and I'm
16 sure that's the case, that he had no prior involvement in
17 nuclear power licensing proceedings in the sense of either
18 being a witness or an Intervenor group or for a utility or
19 having worked for the NIC Staff. He's an academic research
20 oriented person who has, however, been very active in
21 fields of relevance here, namely measuring magnitude and
22 more recently strong motion studies.

23 I say this is an informal arrangement and I
24 really mean it in two senses. It's very limited both in
25 duration and scope. He simply wasn't available to come down

9
1 here and sit every day and help us understand technical
2 terms. And, indeed, until yesterday, for a couple of hours
3 when we talked with him about some of the problems we were
4 having, that was the first time we had seen him and I'm not
5 not sure when we're going to be able to do it again. So
6 it's very limited just in terms of time.

7 In terms of also formality, there is no formal
8 consulting arrangement between us and Dr. Kanamori -- no
9 piece of paper evidencing his arrangement because he wanted
10 to do this, whatever he did do, on a pro bono basis and
11 didn't want to get paid. So that too goes to its
12 informality.

13 The Board's need for this kind of help stems
14 from the fact that the record bears witness to the highly
15 technical nature of many of these issues. The members of
16 the Board, the three of us, are not by background trained
17 in either geology or seismology. I, myself, am a lawyer
18 with very little or no technical background. The other
19 two members of the Board do have technical backgrounds.

20 But this all goes to say that in an area like
21 seismology particularly, notwithstanding these very useful
22 tutorials that we've been having, we can still use some
23 help on terms and on understanding the concepts.

24 Dr. Kanamori's purpose, as we see it, is to
25 explain terminology, explain concepts, perhaps point out

10 1 aspects of problems that may not emerge from testimony
2 and to help us ask the right questions in the course of the
3 proceeding.

4 Our discussions with him are based on the record
5 in this case; this is, in every sense, an on-the-record
6 case. It is no part of his function to provide evidence.
7 He has no function in deciding this case or any of its
8 issues. Indeed our discussions with him yesterday was the
9 last one -- who knows when we'll have another -- and are
10 not cast in terms of ultimate issues or how big an
11 earthquake would come off the OZD. They're cast in much
12 more general terms.

13 We may have another session or two of that
14 sort as time goes. I think time pressures will be such
15 that we won't be able to do very much of that kind of
16 thing.

17 We may come to a point later on, and this could
18 be useful, if we get to the decision stage and we write an
19 opinion -- as people who are not experts in these fields,
20 we would want to be sure we were using terms accurately.
21 We would want to be sure that, if we were developing a line
22 of reasoning, it made sense, so to speak, that there
23 weren't logical inconsistencies in what we had to say. We
24 might ask him to read a draft for those kinds of purposes,
25 again not for purposes of any judgment on the merits.

1 I said earlier that Dr. Kanamori has not been
2 involved in prior cases or associated with any particular
3 point of view with respect to nuclear power.

4 I did notice Dr. Brune's testimony cites
5 Dr. Kanamori at one point or two and I believe the Staff
6 does too at one point or two.

7 He mentioned yesterday when we were talking with
8 him that he had some discussions at some point with Dr. Brune.
9 He also had some discussions with a seismologist with the
10 TERA Corporation and he thought it was in connection with
11 this case. That was a Dr. Mansom-- I don't know the
12 pronunciation--Niazi, N-i-a-z-i. So that although he
13 hasn't been affiliated with various sides, if you will,
14 of this controversy, he knows an awful lot of seismologists
15 and he talks on the telephone about this, that and the other
16 thing.

17 I did tell him that, if he was going to work
18 with us in this informal consulting arrangement, he would
19 have to refrain from further discussions with parties in
20 this case or their witnesses during the pendency of this
21 proceeding. I believe he understands that ex parte
22 contact concept or, if not technically ex parte, then the
23 things that might be thought to raise propriety questions.

24 So that is our understanding with him. I wanted
25 to put on the record his identity and purpose and the

12

1 extent of our contacts.

2 If, on the basis of what I have said, the
3 parties feel they want to raise any questions, they're free
4 to do so.

5 Incidentally, earlier I had asked the parties
6 to provide copies of testimony and exhibits to Dr. Kanamori
7 and they have done so. So he does have those in hand.

8 With that, I believe we can pass to the main
9 order of business today, but let me ask counsel if there
10 are other things that they want to bring up.

t2 11 MR. CHANDLER: I have two preliminary matters,
12 Mr. Chairman.

13 JUDGE KELLEY: Okay.

14 MR. CHANDLER: I would like to serve on the
15 Board and parties this morning the NRC Staff views with
16 respect to issuance of a license for San Onofre Units 2 and
17 3 --

18 JUDGE KELLEY: Yes. I meant to ask for that.

19 MR. CHANDLER: -- that is due to be served, I
20 guess in hand this morning, under the Board's order. This
21 document was filed by the Staff on Friday, June 26th.

22 JUDGE KELLEY: Yes. I simply forgot to mention
23 that and I hope the other parties have their filings on
24 low power licensing or will have them in the course of the
25 day.

13 1 MR. WHARTON: Mr. Chairman, we will have our
2 briefs filed at lunch time today.

3 JUDGE KELLEY: Fine.

4 MR. PIGOTT: Ours will also be served sometime
5 today.

6 JUDGE KELLEY: Fine.

7 MR. CHANDLER: The second item, Mr. Chairman,
8 is in anticipation of the testimony of Drs. Kennedy and
9 Green.

10 I would like to note for the record that with
11 me at counsel table are a number of new faces.

12 On my immediate right is Dr. James Davis. His
13 title is State Geologist with the California Division of
14 Mines and Geology.

15 To his right is Mr. Harold Eisenberg, Deputy
16 Attorney General, State of California, who is making an
17 appearance for the limited purpose of the testimony of
18 Dr. Kennedy who is of this California Division of Mines
19 and Geology.

20 And to his right is Mr. Robert H. Morris. He's
21 a geologist and is Deputy Chief for Reactor Programs, Office
22 of Environmental Geology of U.S. Geological Survey.

23 JUDGE KELLEY: Happy to have you here, gentlemen.

24 I'd like to make one further point that your
25 submission reminded me of.

14 1 These papers that we have now in connection
2 with the emergency planning issues amount to a rather
3 considerable stack. In addition to this low power paper,
4 there are EPZ briefs and there are contentions and there
5 are earthquake briefs. I have this rather disorderly filing
6 system in my motel room and I'm not at all sure that I have
7 everything that I'm supposed to have.

8 What I would propose to do perhaps later today
9 is go through that and then I might just sit here at the
10 mike -- or we might informally do this. I want to make
11 sure I've got everything I'm supposed to have from everybody.
12 So, perhaps, at the end of the day, we could spend a few
13 minutes making sure that that is the case.

14 Mr. Wharton, do you have any housekeeping
15 matters to bring up?

16 Should we at this point talk about your desires
17 with regard to Messrs. Green and Kennedy as witnesses? That
18 might be something we should take care of here or try to.

19 MR. WHARTON: Yes. Just one housekeeping matter.

20 In the order of presentation of witnesses of
21 Intervenors Carstens, et al., that I served on the Board and
22 the parties on Friday, I have one change to make and it's
23 one that Mr. Pigott commented on, the date for Mr. Legg. We
24 have here not available till August 1st, It should be not
25 available until July 27th. That was a mistake in putting it

15
1 down.

2 JUDGE KELLEY: All right.

3 MR. WHARTON: As far as Dr. Greene and Dr. Kennedy
4 are concerned, we served the subpoena on Dr. Kennedy this
5 morning for direct testimony for Intervenors as part of
6 Intervenors' case.

7 JUDGE KELLEY: And we will be hearing from the
8 State with regard to the subpoena; correct?

9 MR. EISENBERG: I've already talked to counsel,
10 Mr. Chairman. He's tendered the fees. By the end of the
11 day he said he will have the check. We request that he
12 be heard today if at all possible.

13 JUDGE KELLEY: I see. So there is no objection
14 to this subpoena from the State?

15 MR. EISENBERG: No.

16 MR. WHARTON: The check has been tendered.

17 Our only request would be, since we would be
18 putting Dr. Kennedy on as our witness separately, I would
19 like the indulgence of Dr. Kennedy and others if we could
20 put Dr. Kennedy on tomorrow morning only for the purposes
21 of separating it from the case of the Staff itself and,
22 also, quite frankly, Mr. Barlow went on the field trip on
23 Saturday and had all of the documentation and documents for
24 Dr. Kennedy. Yesterday he was working on all that
25 documentation to prepare for cross-examination.

16 1 It's my understanding that I need to to the
2 direct examination and I haven't had a chance to go over
3 the documents to be able to do the proper direct examination
4 of Dr. Kennedy today. I would ask indulgence to do it
5 tomorrow morning. It shouldn't take too long. It's just
6 a matter of being able to get to the papers that I have to
7 review for direct examination of Dr. Kennedy.

8 JUDGE KELLEY: Have you discussed this with
9 Mr. Chandler?

10 MR. WHARTON: Let me back up just a second.
11 There's not a misunderstanding.

12 I talked to Mr. Chandler about it yesterday.
13 He indicated availability of Dr. Kennedy on Tuesday morning,
14 and, on that basis, I went ahead thinking that I could do
15 it Tuesday morning.

16 I talked to Mr. Chandler and Mr. Chandler
17 indicated Dr. Kennedy would rather do it today. I was going
18 on the basis of doing it on Tuesday.

19 MR. CHANDLER: I think Mr. Wharton perhaps
20 mischaracterizes our discussion of yesterday. I said I
21 would presume he would be available tomorrow. I did not know
22 what his preferences would be or his other obligations might
23 be. That I would discuss it with Dr. Kennedy and advise
24 Mr. Wharton this morning, which I then did, indicating
25 Dr. Kennedy's preference for today in view of other

17

1 commitments which he has.

2 MR. WHARTON: I wasn't my intention of
3 misrepresenting Mr. Chandler --

4 JUDGE KELLEY: All right. We needn't pursue
5 that.

6 MR. PIGOTT: If I might be heard.

7 JUDGE KELLEY: Yes.

8 MR. PIGOTT: I would request that Dr. Kennedy
9 have his direct examination today. I would note that there
10 is no prepared direct testimony for Dr. Kennedy. There is
11 no outline of proposed direct examination of Dr. Kennedy.
12 Applicants are completely without notice as to what is
13 the Intervenors' plan to go into.

14 Now I'm prepared to attempt a cross-examination
15 of Dr. Kennedy immediately after Mr. Wharton's direct, but
16 I would certainly object to his having the overnight
17 period to further prepare his direct and then expect me to
18 come on without any kind of a showing to conduct cross. I
19 think that's terribly unfair. I think he should proceed
20 as Dr. Kennedy becomes available for direct examination.

21 MR. WHARTON: Mr. Chairman, just one further
22 thing I think we must point out.

23 We are trying to compensate for Dr. Kennedy's
24 schedule in taking him out of line as far as our case in
25 chief is concerned. It's my understanding that -- we have

18 1 subpoenas served and we can go ahead and put them in order
2 in our case when our case comes up.

3 I would prefer not to have to do that to
4 accommodate Dr. Kennedy's schedule. I'd like a little
5 accommodation, on the other hand, because, as I said, we
6 can do it the way we want to do it as Mr. Pigott last week
7 so forcefully argued that he can present his case in the
8 order that he wants to present it.

9 JUDGE KELLEY: So I'm clear in my mind, we
10 discussed this lack of direct on subpoenaed witnesses and
11 the Intervenors were then directed to file outlines, but I
12 don't believe the time has come. Is it this Wednesday?

13 JUDGE HAND: That's right.

14 JUDGE KELLEY: Since these witnesses happened
15 to come here today, we have that problem.

16 Dr. Kennedy, you've heard these struggles over
17 your availability. I'd just ask you a couple of direct
18 questions.

19 If for some reason it turned out that we would
20 like to have you here tomorrow to testify, could you be here?
21 How tight is your schedule?

22 DR. KENNEDY: Yes, I could be by changing my
23 schedule extensively.

24 JUDGE KELLEY: What if your option would be to
25 have to come back a week or ten days later, would you rather

19

1 stay here then and get it taken care of?

2 DR. KENNEDY: Of course, as we have mentioned,
3 I would prefer it today over tomorrow. Later during the
4 proceedings, I'm going to be at sea on several cruises and
5 really quite unavailable.

6 JUDGE KELLEY: So you're really gone after the
7 next couple of days and you're going to be out on the high
8 seas somewhere?

9 DR. KENNEDY: That's correct.

10 JUDGE KELLEY: A very strong case of
11 unavailability.

12 It turns, in part, it seems to me, on just how
13 far we get today. If by some accident Mr. Chandler is
14 through with Greene and Kennedy as his witnesses at 5:15
15 today, then the answer is going to be kind of obvious. I
16 have no idea how that will transpire.

17 It seems to me that for now -- I've heard the
18 various considerations. Why don't we go ahead and we will
19 be thinking about it and we know what the issue is and we'll
20 have a ruling a little later in the day as to just how this
21 ought to be handled.

22 MR. WHARTON: Mr. Chairman, just so there is
23 no misunderstanding, we are prepared to go with cross-
24 examination today. There's no problem with that.

25 The only thing we're talking about is that there

20
1 are other parts of Dr. Kennedy's testimony that are not about
2 the CZD that we're getting into. These have to do with
3 the extension of the fault, OZD south; that would be down
4 towards Baja. That's the area that we want to have direct
5 examination on, so it's not the area regarding the CZD.
6 It's not a different subject matter but it's a different
7 area.

8 JUDGE KELLEY: You mean your cross of these
9 witnesses as Staff witnesses. You're prepared to --

10 MR. WHARTON: Yes.

11 JUDGE KELLEY: I was assuming that. It never
12 occurred to me that weren't going to do that.

13 MR. WHARTON: No.

14 JUDGE KELLEY: I thought the only issue was
15 Dr. Kennedy as your witness.

16 MR. WHARTON: That's correct.

17 JUDGE KELLEY: And when that would happen.

18 MR. WHARTON: That's correct.

19 MR. CHANDLER: Mr. Chandler, if I may make a
20 suggestion.

21 Perhaps if we took a somewhat more extended
22 lunch break, perhaps Mr. Wharton would then be able to --
23 I don't know. I can't speak for him on this, but he would
24 be able to better prepare his direct examination of these
25 individuals and proceed, assuming time is available this

21
1 afternoon, to conclude his direct.

2 MR. WHARTON: That may work depending on where
3 we are at lunch break time.

4 JUDGE KELLEY: Okay. Let's think about that.
5 Mr. Pigott, anything else?

6 MR. PIGOTT: No. I'd like to get moving so we
7 can perhaps finish him today.

8 JUDGE KELLEY: Okay. Let's do it.

9 MR. CHANDLER: Then, Mr. Chairman, I would like
10 to call Dr. H. Gary Greene and Dr. Michael P. Kennedy to
11 the stand and ask that they be sworn.

12 JUDGE KELLEY: Yes.

13 Let me swear you in.

14 Could you raise your right hands, please.

15 /////
16
17
18
19
20
21
22
23
24
25

1 Whereupon,

2

H. GARY GREEN

3

MICHAEL P. KENNEDY

4

were called as witnesses and, having been first duly sworn

5

by the Chairman, were examined and testified as follows:

6

MR. CHANDLER: Mr. Chairman, if I may ask Mr.

7

Pigott if it would be possible somehow to move his viewgraph

8

machine somewhat to one side. I would like to see periodically

9

when my witnesses wince or otherwise display pain.

10

MR. PIGOTT: Yeah, let us just take a minute.

11

JUDGE KELLEY: Off the record for a minute.

12

(Discussion off the record)

13

JUDGE KELLEY: Back on the record.

14

DIRECT EXAMINATION

15

BY MR. CHANDLER:

16

Q I will ask each of you in turn a series of

17

brief questions. Dr. Green, do you have before you a document

18

entitled "Biography of H. Gary Green?"

19

A (WITNESS GREEN) I seem to have left it in my

20

briefcase.

21

Q Dr. Green, before we get to that document, if I

22

could ask that you for the record identify yourself completely

23

by name, by whom you are employed, and in what capacity?

24

A My name is H. Gary Green. I am employed by the

25

U.S. Geological Survey, and I am a marine geologist.

2 1 Q Thank you. Do you have before you a copy of a
2 document entitled "biography of H. Gary Green?"

3 A Yes, I do.

4 Q Was this document prepared by you?

5 A Yes, it was.

6 Q Are there any additions or corrections to that
7 document?

8 A No, there is not.

9 Q It is true and correct to the best of your know-
10 ledge and belief?

11 A That is correct.

12 Q And would you testify as set forth therein?

13 A Yes, I would.

14 MR. CHANDLER: Mr. Chairman, I would ask that the
15 document entitled "Biography of H. Gary Green" be incorporated
16 in the transcript as if read.

17 JUDGE KELLEY: So ordered.

18 MR. CHANDLER: I will provide the reporter with
19 the requisite number of copies.

20 (Whereupon, the testimony of H. Gary Green was
21 inserted into the record)

22

23

24

25

BIOGRAPHY OF
H. GARY GREENE

H. Gary Greene was born in 1938. He received his professional education in geology at California State University at Long Beach (B.S.-1966), California State University at San Jose (M.S.-1970), and Stanford University (Ph.D.-1977). He joined the U.S. Geological Survey (USGS) in 1966 while studying for his M.S. degree. Prior to coming to the USGS, he worked as a student marine geophysicist for Richfield Oil Company, Texaco, Inc., Rayflex Exploration Company, and Alpine Geophysical Company. Throughout his employment with these companies, he was actively involved in geophysical exploration for oil and became proficient in seismic reflection interpretative techniques and the operation of marine geophysical instruments.

During his early years with the USGS, Greene undertook sedimentary and geophysical studies of Arctic beaches, and participated in several marine geological and geophysical studies of the Bering Sea. In 1969, he became a co-principal investigator in a joint NOAA-USGS geophysical investigation of Norton Sound. From 1970 to 1974, Greene was project chief for the geological and geophysical investigations of the continental shelves in the Monterey Bay and Ventura offshore regions of central and southern California. In these studies he pioneered the development of seismic interpretative techniques for the location of offshore ground water basins and for the delination of potential sites of salt water encroachment. Also, during this time, he participated as part of a team of USGS scientists in an IDOE geophysical investigation of the Venezuelan borderland. In 1974, Greene participated in an NSF cooperative USGS-Spanish geological research program where he was project chief for the marine geophysical resource evaluation of the Gulf of Almeria and was responsible for the training of Spanish geoscientists in marine geology. Upon returning from Spain, Greene was invited by the California Coastal Zone Conservation Commission to assist in the design and the geological element for the coastal plan. In conjunction with this, Greene constructed maps of environmental significant geologic features of the California coastal zone pertinent to the planning process. He participated in JOIDES DSDP Leg 55 drilling of the Emperor Seamounts aboard the GLOMAR CHALLENGER from June to July 1977. As the geophysicist aboard, he was responsible for final selection of the drill sites and the prediction of sediment type and thickness to be penetrated. Objective of cruise was to determine the validity of the Hawaiian "hot spot" hypothesis. Acted as assistant editor for the Initial Report of DSDP, Volume 55. Greene is also a co-principal investigator with Brent Dalrymple and David Claque of the USGS in a Seamount-Linear Island chain project.

Greene recently served as a member of the U.S. delegation to the 9th Session of the United Nations Committee of Coordination of Joint Prospecting for Mineral Resources in South Pacific Offshore Areas (CCOP/SOPAC). Participated in the Second Workshop on the Geology, Mineral Resources and Geophysics of the South Pacific sponsored by CCOP/SOPAC and Intergovernmental Oceanographic Commission of Joint Prospecting for Mineral Resources in Asian Offshore Areas (CCOP). He is participating in a continuing workshop of the East-West Center at Hawaii, Environment and Policy Institute, on the development of environmental guidelines, oil and gas exploration and development for Pacific developing nations, specifically Asian nations. He has co-authored a paper entitled "Environmental guidelines for oil and gas exploration: development drilling and production."

Greene is presently Project Chief of the Southern California Environmental Project that is evaluating geological hazards in the OCS petroleum lease sale areas of the Southern California Borderland. He supervises 6 to 8 scientists and technicians. In addition, he is a co-principal investigator on the USGS hydrocarbon resource appraisal projects for the southern and central offshore regions of California and the Pacific-Arctic Branch of Marine Geology's area expert for the Southern California Borderland where he participates in review, selection, and stipulation of OCS lease sale tracts cooperatively with the Bureau of Land Management (BLM), USGS-Conservation Division and state agencies. He has testified before a Congressional Committee investigating the OCS lease sale process. Greene has recently been selected by the Chief Geologists of the USGS to review the Joint Conception LMG's for the California PUC and the San Onofre Nuclear Power Station for the RRC.

Greene is presently Program Director of an offshore geologic map series project for the California Division of Mines and Geology (CDM&G). In this capacity he has been participating with CDM&G scientist Michael Kennedy on recency and character of faulting offshore from metropolitan San Diego, California. He has participated as scientist-in-charge on deep submersible dives using ALVIN to trace and sample the walls of active faults in the San Diego Trough.

Presently, Greene is Deputy General Chairman for the Circum-Pacific Energy and Mineral Resources Conference and on the editorial board of Geo-Marine Letters, a new international journal of marine geology, geophysics, geotechnique, stratigraphy, chemistry, dynamics, environmental problems and applications. He is a registered geologist in the State of California and Assistant Professor for the California State University system where he teaches, part-time, graduate courses on marine geology and geophysics at the Moss Landing Marine Laboratories (MLML) and is a co-principal investigator in a project entitled "Phosphates along the central California coast," a project funded by the California Sea Grant College program support. He is

assisting MLML in designing and implementing an active marine geological research program and graduate curriculum and is Master of Science thesis advisor to over 6 students working on degrees from San Jose State University and the Naval Postgraduate School in Monterey. He is also presently a member of the Advisory Board to the Geological Sciences Department at California State University-Long Beach where he is assisting in the development of a new curriculum.

He is a member of both the National and Pacific Coast Sections of the Society of Exploration Geophysicists, the Peninsula Geological Society, the San Francisco Bay Area Geophysical Society, the American Geophysical Union, the Geological Society of America, and the American Association of Geologists. Greene's interests vary from marine geophysics to beach sedimentation and he has authored or co-authored over 70 papers and abstracts. He is actively involved in research dealing with the geology and origin of submarine canyons and seamounts, structural development of continental shelves and marginal basins through wrench-fault tectonics, and the prediction and location of hydrocarbon reservoirs. He has been Chief Scientist or co-Chief Scientist on over 25 oceanographic cruises, many associated with academic institutions and other Government agencies outside of the USGS.

3
1 BY MR. CHANDLER:

2 Q Dr. Kennedy, I would ask that you also identify
3 yourself for the record, indicating by whom you are employed
4 and in what capacity.

5 A (WITNESS KENNEDY) Michael P. Kennedy. I am
6 employed by the California Division of Mines and Geology.
7 That is the State of California, and I am a geologist.

8 Q And do you, sir, have before you a document
9 entitled "Statement of professional qualifications?"

10 A I do.

11 Q Was that document prepared by you?

12 A Yes, it was.

13 Q Are there any additions or corrections you wish
14 to have made?

15 A No.

16 Q Is it true and correct to the best of your know-
17 ledge and belief?

18 A Yes, it is.

19 Q And if called upon, would you testify as set
20 forth therein?

21 A Yes, I would.

22 MR. CHANDLER: Mr. Chairman, I would ask that the
23 document entitled "Statement of Professional Qualifications of
24 Michael P. Kennedy" be incorporated in the transcript as if
25 read.

JUDGE KELLEY: So ordered.

MR. CHANDLER: I will provide the reporter with the requisite number of copies of each of these documents.

(Whereupon, the direct testimony of Michael P. Kennedy was inserted into the record)

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

STATEMENT OF PROFESSIONAL QUALIFICATIONS

MICHAEL P. KENNEDY
3574 Loan Jack Road
Encinitas, California . 92024

EDUCATION

1973 Geology Major - Ph.D. University of California, Riverside
1971 Geology Major - M.S. University of California, Riverside
1965 Geology Major - B.A. Whittier College, Whittier

EXPERIENCE

1/76 - present University of California
 Scripps Institution of Oceanography
 Geological Research Division
 La Jolla, California 92093

 Lecturer and Research Associate

10/65 - present California Division of Mines and Geology
 107 South Broadway, Los Angeles, California
 213/620-3560

 Marine Geologist

9/64 - 10/65 F. Beach Leighton, Consulting Geologist
 300 South Beach Blvd., La Harbra, California
 213/691-2125

 Geologist

1/62 - 9/64 F. Beach Leighton, Consulting Geologist
 As above.

Prior to 1964 Student

PROFESSIONAL LICENSES

California Registered Geologist #273
California Certified Engineering Geologist #160

PROFESSIONAL ORGANIZATIONS

Geological Society of America - member
American Association of Petroleum Geologist - member

BIBLIOGRAPHY

Michael P. Kennedy

- Kennedy, M.P., 1967, Preliminary report, engineering geology of the City of San Diego, California: California Division of Mines and Geology open-file report 67-01.
- Kennedy, M.P., 1968, Preliminary geologic map of the San Diego coastal area, California: California Division of Mines and Geology open-file reports 67-02, 68-09, 68-10, 69-13, 69-14.
- Kry, D., and M. P. Kennedy, 1969, Cretaceous and Eocene coccoliths at San Diego, California: California Division of Mines and Geology Special Report 100, p. 33-43.
- Moore, G. W., and M. P. Kennedy, 1970, Coastal geology of the California-Baja California border area: American Association of Petroleum Geologists, Pacific Section, field trip guidebook, p. 4-9.
- Kennedy, M. P., and G. W. Moore, 1971, Stratigraphy and structure of the area between Oceanside and San Diego, California: Geologic Road Log, in Elders, W. A., ed., Geological Excursions in Southern California: Geological Society of America, 67th Annual Meeting, Cordilleran Section Guidebook, University of California, Riverside Museum Contribution, v. 1, p. 149-166.
- Kennedy, M. P., and G. W. Moore, 1971, Stratigraphic relations of Upper Cretaceous and Eocene formations. San Diego coastal area, California: American Association of Petroleum Geologist Bull., v. 55, p. 709-722.
- Kennedy, M. P., 1971, Eocene shoreline facies in the San Diego coastal area, California: Geological Society of American Abstracts with Program, v. 3, p. 142.
- Golz, D. G., and M. P. Kennedy, 1971, Comparison of mammalian and invertebrate chronologies in the Eocene of southern California: Geological Society of America Abstracts with Program, v. 3, p. 125.
- Gray, C. H., Jr., M. P. Kennedy, and P. K. Morton, 1971, Petroleum potential of southern coastal and mountain area, California: American Association of Petroleum Geologist Memoir 15, p. 372-384.
- Kennedy, M. P., 1973, Stratigraphy of the San Diego Embayment, California: University of California, Riverside Unpublished Ph.D. Dissertation.
- Kennedy, M. P., 1973, Sea-cliff erosion at Sunset Cliffs, San Diego, California: California Geology, v. 26, p. 27-31.

- Kennedy, M. P., 1973, Bedrock lithologies, San Diego area, California: in Studies on the geology and geologic hazards of the greater San Diego area, California: San Diego Association of Geologists and California Association of Engineering Geologists joint field trip guidebook, p. 9-15.
- Peterson, G. L., and M. P. Kennedy, 1974, Lithostratigraphic variations in the Poway Group near San Diego, California: San Diego Museum of Natural History Transactions, v. 17, p. 251-257.
- Kennedy, M. P., S. S. Tan, R. H. Chapman, and G. W. Chase, 1975, The recency and average rate of fault movement in San Diego, California: Geological Society of America Abstracts with Program, v. 7, p. 333.
- Kennedy, M. P., 1975, Geology of the San Diego metropolitan area, California, western San Diego metropolitan area: California Division of Mines and Geology Bull. 200A.
- Kennedy, M. P., and G. L. Peterson, 1975, Geology of the La Mesa, Poway and southwest quarter of the Escondido quadrangles, eastern San Diego metropolitan area, California: California Division of Mines and Geology Bull. 200B.
- Kennedy, M. P., S. S. Tan, R. H. Chapman, G. W. Chase, 1975, Character and recency of faulting, San Diego, California: California Division of Mines and Geology Special Report 123.
- Moore, G. W., and M. P. Kennedy, 1975, Quaternary faults at San Diego Bay, California: U.S. Geological Survey Journal of Research, v. 3, p. 589-595.
- Givens, C. R., and M. P. Kennedy, 1976, Middle Eocene mollusks from northern San Diego County, California: Journal of Paleontology, v. 50, p. 954-975.
- Golz, D. J., G. T. Jefferson and M. P. Kennedy, 1977, Late Pliocene vertebrate fossils from the Elsinore fault zone, California: Journal of Paleontology, v. 51, p. 864-866.
- Kennedy, M. P., 1977, The recency and character of faulting along the Elsinore fault zone in Riverside County, California, Wildomar to Upper Wolf Valley: California Division of Mines and Geology Special Report 131.
- Kennedy, M. P., S. S. Tan, 1977, Geology of the National City, Imperial Beach, and Cay Mesa Quadrangles, southern San Diego metropolitan area, California: California Division of Mines and Geology Map Sheet 29.

- Kennedy, M. P., and G. Borchardt, 1977, Liquefaction as a potential earthquake hazard to urban San Diego, California: U.S. Geological Survey, Office of Earthquake Studies technical reports, B1-B22.
- Kennedy, M. P., 1977, Refraction survey across suspected faults in Otay Valley, California: U.S. Geological Survey, Office of Earthquake Studies technical reports, D1-D10.
- Kennedy, M. P., 1977, Surface faulting and liquefaction as potential earthquake hazards in urban San Diego, California: U.S. Geological Survey Office of Earthquake Studies Summaries of Technical Reports, v. 4, p. 21.
- Kennedy, M. P., and E. E. Welday, 1978, Quaternary faults offshore from urban San Diego, California: California Division of Mines and Geology Map Sheet 40.
- Kennedy, M. P., K. A. Bailey, H. G. Greene, and S. H. Clarke, 1978, Recency and character of faulting offshore from metropolitan San Diego, California: U.S. Geological Survey Office of Earthquake Studies Summaries of Technical Reports, v. 7, p. 23-24.
- Kennedy, M. P., E. E. Welday, G. A. Borchardt, G. M. Chase, and R. H. Chapman, 1978, Studies on surface faulting and liquefaction as potential earthquake hazards in urban San Diego, California: U.S. Geological Survey Office of Earthquake Studies Summaries of Technical Reports, v. 5, p. 19.
- Kennedy, M. P., 1978, Recency and character of faulting offshore from metropolitan San Diego, California: U.S. Geological Survey Office of Earthquake Studies Summaries of Technical Reports, v. 6, p. 22-23.
- Arthur, M. A., E. L. Winterer, U. von Rad, and M. P. Kennedy, 1979, Upper Cretaceous deep-sea fan deposits, San Diego (stop 3, McClellan Road and Rosecrans Boulevard, Point Loma), in Abbott, P. L., editor, Geological excursions in the southern California area: Department of Geological Sciences, San Diego State University Special Publication for 1979 Geological Society of America National Meetings, p. 190-194.
- Arthur, M. A., E. L. Winterer, U. von Rad, and M. P. Kennedy, 1979, Upper Cretaceous deep sea fan deposits, San Diego (stop 5, La Jolla), in Abbott, P. L., editor, Geological excursions in the southern California area: Department of Geological Sciences, San Diego State University Special Publication for 1979 Geological Society of America National Meetings, p. 198-208.
- Borchardt, G. and M. P. Kennedy, 1971, Liquefaction potential in urban San Diego, California: A pilot study: California Geology, v. 32, p. 217-221.

- Givens, C.R., and M. P. Kennedy, 1979, Eocene Molluscan stages and their correlation, San Diego area, California, in Abbott, P. L., Editor, Eocene depositional systems, San Diego, California: Pacific Section, Society of Economic Paleontologists and Mineralogists Guidebook, p. 81-95.
- Greene, H. G., K. S. Bailey, S. H. Clarke, J. I. Zoyny, and M. P. Kennedy, 1979, Implications of fault patterns of the inner California continental borderland between San Pedro and San Diego, in Abbott, P. L., and W. J. Elliott, Editors, Earthquakes and other perils, San Diego region: San Diego Association of Geologists Special Publication for 1979 National Geological Society of America Meeting field trip, p. 21-27.
- Kennedy, M. P., 1979, Recency and character of faulting offshore from metropolitan San Diego, California: U.S. Geological Survey Summaries of Technical Reports, v. 8, p. 37-39.
- Legg, M. R. and M. P. Kennedy, 1979, Faulting offshore San Diego and northern Baja California, in Abbott, P. L., and W. J. Elliott, Editors, Earthquakes and other perils, San Diego region: San Diego Association of Geologists Special Publication for 1979 National Geological Society of America Meeting field trip, p. 29-46.
- Morton, D. M., and M. P. Kennedy, 1979, Renewed movement in the Wright Mountain Landslide, San Gabriel Mountains, San Bernardino County, California: California Division of Mines and Geology Special Report 136, p. 1-5.

5
1 BY MR. CHANDLER:

2 Q Drs. Green and Kennedy, do you have before you
3 a document entitled "Review of Offshore seismic reflection
4 profiles in the vicinity of the Cristianitos fault, San Onofre,
5 California," by H. Gary Green and Michael P. Kennedy, and a
6 document entitled "Addendum to review of offshore seismic
7 reflection profiles in the vicinity of the Cristianitos
8 fault, San Onofre, California, by H. Gary Green and Michael
9 P. Kennedy?

10 A . (WITNESS GREEN) I have the addendum. I am
11 pretty sure I have the review here, too. We have the
12 addendum. The review is in my briefcase.

13 Q If you are referring to the Staff Safety
14 Evaluation, NUREG 0712, I would refer you to pages F-3, and
15 G-8.

16 A All right, we have found it.

17 Q I would ask each of you to answer in turn, Dr.
18 Green, was this document prepared by you?

19 A (WITNESS GREEN) Yes, it was.

20 Q And are there any additions or corrections you
21 wish to have made in that document?

22 A No. Not I.

23 Q Dr. Kennedy, was this document also prepared by
24 you?

25 A (WITNESS KENNEDY) Yes, that is correct.

6 1 Q Are there any additions or corrections you wish
2 to have made in this document?

3 A No.

4 Q Dr. Green, is this document true and correct to
5 the best of your knowledge and belief?

6 A (WITNESS GREEN) It is.

7 Q And Dr. Kennedy, to your knowledge, is this
8 document true and correct to the best of your knowledge and
9 belief?

10 A (WITNESS KENNEDY) Yes.

11 Q And if asked these same questions with respect
12 to the addendum, would you so answer?

13 A I would, yes.

14 MR. CHANDLER: Mr. Chairman, the Staff has
15 indicated in its letter of June 8, 1981, transmitting the
16 Staff's direct testimony that it would use as its direct
17 testimony the Staff Safety Evaluation, pertinent sections
18 thereof. We identified at that time these particular portions
19 and indicated therein that they would be sponsored by Drs.
20 Green and Kennedy.

21 I would propose not to have these portions bound
22 into the transcript as if read. Each of these documents is
23 contained in Staff Exhibit Number 1, and for that reason,
24 I will not ask that they be separately bound in the
25 transcript.

7 1 Mr. Chairman, as requested by the Board, I have
2 asked Drs. Green and Kennedy if they will prepare a summary
3 of this report and its addendum. Dr. Green will make a brief
4 summary presentation of its contents.

5 MR. PIGOTT: Excuse me, the SER is in evidence,
6 correct?

7 MR. CHANDLER: Yes.

8 MR. PIGOTT: Okay, thank you.

9 JUDGE KELLEY: The SER is in evidence. I wonder
10 if -- I don't know that it really matters. Mr. Wharton
11 objected to its being in evidence. Let me ask as to this
12 portion, now that it is being sponsored, do you object to
13 this part being in evidence?

14 MR. CHANDLER: I don't believe Mr. Wharton did
15 object to the SER. In fact, I believe he requested that the
16 safety evaluation be placed in evidence.

17 MR. WHARTON: That is correct, Mr. Chandler, I
18 did not object to the SIR.

19 JUDGE KELLEY: And I withdraw my comment, all
20 right.

21 BY MR. CHANDLER:

22 Q Dr. Green, if you would please provide a brief
23 summary of the report and its addendum?

24 A Yes. On May 8, 1980, the U.S. Nuclear Regulatory
25 Commission requested that a comprehensive review be made of

8
1 all the marine geophysical data relevant to the character and
2 recency of faulting along the offshore extension of the
3 Cristianitos fault in the vicinity of the San Onofre Nuclear
4 Generation Station.

5 This request was made to the U.S. Geological
6 Survey and was concerned specifically with the proposed
7 structural relationship between the Cristianitos zone of
8 deformation and the Newport-Inglewood Rose Canyon fault zone.

9 I undertook this investigation and suggested that
10 Mike Kennedy of the California Divisions of Mines and
11 Geology assist me in this review, primarily because Mike and
12 I have in the past for some time been working together
13 jointly on marine geophysical investigation in the general
14 regional offshore region of Southern California.

15 In this review, we did not make an attempt to
16 correlate the offshore geologic structures with those
17 structures mapped onshore, except to look at what we had
18 initially discussed previously was to determine the offshore
19 extension of the Cristianitos fault.

20 We then undertook extensive interpretation of
21 continuous seismic reflection profiles supplied to us by the
22 Applicant, in this case Southern California Edison, and those
23 seismic reflection profiles consisted of in a general manner
24 profiles that were collected by Marine Advisors, Woodward
25 Clyde, Fugro, Western Geophysical and profiles that were

9 1 collected by the USGS in 1970 and 1978 and '79.

2 In addition, an addendum was presented from our
3 work, with -- that was based on interpretation of profiles
4 collected in 1980 by Nekton, Incorporated.

5 In our interpretation, we constructed a detail
6 structural map that consists of faults and folds in the
7 offshore region. In this region we also identified what we
8 considered to be data voids, and data voids are areas in
9 which good quality data were lacking, or density of seismic
10 profiles was insufficient to map and correlate structures at
11 the scale of one to 24,000 that we were mapping at.

12 I must emphasize that the notation data void does
13 not mean that data were not available, only that we felt
14 we, Kennedy and Green, felt that the data were insufficient
15 for collection -- for correlation with confidence between
16 seismic lines.

17 Again, in summary, the results of our
18 interpretation, results in a map called plate 2 of the previous
19 described publications by both Kennedy and myself, and that
20 map shows the structural relationships as we have mapped it
21 offshore in the SONGS region.

22 MR. CHANDLER: Mr. Chairman, plates 1 and 2, which
23 are behind Drs. Green and Kennedy, are contained in the Staff
24 Safety Evaluation at pages F-24, which is plate 1, and page
25 F-25, plate 2.

1 WITNESS GREEN: I will make a correction. I think
2 I said plate 2 was a structural relationship. It was plate 1.

3 MR. CHANDLER: These maps being in the safety
4 evaluation report, have already been received in evidence. I
5 would be pleased if the Board believes it would serve a
6 useful purpose to provide to the Board a larger version of
7 each of these plates. I don't know if these particula
8 copies can be left here today, but I can provide them to the
9 Board if it believes it would be useful.

10 JUDGE KELLEY: Well, the plate in the SER, it
11 seems to me it would be pretty clear. That is helpful to have
12 a bigger one. I don't know if we need anything in addition.
13 Do you think so, Cadet? Thank you, but I think this will
14 do for our purposes.

15 BY.MR. CHANDLER:

16 Q Dr. Green, could you briefly describe the
17 Cristianitos zone of deformation as it is portrayed on plate
18 number 1?

19 JUDGE KENNEDY: Can I just interrupt with one
20 question? I am still not entirely clear about data voids,
21 and I know you gave us some explanation, but the label is
22 prominent on plate 1, and perhaps other places. Does it mean,
23 at the risk of repeating yourself, does it mean that with the
24 techniques you have got now for seismic profiling you simply
25 can't get good data in those areas, or is it that nobody tried

11 1 or what?

2 WITNESS GREEN: No, as we use the term "data void,"
3 it represents basically two things. One thing is that either
4 there is a lack of data there, no lines have been run in
5 that general vicinity, or that lines have been run in that
6 vicinity, but they were not of good enough quality to be
7 usable for our mapping. In other words, due to perhaps the
8 shallowness of the water, the lithology, the types of rocks
9 that existed on the sea floor, you did not get a good
10 reflection profile, and so you could not use that to develop
11 your structural picture.

12 JUDGE KELLEY: So that it is true that in some
13 areas and given certain kinds of formations, you can't get
14 a good seismic profile reading, is that right?

15 WITNESS GREEN: That is correct.

16 JUDGE KELLEY: But are you saying in your studies
17 which is which?

18 WITNESS GREEN: No. We did not distinguish
19 between the two.

20 JUDGE KELLEY: Okay, thank you.

21 BY MR. CHANDLER:

22 Q Dr. Green, could you provide a brief verbal
23 description of the Cristianitos zone of deformation, which
24 is depicted on plate 1?

25 A (WITNESS GREEN) Okay, the Cristianitos zone of

12

1 deformation, as we have mapped it, trends north in the
2 general area of study, and lies oblique to the OZD, which
3 generally parallels the coastline.

4 The CZD, or the Cristianitos zone of deformation,
5 consists of an echelon faults and folds that extend offshore
6 from SONGS, and the zone appears to continue approximately
7 16 kilometers where it merges with or is truncate by the OZD.

8 I can step to the map, and diagram the general
9 area that we call the CZD, if you wish.

10 Q That might be helpful.

11 JUDGE KELLEY: Yes.

12 BY MR. CHANDLER:

13 Q I think, if you would, two requests, Dr. Green.
14 Would you please try to take a microphone with you if it will
15 reach, and if you can, when you point out areas, provide
16 sufficient identification because the transcript otherwise
17 won't be sufficiently clear.

18 A (WITNESS GREEN) Yes, I understand. Okay, I
19 will try to speak up here, and bend my neck if I can. Okay,
20 the Cristianitos zone of deformation, as we have mapped this,
21 begins on this map under the word "Crystal Needles," just
22 along the profile line called B-B prime, and it extends all
23 the way across the map from left to right, just past the
24 profile marked G-G prime, and just a little bit to the
25 left of the large word "data," under data void.

1 JUDGE KELLEY: When you say it -- did you say
2 earlier that it trended north?

3 WITNESS GREEN: I am sorry, I guess it is the
4 perspective that you look at it. The general trend of the
5 relationship would be a north-south trend if you like.

6 JUDGE KELLEY: I couldn't find that arrow north
7 again on it -- on this plate.

8 WITNESS GREEN: Latitude and longitude are on
9 there, that gives you the --

10 JUDGE KELLEY: Okay.

11 WITNESS GREEN: It is a different projection than
12 you normally use.

13 JUDGE KELLEY: Okay.

14 WITNESS GREEN: Normally north is up to the north
15 and this it is skewed over to the left.

16 JUDGE KELLEY: North is usually up to the north,
17 yes.

18 WITNESS GREEN: North is north.

19 MR. CHANDLER: Usually, sir, yes.

20 BY MR. CHANDLER:

21 Q Dr. Green, or Dr. Kennedy, I have two brief
22 questions if I may, Mr. Chairman, on direct. Would you
23 characterize your collective efforts as wholly collaborative,
24 and that each of you is essentially responsible for the
25 entirety of the report?

1 A (WITNESS GREEN) That is correct. We worked on
2 this report, if you like to use the term, intimately,
3 together. We were together throughout the whole construction
4 of the map and the report.

5 Q And it represents a consensus view?

6 A That it does.

7 Q One final question, gentlemen. Could you please,
8 perhaps for the information of the Board, the parties,
9 indicate why this zone bears the name Cristianitos zone of
10 deformation?

11 A Well, there is some history behind that, and I
12 won't go all into that history. Basically, it is the common
13 practice to name structural features after geographical
14 locations, sometimes after other structural features, and when
15 we discovered this zone offshore, we for brevity's sake in
16 the report in describing this, we needed to think of a name,
17 and we kicked around a variety of different names, all of
18 which did not sort with us, or did not please our colleagues
19 as being a definitive name, and we came up with the name as
20 Crystal Needles, because the Crystal Needles region,
21 geographical region, was close by.

22 Q And so is it fair then to say it is purely a
23 geographical appellation, it does not -- it is not intended
24 to imply, I gather based on your earlier response, a
25 relationship, a necessary relationship with the Cristianitos

1 fault?

2 A The intent of naming that feature was not
3 initially meant to apply to construe the fact that this was
4 related to the Cristianitos fault, that is correct.

5 JUDGE KELLEY: Just a question about the names of
6 geological formations of this character. If you give it the
7 name Cristianitos zone of deformation, how does it, or does
8 it become official in some sense? Is there some body that
9 says yes, that is a good name, and from now on it shall be
10 known as that, or not?

11 WITNESS GREEN: Yes, there is generally names that
12 come up like this are used in an unofficial capacity, and
13 generally are marked as such with quotes. There is a geologic
14 names committee in the Geological Survey, for instance, that
15 will eventually formalize a name or reject the name, and
16 generally this does not happen until it comes out into some
17 type of formal publication, and then it is accepted and used
18 in the sense, by the scientific community.

19 JUDGE KELLEY: Does the Cristianitos zone of
20 deformation at this point, then, have quotes around it?

21 WITNESS GREEN: That is correct.

22 JUDGE KELLEY: All right. Thank you.

23 MR. CHANDLER: Mr. Chairman, the witnesses are
24 available for cross-examination.

25 JUDGE KELLEY: Let me ask for comment from Counsel.

1 In the past, during Mr. Pigott's case, which is still on, we
2 have followed the sequence that was followed in order of
3 presentation with Mr. Wharton, and then Mr. Chandler for the
4 staff.

5 In the case of the Staff's witness that we now
6 have on, may I ask Mr. Wharton and Mr. Pigott who they think
7 should go first and why, or whether they care?

8 MR. CHANDLER: Can I pick?

9 JUDGE KELLEY: Yes? Can you what?

10 MR. CHANDLER: I asked if I could pick, but that
11 is all right.

12 JUDGE KELLEY: No. What is your pleasure, Mr.
13 Wharton?

14 MR. WHARTON: Mr. Chairman, I would prefer that
15 the Applicants would go on with cross-examination first. I
16 believe as far as the level of cross-examination, I believe
17 that the Applicants are going to have to cross-examine a bit
18 more than we will, because I think this is a position that
19 they don't agree with.

20 MR. PIGOTT: Could we leave the characterization
21 of the testimony to some further point and just talk about
22 the order?

23 MR. WHARTON: Well, I was stating that for
24 purposes of just saying why they should be going first. Our
25 position would be because of their -- of what I perceive to

1 be their position on this issue, that they should have
2 cross-examination first.

3 MR. PIGOTT: I would prefer to proceed first.

4 JUDGE KELLEY: Go ahead.

5 MR. PIGOTT: Gentlemen, I guess we will probably
6 for a little while muddle through the identification and who
7 wants to respond to what.

8 CROSS-EXAMINATION

9 BY MR. PIGOTT:

10 Q Have you worked out a preference as to how you
11 wish to respond?

12 A (WITNESS GREEN) No, I think unless you direct
13 the question directly to one of us, we will -- one or the
14 other of us will pop up and try to answer the question.

15 Q Okay, fine. Let me turn first to plates 1 and 2.
16 And simply by way of identification, they are marked, I
17 believe, on pages F-24 and F-25, which would follow the --
18 which follow the initial report, the review of offshore, et
19 cetera, is that correct?

20 A That is correct.

21 Q In fact, however, so that we are not confused,
22 these plates were actually drawn and submitted as of the date
23 of the addendum, were they not?

24 A Yes, these were the plates that were attached to
25 the addendum, when they were --

1 Q So if one were to try and get the absolutely
2 right sequence, we would have the report found in Appendix F
3 to the SER, without these plates, and then the addendum in
4 Appendix G, with these plates attached, is that correct?

5 A Okay, I lost you there.

6 A (WITNESS KENNEDY) I think I can answer that. The
7 initial set of plates that came out in the first report,
8 so there should be two sets of maps, one with the initial
9 report, one with the addendum. The most up-to-date maps,
10 which are marked as F-24, as of plate 1, represents the maps
11 that should be attached to the addendum.

12 A (WITNESS GREEN) Correct.

13 MR. CHANDLER: Dr. Kennedy, could you speak up a
14 little bit? You are getting lost a little.

15 BY MR. PIGOTT:

16 Q All right, now just going to your -- the back-
17 ground of you, Dr. Green, I believe you are a geologist by
18 profession, is that correct?

19 A (WITNESS GREEN). That is correct.

20 Q And not a seismologist?

21 A That is correct.

22 Q And Dr. Kennedy, is that the same for you?

23 A (WITNESS KENNEDY) Yes, it is.

24 Q I believe you have already discussed how you
25 became involved in the review of San Onofre Units 2 and 3.

1 You have presented two studies, but am I not correct that your
2 first glancing blow with this area is really in an even
3 earlier report?

4 A (WITNESS KENNEDY) That is correct.

5 Q Okay, and is that not found in -- or that is
6 found in a -- or known as implications of fault patterns of
7 the inner California continental borderland between San Pedro
8 and San Diego, by Green, Kennedy, and others?

9 A (WITNESS GREEN). That is correct.

10 Q All right, and for full reference, that is found
11 in a book entitled "Earthquakes and other Perils, San Diego
12 Region," edited by Patrick L. Abbott and William J. Elliott,
13 1979, is that correct?

14 A That is correct.

15 Q And in that article, which I believe commences on
16 page 29 of the publication, you discuss a number of zones of
17 faults and other deformation, including what you refer to as
18 the Newport-Inglewood Rose Canyon Vallecitos San Migue. fault
19 zone, is that correct?

20 A That is correct.

21 Q And there is a map in that document which is found
22 on about page 30, you are familiar with that map?

23 A We don't have a copy of that in front of us, so
24 I am familiar with the publication.

25 Q Okay, you are familiar with it, but I am not going

1 into detail.

2 A Okay, fine.

3 Q Could I ask you what the basis was for the drafting
4 of that map, and I don't care care about the other areas. I
5 am looking only at the Newport-Inglewood Rose Canyon, et
6 cetera.

7 MR. CHANDLER: Mr. Pigott, I would like to provide
8 him with a copy of the map so he can --

9 MR. PIGOTT: Certainly.

10 MR. CHANDLER: -- give you a better answer.

11 WITNESS GREEN: What page was that on?

12 BY MR. PIGOTT:

13 Q I believe it is on page -- following page 31?

14 MR. CHANDLER: Is that the two-page map, Mr.
15 Pigott?

16 MR. PIGOTT: Yes. I am sorry, I have the wrong
17 one. I am sorry, that is on page 22.

18 BY MR. PIGOTT:

19 Q Do you have it?

20 A (WITNESS GREEN) Yes, we have it.

21 Q And could you tell us what information you had
22 available to you at the time you drafted that map?

23 A Yes, this map was based on seismic reflection
24 profiles collected by the USGS, 1979 -- 1978 and 1979, two
25 different cruises.

1 Q And that was the only information that was used
2 for putting that map together, is that correct?

3 A That was the sole information we used for
4 constructing this map, that is correct.

5 Q And who claims to be the draftsman of that
6 particular map?

7 A I am uncertain what you mean by draftsman.

8 Q Well, someone must have initially had to put it
9 together, did they not?

10 A Yes, that is correct. I believe I am the person
11 that initially put this map together, and then the co-authors
12 spent time doing extensive revision.

13 Q Now, subsequent to that map, you were asked to
14 do the review which you described in your earlier statement,
15 is that correct?

16 A That is correct.

17 Q And is it fair to say that that request, if you
18 know, was as a result of this particular publication?

19 A To my knowledge, I believe it was.

20 Q And in performing the subsequent review, were you
21 supplied with additional data?

22 A Yes, I was.

23 Q And could you describe for us what data that was?

24 A I can. Just a second here, and I will give you
25 the list. Okay, the data that we used in our review consist

1 of intermediate penetration sparker profiles collected by
2 Marine Advisors, intermediate penetration sparker and high
3 resolution uni-boom profiles presented by Woodward Clyde,
4 a Fugro sonic-profile, deep penetration CDP profiles by
5 Western Geophysical, 1970 intermediate penetration sparker
6 and high resolution profiles selected by the USGS in 1970, and
7 intermediate to deep penetration and high resolution uniboom
8 profiles collected by the USGS in 1978 and 1979.

9 The addendum report then reviewed profiles
10 collected in 1980, consisting of high resolution watergun and
11 three and a half kilohertz reflection data collected by
12 Nekton Incorporated.

13 Q Okay, well, you are going a little bit faster
14 than I wanted there, but the first -- the data examined for
15 the initial report, as we will call it, in Appendix F, is
16 as set forth on page 11-11 in the SER, is it not?

17 A That is correct.

18 Q Okay. Then subsequent to the issuance of this
19 report, there was additional work done, which I believe you
20 referred to as the Nekton study, is that also correct?

21 A That is correct.

22 Q And in coming to the addendum, then, I don't
23 believe there is a data table such as this, in particular,
24 but it would be the same plus the Nekton, is that right?

25 A That would be correct.

1 Q Could you describe for us the purpose of the
2 initial study? By the initial study, I will say the initial
3 study for the NRC.

4 A As I explained in my summary, the purpose of
5 that study was on request of the NRC, to review all
6 available geophysical data offshore of the site, and to
7 evaluate that data or interpret that data for structure, and
8 to look at a possible relationship between the Cristianitos
9 fault and the offshore structures.

10 Q All right. Directing your attention to page F-3,
11 I read that one of the purposes was to determine the seaward
12 extension, if any, of the Cristianitos fault.

13 A That is correct.

14 Q Let me ask you, did you reach a conclusion with
15 respect -- and I assume that the Cristianitos fault in this
16 context is used in the limited sense of the onshore
17 Cristianitos fault?

18 A That is how I understand the use of it.

19 Q Did you determine a seaward extension of that
20 onshore fault?

21 A No, we did not determine seaward extent of that
22 fault per se.

23 Q Are you familiar with the Applicants' position
24 and data in this proceeding, and with respect to this area
25 generally, indicating that they do not believe the

1 Cristianitos fault extends beyond about 6,000 feet from the
2 shore?

3 A I am familiar with that statement, yes.

4 Q Do you have any reason to disagree with that
5 statement?

6 A I have no reason to support or disagree with that
7 statement.

8 Q In any event -- well, let me -- did you see
9 anything beyond the 6,000 foot mark in your profiles that
10 could be associated as a trace of that onshore Cristianitos
11 fault?

12 A Yes.

13 Q A single line? A trace of a --

14 A A series of lines.

15 Q What are you referring to when you say that? If
16 you could describe it, it would be much simpler, Dr. Green.

17 A Okay. I think the series of lines, short,
18 discontinuous questionable lines on plate 1, would be the
19 features mapped possibly as AA on the map.

20 Q Is that reflected anywhere in the report?

21 A Is that reflected anywhere in the report?

22 Q Yes.

23 A I don't recall.

24 Q Dr. Kennedy, do you agree with that statement,
25 that the "A" feature on the plate 1 map is a continuation, or

1 may be a continuation of the Cristianitos fault?

2 A (WITNESS KENNEDY) I think I agree with his
3 statement that Gary made, that this fault that we have
4 labeled as "A" is a feature that could be on a -- could be
5 projected, have a projected relationship with the
6 Cristianitos fault, but we did not state such in our report.

7 ///

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

1 BY MR. PIGOTT:

2 Q Do you have before you your depositions that were
3 taken in this proceeding?

4 A (WITNESS KENNEDY) I don't.

5 MR. PIGOTT: I wonder if Counsel could supply it.
6 Dr. Greene's was taken on April 3, 1981, and Dr. Kennedy's, I
7 believe, on --

8 WITNESS GREENE: Yes, we have this in front of us.

9 MR. PIGOTT: Okay.

10 BY MR. PIGOTT:

11 Q Taking a look at Page 37 --

12 A (WITNESS GREENE) On whose deposition, please?

13 Q Oh, I am sorry: your deposition, Dr. Greene.

14 A Page 37?

15 Q Yes. Starting at Line 17, I believe there is a
16 reference there -- Line 13 on that page. Let me direct your
17 attention now to what is shown on the map as being marked
18 a fault or a feature of some type. It appears around the
19 intersection of Profile CC Prime and AA Prime.

20 Is that what we are looking at?

21 A Is that what we are looking at now?

22 Q Yes.

23 A I mean, is that what we are talking about now?

24 Q That is the "A" fault that you were just referring
25 to, is it not?

2

1 A Yes, that is correct.

2 Q Okay. Then the question: Do you associate that
3 feature, whatever it is, with the Cristianitos zone of deforma-
4 tion? Answer: We do not in the text associate that, per se,
5 with the Cristianitos zone of deformation. Question: And
6 what were your reasons for that? Answer: The reasons at
7 that particular locality was that the faults were not well-
8 defined; number one; they were at depth, and we noticed that
9 a better, well-defined zone of deformation existed further
10 seaward that we could isolate.

11 However, I would like to mention that we do, in
12 the text, bring in around Profile DD Prime and FF Prime; that
13 the faults that exist there could be incorporated within our
14 zone of deformation and connect to fault zone A.

15 That is the end of the quotation at that point in
16 time.

17 Do I judge your testimony to be different today
18 than at the time of the deposition?

19 A No.

20 Q Are you saying now that the "A" fault is connected
21 to -- what I will refer to as the "A" fault, is connected
22 both to the Cristianitos and the zone of deformation?

23 MR. CHANDLER: I will object to that, Mr. Chairman.
24 I think the question has already been asked and answered.
25 That is where we started off this line of questioning, and I

3 1 believe the witness has responded to that; they both did.

2 JUDGE KELLEY: I don't believe he has. At least
3 it is important enough that I would let him answer twice.

4 Please do.

5 WITNESS GREENE: It has been my understanding that
6 we are talking about the Cristianitos fault, per se, not the
7 Cristianitos zone of deformation. Is that correct? The
8 previous questionings that I have been answering have been
9 the Cristianitos fault, as I understand it.

10 And now, what we read here is something that deals
11 with the Cristianitos zone of deformation.

12 JUDGE KELLEY: Could you restate your last question,
13 Mr. Pigott?

14 MR. PIGOTT: Yes.

15 BY MR. PIGOTT:

16 Q We were discussing whether or not the Cristianitos,
17 as it is known traditionally onshore, continues offshore. Then
18 I read you some portion of the deposition, which I thought
19 was an indication from you that you did not consider you had
20 found anything in the offshore that you could relate to that
21 Cristianitos fault in, I will call it, its traditional sense.

22 Do I understand that that is still your testimony,
23 or are you now associating it with something else?

24 A I think the answer to clarify it, and my inter-
25 pretation would be, that we have not in the report identified

4

1 the Cristianitos fault, per se, as being offshore. If one
2 were to do this, the projection would line up with Features AA
3 that we discuss here, and that would be the closest relationship.

4 Q So you are saying that what is seen as the "A"
5 would be the closest thing to a projection of the traditional
6 Cristianitos fault?

7 A As the Cristianitos fault in the restricted sense,
8 yes.

9 Q And you are not here testifying that Fault A is
10 a continuation of the onshore Cristianitos fault?

11 A No, and we do not map that as such, either.

12 Q And further, simply for clarification of Page 38
13 of your deposition of that day, beginning at Line 5: Question:
14 Since you didn't do any onshore study, I would assume that
15 you have no comparison of that "A" feature with the Cristianitos
16 fault onshore; is that correct?

17 A That is correct. And, as I stated earlier in the
18 summary is that we did not compare the onshore features. I have
19 not worked onshore at all.

20 Q So we are still in the position then, after all
21 this, of a conclusion that with respect to the onshore
22 Cristianitos, you have not mapped it beyond the approximate
23 6,000 yards or meters that the Applicants have stated as
24 their offshore projection of that fault; is that correct?

25 A I think I answered that as being that we had no

5 1 evidence to support or dispute that.

2 Q Okay.

3 JUDGE KELLEY: This might be a good point for a
4 coffee break; it seems to be mid-morning. Could we take a
5 15-minute coffee break at this point?

6 (Recess.)

7 JUDGE KELLEY: We are back on the record, and
8 Mr. Pigott will resume his cross-examination.

9 MR. PIGOTT: Thank you.

10 BY MR. PIGOTT:

11 Q Dr. Kennedy, do you have your deposition in front
12 of you?

13 A (WITNESS KENNEDY) Yes, I do.

14 MR. CHANDLER: Dr. Kennedy, could I ask you to
15 speak up, please?

16 (WITNESS KENNEDY) Yes.

17 BY MR. PIGOTT:

18 Q Let me refer to Page 48, starting on Line 2. Let
19 me read that.

20 Question: Which raises another question in my
21 mind, which is this "A" zone. What is that? Is that a part
22 of what has been called the Cristianitos zone of deformation?
23 And now I am referring to a series of either folds or faults,
24 and again, it is within a number of question marks, but it
25 is lying somewhat eastward of the line we were just discussing.

6 1 Answer: Well, the fault that is labeled "A" on
2 that map is the shoreward boundary of the broad zone of
3 deformation, which includes fold "G" on the shoreward side
4 of what we have called the Cristianitos zone of deformation.

5 Question: So you consider this a portion of the
6 Cristianitos zone of deformation?

7 Answer: That is right. I would like to refer
8 back to the report, to be certain whether or not, in its
9 broadest sense, that is right.

10 Question: Fine, take your time. Do so off the
11 record.

12 Answer: Okay. The answer to that would be no.
13 We did not include this in what is called the Cristianitos
14 zone of deformation, and I can refer to the third paragraph
15 of the initial report on Page -- well, as I have it, 5.

16 Then, I would have you refer to Page 87. Here
17 you were being questioned by Mr. Wharton, on Line 14:

18 Referring again to the map and what I believe we
19 have called the fault "A," or we have referred to it as that.

20 Answer: Yes.

21 Question: Okay. Looking at fault "A," how does
22 it -- or do the characteristics of fault "A" differ from,
23 say, what is designated as the zone of deformation? What
24 is the difference?

25 Mr. Pigott: Excuse me. Which zone of deformation?

7 1 Mr. Wharton: The Cristianitos zone of deformation.

2 WITNESS: Fault "A" is a fairly discontinuous
3 fault, but as you will look at it closely, it is made up of
4 many segments with many question marks, that while we feel it
5 is possibly an echelon fault that lies off to the east side
6 of the zone of deformation, it does not have a characteristic
7 as to the characteristics of the Cristianitos zone of deforma-
8 tion; it is a very different type of fault.

9 In large part, it is seen only on very deep
10 reflectors in what would be called part of the near-shore
11 section, and it does not come near the surface at all in its
12 tracing.

13 Do you recall giving those questions and answers
14 at that time, Dr. Kennedy?

15 A (WITNESS KENNEDY) Yes, I do.

16 Q And that is your position today?

17 A Yes.

18 Q Is it correct for us to conclude, therefore, that
19 the "A" fault, as we have seen it, is a part neither of the
20 Cristianitos zone of deformation or what we traditionally
21 call the onshore Cristianitos fault?

22 Whoever wants to answer.

23 A (WITNESS KENNEDY) I believe in both of our
24 statements here that we stated that we did not include this
25 in our report as the Cristianitos zone of deformation. If

8 1 you wanted to include that, and we left that as an open question,
2 then it would make the zone of deformation much wider.

3 Q But you have not done so in your testimony?

4 A We have not done so in our testimony.

5 Q Let me go over some background items.

6 Did either of you, as a part of this study, make
7 an investigation of the offshore stratigraphy?

8 A (WITNESS GREENE) I did not.

9 A (WITNESS KENNEDY) No.

10 Q Did either of you, as a part of this investigation,
11 do a study of the onshore structure and stratigraphy, including
12 the ages of the various structures?

13 A (WITNESS GREENE) I did no onshore work at all.

14 A (WITNESS KENNEDY) Nor did I.

15 Q Did either of you investigate the evolution of
16 the Cristianitos fault, its onshore traditional style?

17 A (WITNESS GREENE) I did not do any onshore work
18 at all, or look at any of the onshore data in relation to that.

19 A (WITNESS KENNEDY) I didn't, either.

20 Q Okay. And did either of you look at the evolution
21 of the Capistrano Embayment as a part of your study of this
22 area?

23 A (WITNESS KENNEDY) No.

24 JUDGE HAND: Mr. Pigott, where is the Capistrano
25 Embayment? What are its boundaries?

9 1 MR. PIGOTT: The Capistrano Embayment is the area
2 of -- let me see, I would have to go to Dr. Ehlig's testimony.
3 As I recall, it is the area offshore aligned with the
4 Cristianitos fault. It is the down-drop portion, in effect,
5 of the onshore Cristianitos fault. If you remember Dr. Ehlig's
6 testimony of the listric normal --

7 JUDGE HAND: Yes.

8 MR. PIGOTT: Okay. That was, I believe, if I
9 passed Dr. Ehlig's course, I believe that is the Capistrano
10 Embayment area.

11 MR. CHANDLER: I don't think Mr. Pigott has gotten
12 a good grade in Mr. Ehlig's course; he may have passed it.
13 I don't necessarily agree with his characterization of the
14 Embayment, and rather than Mr. Pigott testifying, perhaps
15 one of the witnesses could indicate if they have knowledge of
16 what Region the Capistrano Embayment includes. I think that
17 would be preferable.

18 MR. WHARTON: I was just going to say the same
19 thing, Mr. Chairman.

20 JUDGE KELLEY: Fine.

21 MR. PIGOTT: I would be much relieved if they can.

22 MR. WHARTON: I move to strike Mr. Pigott's
23 testimony as to the Capistrano Embayment.

24 BY MR. PIGOTT:

25 Q Let me ask then either Dr. Greene or Dr. Kennedy:

1 Are you familiar with the region known as the Capistrano
2 Embayment?

3 A (WITNESS KENNEDY) Only in a very small scale or
4 gross sense.

5 Q But could you give us just a general description
6 of its -- I believe what we are looking for is its geographic
7 extent, where it would lie.

8 A It seems to me, to get something accurate on this,
9 we should go back and look at the description that Perry Ehlig
10 made, rather than to ask us. We both have, I think, stated
11 clearly that we haven't worked on the onshore part.

12 Q Fine.

13 MR. PIGOTT: Could I give you a reference at a later
14 time to Dr. Ehlig's testimony, Dr. Hand?

15 JUDGE HAND: Yes. I got lost geographically; that
16 is all.

17 MR. CHANDLER: I think, Dr. Hand, I would agree
18 with Mr. Pigott's characterization certainly that it is generally
19 north of the Cristianitos.

20 BY MR. PIGOTT:

21 Q Did either of you, Dr. Greene or Dr. Kennedy, do
22 any investigation to determine whether, what you have called
23 the Cristianitos zone of deformation, extends onshore, and
24 is expressed, for instance, in the seacliffs?

25 MR. CHANDLER: Mr. Chairman, we are getting mighty

1 repetitious at this point. I think that both Drs. Greene and
2 Kennedy very clearly delineated on numerous occasions the
3 extent of their efforts, and that is expressed in the reports
4 that are before the Board.

5 JUDGE KELLEY: Well, I will just ask Mr. Pigott
6 to wind up this line of questioning with another question or two.

7 MR. PIGOTT: Yes, I will be. Thank you.

8 Could I have an answer?

9 WITNESS KENNEDY: Please repeat the question.

10 BY MR. PIGOTT:

11 Q Whether you studied the onshore area, including
12 the sea-shore cliffs, to determine whether or not the -- what
13 you have referred to as the CZD extends onshore?

14 A (WITNESS GREENE) I have done no work onshore.

15 Q And that goes, I think, the same for you, does it
16 not?

17 A (WITNESS KENNEDY) That is correct.

18 Q Okay. Did either of you do a study or an evalua-
19 tion with respect to the capability of the Cristianitos zone
20 of deformation?

21 A (WITNESS GREENE) No.

22 A (WITNESS KENNEDY) No.

23 Q Let me move on then to another line of questioning.

24 JUDGE KELLEY: Is it fair to say that it was really
25 a mapping that you did?

1 WITNESS GREENE: Yes. It was mainly producing
2 the geometry of the structure.

3 BY MR. PIGOTT:

4 Q Let me make a correction for the record. I referred,
5 I believe, to Applicant's position, that Cristianitos fault
6 did not extend over a distance of 6,000, and I have the wrong
7 measure. It is 6,000 feet. That is Applicant's position.
8 I am sure you understood it that way when I was asking the
9 question.

10 A (Witness Greene) Yes, I understand it to be
11 6,000 feet.

12
13 /////

6rpl

1 Q Getting precisely to what you have described
2 as the Cristianitos Zone of Deformation, over the recess
3 we did set up an overhead and I believe that accurately
4 depicts Plate 1 from the SER.

5 Would you just take a second to be sure in your
6 own mind it's a faithful reproduction.

7 A It appears to be such.

8 Q I think it's easier if we can work from that
9 overhead.

10 MR. CHANDLER: Mr. Pigott, if I may ask for the
11 source of that map. It appears to be somewhat different than
12 the map that does appear in the Safety Evaluation Report.
13 I'd like just to assure that it is, in fact, the one that
14 bears the date of September, 1980.

15 MR. PIGOTT: I believe it is. It is supposed
16 to be.

17 MR. WHARTON: Mr. Chairman, I go along with
18 Mr. Chandler's objection there. I think we need further
19 clarification of the map.

20 JUDGE KELLEY: Well, let's just get this
21 straightened out.

22 Let me ask this. Was this made just over the
23 break, the overlay that we're looking at now?

24 MR. PIGOTT: It wasn't made over the break, no.
25 It was made some period of time earlier.

1 JUDGE KELLEY: I see. Just looking at it,
2 the heart of it seems to be the same as what we call Plate 1
3 in the SER. There are some notations that seem to be a
4 little bit different at the bottom right corner. It isn't
5 set up the same way, so it's not, on its face, identical
6 in terms of -- the bottom right legend may be irrelevant.
7 I'm just pointing out that it's not the same in Plate 1.

8 MR. PIGOTT: No.

9 JUDGE KELLEY: Does there appear to be in any
10 respect -- I think it is useful to have this if we're going
11 to talk about it in detail.

12 Could the witnesses take a closer look, take
13 a minute or so, and look at your Plate 1 and see whether
14 you see whether Plate 1 and that overlay appear to differ
15 in any material respect? The parties may do likewise.

16 MR. CHANDLER: Mr. Pigott, would it be possible
17 to use Plate 1 as it appears on the easel there?

18 MR. PIGOTT: It would be possible. I thought
19 it was just a little bit easier and more graphic for
20 explanation purposes to have the larger, more easily read
21 document in front of the Board.

22 I would submit that the only difference is in
23 the legend, and that the mapping is certainly intended to be
24 and I believe is identical.

25 JUDGE KELLEY: Let me ask the witnesses whether

1 they see any material difference in the two.

2 WITNESS GREENE: Yes. It appears to be the
3 same map that's in this -- in our report. There are some
4 things missing. For instance the lower part of it is cut
5 off a little bit, but --

6 JUDGE KELLEY: The lower part and the right
7 part.

8 WITNESS GREENE: Yes.

9 JUDGE KELLEY: But let me ask you this.

10 The Applicants want to talk about the so-called
11 CZD. It shows the CZD; does it not?

12 WITNESS GREENE: Yes, it does.

13 JUDGE KELLEY: Does it omit any part of it
14 that's material to this discussion?

15 WITNESS GREENE: Not that I can see.

16 JUDGE KELLEY: Mr. Wharton, you took a closer
17 look. Do you have any specific objection to this?

18 MR. WHARTON: I have one more thing I want to
19 look at.

20 MR. CHANDLER: For the record, Mr. Chairman,
21 I haven't noted an objection. I just wish to assure that
22 it is in fact the most current and appropriate map to be
23 having reference to.

24 JUDGE KELLEY: I understand the objection, but
25 are you prepared to tell us right now in what respect it's

4
1 not?

2 MR. WHARTON: No, sir. As I say, I have not
3 made an objection.

4 JUDGE KELLEY: Oh, all right.

5 MR. WHARTON: I just wish to assure that it is
6 in fact --

7 JUDGE KELLEY: I misunderstood. I understand
8 now.

9 Mr. Wharton, any specific comment?

10 MR. WHARTON: Yes. I reviewed it. The only
11 thing that I have noted is some of the question marks on
12 this map appear to be on that map but we can't really make
13 them out as question marks. I would assume that that is
14 what they are.

15 Other than that, I can't find any substantial
16 differences.

17 JUDGE KELLEY: Well I think, for our purposes
18 of understanding questions, it will be useful, so let's
19 go ahead on that basis.

20 BY MR. FLOTT:

21 Q. Taking a look at what you have designated, the
22 Cristianitos Zone of Deformation -- hopefully for ease of
23 reference, I'm going to divide it into, only for purposes
24 of discussion and not geologically in any means, a northern
25 end and a southern end and the demarcation would be

5
1 approximately where FF Prime runs; okay?

2 A. (WITNESS GREENE) Okay.

3 Q. Looking at the northern portion of that zone --
4 well, first of all, would you describe what is seen in that
5 northern zone. Could you give us a general description.

6 A. I understand you to mean a general description
7 as far as the --

8 Q. Severity of the folds and faults, their general
9 characteristics.

10 A. Within the Cristianitos Zone of Deformation --

11 Q. Yes.

12 A. -- as we have mapped it?

13 Q. Yes.

14 A. Okay. In the northern zone -- and that would be
15 in the general region between Profiles BB Prime and Profile
16 FF Prime -- there are a series of discontinuous faults, some
17 well defined as shown by solid lines, some inferred as shown
18 by dashed lines, and others that are questionable or
19 questionably inferred that are shown with dashed lines with
20 queries.

21 JUDGE KELLEY: As long as we have this very
22 useful overlay up there, when you're talking about a piece
23 but not all of the zone, could you just show with your
24 finger or something what you're talking about?

25 WITNESS GREENE: Sure.

6
1 I'll repeat. I'm talking from line FF Prime
2 to Line BB Prime generally. I'm talking about discontinuous
3 faults shown here, which is in a solid line that refers to
4 a well defined or a good fault, if you have such thing as a
5 good fault.

6 We have two such faults in this area here. We
7 then have others that are inferred faults which are shown
8 at dashed lines and then we have those that we call
9 questionably inferred faults that are dashed lines with
10 queries in them.

11 The zone at such is marked by these little
12 wormy, wiggly designs which essentially means that we're
13 dealing in an area -- a zone that is distorted in the
14 seismic reflection profile. We're unable to really make
15 heads or shoulders out of the structures in that region.

16 Does that answer the question?

17 JUDGE KELLEY: I believe so.

18 BY MR. PIGOTT:

19 Q Moving from south to north, do the features
20 become -- south to north in a northern segment, if I can --
21 I only want you to look at that northern half right now.
22 We will get to the other part.

23 Could you describe what I'll call the level of
24 deformation or sense of deformation moving from south to
25 the north? Does it become more pronounced, less pronounced,

7
1 does it stay the same?

2 A. (WITNESS GREENE) I'm having trouble with the
3 level of deformation. I don't fully understand what is
4 meant by level of deformation.

5 Q. Is the deformation more severe or sharper towards
6 the area of FF Prime as compared to the area down at
7 BB Prime?

8 A. I have not looked at this in that framework as
9 far as severity.

10 Q. Well let me ask, then. Would this -- okay.
11 I'm sorry. Go ahead.

12 A. I think my problem is that I'm having a
13 difficult time understanding what is meant by severity in
14 a geologic term. I don't fully understand.

15 Q. What if I use the word "amplitude of the folds"?
16 Would that have meaning to you?

17 A. Yes. I can deal with amplitude.

18 Q. Okay. Could you compare the amplitude of the
19 folds at the area of FF Prime as to where they are reflected
20 at BB Prime?

21 A. No, I can't. I can't based on this map because
22 we did not map folds in that relationship as far as
23 amplitude is concerned.

24 Q. Would it be of geologic significance to you in
25 examining zones such as we have displayed here that the

8

1 amplitude becomes less and less and perhaps almost dies out
2 towards one end or the other of the structure?

3 A. I don't think so. I don't know how I would
4 use amplitude in that relationship.

5 Q. Would it not be an indication that perhaps the
6 zone or the feature is in fact dying out?

7 A. No. The problem with amplitude and anything
8 that deals in that type of situation is reflected in
9 lithology as well. In other words, what is the ductility
10 of the rocks you're dealing with? Do you have changes in
11 ductility? We're getting then involved in stratigraphy,
12 we're getting involved in rock mechanics, and I'm not able
13 to answer that. I'm just not a rock mechanic and I don't
14 know the stratigraphy that well there. I'm sorry.

15 Q. So you haven't examined it from this aspect is
16 the short answer.

17 A. That's correct.

18 Q. This area that I've called the northern portion
19 of your zone, do you understand that to be a newly-mapped
20 feature or is that something that has been known for some
21 period of time? Do you know?

22 A. Well I can only speak for us and what I can say
23 is that we have -- this is new to us because we have mapped
24 -- and I'm speaking about the detail that we have mapped.
25 This is the first time that we have mapped this region in

9

1 that detail.

2 Q It has been mapped though, has it not, along
3 with the -- it has been mapped and, in fact, the same
4 features shown in previous maps.

5 MR. CHANDLER: Is that a statement, Mr. Pigott,
6 or a question?

7 MR. PIGOTT: All right. Let me turn it into
8 a question. I'm sorry.

9 MR. WHARTON: Mr. Chairman, may I interrupt for
10 just one second here for clarification.

11 This is Mr. Chandler's witness. I'm wondering
12 if I have the rights to object to the form of the question
13 or whatever since he's not my witness. I would like the
14 opportunity to do that but I don't want to jump in on
15 Mr. Chandler since he is his witness.

16 JUDGE KELLEY: Yes. Mr. Chandler, what is
17 the practice on this point?

18 MR. CHANDLER: Generally I think such objections
19 are permitted.

20 JUDGE KELLEY: It seems, if sparingly done, okay.

21 MR. WHARTON: I don't intend to do it very often.

22 MR. CHANDLER: I think, Mr. Chairman, in view
23 of the sort of tripartite nature of the proceeding, each
24 of the parties has sort of an interest in the record and
25 the development of an appropriate record, and I think for

10 1 that reason such objections generally are entertained.

2 JUDGE KELLEY: Of course, in this case we do
3 have Mr. Wharton calling these very same people as his own
4 witnesses, so he has got every opportunity to develop his
5 own record.

6 MR. CHANDLER: Certainly.

7 JUDGE KELLEY: On an extremely sparing basis,
8 okay.

9 BY MR. PIGOTT:

10 Q. A part of your investigation involved review
11 of the marine advisors' work; did it not?

12 A. That's correct.

13 MR. PIGOTT: Because of the order of proof,
14 ordinarily we would have had Dr. Moore preceding these
15 witnesses and therefore some items -- the authenticity of
16 which would be sponsored by Dr. Moore -- I had planned to
17 use in the cross-examination or the examination of
18 Drs. Greene and Kennedy. So I would ask that there be
19 another overlay put on this display right now which depicts
20 earlier work done by marine advisors back in approximately
21 1970, putting on what they call an E-Fault.

22 BY MR. PIGOTT:

23 Q. Are you familiar with that interpretation?

24 MR. WHARTON: Mr. Chairman, I'm going to use
25 one of my sparing objections and object at this particular

11 1 time.

2 One, I don't believe this particular overlay
3 has been given to the witness prior to testimony nor to
4 attorneys for the witnesses.

5 Two, we don't have any foundation laid for using
6 this particular document and he appears to be presenting
7 this particular overlay for the truth of what's in it for
8 cross-examination.

9 JUDGE KELLEY: This overlay reflects the result
10 of some prior study?

11 MR. PIGOTT: 1970 Marine Advisors' Study,
12 which is in the -- if not the FSAR, certainly the PSAR.
13 It's in this record.

14 JUDGE KELLEY: Would it be your anticipation
15 that, when you do have Dr. Moore as a witness, he would
16 vouch for this and would put it in as evidence?

17 MR. PIGOTT: Yes, sir.

18 JUDGE KELLEY: I think then that, in view of
19 the change in the order, it's reasonable for Mr. Pigott
20 to use this overlay.

21 We've been pulling out Bolsa Island reports and
22 other things throughout and using them for cross-examination
23 and there's no reason why these witnesses can't look at
24 this overlay, take a little time to study it before they
25 answer and be cross-examined on the basis of it in the

12 1 Board's view.

2 o the objection is overruled.

3 BY MR. PIGOTT:

4 Q. Either Dr. Greene or Dr. Kennedy, in the course
5 of your examination of the marine advisors' work, did you
6 become aware or were you familiar with this particular
7 interpretation?

8 A. (WITNESS GREENE) No.

9 A. (WITNESS KENNEDY) I have seen this interpre-
10 tation.

11 Q. Okay. Without going into a great deal of
12 detail, would it be correct to say that the two more or
13 less confirm each other as to the presence of some kind of
14 an area of disturbance or faulting or folding?

15 A. (WITNESS KENNEDY) I think more or less they do.

16 Q. Okay. I believe you stated that, when you did
17 this study, you did not do a detailed examination of the
18 lithography or the stratigraphy of the area.

19 Have you examined the testimony that has been
20 placed in evidence by Dr. Moore or to be submitted into
21 the record by Dr. Moore in this proceeding?

22 A. (WITNESS GREENE) Yeah, I've seen the data that
23 was put in by Dr. Moore.

24 MR. CHANDLER: I'd like to make sure the witness
25 clearly understood that question because the response came

13 1 back a little different than the question went out.

2 MR. PIGOTT: Well I'll ask that we put on the
3 screen DGM-H and I'll just very briefly ask the witnesses
4 if they have examined this particular figure which is from
5 Dr. Moore's testimony.

6 BY MR. PIGOTT:

7 Q Are you familiar with this, either of you?

8 A (WITNESS GREENE) I've seen those figures. I've
9 not studied them in great detail.

10 Q Then you're not in a position to confirm, for
11 instance, whether or not the blue depicted on that overlay
12 is Monterey or any other type of formation?

13 A No, I'm not. It's very difficult to look at an
14 interpretation like that and be able to substantiate or --

15 Q Okay. Nor have you looked at such depictions
16 for purposes of answering the question of whether or not
17 the amplitude varies from -- well as it moves to the north;
18 is that correct?

19 A We have done no amplitude studies that you have
20 outlined.

21 /////

22

23

24

25

7

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

Q Let me direct your attention now to what I will call the southern extent of what you have referred to as the Cristianitos zone of deformation, and that would be the area lying south of -- I guess FF Prime is the demarcation point we took earlier, which is to the right of the map that is shown as Plate 1, and what we have up on the screen.

Could you contrast for us or compare, if that is possible, the level of, I will say "significance;" I am sure there should be a better word; the strength of the showing of the features in that area to the south of FF Prime, down to GG Prime, shown as the Cristianitos zone of deformation.

Q Could you characterize those folds and faults for us?

A The portion of the map, the southern part of the zone of deformation that we are talking about, going from Profile FF Prime to Profile GG Prime, is shown primarily by two more continuous strands, I can say, but a narrower zone than we have described to the north.

This is made up of both inferred faults, which are shown along this section that is half on -- or half of it is north of GG Prime, and the other half of it is south of GG Prime, and a portion that is called questionably inferred maps, as well as an inferred fault to the north, which has at least three queries on it, making that a questionably inferred zone.

1 The center of it again, with the little wiggly,
2 the wormy pattern, denotes a zone of incoherency, a zone
3 where we can't peg out structures, per se. This is primarily
4 based on, and better defined by, the Nekton data that we
5 looked at later on.

6 Q Could you perhaps give us an answer in terms of
7 severity or degree of deformation between what I will call
8 the south end and the north end? Is it fair to say that the
9 north end is more severely deformed than the south end, as a
10 general statement?

11 A Again, I am having difficulties dealing in severity.

12 Q Well, just simply degree of deformation.

13 A The statement that I can say about that zone is
14 that it is much narrower in that locality, and perhaps not
15 as complex structurally.

16 A (WITNESS KENNEDY) I think I would like to add to
17 that that the acoustic character of the fractured portion of
18 the zone is very similar in nature along the entire length
19 that we have mapped it. We can't determine whether the
20 acoustic character is more complex, therefore more fractured
21 in certain areas than others.

22 Q If we were to look at Nekton Line 30, which would
23 be on your Plate 2 --

24 MR. CHANDLER: Are we finished with Plate 1,
25 Mr. Pigott?

1 MR. PIGOTT: Probably not.

2 WITNESS GREENE: I am sorry, I can't find Nekton,
3 Line 30.

4 BY MR. PIGOTT:

5 Q Perhaps on your larger map behind you, it might
6 be easier.

7 JUDGE KELLEY: Can you give us a hint?

8 WITNESS GREENE: I need that hint.

9 BY MR. PIGOTT:

10 Q Okay. I hate to say it, but I think it is probably
11 plotted incorrectly on the maps that you have. I think, if
12 you take a look at your maps, you will find two Line 22's
13 and no Nekton 30. Nekton 30, I think, is the line that runs
14 furthest north, the northernmost line, and probably running
15 through about the same point as FF Prime.

16 A (WITNESS KENNEDY) It appears as though the
17 Nekton lines are increasing in multiples of two. It goes
18 22, 24, 26. So are you saying that the labeling is off along
19 the entire sequence?

20 Q That is my best speculation, starting with one
21 of the 22's.

22 A Okay.

23 MR. PIGOTT: Okay. I have now put on the Viewgraph
24 something entitled "Nekton 30," and again, because of the
25 order of proof, Mr. Chairman, I will ask that I be allowed to

1 tie in its validity at the time Dr. Moore takes the stand.

2 JUDGE KELLEY: Granted.

3 BY MR. PIGOTT:

4 Q Now, would either of you care to point out on
5 Nekton 30, assuming that you recognize it as being such, the
6 locations of -- let's see, first of all, the Cristianitos zone
7 of deformation.

8 If you consider this to be at all something that
9 you would like some time to examine and check any of your
10 own charts before answering these questions, I would wilfully
11 agree to that. I am not trying to ask you to interpret
12 profiles from the stand, brand new.

13 MR. CHANDLER: Mr. Chairman, I would like to
14 object until we have a little better identification from
15 Plate 2 of which line, indeed, is Nekton 30, assuming that
16 one of them is improperly labeled.

17 JUDGE KELLEY: Plate 2, Nekton 30, I still haven't
18 found. Let me put the question differently: What is Nekton 30
19 on that chart, I assume, is some line on Plate 2?

20 MR. PIGOTT: Yes, and let me try and explain even
21 further. I will put another chart up, all of which are
22 subject to being struck if I can't tie in their validity at
23 some point.

24 That is supposed to be an overlay of the track
25 lines in the area of interest against what has been marked on

1 the Kennedy and Greene plates as "data voids," and I will get
2 to it for that purpose at a later time.

3 MR. CHANDLER: Is this an exhibit, Mr. Pigott?

4 MR. PIGOTT: It will be.

5 BY MR. PIGOTT:

6 Q Dr. Kennedy, can you perhaps identify there what
7 would be Nekton, Line 30?

8 A (WITNESS KENNEDY) You would like me to point to
9 that?

10 Q Yes, if you would.

11 A It appears as though you are speaking of this line
12 beginning here, with 30.

13 Q And is there enough information on that map for
14 you to generally describe where that line with respect to the
15 CZD?

16 A No, I don't believe there is enough information
17 on that map.

18 Q Okay. Do you recall having examined Nekton, Line 30?

19 A I certainly believe we did.

20 A (WITNESS GREENE) May I add something?

21 Q Certainly.

22 A This disturbs me a lot. I will tell you why.
23 First of all, the maps that we used, of course, came straight
24 from the Applicant, and if we are looking at a drafting error
25 as far as 22 and 30 are concerned, it is now -- let me back up.

1 We are looking at a profile that, if it has been
2 shifted, it is difficult from memory to say yes, indeed, that
3 that profile exists, and yes, indeed, that profile exists
4 where you have shown it. Without us looking at the original
5 map, it is difficult for us to answer that.

6 And, in the same token, it is difficult to place
7 a structure, or anything else, on that profile, or on that map,
8 based on a shift pattern, if you like.

9 MR. PIGOTT: Well, Mr. Chairman, as I said earlier,
10 I certainly have no intention of putting these gentlemen in
11 any kind of a deposition status. It has been our belief,
12 and certainly our intent, to work with all the same data. It
13 would appear that there may have been some drafting errors
14 between what is depicted in one exhibit and another --

15 MR. WHARTON: Mr. Chairman, I object to that.

16 JUDGE KELLEY: Let Mr. Pigott finish, please.

17 MR. PIGOTT: I would ask that we be allowed to
18 take a short recess to confer with the witnesses to get this
19 data straight. I just don't see any reason to fill the
20 record with this kind of a discussion when I think it is a
21 matter of some experts getting together and understanding
22 what the references are.

23 JUDGE KELLEY: I think it is important that at
24 least everyone agree on what it is we are looking at, and on
25 that basis, why don't we take a 10-minute recess; no more than

1 that. It is 11:30. At 20 of 12:00 we will resume.

2 (Recess.)

3 JUDGE KELLEY: Back on the record.

4 We took a short recess in order for Counsel and
5 the witnesses to confer and to straighten out some apparent
6 discrepancies in data, and I understand that we have made some
7 progress in that regard, and we are now ready to resume.

8 MR. CHANDLER: Before getting any further response
9 from the witnesses, if they could clarify the nature of the
10 problem that we have addressed, I think it will be helpful
11 for the record.

12 JUDGE KELLEY: Yes. Please go ahead. If you could
13 just comment on what the problem was, and that you solved it,
14 if you did.

15 WITNESS KENNEDY: I feel that we have solved it.
16 The fact that a second Line 22 was drafted, that if that 22
17 is removed and all the numbers are moved sequentially to the
18 south and the 30 is added onto the last line, we have the
19 right information.

20 And I could further point out that it is certain
21 that the initial investigation of each line is very closely
22 connected to shot points, so that if you had the wrong line
23 and you were looking at a profile of a different number,
24 they wouldn't compare, based on shot point information.

25 So it is strictly a drafting error on the plate

1 that is shown here on the screen.

2 MR. CHANDLER: Dr. Kennedy, so that we are very
3 clear on that, it is only drafting with respect to the numbering
4 of the lines, not the lines, themselves?

5 WITNESS KENNEDY: That is correct.

6 MR. CHANDLER: So that, in your review, you did
7 indeed look at Line 30, which Mr. Pigott has made reference to?

8 WITNESS KENNEDY: That is correct.

9 JUDGE KELLEY: Why don't we go back to the examina-
10 tion.

11 MR. PIGOTT: Thank you.

12 BY MR. PIGOTT:

13 Q Now, without asking for exact precision, would
14 either of you please show in the visual of Plate 1 where it
15 is that Nekton 30 approximately would lie? We just want to
16 get a range. We will get perhaps more exact.

17 I would suggest you should probably use both
18 Plate 1 and Plate 2.

19 A (WITNESS GREENE) Yes. Both plates are of the same
20 scale, and generally, what you would do is just lay Plate 1
21 over Plate 2, and you could find the locality instantly.

22 MR. CHANDLER: Perhaps Mr. Pigott has such an
23 overlay which might facilitate this.

24 MR. PIGOTT: I wish I did, Mr. Chandler, but
25 it didn't come out exact enough to do that. The scale between

1 the two of them is just different enough --

2 WITNESS KENNEDY: To show the position of that line
3 would have to be very approximate.

4 MR. PIGOTT: Okay, very approximate.

5 WITNESS KENNEDY: That is going to be impossible,
6 too, using the screen example. We use this example because
7 we have the same scale.

8 BY MR. PIGOTT:

9 Q Fine. Why don't you go to your large map.

10 A Okay. Line 30 is approximately in the same area
11 as Profile G.

12 Q Okay. So it would be going approximately through
13 what I would call the southern end of the southern portion of
14 what has been called the Cristianitos zone of deformation; is
15 that correct?

16 A Again, in a very approximate sense.

17 Q Thank you. And I will now put up the overlay of
18 the various track lines, and if you can find 30 there, would
19 that correspond approximately with the description -- again,
20 being approximate -- with the approximate location you have
21 just given us?

22 A I assume that that is correct. The plotting of
23 Line 30 should be the same on both maps.

24 Q The next overlay, I believe, is a seismic profile
25 of Nekton 30, and I believe with one particular shotpoint

1 placed at the top of the legend, that being 20 there, do
2 you recognize that as a part of the Nekton data, subject to
3 further, specific identification?

4 A It is difficult for me to say. When you have a
5 series of profiles from more than a half a dozen surveys, I
6 can't tell you, based on this, what profile we are looking at.
7 I mean, I would have to assume that what you are showing me is
8 correct. And I see a shotpoint up there, only a single shot-
9 point, which looks like 120, rather than 20, and I am a bit
10 confused whether this is a profile that we should identify
11 or not; let me put it that way.

12 Q Let me ask you just the bottom-line question: From
13 that profile, can you identify any of the features that we
14 have been talking about this morning, i. e., the OZD, the
15 CZD, or anything else?

16 MR. CHANDLER: Mr. Chairman, I would like to
17 object to that. I think, in the presentation given by
18 Dr. Moore, in his very good explanation, I think, of the
19 complexity of dealing with such profiles, I think it would be
20 completely unreasonable to ask these witnesses sitting on
21 the stand to look at that and try to make identification of
22 any structures.

23 MR. PIGOTT: If I might respond, Mr. Chairman,
24 I think, surely, we have gone through sufficient foundation
25 and background to show that we are dealing with a seismic

1 profile that has been examined as a part of this witness'
2 examination. I think that we have rather laboriously identi-
3 fied its general location, although, because of draftsman
4 errors and because of slight changes in scale from map to
5 map, we perhaps don't have a pinpoint precision, and given
6 that Applicants will provide the appropriate foundation for
7 this particular seismic profile at the time its witness is
8 called in the order of proof, I would think that with that
9 much identification, with that much narrowing of the area to
10 be examined, that surely we can test the ability of these
11 witnesses to identify something with respect to the structures
12 that we are supposed to be examining here.

13 MR. CHANDLER: Mr. Chairman, my problem is that,
14 in response to the prior question, Dr. Greene clearly indicated
15 that he couldn't be certain just what this was. I mean, he
16 didn't express any particular reservation that this may, in
17 fact, be one of the multitude of shotpoints that he has
18 examined, and I have no reason to doubt that, in fact, he has
19 examined it, but I think, as Dr. Moore himself explained in
20 his explanation to the Board, it is quite a complex under-
21 taking to go through a profile, especially one which is taken
22 somewhat out of context in the midst of cross-examination.

23 MR. WHARTON: Mr. Chairman, may I make one comment?

24 It would seem to me that the whole context of the
25 question right now is so unclear as for the witness to not be

1 able to answer it, as presented, as he has already indicated.
2 He really doesn't have all the information he needs to answer
3 the kind of question that is being asked about it.

4 JUDGE KELLEY: Well, I think it has been a difficult
5 process to lead up to this question, and we have all partici-
6 pated in it. That may go to the significance or weight to
7 be given to the answer, one way or the other.

8 But the question is, can you identify this as
9 depicting something in the OZD, or anyplace we have talked
10 about? I am roughly paraphrasing, and I think the witness
11 can say he doesn't know, or he can make an identification.

12 So would you attempt and answer it as best you can?

13 BY MR. FIGOTT:

14 Q Again, if you have the question in mind.

15 A I think, the one way we can clarify this is, when
16 you work with this type of acoustic information, that you
17 need to develop . fence diagram-type relationship or holo-
18 graph-type thing, if you would like; three-dimensional
19 pictures.

20 You can't take one profile and magically pick one
21 piece of information off of it. If you have several profiles
22 and you see a trend, you can put this thing together as a
23 matter of following from line to line.

24 Secondly, that if you will note where I have shown
25 the profile to approximately lie, that in that part of the CZD,

1 there are question marks, there are dash lines, and there
2 are lines that do not clearly depict all of the features that
3 we have shown.

4 And I would like to say that on this particular
5 profile, it doesn't represent one of the best, by any means,
6 that we have in this area.

7 ////////

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

8rpl

1 Q Assuming again that this is a profile of the
2 area in question, does it not at least point out that the
3 so-called structures we're dealing with are extremely small
4 in their sense of deformation?

5 A (WITNESS GREENE) I have difficulty in
6 understanding what is meant by "small" in the scale of what
7 we're dealing with here.

8 Q All right. Let's assume that, instead of
9 looking at something in the area of the Cristianitos -- the
10 CZD and you're out in the area of Coronado Banks fault,
11 would we be having any problems seeing whether or not there
12 were breaks in the stratigraphy or wouldn't they just leap
13 out at you?

14 A Okay. The difficulty in answering that question
15 is that there is a variable -- the criteria that you use is
16 variable.

17 First of all, if you deal with a fault, you need
18 to have an understanding for the lithology perhaps --
19 the acoustical lithology, I should say. Some faults would
20 appear better defined, for instance, if they juxtaposed
21 differing lithologies, whereas those that are in the same
22 type of strata do not come booming out to you as well as
23 others.

24 When we discuss things as vertical displacement
25 and lateral displacement -- there are different ramifications

1 to consider when we talk about comparing faults or saying
2 one fault is larger or smaller than others.

3 So what we're dealing with in a seismic
4 reflection profile is basically an apparent fault on a
5 single profile. We're dealing with an apparent fault, an
6 apparent displacement.

7 So I'm having difficulty in answering the question
8 in the sense that I just cannot answer it as one is smaller
9 or bigger than the other. I just can't do that.

10 Do you have anything to add to that, Mike?
11 I'm sorry.

12 A. (WITNESS KENNEDY) No. I think it's been
13 adequately put.

14 Q. Can you determine from what we have on the
15 screen whether or not there is any faulting at the surface?

16 A. (WITNESS GREENE) Well I understand you to
17 ask -- you're asking me for an interpretation of this
18 profile and it's very difficult to interpret a profile
19 that's sitting on a screen such as this.

20 There is one inherent problem with a profile
21 like this. The profile has a very wide bubble pulse in it
22 and, without sitting down and comparing this with other
23 profiles, looking at it in different angles, it's
24 difficult -- even doing some processing perhaps, it's
25 difficult to make that statement. So I cannot make that

1 statement sitting here and looking at that profile.

2 Q That becomes even more difficult when you're
3 dealing with small structures; does it not?

4 A Not necessarily, no.

5 Q Why not?

6 A (WITNESS KENNEDY) I think it gets to a point
7 of scale when you say "smaller structure". Certainly if
8 you get down to the micro scale you're not going to see
9 something that you see on a macro scale, but I think what
10 Gary meant by that but --

11 Well maybe you ought to clarify what you mean
12 by "small" and "large". The San Andreas versus some micro-
13 structure is obviously the answer to your question.

14 Q Let's stay offshore, San Clemente versus the
15 Cristianitos Zone of Deformation. You've examined the
16 profiles of the San Clemente fault offshore, have you not,
17 both of you?

18 A Certainly.

19 A (WITNESS GREENE) Yes.

20 Q Okay. Now if you had a cross-section or a
21 profile of the San Clemente fault, would you have any
22 difficulty pointing out the break?

23 A (WITNESS KENNEDY) I would say on many profiles,
24 just as you mentioned the Coronado Bank fault, yes. When you
25 put a number of these profiles together, you're talking about

4
1 a fault the size of the San Clemente fault in the area
2 where the escarpment is a second in depth in the water
3 column; certainly that's a greater feature than what we're
4 seeing here. If that's the answer you want, then, yes.

5 Q. So what we're seeing here, if anything, are
6 small features; is that correct?

7 A. (WITNESS GREENE) Well I have something to add
8 onto this. Is your question: Is it more difficult to
9 identify smaller features than bigger features?

10 In the context that you're using, the
11 San Clemente fault, let's say, to some fault not quite that
12 length and with that much displacement, I'm not sure that
13 a smaller feature is easier or less easy to identify.
14 Perhaps it may be better to identify. It depends upon the
15 complexity of the structure. A large feature could have a
16 lot of distortion and a lot of what we call acoustical hash
17 or acoustical inconsistencies to it that it makes it more
18 difficult for us to define properly; whereas a smaller
19 feature may not have that.

20 I can't really deal with smallness and bigness
21 in this sense because of the complexity of different
22 structures. And you can have complex small structures and
23 you can have complex big structures.

24 Q. Well in the area that we're talking about now,
25 the southern end of the -- what I'm calling the southern end

5
1 of your Cristianitos Zone of Deformation, you had trouble
2 finding any feature; didn't you?

3 MR. CHANDLER: Objection, Mr. Chairman. I
4 think these witnesses have responded on numerous occasions
5 regarding this particular profile, that they have indicated
6 an inability to work from a single, isolated profile or
7 a portion thereof and come to any conclusion, whether it's
8 large or small, what it represents and what it may not
9 represent.

10 JUDGE KELLEY: I don't think the last question
11 had anything to do with this overlay, unless I misheard it.

12 I do think that we've just about worked the
13 overlay to the extent that it ought to be worked.

14 But I think the last question is proper.

15 BY MR. PIGOTT:

16 Q. Do you have it in mind?

17 A. (WITNESS KENNEDY) I'd like to add that Gary's
18 initial remark that, when you're dealing with different rock
19 types and you're dealing with different slip patterns on
20 faults, it compounds this problem. A strike-slip fault
21 within the same rock type say within the Monterey Formation,
22 within the Capistrano Formation, a much larger fault might
23 be more difficult to observe than say a very small fault
24 that juxtaposes the San Onofre to the Monterey or
25 Capistrano.

6
1 So I think our answer really is that you can't
2 simply state that one fault is, as you used the term,
3 larger or smaller simply by looking at a single reflection
4 profile such as this.

5 Q Thank you, Dr. Kennedy.

6 But getting past that point now and on to the
7 next one, looking at the area that we've informally defined
8 as the southern end of your Cristianitos Zone of
9 Deformation, is it not correct that you had difficulty
10 finding any real structure in that area?

11 A (WITNESS GREENE) I think the map shows our
12 difficulties. We talk about inferred faults and questionably
13 inferred faults and I think we'll stand behind that as what
14 we looked at there.

15 Q Dr. Greene, as a matter of fact, we went into
16 this, as I recall, at your deposition and perhaps we can
17 short-circuit some lengthy questioning if I simply read
18 from your deposition where we talked about this.

19 I would direct your attention to Page 38 of
20 the deposition of Dr. Greene, and, commencing at Line No. 11,
21 I believe I am doing the questioning at this point.

22 "Question: 'Now as I look at what has been
23 marked as the Cristianitos Zone of Deformation, especially
24 at its south eastward extent of shock .150 on line GG, I
25 notice the presence of a number of question marks. Can you

7
1 give us the significance of the question marks of those
2 locations?'"

3 If I might interrupt the quotation there.

4 Dr. Greene, you would understand that to be
5 what we have discussed as being the southern extent of the
6 Cristianitos Zone of Deformation; would it not?

7 A. Yes, that's what I understand.

8 Q. Okay. Continuing then at Line 17:

9 "Answer: 'I'm going to put my finger on where
10 I think the question mark you're referring to (indicating) --

11 "Question: 'That's correct.'

12 "Answer: 'Yes. The reasons for question marks
13 there is that we have no line crossing that particular
14 segment and it may or may not continue that far. We have
15 no information there to continue it.'

16 "Question: 'As you go northwest on that same
17 structure, there are more question marks.'

18 "Answer: 'That's right. This relates upon
19 the interpretation of the seismic reflection profile. The
20 fault is an inferred fault from the interpretations in the
21 seismic reflection profile.'

22 "Question: 'Even though you looked at the
23 seismic reflection profiles, you were not able to
24 definitively see a fault that matched from line to line as
25 you are moving north or south.'

8

1 "Answer: 'At that point where the question
2 mark is placed (indicating), the profile shows some
3 distortion. That may or may not be a fault. Yes.'

4 "Question: 'You mean the question mark means
5 that not only is there a question whether you can associate
6 it with something on an adjacent line, there is also a
7 question as to whether or not it is even a fault?'

8 "Answer: 'There -- well, yes. What I am
9 stating in the profile is it's a questionable fault. The
10 feature that we have mapped is a questionable feature.'

11 "Question: 'What could it be if it is not a
12 fault?'

13 "Answer: 'It could be several different things.
14 It could be something incorporated within the sediment that
15 distort the records at that point. It could be a tight fold
16 among other things. It could be instrumental, which I have
17 thrown out.'

18 "Question: 'Why would you throw out the
19 instrumental possibility?'

20 "Answer: 'Not being involved in the collection
21 of data, I am unable to tell what instrumentally is going
22 on. However, there are certain criteria that you use in
23 establishing instrumental problems and one of these things
24 that you see we call a glitch that continues completely
25 through the profile including the purely ins. tal

9
1 reflectors that you get at the top of the profile and any
2 noise that may exist at the bottom of the profile.'

3 "Question: 'Where you have question marks,
4 does the question mark apply only to the geographic space
5 between the mapped structures?'

6 "Answer: 'The question marks on the end of
7 a geologic structure indicate it's questionable about its
8 length, how far one way it has gone. Question marks that
9 are generally found in this case in the center indicate
10 that that is an interpretational question. We are
11 confident about the location but not confident about the
12 structure itself that we have interpreted.'

13 "Question: 'Okay. As I look along the main -- the
14 most predominant of the map structures, I see numerous -- a
15 number of question marks in the middle of the map structures
16 and on the ends as well as the middle of one of the other
17 structures.'

18 "Answer: 'That's correct.'

19 "Question: 'I don't mean to belittle or demean
20 it, but if one was to go to the other end of the spectrum,
21 is it possible that what we have here is a zone of
22 distortions?'

23 "Answer: 'In the true seismic reflection
24 methodology, you are correct because what we are looking at
25 in a seismic reflection profile is an acoustical profile.

10

1 However, how we correlate faults -- and I don't know if you
2 want to get into this type of dissertation -- but how we
3 correlate faults is that we look at a combination of
4 features, and I have described it in the initial part of
5 our paper. We are able then look for various sets of
6 criteria, for instance disturbance, for instance other
7 structures that are associated with that disturbance, and
8 come up and correlate these features together.

9 "Now if in a locality we see several, we have
10 profiles that for one reason or another do not show the
11 structure as well as their adjoining profiles, we will
12 question that location. If they correlate, well, then we
13 draw the line connecting these profiles and we will question
14 then that locality that we felt the record did not exhibit
15 the fault in a well-defined manner.'

16 "Question: 'It would appear then that -- and I
17 am trying to put some interpretation on what I am hearing.
18 In this Cristianitos Zone of Deformation, we have certain
19 well defined -- or there are certainly some disturbances
20 that are easily located and certainly recognize, when you
21 look at the seismic profiles, but would appear to be
22 still a level of uncertainty, first of all, as to whether
23 these disturbances are in fact faults or some other
24 structure; is that correct?'

25 "Answer: 'That's correct.'"

11

1 JUDGE KELLEY: Let me just interrupt and ask
2 a question, Mr. Pigott.

3 Are you coming to a point where you would then
4 say -- and would you say the same thing today or words to
5 that effect --

6 MR. PIGOTT: I just came to that point.

7 JUDGE KELLEY: Good. I was wondering how much
8 you were expecting them to remember, but okay.

9 MR. PIGOTT: I believe they are reading along.

10 JUDGE KELLEY: All right.

11 BY MR. PIGOTT:

12 Q With the end of that quotation, which was on
13 Line 23, which is in the middle of one of your answers but
14 I don't believe I distort the answer by ending it there, if
15 you were asked those questions today, does that still state
16 your position?

17 A (WITNESS GREENE) Okay. I'm understanding
18 you're asking me several questions here or you're asking me
19 one question?

20 Q I'm asking you one question. Would you change
21 what you said at the time of your deposition where I read
22 between then and now?

23 A No, I would not.

24 MR. PIGOTT: We are now coming to an area that
25 is a bit of a change of pace and I would suspect about

DARON GRABERLE TONO

12 1 another 15 minutes or so would not be the end of the exami-
2 nation. This may be an appropriate spot for the break.

3 JUDGE KELLEY: Okay. Let's just consider for
4 a moment where we are. The suggestion was made that, along
5 with the usual lunch hour, I might afford Mr. Wharton
6 enough time to be ready for his direct of these witnesses.

7 It looks like you're moving right along pretty
8 well, Mr. Pigott.

9 Is it realistic from this perspective to think
10 then that we will get to Mr. Wharton's direct? I would
11 think so.

12 MR. PIGOTT: I would suspect I will finish my
13 cross before the first afternoon break.

14 JUDGE KELLEY: Okay.

15 MR. CHANDLER: I think then the question becomes
16 how much cross Mr. Wharton may have.

17 MR. WHARTON: I would like some time at lunch
18 time to get ready for direct.

19 JUDGE KELLEY: Can you give me some indication
20 about Mr. Chandler's question, though? You would have
21 cross and then you would have direct, as I understand it;
22 right?

23 MR. WHARTON: Yes, that's correct.

24 JUDGE KELLEY: Do you think you would be ready
25 to go to your direct in mid-afternoon?

13

1 MR. WHARTON: I think Mr. Barlow could probably
2 go the afternoon, as a matter of fact. He probably could
3 go the whole afternoon on cross-examination.

4 MR. PIGOTT: Mr. Chairman, if I might make a
5 suggestion.

6 JUDGE KELLEY: Wait a minute now. Now you're
7 saying that Mr. Barlow will go all afternoon and you won't
8 get to your direct?

9 MR. WHARTON: I don't think so. I don't think
10 we will.

11 MR. PIGOTT: Mr. Chairman, I would ask that,
12 when I have concluded my cross-examination, which I
13 estimate to be before the noon break, sometime before we
14 conclude today, so that at least I will have the benefit
15 of knowing what the direct examination is, that Intervenors
16 complete their direct examination of these witnesses and
17 we would pick up tomorrow with whatever cross-examination
18 -- whether it's cross-examination at this level of their
19 direct or cross-examination of their further direct on
20 being called under subpoena.

21 JUDGE KELLEY: Any other comment?

22 MR. WHARTON: I might point out that Mr. Pigott
23 does have the deposition of Dr. Kennedy and the areas that
24 we're going to cover, I believe, are in the deposition, so
25 it's not like he has not had an opportunity to review that.

14

1 I'd still ask for the direct on the record.

2 JUDGE KELLEY: Mr. Barlow and Mr. Wharton, too,
3 perhaps, do you see, in important respects, that the
4 position and testimony of these witnesses is really at odds
5 with your position?

6 MR. WHARTON: I think we would like to go into
7 cross-examination for more clarification of Dr. Greene's
8 and Dr. Kennedy's positions since it is important to our
9 position. We would like to go into it in much more detail,
10 not as an adversary --

11 JUDGE KELLEY: Yes. I didn't see them, quite
12 frankly, as adversary and I was therefore sort of surprised
13 that it would take you that long to cross-examine.

14 MR. WHARTON: There are many things that we
15 would like to get into that they have direct knowledge of
16 and their findings have implications that we would like to
17 get into.

18 JUDGE KELLEY: But is this cross or direct?

19 MR. WHARTON: This would be on cross-examination
20 of -- I believe it would be appropriate to do it on cross-
21 examination since they're called as Mr. Chandler's
22 witnesses. Our direct examination doesn't have to do with
23 Cristianitos Zone of Deformation or the significance of
24 that particular feature but rather the southerly extension
25 of the Rose Canyon fault.

15

1 JUDGE KELLEY: Let me inquire again of the
2 witnesses' availability. I've heard this once before but
3 can you remind me?

4 Do you both have a problem tomorrow or just one
5 of you?

6 MR. CHANDLER: Mr. Chairman, if I may for one
7 second. I believe that Mr. Wharton, first of all, has only
8 subpoenaed Dr. Kennedy.

9 MR. WHARTON: That's correct.

10 JUDGE KELLEY: All right. That simplifies
11 that question.

12 You indicated that, yes, you could be here
13 tomorrow but you would have to do some fancy schedule
14 juggling; is that about right?

15 WITNESS KENNEDY: That's correct, yes. Some
16 things that have been on my calendar for a good period of
17 time and, once I juggle one, that means juggling others.
18 It would be most inconvenient.

19 JUDGE KELLEY: Where do you live?

20 WITNESS KENNEDY: I live in North San Diego
21 County.

22 JUDGE KELLEY: So you're in this area.

23 WITNESS KENNEDY: I'm in this area.

24 JUDGE KELLEY: And when are you putting to sea
25 again?

16
1 WITNESS KENNEDY: Actually, the sea time isn't
2 until next month. This has to do with a personal situation
3 and an airplane ticket to Houston over a busy holiday
4 weekend. I'm not sure that I can even reschedule.

5 JUDGE KELLEY: Well, in the normal course of
6 events, as to your direct, your direct doesn't start till
7 next week; does it?

8 MR. WHARTON: That's correct, Mr. Chairman.
9 It doesn't start until we've finished this and probably
10 after the break.

11 JUDGE KELLEY: Mr. Kennedy, if you had your
12 preferences, would you rather be here tomorrow or be here
13 next week or is that even worse?

14 WITNESS KENNEDY: Yes, later really gets worse.
15 Tomorrow would be my preference over the two.

16 JUDGE KELLEY: All right.

17 MR. EISENBERG: Can we get a time frame in terms
18 of how long he's going to be here tomorrow, a half day or
19 a full day?

20 MR. WHARTON: I would anticipate not more than
21 a half a day. I anticipate our part would be probably about
22 an hour and a half to two hours; maximum of two hours and
23 more like an hour and a half.

24 MR. CHANDLER: Well, Mr. Chairman, perhaps
25 another solution may be if we took a somewhat extended

17 1 luncheon recess and direct could be prepared, perhaps we
2 could be more productive sitting a little later this evening.

3 JUDGE KELLEY: Yes, I've thought about that.

4 MR. WHARTON: I just want to point out that
5 it is our -- I believe our choice of how we want to put on
6 direct examination. I'm just trying to be as accommodating
7 as possible and that it fits in with what we have to do
8 also.

9 As I say, our direct case does not start for
10 another week and a half.

11 I would simply ask that you accommodate us just
12 a half a morning tomorrow morning to do -- this afternoon,
13 I believe, is going to be long. We'll be in a situation
14 where we'll be preparing over lunch time quickly, we'll be
15 going along and then we'll be going very late. I think that
16 it's just a little bit too much to ask in one day.

17 MR. PIGOTT: I again object to this dilly-dallying
18 and delaying of the putting on of the direct. I think that
19 intervenors should be in a position to at least ask their
20 direct questions which have been subject to being prepared
21 for months and perhaps even years.

22 MR. BARLOW. Your Honor, what I --

23 JUDGE KELLEY: Okay. I think we've heard
24 about enough.

25 We'll take an hour and a half.

18

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

Mr. Wharton, I want you to be prepared to put your direct on today. I'm not sure if we'll get there or not, but we will consider this among ourselves and spell out clearly after lunch what we're going to try to do today.

And, with that, it is about a quarter after 12:00. We will take an hour and a half lunch break. We will resume here at a quarter of 2:00.

(Whereupon, at 12:15 p.m., the hearing was recessed for the lunch period, to resume that same day, Monday, June 29, 1981, at 1:45 p.m.)

- - -

1 JUDGE KELLEY: Back on the record. We talked
2 earlier about the possibility of going into the evening this
3 evening, in order to cover certain pieces of ground. We've
4 looked into that, and unfortunately have discovered that this
5 particular room has been devoted to another purpose this even-
6 ing involving several hundred people, and that we are being
7 asked to vacate it promptly at 5:00 so that they can set up
8 for that. Now, we did have the -- I'll mention the option of
9 going upstairs to the tower, but there's so much table moving
10 and wire laying and mike carrying involved in going up there
11 and back down here, that it seems to be not a terribly happy
12 option. We would have taken a kind of a long lunch today and
13 quit at 5:00; we are prepared to begin in the morning at 8:00
14 to make up an hour, if that's agreeable with counsel and
15 others. So, I'll mention this again at the end of the day,
16 but we're going to have to quit here at 5:00 and for the rea-
17 sons stated, and so that's what we'll have in mind. Well,
18 we'll see.

19 I want to mention something that I've given a
20 little more thought over the noon hour, Mr. Barlow, with re-
21 gard to the Carstens' cross-examination of these witnesses.
22 As I understood you, you don't really view their direct posi-
23 tion on this question as hostile or inconsistent to you, but
24 you saw cross as an opportunity to go into greater detail, in
25 effect building up your direct case. Is that a fair statement?

2

1 MR. BARLOW: Yes, that would be a fair statement.

2 JUDGE KELLEY: Okay, I must say that it raises a
3 few questions in my mind about propriety. Normally, cross-
4 examination is directed to a hostile witness in an effort to
5 undercut the positions the witness is taking --

6 MR. BARLOW: Mr. Chairman, may I add one thing,
7 if I may, before you make a determination. I state that we
8 don't have strong disagreements; we don't have disagreements
9 with Mr. Green, Dr. Green and Dr. Kennedy. I think that for
10 the purpose of the full record that one way or the other that
11 all of their testimony be brought to this particular board so
12 that you understand all of it and get a full view of all of it.
13 The Staff has resisted our subpoenaing Dr. Green, and it was
14 our understanding that we could engage in questions of Dr.
15 Green and would make a full record on the issue of the possi-
16 ble connection of the CZD and the OZD, and I think that's
17 appropriate under the circumstances of this case; there's no
18 other opportunity for us to elicit other information from
19 Dr. Green than through this method itself.

20 MR. CHANDLER: Mr. Chairman, it is --

21 JUDGE KELLY: I had a few comments in addition
22 that I let Mr. Wharton come in, and I want to make a couple
23 of other points about this. I might just make a general ob-
24 servation that it's very common to say that intervenor
25 groups with slim or very little resources very often make

3

1 their "case" through cross-examination, but I believe that
2 normally means against hostile witnesses and not against wit-
3 nesses that are essentially either supportive or not inconsis-
4 tent with the intervenor's case. Now I wasn't aware, quite
5 frankly, perhaps I forgot, I wanted to mention I know you sub-
6 poenaed Dr. Kennedy; I didn't recall about Dr. Green. You
7 haven't subpoenaed him; I know that. I don't recall -- did
8 you apply for a subpoena?

9 MR. BARLOW: No, we did not.

10 JUDGE KELLEY: But this was because of, I'll turn
11 to Mr. Chandler, negative indications from the Staff as to
12 his availability? Is that fair --

13 MR. CHANDLER: Mr. Chairman, we indicated to Mr.
14 Wharton that Dr. Green would be available for cross-examin-
15 tion. He is, as we have indicated previously I've indicated
16 certainly to Mr. Wharton--I would consider Dr. Green to be an
17 equivalent of a Staff employee, that is to say, as I've ex-
18 plained with respect to Dr. Luco, a consultant to the Staff
19 with respect to his review of San Onofre 2 and 3, and certain-
20 ly I think it would be highly inappropriate to have issued a
21 subpoena calling for the testimony of Dr. Green. What's even
22 more important, however --

23 JUDGE KELLEY: I'm certainly not suggesting we
24 should issue subpoenas where we don't have to --

25 MR. CHANDLER: -- but I think it was absurd. You

4

1 know, it's completely unfounded, Mr. Chairman, to suggest that
2 the Staff has taken any great efforts to dissuade Mr. Wharton
3 from seeking a subpoena. We have indicated our perfect will-
4 ingness to have Dr. Green available. Indeed, he sits on the
5 stand now, and to suggest otherwise is simply without basis.

6 JUDGE KELLEY: Okay, so I think that -- let's pass
7 on beyond that, I mean that the history of all that, I'm sure
8 you both are telling me your view of the world and --

9 MR. WHARTON: Sir, Mr. Barlow --

10 JUDGE KELLEY: Just a moment, Mr. Wharton. The
11 other point that I want to raise, and then I'd be happy to
12 hear from all three counsel: what frankly troubles me about
13 cross-examination to make a direct case is that it seems to
14 me that it can get us--either get us into endless cycles of
15 direct and cross or it can distort what we normally try to
16 get at through the normal rules of direct, followed by cross,
17 followed by re-direct possibly, because Mr. Pigott here this
18 morning on behalf of the applicants has had, and is still in
19 the process of, a cross-examination of the witnesses, and
20 without really characterizing, I think that in certain res-
21 pects their position is not entirely consistent with his, and
22 so he's exploring that; and then he finishes and says, "I'm
23 through with my cross-examination." Then we have you, Mr.
24 Barlow, come along and in effect get them testifying for some
25 other longer period of time into matters that weren't in their

5

1 prior testimony, I assume, and then what do we do? Do we go
2 back to Mr. Pigott for more cross? I quite frankly wouldn't
3 want to, but I'm a little concerned about where this is leav-
4 ing us, and those are my concerns. Why don't you go ahead,
5 Mr. Wharton, if you want to speak to some of them, then I'll
6 get to the other people.

7 MR. WHARTON: After hearing the Chairman's com-
8 ments, I think what we're trying to do is we are trying to
9 accommodate both the schedules of Mr. Green -- Dr. Green, and
10 Dr. Kennedy. I think in light of what the Board has just said
11 that it would be appropriate that we would re-schedule-- and
12 since there are problems with tomorrow, we re-schedule and
13 set them up for our case in chief, put them on as our direct
14 case, and that would be the extent of it. I mean if we --
15 if there are problems with this, I propose then that we have
16 Dr. Kennedy on July 8 and Dr. Green, based upon his availa-
17 bility, as direct witnesses for the intervenors, and we will
18 go through the subpoena process for Dr. Green, and try to work
19 his schedule with the schedule we have, which I'm sure would
20 cause another motion to quash the subpoena; but I understand
21 what you're saying, and I think it is a very good point.

22 All we're trying to do is accommodate these par-
23 ticular witnesses; I thought we could get the evidence on that
24 way, and it does cause some problems, so that's what I would
25 suggest, and I would make a motion on the part of the

6

1 intervenors that Dr. Green and Dr. Kennedy be intervenors'
2 witnesses in their direct part of their case when that starts.

3 JUDGE KELLEY: Well, I'll pass on the motion
4 until -- until I've heard from the other counsel. Mr. Pigott,
5 would you like to comment on this whole problem area?

6 MR. PIGOTT: Yes. I find it very disturbing to
7 reach these kinds of arguments at this stage of the proceed-
8 ings. It's not like as if this has been thrust upon the inter-
9 venors in any sense. These are two gentlemen who have been
10 known to be an integral part of what they see as their case
11 for some good period of time going back to when the reports
12 first were published back in 1980, and I would oppose Mr.
13 Wharton's motions for adding Dr. Green especially to his wit-
14 ness list and asking for a subpoena to have him scheduled at
15 some later date. I think that -- I am willing to suspend my
16 cross-examination at this time in order that intervenors do
17 whatever direct examination they want of Mr. Kennedy and get
18 it on the record and then let us pick up the cross-examination
19 of the direct after that and I will attempt to weave in all
20 cross-examination at that time in the hopes of disposing of
21 both witnesses, either late this afternoon if we're lucky, or
22 tomorrow morning at worst.

23 JUDGE KELLEY: Do you have any comment on the con-
24 cern I raised about cross-examination that it is not hostile
25 in the usual sense building up further testimony?

7 1 Well, I think you understood what I --

2 MR. PIGOTT: I think that would be obviated if
3 the intervenors were required to do their direct right now
4 and I would just roll it in for all of my cross and they would
5 then have one more shot and that would only be at the areas
6 that they're not calling upon the witnesses for further direct,
7 in other words with respect to their prepared testimony. And
8 I of course ask for perhaps re-cross, depending upon what
9 comes out, but I would pledge to be as limited on that as
10 possible.

11 JUDGE KELLEY: Mr. Chandler:

12 MR. CHANDLER: I just wanted to make sure I under-
13 stood Mr. Pigott. Is your suggestion that at this point
14 Dr. Kennedy be called for purposes of obtaining his direct
15 testimony on those matters intervenors wish to elicit informa-
16 tion on?

17 MR. PIGOTT: Yes.

18 MR. CHANDLER: Followed by resumption of your
19 cross on both the direct case of the Staff on this issue as
20 well as on the direct presentation by the intervenors?

21 MR. PIGOTT: Yes, with the one caveat that, if
22 intervenors went too far, it may require me to look at the record
23 over the night to finish the cross-examination with respect
24 to the added direct, but it would be my intent and my attempt
25 to wrap up all cross-examination at the earliest possible time.

8

1 JUDGE KELLEY: Let me go back. The purpose of
2 this prolonged lunch hour was, among other things, to give you
3 a chance to get your direct ready for Mr. Kennedy. Correct?

4 MR. WHARTON: That's correct; I think we had an
5 hour and a half.

6 JUDGE KELLEY: And do you feel prepared at this
7 point to do this?

8 MR. WHARTON: Not fully, no, I do not. There are
9 various maps that I need to go over with Mr. Barlow before I
10 can give the direct testimony and I haven't been able to go
11 over those particular maps -- not these maps; they're separate
12 maps. They are separate maps that would form a part of our
13 direct case. We haven't had a chance to do those.

14 MR. CHANDLER: Mr. Chairman, I --

15 JUDGE KELLEY: Just a moment, please. These maps --
16 are these new maps or old maps?

17 MR. WHARTON: They're new maps. What are the
18 dates of those? They're 1980 maps --

19 JUDGE KELLEY: But they've been in the possession
20 of you and Mr. Barlow for some time.

21 MR. WHARTON: Mr. Barlow informs me he got them
22 yesterday from Scripps; how long they were actually available
23 I do not know personally.

24 JUDGE KELLEY: One would assume that if they are
25 '80 maps, they've been available in '81. We've known for how

9

1 long these two gentlemen were going to be here today as
2 witnesses?

3 MR. CHANDLER: We indicated some time in early
4 June with finality; I indicated as early as February 20 that
5 these individuals would be called as Staff witnesses. I would
6 also point out that certainly with respect to the direct tes-
7 timony of Dr. Kennedy by Mr. Wharton that again with some cer-
8 tainty, I think for the first time with certainty, in his fil-
9 ing of approximately June 5, he advised the Board and parties
10 of his intention to call Dr. Kennedy. I'm somewhat amazed to
11 find ourselves on June 29 with no firmed-up idea of a direct
12 presentation. He professes, by the way, yesterday to have indicated
13 some many months ago his intention to call Dr. Kennedy. I
14 believe that was part of his earlier argument --

15 JUDGE KELLEY: But I think I've heard almost
16 enough argument on this. Mr. Wharton, do you have one more
17 point to make?

18 MR. WHARTON: Yes, I just wanted to point out
19 that this was an accommodation. We intended to call Dr.
20 Kennedy as our direct witness. That was our intent from the
21 beginning. We had declared Dr. Green as a witness for us in
22 our Interrogatories back some eight months ago, so there's no
23 real question about that. We were trying to do this
24 as an accommodation to Dr. Green and Dr. Kennedy, and all we're
25 asking right now is some accommodation as far as the chance to

10

1 do the direct. It was our understanding that we would be go-
2 ing into this, have full chance for cross-examination of the
3 Staff witness, and that will be the extent of our involvement
4 in this particular part of it. We will cross-examine the
5 issue of the Cristianitos zone of deformation and then be able
6 to put Dr. Kennedy on as our witness; and there was no set
7 time when he would be put on as our witness. It was my under-
8 standing that that would be a time of our choosing and to
9 accommodate as best we could Dr. Kennedy. That's the posi-
10 tion we're in right now. I believe we're entitled to full
11 cross-examination of the Staff's witness and to present direct
12 testimony from Dr. Kennedy, preferably with our direct case;
13 but if we have to do it sooner than that, we can do it.

14 JUDGE KELLEY: I might just add -- and I really
15 think that we've just about beaten this one to death, and I'm
16 prepared to make a ruling on it, but I might just add that I
17 don't know whether the Staff would have objected to a subpoena
18 by Mr. Kennedy; you indicated earlier that you wouldn't; but
19 it still seems to me to be pertinent. And if I've ever seen a
20 case lack of exceptional circumstances it's in this one.
21 These two witnesses came in and said they wrote this document,
22 they wrote it together, they agreed with each other, and it
23 was a totally collegial product. That is to say, one of these
24 gentlemen or the other can testify at least about the
25 part that was put in the Staff's direct case without any need

11

1 at all, it seems to me, for the other. That I think has a
2 bearing on this overall situation. It's been clear for some
3 time that these two gentlemen, at least one of them, was limi-
4 ted in his availability, Dr. Kennedy. They're here; they're
5 here today, and they'd like to get on with it. I think that
6 the applicant's motion under these circumstances is a sensible
7 one, and under that approach, we would have the direct presen-
8 tation at this time by the intervenors of witness Kennedy,
9 right? Okay. The witness Kennedy, and followed by resumption
10 of cross by Mr. Pigott, followed by cross by the intervenors.
11 Did I state that correctly?

12 MR. CHANDLER: I believe so. We've got the two
13 pieces here.

14 JUDGE KELLEY: Then you would have cross, I take
15 it, of the direct part --

16 MR. CHANDLER: A limited re-direct, I would --

17 JUDGE KELLEY: All right --

18 MR. CHANDLER: -- at the most.

19 JUDGE KELLY: It's a solution that wor't please
20 everybody, anybody, entirely, but I think it's sensible under
21 the circumstances, and so that's the way we will do it. I
22 will simply add one thing, Mr. Barlow. I still have reserva-
23 tions about producing in effect a direct case on cross, and
24 we'll see how this develops, but I may, if it seems to be
25 going on inordinately and in any sense with any unfairness

12

1 involved--I may have to put some restrictions on that.

2 MR. CHANDLER: Mr. Chairman --

3 JUDGE KELLEY: Yes --

4 MR. CHANDLER: -- since we will now commence the
5 direct case of intervenors' witness, Dr. Kennedy, I would ask
6 if Dr. Green may step down for the moment.

7 JUDGE KELLEY: Yes, I think so.

8 ///

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

1 MR. WHARTON: Mr. Chairman, I have, in anticipa-
2 tion of cross-examination -- I ran direct examination, asked
3 for certain copies to be sent down to the hearing this
4 afternoon, and they should -- I was anticipating they would
5 be here around three o'clock, if I can proceed, I have one
6 copy of the document, that I want to be able to go through.
7 The document itself is one, "Earthquakes and Other Perils of
8 San Diego Region," which I know for a fact the Applicants
9 had many copies of, and I believe the Staff does also.

10 JUDGE KELLEY: I know, that was referenced this
11 morning, I believe. I don't -- would anyone with extra copies
12 favor us with one?

13 MR. CHANDLER: Unfortunately the Staff does not
14 have extra copies, Mr. Chairman. As a matter of fact, I think
15 the witness has my only copy.

16 JUDGE KELLEY: You have got some more coming,
17 right?

18 MR. WHARTON: Yes, I have more coming, but it is
19 not going to be for about an hour.

20 JUDGE KELLEY: Are there several others in this
21 same category, or just --

22 MR. WHARTON: There is two copies that I need.
23 There are two articles written by Dr. Kennedy that I want
24 to refer to, and they are from -- both of them are from
25 Earthquakes and Other Perils, San Diego Region, which we

1 refer to as the green book in the depositions.

2 JUDGE KELLEY: Well, why don't you go ahead.

3 MR. PIGOTT: I do have a copy for the Board's
4 use during the --

5 JUDGE KELLEY: Thank you very much.

6 DIRECT EXAMINATION

7 BY MR. WHARTON:

8 Q Dr. Kennedy, I believe you have a copy of a
9 publication entitled "Earthquakes and Other Perils, San Diego
10 Region," edited by Patrick L. Abbott and William J. Elliott,
11 is that correct?

12 A (WITNESS KENNEDY) That is correct.

13 Q And referring to the index of that particular
14 publication, there is one publication called "Implications
15 of Fault Patterns of the Inner California Continental Border
16 Land Between San Pedro and San Diego," listed on page 21.

17 Did you participate in writing that particular
18 article?

19 A Yes, I did.

20 Q Would you state what your participation was in
21 writing that particular article?

22 A The article was written initially by the
23 principal author, and the other co-authors critically reviewed
24 both the map and the text and made input as they felt
25 necessary.

3
1 Q Did you participate in drawing this map found on
2 page 22?

3 A Yes, I was involved in various parts of that map.

4 Q Could you state which parts of this map you were
5 involved in? That is, on page 22.

6 A My responsibility lied mainly within the area of
7 the San Diego coastal margin, between the San Diego trough
8 and the coastline on the east, the Mexican Border on the south,
9 and the area of approximately Oceanside on the north.

10 Q Okay, thank you. Okay, on page 23 of the
11 publication there is a second paragraph, reads, the Newport-
12 Inglewood Rose Canyon fault zone, which extends offshore at
13 Newport Beach, appears to have influenced development of the
14 eastern slope of the Gulf of Santa Catalina physiographic
15 basin. The zone is defined at the surface by discontinuous
16 generally northwest-trending faults and folds, within
17 Tertiary and Quaternary strata.

18 These structural features form a discrete belt
19 that extends for at least 240 kilometers from near the Santa
20 Monica Mountains into Baja California.

21 Do you basically agree with that statement?

22 MR. FIGOTT: What is basically agree? Either he
23 agrees or doesn't agree.

24 BY MR. WHARTON:

25 Q Do you agree with that statement?

4 1 A (WITNESS KENNEDY) I would like to clarify it and
2 my statement by saying that in a very small-scale map, and
3 developing an academically-based model, yes, I do agree with
4 it. There is speculation involved.

5 Q You say there was speculation?

6 A There is speculation involved. This is a model.

7 Q What do you mean by speculation in your particular
8 profession?

9 A In developing a model of this sort, that there are
10 certain inferences made. These inferences can be projections
11 of faults where, say, closely spaced data sets are unavailable.

12 So, some of the inferences are by way of broad-
13 based correlations.

14 Q On the bottom of page 23, it states, the length,
15 trend, and character of these two major offshore fault zones,
16 okay, before I continue with this sentence, what are you
17 referring to in that sentence, "these two major offshore fault
18 zones?"

19 A Excuse me, I will have to go back and read the --

20 Q It refers back to the two that you discussed.

21 MR. CHANDLER: Mr. Chairman, I would like to note
22 an objection to that question. No foundation has been laid to
23 show any knowledge on the part of this witness of these
24 respective portions of the document. I think Dr. Kennedy
25 indicated his role in -- with respect to this document, and it

5 1 is not clear whether that role extended to, for example, the
2 quotation that Mr. Wharton just read.

3 MR. WHARTON: Mr. Chairman, I think we -- his name
4 is on the publication. I will go back and see if there is
5 any further foundation that we have to lay.

6 BY MR. WHARTON:

7 Q Dr. Kennedy, you assisted in writing this
8 particular article?

9 A (WITNESS KENNEDY) Yes, I assisted.

10 Q And you reviewed this particular article?

11 A Yes, I did.

12 Q Okay, and in the process of putting your name on
13 this particular article, are you attributing this article for
14 publication to yourself?

15 A Those parts that I am responsible for, yes.

16 Q Okay. Which parts in this particular article are
17 you not responsible for?

18 A I had mentioned previously that the area that
19 deals with the San Diego coastal margin, I am responsible
20 for segments of the Coronado Bank fault off San Diego, and the
21 area of the Rose Canyon fault zone offshore from San Diego.

22 Q Did you review the rest of the statements in
23 this particular article?

24 A Certainly did.

25 Q And did you find any disagreement with the other

1 statements in this article at the time that you had your ²²²⁴
2 name put on it as co-author of the article?

3 A Not major disagreements, but I would like to add
4 that there are parts of this area that I am not -- I have no
5 first-hand knowledge of, and of course the responsibility
6 then lies on the authors that worked in that area.

7 Q If I get to an area that you don't have any
8 first-hand knowledge of, that I ask you about, would you
9 please so indicate?

10 A Yes, I will.

11 Q Okay. Going back to that sentence again, the
12 length, trend and character of these two major offshore fault
13 zones are comparable to the Whittier-Elsinore and San Jacinto
14 fault zones offshore. Did you check to see if -- what this
15 sentence refers to as two major offshore fault zones?

16 A Well, I can't answer the question as to which two
17 fault zones are being referred to. The comparison with the
18 onshore faults I would not -- that was not part of my
19 responsibility.

20 Q Okay, there is a sentence here, short en
21 echelon second order faults are associated with each major
22 fault zone and commonly splay from the primary faults at
23 angles from 20 to 40 degrees. Do you agree with that
24 particular statement?

25 A In a general sense, I do agree with it. Again, in

7 1 the areas that I have worked along, specifically the one
2 fault near the San Diego coastal area, yes.

3 Q Okay, and what are you referring to -- could you
4 describe further what this means, that short en echelon
5 second order faults are associated with each major fault zone
6 and commonly splay from the primary faults at angles from
7 20 to 40 degrees, could you put in laymen's terms what that
8 means?

9 MR. CHANDLER: I am going to object, Mr. Chairman.
10 Once again, I don't think any foundation has been laid to show
11 that Dr. Kennedy in fact is responsible for this portion of
12 the document.

13 MR. WHARTON: Mr. Chairman, it is an article he
14 has assisted in writing. It is an article he has reviewed.
15 He can, I believe, give explanation of this particular
16 sentence and what it means. That is what I am asking for.

17 JUDGE HAND: I happened to look in the -- just
18 inside the cover of the first page, and it says this was
19 prepared for the Geological Society of America field trip by
20 the San Diego Association of Geologists. I don't understand
21 this. It sounds to me like it is kind of a pocket, quick
22 look at something, something for people who are very remote
23 and want some general feeling on. Is this -- are we dealing
24 here with hard science, or are we dealing with some kind of a
25 quick at something? What is the nature of this thing?

1 MR. WHARTON: I believe that the -- a witness²²²⁶
2 could probably testify to it.

3 JUDGE HAND: Would he make some comments for us,
4 because I simply don't understand.

5 WITNESS KENNEDY: I do agree that that is good
6 point. These papers were put together for the entire
7 Geological Society of America audience for a field trip, and
8 our contribution to this article is a generalized conceptual
9 model for the Southern California borderland as we saw it at
10 the time. We were not drawing any major conclusions in this
11 paper. It is a formerly unpublished paper.

12 JUDGE HAND: And when you say you were drawing a
13 model, am I to assume that like most models these days, there
14 is a lot of uncertainty in the model?

15 WITNESS KENNEDY: This map has been drawn, as you
16 can see, at a very small scale, and there is a lot of
17 speculation, as I tried to point out, in connecting major
18 faults in this model, to give the reader a feeling for the
19 position that we are -- were taking at the time of the writing
20 of the article, the position, and then you would say the
21 intermediate point of a lot of this research.

22 JUDGE HAND: And in view of the complicated and
23 important topic that we are faced with, is this a good place
24 for this Board to get data from to base an opinion on?

25 WITNESS KENNEDY: With respect to my own research,

9 1 I would say no, there are a lot of published papers on
2 faulting within the San Diego coastal region I have been
3 involved in that it seems to me would be far better informa-
4 tion to go to if my testimony is to be very specific.

5 JUDGE HAND: Mr. Wharton, then can you explain to
6 me why we are looking at this in view of what I just heard?

7 MR. WHARTON: Mr. Chairman, I haven't introduced
8 the document into evidence. There are certain statements made
9 in this particular document that I would like to discuss with
10 Dr. Kennedy, some of them -- one of the statements that I am
11 referring to right now, he has said he essentially agrees
12 with that particular statement. I would like an explanation
13 of it.

14 He can testify as to whether the statement is an
15 accurate statement or not an accurate statement. I am not
16 asking for the document to speak for itself. Dr. Kennedy is
17 here. Dr. Kennedy, as I said, he can agree or disagree. He
18 can say this is not part of what he did or he can say that it
19 is part of what he did.

20 It is an informational document I think will help
21 the Board to center on the evidence that we are trying to
22 elicit. For example, this last paragraph, if this particular
23 paragraph -- if he basically agrees with this paragraph, then
24 we would be looking at the possibility or it is an offer of
25 proof, does this -- does the Cristianitos zone of deformation

10

1 kind of formation agree with this particular statement.

2 Now, I am not offering this document at this time
3 for the truth of it as a fully authenticated document. I
4 think it is a good document to get Dr. Kennedy's thinking, and
5 he can testify to it. I am not using it to contradict
6 something.

7 JUDGE KELLEY: You know, we have had with other
8 witnesses so far these sort of brief overview statements. Now
9 here you don't have a witness with prepared testimony, but
10 I wondered if it wouldn't be helpful, really, to all of us,
11 if you could take a few minutes just yourself to indicate
12 what your objectives are, and what you expect to elicit from
13 the witness.

14 MR. WHARTON: The areas that I wanted to get into
15 were -- the first, which has already been testified to was
16 the statement as to the length and the nature of that
17 formation known as the Newport-Inglewood Rose Canyon fault
18 zone. I believe that this has already been gone through.

19 The paragraph that I am looking at right now,
20 looking towards the statement here where he is talking about
21 the Newport-Inglewood Rose Canyon fault zone, and there it
22 is stated that short en echelon second-order faults are
23 associated with each major fault zone, and commonly splay
24 from the primary fault that angles ~~from~~ 20 to 40 degrees.

25 The purpose of looking at this is to see as a

1 general proposition, is that the nature of these kinds of ²²²⁹
2 these particular faults, and that is Newport-Inglewood fault
3 zone does have the second-order faults which commonly splay
4 from the primary fault.

5 The purpose of that is after going through that,
6 to have Dr. Kennedy look at the map that he drew of the
7 Cristianitos zone of deformation and to see if the
8 Cristianitos zone of deformation, if mapped, generally falls
9 inside what was anticipated when he said that a second-order
10 fault, common -- it is splaying from a primary fault at an
11 angle of 20 to 40 degrees.

12 That will give us, I believe, some better
13 understanding of the nature of what the Cristianitos zone of
14 deformation is. What we know now is it is a feature, but we
15 haven't got any further indications of what it is.

16 Also, there is a statement in here regarding
17 whether or not there is an opinion stated here as to the --
18 that the offshore zones represent through-going right-slip
19 faults within the underlying basement rocks. This is as I
20 say a statement regarding this particular Newport-
21 Inglewood fault zone. Dr. Kennedy participated in writing
22 this, and I would like to elicit further from him whether
23 this statement is accurate to his knowledge, and whether it
24 is something that is evidence for the Board to consider, that
25 is, that it is a throughgoing right-slip fault.

1 And then, finally, to get the overall picture of
2 what the Newport-Inglewood fault zone is, there is a
3 statement here regarding in being part of the Catalina Block
4 and then to get some explanation of what the meaning of and
5 significance of it being part of the Catalina Block is.

6 The other testimony I am looking towards is
7 testimony in the other publication in this document, entitled
8 "Faulting Offshore San Diego and Northern Baja California,"
9 where there are statements in the article that the Rose Canyon
10 fault apparently merges with Vallecitos San Miguel fault zone
11 and possible connections other -- some other places to find
12 out any update that Dr. Kennedy may have as to -- as far as
13 the statement in this particular article, and I do believe
14 that he has testified that this is his area that he -- of
15 his expertise, checking -- find -- find out if we can get
16 any idea of if it does merge, how long the fault zone would
17 be, and then the significance of any connection, if there is
18 a connection, between the OZD or the Rose Canyon portion of
19 the OZD, with the Vallecitos-San Miguel, what significance
20 that would have, and then looking at the maps of Alba Blanca
21 and Rose Canyon, to see any possible connections, and any
22 further information he may have regarding the connections
23 between the Rose Canyon and the Alba Blanca or the Vallecitos
24 San Miguel fault, that is overview of what my direct
25 examination, I would like to get into.

12 1 MR. PIGOTT: Mr. Chairman, with the exception of
1 2 the latter subjects having to do with -- really falling within
3 the words "extent" or "length" of the OZD in Issue Number 4,
4 the other points that Mr. Wharton discusses would appear to
5 be no more than a second chance at cross-examining Dr. Kennedy
6 on the same matters that both Drs. Kennedy and Greene have
7 been put on the stand by the Staff.

8 This same article was glancingly referred to, I
9 think, by me in the cross-examination earlier this morning
10 as the first article that I guess got Kennedy and Greene into
11 this mess.

12 But I object to this examination, or further
13 examination of Dr. Kennedy, alone, with respect to the
14 Cristianitos zone of deformation and the OZD as it applies
15 in the area of San Onofre.

16 I had expected to hear further direct with respect
17 to the Mexican faults, the Vallecitos, Agua Blanca, et cetera,
18 and I think that is proper additional direct. I do not think
19 that the other areas are proper additional direct.

20 MR. WHARTON: Mr. Chairman, I am on direct. I
21 believe I have been told to go on direct a little earlier than
22 I thought. I believe, on direct, I can go where I want to,
23 as long as it is relevant to this particular case, and it is
24 certainly relevant to this case.

25 You have indicated you don't want me to go too far

2
1 on cross. I am at a loss on which way to go.

2 JUDGE KELLEY: My indication was to Mr. Barlow,
3 who told me he was going to develop his direct case on cross,
4 and that was what bothered me in that regard.

5 In any event, your primary focus here -- you told
6 me this morning, when I asked you what was the difference
7 between what was being done this morning and what you were
8 going to do on direct, was that you were going to focus on
9 the Rose Canyon and the southern end, basically.

10 MR. WHARTON: Well, it has to do with the total
11 length of the fault.

12 JUDGE KELLEY: Okay, but that was the focus, and
13 I believe that you made a distinction between the two.

14 In any event, at this stage, if you are down south,
15 so to speak, you don't have any overlap with the Cristianitos
16 up north, and we can see how things come out as and when you
17 get up there.

18 I think it would be premature, and now is not
19 the time for a ruling of any kind. I appreciate your over-
20 view list of questions, to give us some feel for where you
21 want to go.

22 And with that, why don't you go ahead.

23 BY MR. WHARTON:

24 Q I believe I had asked you whether you agreed
25 with the statement: "Short, en echelon, second-order faults

1 are associated with each major fault zone and commonly splayed
2 from the primary faults at angles from 20 to 40 degrees."

3 Do you have any disagreement with that particular
4 statement?

5 MR. CHANDLER: Mr. Chairman, I would just like to
6 note an objection to this form of questioning. I believe at
7 this point Dr. Kennedy is Mr. Wharton's witness, and while
8 I think we should have a little latitude with leading questions,
9 I think we have come to a point where we have exceeded that.

10 MR. WHARTON: Mr. Chairman, I could ask if he
11 agrees with everything here. This is the foundation for asking
12 other questions.

13 JUDGE KELLEY: I am going to overrule the objection
14 as leading. Some leading may be helpful here and, moreover,
15 leading questions aren't all that bad with a witness as
16 sophisticated as Mr. Kennedy is. So go ahead.

17 But I have a question, myself. The sentence
18 prior thereto talks of Whittier, Elsinore and San Jacinto.
19 Did I misunderstand that you had this 20 to 40 portion of
20 the next sentence referring to Newport and Inglewood?

21 MR. WHARTON: Yes.

22 JUDGE KELLEY: And how does that happen? Am I
23 misreading it?

24 MR. WHARTON: Well, the full sentence reads: "The
25 length, trend and character to these two major offshore fault

4 1 zones," and it refers to the offshore fault zones in this
2 article.

3 JUDGE KELLEY: Oh, are comparable to; all right.

4 MR. WHARTON: The two refer to Newport, Inglewood,
5 Rose Canyon fault zones and Palos Verdes.

6 JUDGE KELLEY: Fine. I misread it. Go ahead.

7 MR. WHARTON: Okay, and they are comparable to
8 these other faults.

9 JUDGE KELLEY: Yes.

10 BY MR. WHARTON:

11 Q I believe there was a question pending.

12 A Okay, and the answer to your question then is, if
13 I still remember it correctly, is that, again, I have to refer
14 to those faults that I have worked on. I can't refer to the
15 faults in the entire map; those faults immediately offshore
16 from the San Diego coastal area; for example, the Coronado
17 bank fault. They are splayned. They splay from one another,
18 reconnect in certain places, sometimes splay and stop in
19 very short amount of distances; sometimes lie en echelon
20 with one another; very, very complex pattern when you look
21 at these faults in detail.

22 So that statement for the faults that I have
23 worked on, these en echelon, second-order faults, are
24 associated with each major fault zone, I can't say, but with
25 respect to the Coronado bank fault and immediately offshore to

5 1 the Rose Canyon fault. There are splays, there are discontinuous
2 sections, and there are areas where these angles of 20 to 40
3 degrees do hold true.

4 Q The fact they are commonly splayed from primary
5 faults at angles from 20 to 40 degrees, is this particular
6 phenomena fairly common in these short, en echelon faults
7 that you are referring to, in general, without referring to
8 the ones you know particularly? In general, from your know-
9 ledge, is this a fairly common phenomena?

10 A As I think I just stated, these sorts of things
11 do occur, but a lot of other types of splays in discontinuities,
12 in short segments, also occur. So these are amongst the
13 characteristics that could be included in the faults I have
14 looked at immediately offshore from San Diego.

15 Q In looking at the map that you have done of the
16 Cristianitos zone deformation and its relationship to the
17 offshore zone of deformation, does the relationship of those
18 two features correspond to a short, en echelon, second-order
19 fault, splaying from a primary fault at angles from 20 to 40
20 degrees?

21 MR. CHANDLER: Mr. Chairman, I understood that we
22 were talking about the southern end of the OZD at this point
23 in time on direct. Somehow, we are back -- I am really not
24 sure where we are going on this.

25 MR. WHARTON: I would ask your indulgence.

6 1 In the process of preparing direct, at Noontime
2 I was reviewing this, and this came to me, and I think it is
3 a very important point, but I don't want to pursue it too long.

4 The question, as posed, I think it is an important
5 question, if he can answer.

6 MR. CHANDLER: Well, my point is very simple,
7 Mr. Chairman. We had available, and we will have available
8 again, Dr. Greene and Dr. Kennedy to discuss their report,
9 and I would presume cross-examination, even from Mr. Wharton,
10 may be appropriate on certain aspects of the CZD.

11 I understood that the scope of the direct of
12 Dr. Kennedy was going to focus on the Rose Canyon and south-
13 ward projections, if you will.

14 JUDGE KELLEY: Well, that was my understanding,
15 too. But if this is a particular question you want to put,
16 Mr. Wharton, we could argue about it longer than it will take
17 to ask it later. If this is a long line of questioning, that
18 may be different. If this is just a point you want to make,
19 then go ahead and make it.

20 BY MR. WHARTON:

21 Q Do you remember the question?

22 A Would you repeat it?

23 MR. WHARTON: Could we have the question read
24 back, please?

25 (The previous question was played back.)

1 MR. PIGOTT: Objection, on the grounds that the
2 question assumes a fact not in evidence; that is, that there
3 is a relationship between the Cristianitos zone of deformation,
4 as it has been styled, and the offshore zone of deformation.

5 JUDGE KELLEY: Do you want to recast your question
6 in hypothetical terms?

7 MR. WHARTON: I will re-read the question.

8 BY MR. WHARTON:

9 Q Looking at the map, as prepared by Greene and
10 Kennedy, and which is an exhibit in this case --

11 QUESTION: Is that Plate 1?

12 MR. WHARTON: I believe it is Plate 1 to the SER?

13 BY MR. WHARTON:

14 Q Looking at the configuration of the Cristianitos
15 zone of deformation and the offshore zone of deformation
16 and their angles from each other, can you compare whether or
17 not those features as shown in your map correspond to what
18 you refer to here as short, second-order faults, which
19 commonly splay from the primary fault and angles from 20 to 40
20 degrees?

21 A I don't feel that I know enough about the area
22 that is reflected on Plate 1 with respect to that intersection
23 to really be able to relate that particular kind of relationship,
24 second-order, to what I have seen, let's say, in the Coronado
25 bank fault, where I have done a great deal more work and have

1 been able to see the relationships in far more detail.

2 Q From your review of the Cristianitos -- the map
3 that you drew, and from your understanding of that particular
4 paragraph, is it possible that the Cristianitos zone of
5 deformation is a second-order fault which is splaying from
6 the offshore zone of deformation?

7 MR. PIGOTT: I object, as calling for speculation.

8 MR. WHARTON: I will rephrase the question.

9 BY MR. WHARTON:

10 Q In answering the previous question, do you have
11 the ability to form an opinion as to whether or not it is
12 a second-order fault which splays from a primary fault?

13 A No, I wouldn't want to say that.

14 Q Can you form any opinion about that, whatsoever?

15 A No, I really can't. I don't know enough about the
16 age relationships in the area of the Cristianitos.

17 Q What information would you need to know to be
18 able to make that determination?

19 A In the case of the Cristianitos, I am not really
20 certain.

21 Q That is, the CZD, you don't know what you would
22 need to make that determination?

23 A No.

24 MR. CHANDLER: Dr. Kennedy, could you speak up
25 when you answer?

1 WITNESS KENNEDY: Yes, I will try.

2 MR. CHANDLER: Thank you.

3 BY MR. WHARTON:

4 Q Okay. Would you describe the off-shore extensions
5 of the Rose Canyon fault zone as mapped in your map sheets 40
6 and 42? Do you have those map sheets with you?

7 JUDGE KELLEY: Are you in the SER?

8 MR. WHARTON: No, this is a separate map that I
9 believe has been done by Dr. Kennedy.

10 WITNESS KENNEDY: Yes, I do have those with me.

11 JUDGE KELLEY: Could you identify them a little
12 more specifically?

13 MR. WHARTON: Yes.

14 MR. PIGOTT: Are the other parties to be afforded
15 copies of this map?

16 MR. WHARTON: This is the only map that I have
17 available. I am not putting the map in as evidence; I am just
18 asking him to review and to explain how he mapped these
19 particular features.

20 MR. PIGOTT: I am going to object to examination
21 of private documents between you and the witness.

22 JUDGE KELLEY: Let me just interject. This is
23 something Mr. Wharton brought up earlier. I don't know if
24 you heard it. He has some extra copies of various things
25 coming down. They are not here yet. The first one was the

1 Green Book. So, at that point, I said, "Well, let's go
2 ahead," and then we found some more Green Books.

3 Maybe we have run into a problem with the map.

4 That is the only one we have got now, right?

5 MR. WHARTON: That is correct.

6 May I have about a 15-minute break to review this
7 and see where the copies are that I am supposed to be getting?

8 JUDGE KELLEY: Well, we haven't been working very
9 long.

10 MR. WHARTON: I have.

11 JUDGE KELLEY: This day is going to disappear on
12 us, I am afraid, without much getting done.

13 MR. CHANDLER: Mr. Chairman, the Staff does have
14 a copy of the map, I believe the same map. If the Applicants
15 may somehow -- perhaps we can move forward.

16 MR. PIGOTT: "Somehow" what?

17 MR. CHANDLER: Move forward, somehow.

18 JUDGE KELLEY: Mr. Kennedy, you have got one, right?

19 WITNESS KENNEDY: Yes, I do.

20 JUDGE KELLEY: So we are short two, as a minimum.

21 Mr. Wharton, is there some discrete area you could
22 move to in the hope that the map will show up pretty soon?

23 MR. WHARTON: Yes. I will go to a different area.

24 JUDGE KELLEY: All right.

25

1 BY MR. WHARTON:

2 Q Going to Page 26 of the article, "Implications
3 of Fault Patterns," on Page 26, the first paragraph: "Second-
4 order fold axes are similarly related to these fault zones.
5 These structural relationships follow the stress pattern
6 for wrench faulting described by Moody and Hill, 1956, and
7 Wilcox, et al, 1973, and suggests that the offshore zones
8 represent through-going, right-slip faults within the under-
9 lying basement rocks."

10 MR. PIGOTT: I am going to ask for a basis as to
11 whether or not this witness, who wrote this, has done the
12 requisite kind of research to support it.

13 MR. WHARTON: I am just going to ask him.

14 BY MR. WHARTON:

15 Q Dr. Kennedy, did you participate in writing this
16 particular sentence?

17 A No, I didn't.

18 Q Do you have any knowledge regarding this particular
19 sentence? That is, knowledge that you could agree or disagree
20 with what is in this particular sentence?

21 A Well, again, I think that sentence refers to the
22 regional aspects of the model, and I repeat that I worked in
23 very detailed fashion in the faults immediately offshore
24 from the San Diego coastal area and in segments of those
25 faults; not in the regional picture of the faults.

1 Q Have you formed any opinion as to whether or not
2 the Newport/Inglewood/Rose Canyon fault zone is a through-
3 going fault?

4 A No, I have not.

5 Q The article at Page 26 states here, "The Gulf of
6 Santa Catalina/San Diego trough region of the Southern
7 California continental borderland contains a major structural
8 block here called the Catalina Block, which probably was
9 formed and is presently being influenced by wrench tectonics."

10 Did you participate in, or have knowledge of,
11 the contents of this particular sentence?

12 A No. Again, that is outside of the area of San
13 Diego coastal margin.

14 Q Can you state whether, from your knowledge, whether
15 the Southern California continental borderland contains a
16 major structural block called the Catalina Block?

17 A Yes, I can state that.

18 In this conceptual model, we do define Catalina
19 Block.

20 Q Is the Newport/Inglewood/Rose Canyon fault zone
21 part of the Catalina Block?

22 A As the map shows, again in this conceptual model,
23 it does bound that block, by definition.

24 Q There is a sentence here that, "The Catalina Block
25 was probably formed, and is presently being influenced by,

1 wrench tectonics. Do you agree with that statement?

2 A Again, we state, as proposed by Wilcox and Harding,
3 and others, as they describe wrench tectonics in a very gross
4 fashion, I would agree with that.

5 Q What does the expression, "Presently being influenced
6 by wrench tectonics" mean?

7 A What we -- and I say "we;" I will speak for myself.
8 What I would mean by that is that there is current tectonic
9 activity in the Southern California borderland, currently.

10

11

/////

12

13

14

15

16

17

18

19

20

21

22

23

24

25

13rp 1

1 Q The other statement here, "Differences in the
2 rate of right slip along these fault zones -- referring to
3 the Rose Canyon fault zone and the Palos Verdes Hills-
4 Coronado Bank fault zone -- could result in elongation and
5 rotation of the block."

6 Can you state what that particular sentence
7 means?

8 A I can state what I think the sentence means.
9 However, I didn't write the sentence.

10 Q Well, regardless, if you have knowledge of what
11 that sentence means, could you tell us what that sentence
12 means?

13 A I think that --

14 MR. CHANDLER: Mr. Chairman, I would object to
15 such speculation by Dr. Kennedy. I mean he just clearly
16 indicated he didn't write it.

17 JUDGE KELLEY: Could you give me again the
18 sentence we're looking at now?

19 MR. WHARTON: Yes. "Differences --

20 JUDGE KELLEY: The last one?

21 MR. WHARTON: Last sentence on Page 26.

22 JUDGE KELLEY: And that is not your sentence,
23 you say.

24 THE WITNESS: No, it's not.

25 JUDGE KELLEY: Objection sustained.

rp2
1 BY MR. WHARTON:

2 Q. You stated that you agreed that the Gulf of
3 Santa Catalina/San Diego trough region is presently being
4 influenced by wrench tectonics means?

5 MR. PIGOTT: I'm going to object. There's no
6 showing that this is this man's expertise, that he has done
7 any studies on it. His name happens to be attached to the
8 article for one specific small portion and Intervenors are
9 trying to ratchet him into supporting the whole of the
10 article. I think we've been patient in listening to it but
11 I think it's established beyond question that this is just
12 not an area that this person should be questioned on and I
13 object to any further questions such as this.

14 JUDGE KELLEY: I thought essentially the same
15 question had been asked about three or four minutes and he
16 had answered it in a rather general way but he had given an
17 answer.

18 You said something to the effect that you thought
19 that the area was tectonically active; isn't that right?

20 May I ask you if the wrench tectonics area is one
21 of your specialties or areas of expertise as we say?

22 THE WITNESS: No. And I think I just stated
23 that the way we're using the term "wrench" as it comes
24 directly from earlier workers, in particular Wilcox and
25 Hardings' paper written a couple of decades ago, we're

rp3

1 using this in a very simplistic conceptual way, not
2 something that is a very determinative term.

3 JUDGE KELLEY: It seems to me the answer you
4 gave earlier was about all you could say; is that fair?

5 THE WITNESS: That's correct.

6 JUDGE KELLEY: Then you should move on.

7 MR. WHARTON: Yes, I will.

8 BY MR. WHARTON:

9 Q. From the same publication or article on Page 29,
10 "Faulting Offshore at San Diego and Northern Baja California"
11 by Mark Legg and and Michael P. Kennedy, did you participate
12 in writing this particular article?

13 A. In a very minor way and that is that I sat on
14 Mark Legg's doctoral committee and I have reviewed this
15 article and I again contributed that portion that I also
16 contributed to the article with Green and others.

17 JUDGE KELLEY: Were you going to be calling
18 Mark Legg later?

19 MR. WHARTON: Yes, I will.

20 JUDGE KELLEY: All right.

21 BY MR. WHARTON:

22 Q. You have reviewed this article with Mark Legg?

23 A. I have reviewed the article, yes.

24 Q. In the process of review, would you be in the
25 position of advising Mr. Legg to either delete parts of the

rp 4

1 article prior to publication?

2 A. In view of the fact that this doesn't constitute
3 a formal publication, prior to publication, yes.

4 And I'd like to also add that again this is a
5 conceptual model and probably three orders of magnitude more
6 conceptual than the Greene and other paper.

7 Q. There is a statement in this particular article
8 at Page 41. I'll simply ask if you agree or disagree with
9 the statement. It would be the third paragraph:

10 "In summary, the Newport-Inglewood-Rose Canyon-
11 Vallecitos-San Miguel fault zone is characterized by right
12 stepping en echelon faults with Quaternary to Holocene
13 offsets in many places."

14 Going down to the -- I won't read all the way
15 through. "Gastil, et al., and Brune and Simons' volumes
16 discuss the details of the Vallecitos and San Miguel fault
17 zones and Greene in all his volume discussed the details of
18 the Newport-Inglewood zone.

19 "Curvature in the Rose Canyon fault zone
20 bounds prominent structural loads in Mission Bay, San Diego
21 Bay and La Jolla Canyon and structural highs at Mt. Soledad
22 and Pt. Loma. This vertical relief is suggested to be a
23 result of the right-stepping oblique slip along the Rose
24 Canyon fault zone forming local regions of tension and
25 compression.

rp5

1 "To the north, the fault zone merges with the
2 Newport-Inglewood fault zone. To the south, it apparently
3 merges with the Vallecitos-San Miguel fault zone, although
4 connection with the Tres Hermanos or Agua Blanca fault
5 zones is possible."

6 Do you agree with the contents of that
7 particular paragraph?

8 MR. CHANDLER: Mr. Chairman, I'll object as
9 being extremely compound. I think this is a concluding kind
10 of statement which contains numerous conclusions. It ought
11 to be broken up into its component pieces.

12 MR. WHARTON: I'll break it up.

13 JUDGE KELLEY: I think it also might be useful
14 to establish first whether this is in any respect Kennedy
15 or this is Mark Legg or who is responsible for the paragraph.

16 BY MR. WHARTON:

17 Q. Would you state if you wrote any of this
18 paragraph.

19 A. I am responsible for certain parts.

20 Q. Would you state which parts you're responsible
21 for?

22 A. Yes. The conceptual portion of this paragraph
23 having to do with the relationship between the Newport-
24 Inglewood-Vallecitos-San Miguel is largely -- is not mine.

25 Starting with the part having to do with the

6
1 curvature in the Rose Canyon fault, having to do with the
2 structural highs of Mt. Soledad and Pt. Loma, having to do
3 with the local regions of tension and compression -- those
4 are my parts and those have been published in other papers
5 of mine.

6 Q Okay. But you didn't write anything regarding
7 the merging of the Newport-Inglewood fault zones to the
8 south of the Vallecitos-San Miguel fault zones.

9 A That's correct.

10 Q Would you disagree with that statement in this
11 article?

12 MR. PIGOTT: Objection. He's already stated
13 he has no basis for making an opinion on this area.

14 BY MR. WHARTON:

15 Q Do you have any knowledge of this particular
16 subject matter, that is the merging or possible merging of
17 the Newport-Inglewood fault zone with the Vallecitos-
18 San Miguel fault zone?

19 A Only that that is in the literature that others
20 have already published.

21 Q Is there any evidence to indicate that the
22 Rose Canyon fault zone may extend to form a structural
23 relationship with the Agua Blanca fault zone?

24 A Again I'd have to answer that that speculation
25 of this sort has been made by others and it's in the

7
1 literature. It's not something that I've worked on
2 directly.

3 Q. Are you testifying that you haven't done any
4 work in determining the southerly extent of the Rose Canyon
5 fault?

6 A. What do you mean by "southerly"? Extend from
7 where to where?

8 Q. Well, from your knowledge, how far down does
9 the Rose Canyon fault zone extend at this point, as far as
10 your knowledge right now?

11 A. I've studied the Rose Canyon fault zone in the
12 San Diego Continental Margin region.

13 Q. And what is your opinion as far as how far
14 south the Rose Canyon fault zone extends?

15 A. I've only studied it in the San Diego region.

16 as far south as the Mexican border in that that was my
17 boundary with respect to international problems that I was
18 able to work.

19 MR. WHARTON: Mr. Chairman, I would like
20 about five minutes. I just need to review this map.

21 JUDGE KELLEY: We know we have to quit at 5:00
22 today. That's two hours from now.

23 Let's take ten minutes now and maybe another ten
24 around 4:00.

25 (Brief recess)

rpl4/8

1 JUDGE KELLEY: Very well, ladies and gentlemen,
2 back on the record.

3 Mr. Kennedy, are you ready?

4 THE WITNESS: Yes, I am.

5 JUDGE KELLEY: Thank you.

6 Mr. Wharton, do you want to resume?

7 BY MR. WHARTON:

8 Q Mr. Kennedy, I had asked you previously if you
9 had a copy of what's referred to as Map 42, Recency and
10 Character of Faulting Offshore from Metropolitan San Diego
11 listed as by Mr. P. Kennedy and S. H. Clark. Do you have a
12 copy of that with you?

13 A Yes, I do.

14 Q Could you get that out, please?

15 MR. PICCOLI: Mr. Chairman, I found that our
16 geologic people did have copies of that map, so at least
17 Applicants can follow him. I don't know if the Board has a
18 copy of it or not.

19 JUDGE KELLEY: I'm afraid the Board does not.

20 JUDGE HAND: Do we need it?

21 MR. WHARTON: I believe I could have Dr. Kennedy
22 refer to it -- put it up and have Dr. Kennedy refer to it.
23 This is one of the problems that I was referring to with
24 having to go on direct right away which was a total
25 surprise to me. These are all the maps that we have; I don't

9
1 them --

2 MR. CHANDLER: We have an extra copy for the
3 Board.

4 JUDGE KELLEY: Go ahead.

5 BY MR. SHARTON:

6 Q Dr. Kennedy, we have placed up on the screen
7 for viewing by everyone a map which is referred to as
8 Map Sheet 42, Recency and Character of Faulting Offshore
9 from Metropolitan San Diego, California, Pt. La Jolla to
10 Baja California. It's listed as by M. P. Kennedy, S. H.
11 Clark, H. G. Green and M. R. Legg; is that correct?

12 A That's correct.

13 Q Now did you participate in drawing this
14 particular map?

15 A Yes, I did.

16 Q And which areas of this map did you draw?

17 A I was responsible for constructing the entire
18 map initially and the other authors contributed following
19 that by adding suggestions and corrections along the way.

20 Q Would you say you're the primary author of that
21 particular map?

22 A Yes, I would.

23 Q When was this map published?

24 A The date on it, I believe, is 1980; yes, it is.

25 Q Do you have any closer time frame as far as when

10
1 it was --

2 MR. WHARTON: Strike that.

3 BY MR. WHARTON:

4 Q When was the map officially published, that is
5 to the best of your recollection within a month?

6 A I don't think it actually was available for
7 sale until early 1981, but these had 1980 dates on them
8 because of -- by the time they were initially submitted to
9 the state printer for publication.

10 Q What is the intent of drawing up a map such as
11 this?

12 A The title of the map is Recency and Character
13 of Faulting, I believe, and the intent was to try to
14 substantiate the recency or the most recent movement where
15 possible along faults that we have mapped by principally
16 reflection methods.

17 Q So would this map contain the latest information
18 regarding the recency and character of faulting offshore
19 for metropolitan San Diego?

20 A As far as what I have done, yes.

21 Q There is an abstract that goes with this map.
22 Do you have a copy of that abstract?

23 A Yes, I do.

24 Q Did you write this abstract?

25 A Yes.

11 1 Q. Were you the primary author of this abstract?

2 A. Yes, I was.

3 Q. Page No. 4, Character of Faulting. It says, "The
4 area study is transected by the Rose Canyon fault zone on
5 the east, the Coronado Bank fault zone centrally and the
6 San Diego trough fault on the west. Together these fault
7 zones comprise a 35- to 40-kilometer wide complex domain of
8 deformation characterized by tectonic compressional highs
9 and tensional lows."

10 Did you write that particular paragraph?

11 A. Yes, I did.

12 Q. And I take it you would stand behind that
13 particular paragraph today?

14 A. Yes, I would.

15 Q. It goes on, "The overall character and
16 relatively through-going nature of these fault zones have
17 been discussed previously," and you have cites, "and are
18 summarized in the following discussion of their
19 characteristics within the area of this study. The Rose
20 Canyon fault zone lies principally on shore and along the
21 eastern margin of the study area. We have therefore based
22 our description of its general character on earlier work."

23 Now that's an accurate description of your
24 thinking and opinion on that matter at this time?

25 A. Yes, it is. And the earlier work was work that

12

1 I had also completed.

2 Q Okay. And it goes on, "Rose Canyon fault zone
3 is considered regionally to be part of the Newport-Inglewood-
4 Rose Canyon-Vallecitos-San Miguel fault system."

5 Did you write that paragraph?

6 A I did read that -- or did write that, and you'll
7 notice the citations following it that that statement is
8 based on a work of others.

9 Q Which part of that are you attributing to others?

10 A The entire statement comes from the papers that
11 are cited following what you just read.

12 Q Would the inclusion of this as the Rose Canyon
13 fault zone to be part of Newport-Inglewood-Rose Canyon-
14 Vallecitos-San Miguel fault system be an indication by you
15 that you agree with the nomenclature of this being this full
16 name of the fault system?

17 A My answer to that is again in a conceptual
18 fashion. We cite the Moore paper which was the initial
19 paper written conceding the Newport-Inglewood-Rose Canyon
20 fault zone as a related structure. The other papers which
21 we have discussed earlier, the Greene and others and the
22 Legg and Kennedy papers as to putting this into further
23 speculative small-scale model.

24 Q Could one assume in reading this that you, by
25 publishing this, do not have strong disagreement with the

13 1 authors on this characterization as the Newport-Inglewood-
2 Rose Canyon-Vallecitos-San Miguel fault system?

3 A. I don't have strong disagreement with it.

4 Again I'd like to repeat that it is a speculation
5 in a model sense.

6 Q. You have done extensive studies of the Rose
7 Canyon fault zone?

8 A. Yes, I have within the San Diego coastal area.

9 Q. Okay. Could you state what the slip rate is
10 of the Rose Canyon fault?

11 A. I think that I should refer back to some of the
12 literature that I have written on the order of five or
13 six years ago to give you those exact numbers, if you'd like
14 me to do that; it would take a few minutes.

15 Q. I would, yes.

16 A. I do have that information in front of me now.

17 This paragraph is from a paper entitled
18 "Character and Recency of Faulting, San Diego Metropolitan
19 Area," published in 1975.

20 To be complete, I would need to read on the
21 order of a full page of text. If I can omit the documentation
22 of the offset stratigraphic horizons and read just the last
23 paragraph which summarizes these stratigraphic separations,
24 I think that it would speed things up.

25 Q. That'll be fine.

14 1 Could we have a reference to the pages?

2 A. Yes. The discussion would begin on Page 8
3 under a subtitle, "Rose Canyon Fault Zone," continued through
4 Page 9, 10, 11, 12 and end on Page 13, part of that text
5 being figures.

6 Q. Thank you.

7 A. The final paragraph states, "By comparing the
8 relative amounts of fault displacements with the ages of
9 the strata faulted, we can reconstruct a long history of
10 faulting probably post-dating the age of the middle Eocene,
11 approximately 50 million years, or possibly the middle
12 Miocene Otay Formation, approximately 10 million years.

13 "In pre-dating the age of the upper Pliocene
14 San Diego Formation, approximately two million years, assuming
15 that the 800 meters of vertical separation revealed by well
16 data occurred in the past 50 million years, 150 meters in
17 the past -- excuse me -- in the past 150 million years and
18 10 meters in the past 100,000 years as postulated above,
19 an average rate of dip-slip for this -- or rather it should
20 be dip separation for this period is between 10 and 15
21 centimeters per 10 to the third years. The average rate of
22 strike-slip fault movement based on offsets of the upper
23 Pliocene San Diego Formation and the shoreline of Pt. La Jolla
24 is one to two meters per 10 to the third years."

25 I didn't hear that figure, 10 to 15 centimeters.

15

1 What was that for; over what period on the dip slip?

2 A. Okay. To go back for the dip separation, 800
3 meters of vertical separation revealed by well data, which
4 was discussed earlier in this text, occurred in the past
5 50 million years, 150 meters in the past one million years,
6 and 10 meters in the past 100,000 years. That would reveal
7 an average rate of 15 centimeters per thousand years.

8 Q. Okay. On Page 5, Paragraph 3, it states there
9 the multi-part complexity of the Rose Canyon fault zone can
10 be followed south offshore to San Diego Bay and the adjacent
11 continental shelf.

12 Would you show on the map there where you can
13 follow it offshore to the San Diego Bay and adjacent
14 continental shelf and refer to what you are referring to
15 as the continental shelf on the map?

16 A. This part of the map that you're referring to,
17 as stated in this text, comes principally from the work of
18 myself and Ed Welday. That is Map Sheet 40.

19 Our conclusion in Map Sheet 40 was that at least
20 one splay of the Rose Canyon fault extending from the
21 La Jolla-Mission Bay area of San Diego crosses San Diego
22 Bay in the vicinity of Harbor Island, crosses Coronado in
23 the central portion and it's onshore as a series of en
24 echelon, very discontinuous faults and is part of offshore
25 silver-strand(ph) or what we refer to as the offshore bite

16

1 of San Diego.

2 Q Okay. Further in that paragraph, "The major
3 elements of the zones of this part of San Diego trend
4 northerly, have uninterrupted length of at least five to
5 ten kilometers and include this Spanish bite, the Coronado
6 and the Silver Strand faults."

7 Would you explain what you mean by that?

8 A The major elements of the Rose Canyon fault
9 zone within this part of San Diego Bay and offshore bites
10 have been given the names again in the report by Kennedy
11 and Welday. The names were established, given formal
12 citation, given formal type areas as the three faults --
13 this being the first step, the second fault being this
14 step and the third fault being the step closest to the
15 Silver Strand.

16

17

18

19

20

21

22

23

24

25

1 BY MR. WHARTON:

2 Q Have you determined whether or not there is a
3 structural relationship between the Rose Canyon fault zone
4 and the Coronado fault?

5 A (WITNESS KENNEDY) The Coronado fault, you mean
6 the Coronado Banks fault, or the --

7 Q Yeah, the Coronado Banks fault.

8 A No, we have not.

9 Q Have you looked in -- have you done any research
10 into that particular area to see if there is any relationship
11 between those two faults?

12 A No, I have not.

13 Q Okay, the three faults that we referred to before
14 as the Spanish Bight, the Coronado and the Silver Strand
15 faults, is it possible that these three faults could continue
16 south along the Baja coast, connect with the Alba Blanca
17 fault?

18 MR. PIGOTT: Objection. Calling for speculation.

19 MR. WHARTON: Mr. Chairman, we do have situations
20 here where there is possible and likely -- I think the area
21 should be pursued. If he has expertise in the area, he can
22 give some indication of the possibility, no possibility,
23 likeliness, or whatever.

24 MR. PIGOTT: I don't care what he answers. I
25 just don't like the questions coming out that way.

1 JUDGE KELLEY: Mr. Kennedy, have you studied these
2 areas that Mr. Wharton is asking you about?

3 WITNESS KENNEDY: No. I think I mentioned I have
4 not really worked south of the Mexican border.

5 JUDGE KELLEY: And the three that you refer to are
6 south of the border? I think there were three.

7 MR. WHARTON: I don't believe they are. I think
8 he was referring to with the -- well, I am reading the
9 sentence again. The longest individual faults of the Rose
10 Canyon here trend generally northwest and have uninterrupted
11 length of only a few kilometers, and includes the Mount
12 Soledad Rose Canyon -- I am sorry, wrong sentence.

13 The major elements of the zone through this part
14 of San Diego trend northerly, have uninterrupted length of
15 at least five kilometers and includes the Spanish Bight, the
16 Coronado, and the Silver Strand faults. Now, what I am trying
17 to do is put all of these together. It is by indication from
18 this and the testimony has been that there is these elements
19 of the zone, and these are three elements of the zone. I am
20 trying to find out how far south they go, if he has any
21 knowledge of that.

22 JUDGE KELLEY: Well, the basic issue seems to me
23 to be whether you have studied these in such a way that you
24 could answer the question, and I guess you will know that
25 yourself, so why don't you go ahead and answer it.

1 WITNESS KENNEDY: Well, again I repeat that if you
2 look at the southern end of this, it is right at the Mexican
3 border, the Silver Strand fault is mapped as far south as we
4 could because of international problems of working in Mexican
5 waters. I have not worked south of where the Silver Strand is
6 shown on this map.

7 Others have speculated in the literature having
8 to do with this relationship. I have not.

9 BY MR. WHARTON:

10 Q Okay, then would you -- from your survey and from
11 the map there, is it your testimony then that the Rose Canyon
12 fault and -- which includes the Spanish Bight, the Coronado,
13 and the Silver Strand faults, have been mapped down to the
14 border?

15 A (WITNESS KENNEDY) That's correct. You can see on
16 the map.

17 Q And you would consider those continuous down to
18 the border?

19 A I think you can see in this area, here is the
20 Mexican border, and you see all the faults stop right at the
21 border.

22 Q Okay.

23 A I mean, on our diagram they stop, because of not
24 working beyond that point.

25 Q Okay, so the only reason they don't continue is

1 there is no data to determine whether they do continue?²²⁶³

2 A That is correct.

3 Q Okay, now I just ask, and maybe we have done it,
4 have you done any research south of the border, in any way
5 whatsoever, to determine whether or not these faults extend
6 further south?

7 A No, I haven't.

8 MR. CHANDLER: Mr. Chairman?

9 MR. WHARTON: That is all I have for direct. Mr.
10 Chairman, I believe that we have identified the map. I would
11 identify the map as Intervenor's Exhibit number 3. I
12 believe there has been full authentication of the map and to
13 testify to the map, and I would introduce it into evidence as
14 Intervenor's Exhibit Number 1 in evidence.

15 MR. CHANDLER: Mr. Chairman, I have not been
16 provided with a copy of the map or the text. The copy I was
17 provided I have since given to the Board.

18 MR. PIGOTT: It is about the second or third
19 Intervenor's 1, isn't it?

20 MR. WHARTON: The first one that gets into
21 evidence -- it is identified as 3. I can go into evidence as
22 Intervenor's 3.

23 JUDGE KELLEY: Got that? Intervenor's number 3?

24 MR. PIGOTT: I am going to object.

25 JUDGE KELLEY: Now, Mr. Chandler wants a chance to

1 look it over. I am going to defer a ruling on your motion to ²²⁶⁴
2 have it admitted.

3 (Whereupon, the above-mentioned
4 document was marked as Inter-
5 venor's Exhibit No. 3 for
6 identification.)

7 MR. WHARTON: Mr. Chairman, I am just raising a
8 question here. We were in the middle of the Applicant's
9 cross-examination when - was put on the direct examination.

10 I suppose that the Applicants are going to
11 continue with cross-examination, and we would like cross-
12 examination also, and we have an hour and a half, today.

13 JUDGE KELLEY: Can someone who thinks he has an
14 excellent memory remember exactly what we decided to do?
15 Otherwise we can have the reporter play it back, but do you
16 want to try?

17 MR. CHANDLER: I will try my memory, rather than
18 try the reporter for a moment.

19 JUDGE KELLEY: All right.

20 MR. CHANDLER: It is my recollection that upon
21 conclusion of the direct case, Mr. Pigott was going to
22 resume cross, which would cover both the direct case presented
23 by the Staff, as well as the testimony now given on direct
24 by Dr. Kennedy, followed by cross by Intervenors, followed by
25 cross on this limited amount of testimony by Dr. Kennedy, and

1 any redirect that may be necessary of Drs. Green and Kent.

2 MR. WHARTON: Mr. Chairman, I point out the
3 timing in that as I say, much against my wishes, I was forced
4 to go to direct without being fully prepared. We now have an
5 hour and a half left in the day for Green and Kennedy, Drs.
6 Green and Kennedy, and I don't know how long all of what Mr.
7 Pigott is going to do now, which is cross-examine on my direct,
8 and finish his cross-examine. I would suspect we are not going
9 to have very much time ourselves for cross-examination, and I
10 would respectfully submit that one of the reasons we didn't
11 want to go out of order is so something like this wouldn't
12 happen.

13 JUDGE KELLEY: Did Mr. -- well, for the record,
14 I understand what you are saying. Did Mr. Chandler's state-
15 ment of the procedural decisions seem correct, you know,
16 whether you dislike it or not, that sounded right to me.

17 MR. PIGOTT: Surprisingly close.

18 MR. CHANDLER: Gee, thanks.

19 MR. PIGOTT: I have just one variation and that
20 is I would to the extent possible would cover the cross-
21 examination of this additional direct.

22 MR. CHANDLER: I thought that is what I said.

23 JUDGE KELLEY: I think he said that.

24 MR. WHARTON: Mr. Chairman, is either of the
25 witnesses absolutely not available tomorrow?

1 MR. CHANDLER: Dr. Green will not be available.²²⁶⁶

2 MR. WHARTON: That is the witness that we most
3 want to cross-examine, because it is the only chance we have
4 of that witness, and I would submit that if, you know, here
5 we are, we can't cross-examine Dr. Green. I would like to
6 have our cross-examine -- and interrupt Mr. Pigott's cross-
7 examination so we may have full cross-examination of Dr. Green
8 and Dr. Kennedy.

9 MR. PIGOTT: If I might start my cross-examination
10 again?

11 JUDGE KELLEY: Well, then let me -- that amounts
12 to a motion, I gather. You are asking that you be allowed to
13 cross-examine Dr. Green now, because he is not available
14 tomorrow?

15 MR. WHARTON: That is correct.

16 JUDGE KELLEY: All right, let me be clear, Dr.
17 Kennedy a little later on is not going to be available at all.
18 Now, you are not available tomorrow. If necessary, could you
19 come back? You are all the way from Washington?

20 MR. CHANDLER: Dr. Green is from Menlo Park.

21 JUDGE KELLEY: Menlo Park. Okay.

22 WITNESS GREEN: Yes, I can come back. I will be
23 out of the country between the 8th and the 18th, but I will
24 be available for questioning outside of that time.

25 MR. PIGOTT: Aren't both of them available

1 tomorrow morning?

2 JUDGE KELLEY: I am being told, I thought, that
3 you are not available tomorrow.

4 WITNESS GREEN: I am available in the morning. I
5 have a ten o'clock plane out. I suspect I could change that --

6 JUDGE KELLEY: Well, that -- could you change that
7 a little bit if you had to?

8 WITNESS GREEN: I will try.

9 JUDGE KELLEY: All right. Well, can you say with
10 certainty you will be here tomorrow morning at least for an
11 hour or so?

12 WITNESS GREEN: What time are we going to start,
13 seven?

14 JUDGE KELLEY: 8:00. 8:00.

15 WITNESS GREEN: To make your life easier, I
16 suspect I could do that.

17 JUDGE KELLEY: You can?

18 WITNESS GREEN: Can.

19 JUDGE KELLEY: Well, I don't think your
20 opportunity to cross-examine Mr. Green is in serious jeopardy
21 at this point, and -- well, at least on the assurance that he
22 will be here tomorrow morning at the outset, so I think we
23 will stick with what we had decided earlier, albeit over your
24 objections that we would go this way, so Mr. Pigott, if you
25 want to pick up on your -- you are now going to combine cross

9 1 of what we just heard from Mr. Kennedy and then also Mr.
2 Green may rejoin him at some point to complete -- would you
3 rather --

4 MR. PIGOTT: I would sooner have Mr. Green now
5 and I will finish the joint cross-examination and hopefully
6 get into the further direct.

7 JUDGE KELLEY: All right, fine. All right.

8 MR. WHARTON: Mr. Chairman, before we start, I
9 just have one minute that I have to use the facility, as I
10 wasn't able to last break.

11 JUDGE KELLEY: All right.

12 (Brief recess)

13 JUDGE KELLEY: I think we are ready for you now.
14 whereupon,

15 MICHAEL KENNEDY

16 H. GARY GREEN

17 resumed the stand and, having been previously duly sworn,
18 were examined and testified further as follows:

19 CROSS-EXAMINATION

20 BY MR. PIGOTT:

21 Q Going back and addressing our attention to the
22 Cristianitos zone of deformation, as it has been styled, can
23 you characterize for us the depths at which these folds and
24 faults are found along the Cristianitos zone of deformation?
25 Perhaps let me even short-circuit further. That is the subject

1 matter in mind. Let me withdraw the question. I will turn,
2 Dr. Green, to your deposition of April 3, at page 61,
3 commencing at line 11, and I believe I was referring here to
4 the -- some statements in the SER, but let me start, quote,
5 "Q. And dropping down to subparagraph (c) in that
6 section that quote, 'minor faults in the area are short in
7 length and occurred below a Pleistocene erosional surface in
8 Tertiary age beds,' unquote, you have no reason to disagree
9 with that particular statement?"

10 "A Right. I am not certain what is meant by minor
11 faults, but that is a semantics problem, and I won't get
12 into that, but I do agree with the fact that they primarily
13 occur before a Pleistocene erosion surface with the
14 stipulation in a few localities where we indicate that there
15 may be some type of offset on the Pleistocene erosion surface,
16 whether an offset or an erosional remnant we are not sure,"
17 end of quote.

18 Does that statement remain your position with
19 respect to the depth of the faulting or folding in what you
20 have called the Cristianitos zone of deformation?

21 A (WITNESS GREEN) Yes, it -- I remain to stay with
22 that statement, that is correct.

23 Q Okay. And just to be a little redundant, there
24 is -- it does not come to the surface, to the sea floor
25 surface?

1 A That is correct.

2 Q Or cut "olocene?

3 A It does not cut above what we have classified as
4 the Pleistocene erosional surface, that is correct.

5 Q Thank you. I believe in your report you have
6 characterized -- and forgive me if I am short-circuiting a
7 little bit, but I believe you have characterized the distance
8 from the Cristianitos zone of deformation, as you have styled
9 it, to the OZD, to be in the area of anywhere from 1 to three
10 and a half kilometers, depending on how you measure it, is
11 that correct?

12 A I am not sure what you are referring to. The one
13 to three kilometers refers to what?

14 Q The distance from -- the closest distance from
15 your Cristianitos zone of deformation to the offshore zone of
16 deformation.

17 A Yes, how I would state that would be that the one
18 to three kilometers refers to the distance within which you
19 may find the possible merging or truncation of the CZD with
20 the OZD. I think that is how we stated that.

21 Q And is that a measurement to a fault on the OZD,
22 do you recall?

23 A I believe the shorter distance is to a fault, from
24 a fault to another structure within the OZD.

25 Q To another structure. What would that structure

1 be?

2 A Yes, I think in this particular instance we are
3 referring to a syncline that may or may not be related to the
4 OZD.

5 Q Perhaps if I could direct you to your plate number
6 1?

7 A Okay, that is better.

8 Q First of all, there is a -- at about just slightly
9 north of H' prime, appears to be the last of that inferred
10 portion of the Cristianitos zone of deformation. Do you see
11 that?

12 A Yes, just to the left of that.

13 Q Okay. Then just below the word "void," there is
14 a partially dashed and partially solid line, indicating, I
15 guess, some faulting.

16 A That is correct.

17 Q Is that associated with the Cristianitos zone of
18 deformation or the offshore zone of deformation, or either?

19 A Is it referred to -- I am sorry?

20 Q Okay. Let me refer you -- do you have the --

21 A Yes, I have the fault. I know --

22 Q Okay.

23 A You are referring to the dashed fault that lies
24 beneath "void".

25 Q Yes.

1 A Between profiles H-H prime, and I-I prime.

2 Q Yes.

3 A Okay.

4 Q Is that considered a part of the OZD or your CZD
5 or whac?

6 A We have not defined whether that is OZD or CZD.
7 That is within that region, or within the general region that
8 is difficult to define, and so we have not associated that,
9 and when I specifically wrote on this, I did not address it
10 as being part of the Cristianitos zone of deformation, and I
11 believe that our length that we give to the Cristianitos zone of
12 deformation does not contain that fault length.

13 Q That particular fault lies very deep, does it
14 not, if you recall?

15 A I can't recall the depth of that fault, but it
16 certainly does not come up to where we give it the symbol of
17 displacing near-surface sedimentary rocks, for instance.

18 Q Would you have anything that would reflect or
19 dispute an assumption that it lies deep in the Monterey
20 formation?

21 A Well again, we did not do stratigraphic
22 analysis, so I cannot answer that question. I do not have --

23 Q Oh, you would not have anything that would either
24 confirm or deny that?

25 A That is correct. We did not do any stratigraphic

1 analysis.

2 Q Can you describe the offshore zone of deformation
3 or characterize it in any way in the areas, let us say, from
4 G-G prime to I-I prime, can you give us a description of the
5 style of faulting or folding that is seen at that location?

6 A You are referring to the OZD?

7 Q Yes.

8 A In that region on this plate, we show two,
9 primarily two faults in the lower part of the plate that
10 lies between G-G prime and I-I prime, and those faults are
11 inferred faults shown by dashed lines, and also questionably
12 inferred faults shown by dashed lines with queries included.

13 ///

14

15

16

17

18

19

20

21

22

23

24

25

16rpl

1 Q Do you have marked on there the syncline that
2 I believe you said you could measure the one kilometer
3 to?

4 A Yes. Now the syncline would be -- it would not
5 fall between HH Prime and II Prime. It would fall
6 primarily between CC Prime and GG Prime. It extends from
7 CC Prime to GG Prime.

8 Q Well to measure then from the Cristianitos Zone
9 of Deformation to that syncline, would you be following the
10 trend of the Cristianitos Zone of Deformation or would you
11 have to take a change in direction there?

12 A I'm sorry. I didn't follow that question.

13 Q If we are to measure the distance between that
14 syncline and the Cristianitos Zone of Deformation, as you
15 have it mapped --

16 A The distance between the two?

17 Q Between the two. Yes. I'm sorry.

18 A Yes.

19 Q Would that be a distance following the trend
20 of your Cristianitos Zone of Deformation or would that
21 require a change in direction to move towards that syncline?

22 A Well the Cristianitos Zone of Deformation bends
23 around to parallel or sub-parallel the OZD or that syncline,
24 .. you like.

25 Q If one were to follow the trend of the CZD as

2

1 you have it mapped there and extend it to a point where it
2 would strike an actual fault of the OZD, how far would that
3 be?

4 A. Well not being able to measure in here, I would
5 again estimate it somewhere: within one kilometer. Perhaps
6 we may find that the two faults would be -- would come
7 together.

8 Q. Taking a look at the scale, Dr. Greene -- it
9 may be somewhat of an imposition, but I wonder if you
10 would go to your expanded plate, enlarged plate, and identify
11 for us, either with a pointer or otherwise, the distance
12 that you would be looking to as being one kilometer between
13 the Cristianitos Zone of Deformation and the Offshore Zone
14 of Deformation.

15 A. Okay. I'd like to state one thing here. This
16 is a general region for the intersection so that what I'm
17 going to give you is going to be a very general number.

18 What we're going to look at is that we have
19 two primary faults that are shown just beneath the
20 deformation between profiles F Prime -- FF Prime and DD
21 Prime. The lower fault on the map shows a fault that comes
22 in very close to the syncline --

23 Okay. I'll start again. The Zone of Deformation
24 or the Cristianitos Zone of Deformation in that portion
25 that we're talking about is that portion that lies beneath

3
1 the words "of Deformation" between profiles FF Prime and
2 profiles GG Prime. There are two faults that have been
3 mapped in there with dashed lines and questionably dashed
4 lines.

5 The lower of those faults has a segment that
6 comes very close within -- it's certainly within a kilometer
7 of the syncline, as you see here.

8 There is another fault beneath shock point 150
9 on profile GG Prime that is a well-defined fault that
10 continues along and passes to the south somewhere within a
11 kilometer of that previous fault that I discussed as the
12 Cristianitos fault and continues on as the fault that we
13 have not assigned particularly to belong to the Cristianitos
14 Zone of Deformation or to the OZD as such.

15 It is in this region that I draw circling
16 around just beneath data void incorporating an anticline/
17 syncline, that general region. I'm not incorporating that
18 in the zone necessarily, but that circumference where we
19 would say that the intersection would be most likely.

20 I'd like to make one other point is that the
21 intersection could -- and we have discussed this amongst
22 the authors -- that the intersection could extend down in
23 through these areas as well. We don't know what the
24 incorporation of those faults are. It's a general,
25 difficult region for us to interpret.

4 1 Q If I may, I think, pick up on one of the things
2 that we discussed earlier, the nature of your study is
3 really a planned view of the disturbance as seen in that
4 area; correct?

5 A That's correct.

6 Q So that the fault that is dashed and then
7 continued that you associate with neither the CZD nor the
8 OZD for this purpose -- its significance is perhaps
9 heightened in the absence of anything other than the
10 planned view. For instance, we cannot see where it lies
11 at depth or have any idea of its age.

12 A Well except in the legend that we use and then
13 also in that locality where the profile is shown as an
14 illustration in the text dealing with anything about the
15 depth. But again you're right. We're looking at the
16 planned view here and we're looking as if we're looking
17 from the top.

18 Q And so we really look at this as though it's
19 everything on one level?

20 A Yes. That's correct.

21 Q Everything in the same age of strata?

22 A That's correct.

23 Q Everything in the same amplification or
24 sharpness of deformation? There's no gradation between
25 any of these things?

5
1 A. I don't know what you mean by -- we're getting
2 back into amplification. I'm not sure that I can define it.

3 But, no, we did not work with amplification,
4 so that is not shown in any fashion on here. Amplification
5 is not shown here.

6 Q. Well I cannot help but notice on the seismic
7 profiles behind you on that state map that, when you hit
8 something large, they almost jump out of those profiles; do
9 they not?

10 A. I'm not familiar with the state map.

11 Q. Okay.

12 A. The one you're referring to.

13 Q. Dr. Kennedy is. Is what is on the right side
14 of your State Map 42 an example of what happens when you
15 get a structure with styles of large deformation?

16 A. (WITNESS KENNEDY) Well I think what Gary
17 tried to say is that we didn't show the difference between
18 say an isoclinal fold and a very gentle fold by way of
19 symbolity on our map.

20 Q. No. I understand that. But my question is:
21 Isn't what you have on the right-hand side of your Map 42
22 some rather striking examples of the kind of seismic
23 profiles you get when there are large amounts of deformation
24 present?

25 A. I would say that's true.

6
1 Q As opposed to the seismic profiles we looked
2 at earlier this morning and didn't make much progress with,
3 which, by comparison, were rather flat --

4 MR. CHANDLER: I object, Mr. Chairman. There
5 was really no discussion of those. All we have is
6 Mr. Pigott's characterization of them. The witnesses
7 couldn't speak to those.

8 JUDGE KELLEY: Sustained.

9 BY MR. PIGOTT:

10 Q The distance between the Cristianitos Zone
11 of Deformation, then, could be from that area -- you've
12 indicated, rather, an area of approximately a kilometer to
13 three and a half kilometers, is that correct, as the
14 distance it could be between truncation and --

15 MR. WHARTON: Objection to the facts assumed.
16 I believe the witness has stated it could be within one
17 kilometer not a kilometer within one kilometer.

18 BY MR. PIGOTT:

19 Q Within a kilometer to three-plus kilometers;
20 is that correct?

21 A Yes. This is a general -- just looking at a
22 map and drawing the circles, this is what we're looking at.

23 Q And that depends not only on where you end the
24 CZD but whether you intersect it with a syncline or a
25 fault.

7
1 A. That's correct.

2 Q. As a general matter, as a zone moves towards
3 what may be the more significant to the master fault, would
4 one normally expect it to become narrower as in this
5 instance or would it be expected to become wider?

6 MR. CHANDLER: Mr. Pigott, could we ask for
7 some clarification of zones that we're talking about a
8 little bit?

9 MR. PIGOTT: Well I'm asking it as a general
10 matter and I'd like to know whether or not the witnesses
11 understand the question.

12 WITNESS KENNEDY: No. I think that you should
13 repeat it, clarify it. I don't understand it either.

14 BY MR. PIGOTT:

15 Q. The CZD, as you have it mapped, seems to narrow
16 as it approaches the OZD; is that correct?

17 A. (WITNESS GREENE) That's correct.

18 Q. Is that what you would expect to see as a
19 smaller fault comes towards the master fault, that it would
20 narrow as it comes in or would you expect it to be wider?

21 A. (WITNESS KENNEDY) I think that this sort
22 of pinching and swelling along sub-parallel and parallel
23 fault zones is not indicative to whether or not it's
24 joining another structure or whether it's coming to an
25 end. This could happen anyplace along a zone like that.

8
1 Q Inconclusive then.

2 A I think so.

3 Q I think perhaps we've reached the one last area,
4 that being the data voids.

5 First of all, as a general matter, looking at
6 the level of investigation and the closeness of the line
7 spacing --

8 JUDGE KELLEY: Would you clarify what this is
9 we're looking at?

10 MR. PIGOTT: I'm sorry.

11 This is what Applicants will verify later when
12 Dr. Moore takes the stand, but it is an overlay of the
13 track lines -- Applicants' track lines in this area over
14 the areas marked by Messrs. Kennedy and Greene as being
15 data voids.

16 JUDGE KELLEY: Is this at least a first cousin
17 of Plate 2 in the SER?

18 MR. PIGOTT: If it was not for a very slight
19 change in scale, in fact which was not intended, it was
20 supposed to be just exactly that, yes. But there may be a
21 slight change in scale such that I can't say it's identical.

22 JUDGE KELLEY: Okay.

23 MR. WHARTON: Mr. Chairr in, I believe there are
24 more track lines on the map on the board than listed in the
25 SER and that's the only evidence so far of what the track

9

1 line should be.

2 MR. PIGOTT: Listed in the SER?

3 JUDGE KELLEY: The Plate 2 of the SER is your
4 reference?

5 MR. WHARTON: Yes, Plate 2 of the SER.

6 JUDGE KELLEY: This is DGM-C from your testimony
7 I believe, which we haven't reached yet.

8 MR. PIGOTT: That's correct, yes.

9 BY MR. PIGOTT:

10 Q Let me ask directly Drs. Greene and Kennedy.
11 Does your Plate 2 attempt to depict all of the track lines
12 that were made available for the study area?

13 A. (WITNESS GREENE) No, it does not.

14 Q As a general question, as a general matter,
15 is the line spacing in this series of investigation as
16 intense or more intense or less intense, however you would
17 characterize it, than that found in most studies you have
18 encountered?

19 A. Well I can speak personally. It's the greatest
20 density of track lines that I've ever dealt with as far as
21 an area of this size. I've not had the fortune to have this
22 much data available to me.

23 Q And, Dr. Kennedy, can you express an opinion as
24 to the intensity of the data that you've had to study on this?

25 A. (WITNESS KENNEDY) I have worked in that same

10
1 kind of detail in the San Diego coastal area, but I agree
2 with Gary that this is an extremely tight series of track.

3 Q I believe you marked on your map a data void
4 approximately in the area of the postulated interconnection.

5 By looking at your track one and the visual
6 that's now on the screen, can you identify the two data
7 voids?

8 MR. CHANDLER: Mr. Pigott, are you talking about
9 Plate 1?

10 MR. PIGOTT: Plate 1, yes. I'm sorry.

11 MR. CHANDLER: Are you asking, Mr. Pigott, if
12 the data voids correspond in Plate 1 to your exhibit?

13 BY MR. PIGOTT:

14 Q Do you recognize this data void in here
15 corresponds with the data void indicated --

16 A Yes, in a crude fashion I would agree with you
17 on that.

18 Q Okay. Looking at that data void, which is the
19 one in the area of the postulated interconnection, could
20 you tell us precisely what it is that you were lacking at
21 that point?

22 A No, I can't. I can reiterate what we have said
23 about data voids, though. It was that it was not
24 necessarily a lack of geophysical profiles in that region.
25 It was that we felt that there were some problems with the

11 1 profile files and we couldn't use to identify what we were
2 looking for and so we just used that to identify it as the
3 data voids.

4 Q Taking a look at the spacing in that area, can
5 you either on Plate 1 or Plate 2 or the one on the screen
6 give us an estimate of the line spacing in that area?

7 I'd refer you to your own Plate 2 for that.

8 A The line spacing is variable throughout the
9 whole map.

10 Q Well I'm asking you to look at the line spacing
11 in the area of that alleged data void.

12 A Scaling it off crudely again, I would say that
13 line spacing is somewhere between 4,000 and 5,000 feet.

14 Q A mile?

15 MR. CHANDLER: Mr. Pigott, I think there may be
16 a lack of communication.

17 WITNESS GREENE: I'm measuring the scale on
18 here and we get around, you know, anywhere from 3300 feet,
19 something like that --

20 BY MR. PIGOTT:

21 Q Should we stay with your Plate 2?

22 MR. CHANDLER: Mr. Pigott, if I may suggest --
23 are you having reference to shock points or track lines?

24 BY MR. PIGOTT:

25 Q Do you have an answer? Do you have an estimate?

12 1 A. (WITNESS KENNEDY) Well I think it would help
2 if you were to say between what group of lines you'd like
3 this information; some of them are as close as 300 or 400
4 or 500 feet.

5 Q. In the area of greatest density.

6 A. (WITNESS GREENE) We'd like to add also though
7 that a lot of these records that show on this map are of
8 very high resolution, 3.5 kHz type information that was
9 not usable for our purpose and I think there are even such
10 lines as side scan information which we didn't, of course,
11 use.

12 Q. When it gets into this particular area of the
13 postulated interconnection, is the data void there because
14 there just wasn't a line that confirmed where you could see
15 an interconnection? Is that what we're dealing with? And,
16 for conservatism purposes, you didn't want to reach a
17 definitive conclusion that it did not connect, truncate,
18 merge?

19 A. (WITNESS GREENE) In that general region, recall-
20 ing the best I can here, is looking at the density that is
21 a variable density throughout the entire map. We did not have
22 the density of course there that we had elsewhere. And
23 that, yes, indeed, profiles did not cross the intersection
24 per se. Therefore we did not say absolutely that the
25 intersection was here or some other locality.

13

1 Q. Dr. Greene, that I can understand. With that
2 specification, is that what you mean by data void with
3 respect to the postulated interconnection?

4 A. Yes, that would be included within our
5 interpretation or our usage of data void.

6 Q. So you are not complaining of a lack of
7 general data in that area.

8 A. No, we're not complaining of a lack of general
9 data.

10 Q. But it just happened there wasn't a specific
11 line that went through that spot that you would have been
12 looking for.

13 A. That's correct.

14 Q. Looking to the areas marked "data void" that
15 would be directly offshore of the site -- and I think in
16 this instance you can use either your Plate 2 or the
17 visual that I have on the screen.

18 Q. First of all, going to your Plate 2, I believe
19 you stated that you did not map all of the track lines
20 available to you; is that correct?

21 A. That's correct. There's a considerable amount
22 of track lines that were given to us that go beyond the
23 scopes of the map and we did not use all of them. We used
24 the ones within the region where we had a few of our track
25 lines.

1 Q Should any significance be drawn from the use
2 of the data void labeled in the area directly offshore, the
3 site and out toward where the OZD is located?

4 A I don't understand what you mean by "sifnificance".

5 Q Why did you put data void out there?

6 A Well, if I can recall correctly, it was a
7 combination of both no data that we had and also the data
8 was not usable to us.

9 Q Do you recall what data you reviewed in that
10 area?

11 A Not offhand, no.

12 Q I believe in your report you indicate that you
13 examined marine advisor lines S-8 and S-9 and I direct you
14 to F-11, your table there.

15 A Marine advisors?

16 Q Yes. Intermediate penetration sparker
17 profiles. It says 5 through 9.

18 A Five through nine, right.

19 Q Yes. Eight and nine. Do you recall having
20 reviewed -- well you recall reviewing the marine advisors'
21 reports.

22 A I know that we reviewed those, yes.

23 Q Okay. Do you recall whether or not there was
24 usable information on those particular lines?

25 A Well I don't recall which lines per se were

1 usable and were not usable. It's not to say that one
2 survey was unusable compared to another survey. I cannot
3 recall. I cannot tell you specifically which profile would
4 be an unusable profile at this point.

5 Q Well, bear with me, gentlemen, but we're in an
6 area directly offshore of the site. As I look at what we
7 have on the overhead, I see a number of lines crossing
8 right through your words "data void".

9 A Yes.

10 Q In those areas and starting in the one that is
11 the furthest offshore, I would like to know why that's
12 called a "data void".

13 A Okay. Again going back to what we said before,
14 if there is a line going through there, the probability
15 of not having good enough data in there -- and there are
16 several ways that you cannot have good enough data in there;
17 it could be a very shallow region; it could be the
18 lithologies that exist on the sea floor. We just did not
19 have good seismic characteristics; we felt that we did not
20 have good seismic characteristics that could be used in
21 this interpretation.

22 Q How about with respect to the data void that
23 is in closer to shore and just the fact it straddles an
24 indication of a Woodward-Clyde boring? Do you recall why
25 it was you put data void in that particular location?

1 A. I would say the same reasoning would go into that
2 as we have stated before.

3 Q. There is a line that runs sort of across there
4 right under the letter "a" of "data" in that notation
5 closest to shore and near the site. Can you identify what
6 line that is?

7 A. Parallel to the coast?

8 Q. It's starting to turn parallel to the coast.
9 If you see, it goes right by the boring and then in towards
10 shore and then veers slightly to the south and west.

11 A. Do you want me to go up and read what is
12 written underneath that?

13 Q. If you can identify it, I'd appreciate it.
14 Is it labeled?

15 A. This would be an assumption on my part but,
16 looking at what I think may be the number to the start of
17 that line, I would say that number there, as I read it --
18 and it's very fuzzy -- is W71-106; that's how I read it.
19 It's fuzzy and it's difficult for me to see.

20 Perhaps you could tell me what it is.

21 Q. I thought it was S-26 but then these things
22 have gone through so many --

23 MR. PIGOTT: May the record show that I
24 conferred with the witnesses and we looked at what is
25 Plate No. 2 and did identify that as S-26.

1 BY MR. PIGOTT:

2 Q. Can you tell us which line S-26 would be, whose
3 data? I think it's marine advisors again.

4 A. I'm sorry. I can't tell you.

5 Q. Again I think it's marine advisors.

6 JUDGE KELLEY: Is "S" a symbol for a particular
7 set of data?

8 A. Unfortunately, I guess, when they started this
9 in 1970, they didn't realize they'd still be doing it in
10 1980 and no system was set up. It's very difficult all
11 the way through; there's no question.

12 MR. CHANDLER: Mr. Chairman, I believe with
13 reference to Plate 2, according to our legend, it's
14 marine advisors.

15 MR. PIGOTT: Mr. Chairman, we have Line S-26
16 with us. I think it would be a burden both on the witnesses
17 and the record to ask them to examine it on the record.

18 I would ask if we could go off the record for
19 a few minutes as they look at that particular line. I
20 think it's rather -- I don't think it's critical, but I
21 think it's sort of important that we deal with this data
22 void subject in its entirety.

23 JUDGE KELLEY: I think it should be clarified
24 as much as possible.

25 To reconvene at 4:30, we'll take ten minutes.

(Brief recess)

18
1

1 JUDGE KELLEY: Okay, we are back on the record,
2 and we will return to S-26 or -2, as it was.

3 Mr. Pigott, go ahead.

4 MR. PIGOTT: Thank you.

5 I have provided to Drs. Greene and Kennedy a
6 seismic profile -- well, let me ask them.

7 BY MR. PIGOTT:

8 Q Could you identify what it is that I have provided
9 you?

10 A (WITNESS GREENE) It is a seismic reflection profile.

11 Q Okay. And are you able to identify which seismic
12 reflection profile it is?

13 A The heading at the end of the profile says it is
14 marine advisor, and it has a Number 13 up there on the left.
15 And below, it has S-25 through -33; 309-415. I suspect that
16 is the shock points.

17 Q Were you able to locate on that the line, or
18 the equivalent to the line, S-26, that you have on your Plate 2?

19 A There is a notation that we can identify that says
20 S-27 and S-26.

21 Q And do you have any reason not to believe that that
22 is, in fact, the seismic profile you examined for putting
23 together your Plate Number 2 at that location?

24 A I have no reason to believe that it is not that
25 profile.

2 1 MR. CHANDLER: Mr. Pigott, excuse me one moment.

2 If that is the profile that I saw during the recess,
3 I believe it has some colored portions or highlighted portions
4 on that. I don't know that that was, in fact, the way it was
5 provided originally.

6 MR. PIGOTT: No, it wasn't, but I don't think it
7 has anything to do with the line of questions that I will be
8 asking, Mr. Chandler.

9 MR. WHARTON: Mr. Chairman, I don't believe we
10 have been supplied copies of what we are looking at right now.

11 JUDGE KELLEY: Yes, I don't see copies. I was
12 assuming that Counsel, and perhaps I mis-assumed, that this
13 was sort of a collaborative break here, where everybody was
14 going to try to find the line and where the data came from.

15 Did either party, Intervenors or the Staff,
16 participate in this exercise here at the break or not?

17 MR. WHARTON: It is my understanding that they
18 were going to be talking to the witnesses and then inform
19 what they were going to be looking at, but I haven't seen
20 what they are looking at as yet.

21 JUDGE KELLEY: Well, I take it we have a logistical
22 problem, again. This is, as I understand it, the raw data
23 given to Kennedy and Greene to perform their work?

24 MR. PIGOTT: Yes.

25 JUDGE KELLEY: It is awkward not to have Counsel

3

1 in the position to have copies. I gather you just don't
2 have any here?

3 MR. PIGOTT: I don't have any, nor would I intend
4 to supply copies of it all. It is to refresh the witness'
5 memory. They have, I believe, and as an Officer of the court
6 would affirm, that they have had copies of this data for
7 their use in their investigation. There is no question that
8 they cannot remember every seismic profile they have seen.
9 As they put together their investigation and as we approach
10 the various points, this is used to do no more than assist
11 them in testifying concerning their map.

12 If Intervenors have any reason to dispute the
13 authenticity of the documents they are looking at, or if
14 the witnesses do, or if NRC do, I would be more than happy
15 to entertain the objections.

16 However, this is not to be identified as an
17 exhibit. This is to be used as, in effect, a refreshing
18 device for the witnesses.

19 MR. CHANDLER: I think Mr. Wharton is entitled
20 to view that thing. I would suggest perhaps we take another
21 couple of minutes --

22 MR. PIGOTT: I would ask, first of all, if they
23 have anybody who is competent to review it.

24 MR. WHARTON: Mr. Chairman, I think, whether we
25 have anybody who is competent to review it is irrelevant,

4 1 totally. We don't have the document in front of us. He
2 is going to be asking questions about what these seismic
3 profiles mean. Whatever questions they say, we are going to
4 be either going on cross-examination -- well, cross-examination,
5 and I think we are entitled to at least have the documents
6 in front of us.

7 I have gone over these. I don't know how to
8 review them, but Mr. Barlow does. He has reviewed them in the
9 past.

10 MR. CHANDLER: I think my suggestion is being
11 expanded quite a little bit.

12 What I was suggesting, Mr. Chairman, is perhaps
13 we could take a couple of minutes while Mr. Wharton and
14 Mr. Barlow perhaps take a look at the profile.

15 JUDGE KELLEY: Well, I think, failing extra copies,
16 that would be a useful thing to do at this point. It depends,
17 it seems to me, a lot on what Mr. Pigott wants to go with
18 this, and it may well be that he is going off in a direction
19 where it doesn't much matter whether we have got it in front
20 of us or not, but I think, for now, if we want to break for
21 two or three minutes while you and Mr. Barlow and Mr. Chandler,
22 if he chooses to, take a fairly hard look at this paper,
23 that would be at least a partial, if not a complete, answer.

24 (Recess.)

25 JUDGE KELLEY: Back on the record.

5 1 MR. WHARTON: Yes, Mr. Chairman. I would object
2 to these profiles being used for any purpose at this time.
3 They are profiles with highlights on them in blue and yellow,
4 or blue and red, I believe. I don't think it is appropriate
5 to present a highlighted seismic profile to a witness and
6 ask him what he finds in looking at a highlighted profile.
7 It is totally inappropriate.

8 MR. PIGOTT: I haven't asked him whether they
9 find anything on there, and I don't intend to ask him if they

10 MR. WHARTON: Well, then, I would like to find out
11 where this is going, because I am really not sure.

12 JUDGE KELLEY: Let me ask. Mr. Pigott, could you
13 give us an indication, with this in front of the witnesses,
14 where you would propose to go?

15 MR. PIGOTT: Yes. There are areas marked on the
16 maps indicating data voids. We have had definition from the
17 witnesses as to how they have used that term. I believe we
18 have discussed at least one significant area where the words
19 "data void" appear, that being the postulated connection.

20 JUDGE KELLEY: Could you just add, postulated
21 connection of what? Of the CZD and the OZD?

22 MR. PIGOTT: Yes, CZD and the OZD, as they have
23 been styled.

24 JUDGE KELLEY: All right.

25 MR. PIGOTT: A second area I think of interest is

6
1 the area directly offshore, the site, where there is also
2 two markings of data void, one in closer to shore, and one
3 apparently in about the same line offshore.

4 Plate Number 2 that Messrs. Greene and Kennedy
5 have placed into evidence show a line, S-26, which cuts
6 approximately through the words "data void;" almost take the
7 leg off one of the "a's," and it is labeled as "26." What we
8 have here is S-26.

9 Now, what we would like to know is whether that
10 is labeled -- it is obviously not data void, because there
11 wasn't a line running through there.

12 I would like to ask them, with their memory, in
13 effect, refreshed, again because of the voluminous data that
14 they have examined in this investigation, why it was they
15 wrote "data void." Is it because S-26 lines are of such poor
16 quality, or is it simply because perhaps there is nothing there?

17 But, in any event, I think that this is an
18 appropriate way to, in effect, clear up a rather significant
19 question in this record. I am not offering it as evidence;
20 therefore, I don't have to serve a lot of copies.

21 They have been offered an opportunity to look at
22 it, perhaps understand it. Certainly, the witnesses have had
23 a chance to look at it. I would not mind if they took more
24 time to go back to their own files and get their own S-26
25 line, if that is what they felt was necessary, but I would

7
1 like to know precisely why they used the words "data void"
2 in that location.

3 MR. WHARTON: Mr. Chairman, under the circumstances
4 of what appears to be not an altered document but a marked
5 document, if you are asking them to make determinations, I
6 believe they should go to the documents that they originally
7 made the determination from, because that is what the map is
8 drawn from.

9 We have not authenticated that this particular
10 seismic profile is the exact profile that Dr. Greene and
11 Dr. Kennedy made their decision from, and combining on that
12 the fact that it is marked and altered in some way, that
13 there is red and blue on it, I would think that if he wants
14 to do that, he should go to the data that they relied on,
15 and not something that Mr. Pigott is representing is what
16 they relied on, without any foundation that they did.

17 MR. CHANDLER: Mr. Chairman, if I may?

18 JUDGE KELLEY: Let me just respond to that.

19 I would assume that the documents from which they
20 did their work are not the documents sitting in front of them
21 now. I assume that this is the Applicant's document that
22 they have come up with, and that their original data papers
23 that they got from the Applicant are back in their files
24 somewhere.

25 You said, I believe, in response to an earlier

8 1 question, words to the effect, at least, you couldn't say
2 this wasn't what you had before you, but given that you had a
3 lot of paper, it might be too much to ask you to verify that
4 this very paper is what you used.

5 I am assuming it is an Applicant's document, in
6 that sense, and that the marine associates made however many
7 copies, or they got Xeroxed, and they got used in that fashion.

8 I have not looked at this myself. Even assuming
9 there are grease-pencil markings or yellows and blues, or
10 whatever, how would those kinds of markings bear on the line
11 of questioning that the Applicants, Mr. Pigott, wants to pursue?

12 MR. WHARTON: As I said, not being able to read
13 them, myself, I don't know. It seems to indicate to me some
14 highlight, but I don't know exactly what they do.

15 If you are asking Mr. Barlow, since he has some
16 information about that, I guess we could ask the witnesses.

17 JUDGE KELLEY: Mr. Barlow.

18 MR. BARLOW: Can you repeat the question?

19 JUDGE KELLEY: I didn't ask a question.

20 What were you going to say?

21 Oh, I did have a question, that is right; why
22 would what Mr. Pigott wants to get into be affected one way
23 or the other by the colored lines that I am being told are
24 on there?

25 MR. PIGOTT: I would like to know how Mr. Barlow

9 1 knows anything about what those lines may or may not be.

2 MR. BARLOW: Well, I have had experience --

3 JUDGE KELLEY: I am sure he will tell us. Go ahead.

4 MR. BARLOW: The nature of the highlights on the
5 profile could influence an analysis of the quality of the
6 data that they are looking at, and that was one of the
7 characteristics that was considered when discussing data voids,
8 the quality of the data; you know, if there was data, but
9 it was of poor quality, then it wasn't considered.

10 In this case, this profile has been highlighted
11 with someone else's interpretations.

12 JUDGE KELLEY: Any comment, Mr. Chandler?

13 MR. CHANDLER: Yes, sir. If my recollection serves
14 me, the highlighting that does appear there is transparent
15 highlighting. It is not as if an opaque line has been drawn
16 over to emphasize certain portions.

17 I am confident that if this brief review of the
18 profiles is indeed sufficient to refresh their recollections,
19 that these gentlemen are of sufficient technical proficiency
20 and sophistication that they would not be unduly influenced
21 by some crayoning or coloration that may appear.

22 JUDGE KELLEY: Let me ask the witnesses whether,
23 in their judgment, the kind of highlighting we have been
24 talking about would have any bearing at all on your likely
25 responses to the line of questions Mr. Pigott says he would

10

1 like to put to you.

2 WITNESS GREENE: Well, the lines that are drawn
3 on here are lines that depict structural interpretations, so
4 we would be influenced in that type of situation, if we
5 were asked about structural problems here.

6 We could move on, I suspect, to another portion
7 of the record, where there is no coloring, and perhaps answer
8 questions that deal with quality of the record, in general.

9 JUDGE KELLEY: So, if I follow you, these lines
10 would indicate this is a fault, or this is maybe a fault, or
11 it is a syncline, or something like that?

12 WITNESS GREENE: Yes, that is correct.

13 JUDGE KELLEY: And this then also bears on, or
14 could bear on, the question of, why is this marked "data void?"
15 Because -- well, you tell me.

16 WITNESS GREENE: Well, the question, as I under-
17 stand it, is why did we mark "data void" when we have a
18 profile like this in that general region?

19 JUDGE KELLEY: I think that is basically the
20 question.

21 WITNESS GREENE: I don't know. I am asking the
22 question.

23 MR. PIGOTT: That is an excellent question.

24 WITNESS GREENE: I just led myself into something.
25 Well, moving aside from the cartoon in here, and

11

1 I am not meaning to be facetious, the record is generally a
2 noisy record. It rings a lot, and has a lot of hyperbolics
3 in it, which are some of the characteristics that we use as
4 a record that is difficult to interpret.

5 JUDGE KELLEY: Let me just interrupt, to be clear
6 just exactly where we are, I feel I am still in the midst of
7 an objection to using this at all, and I am trying to nail
8 down whether or not, really, the kinds of markings that have
9 been referred to are going to influence you one way or the
10 other in answering the questions Mr. Pigott wants to ask,
11 and let's take that example.

12 Why did you mark this as a "data void?" Do these
13 interpretive marks have anything to do with your answer to
14 that question?

15 WITNESS GREENE: The question I gave, do they have
16 anything to do with it?

17 JUDGE KELLEY: Yes.

18 WITNESS GREENE: No.

19 JUDGE KELLEY: Then why don't you go ahead and
20 answer it? Objection is overruled, at least as to that question.

21 WITNESS GREENE: I thought I had.

22 JUDGE KELLEY: Go ahead and answer it again, please.

23 MR. PIGOTT: Your question was so good you can
24 answer it twice, Dr. Greene.

25 WITNESS GREENE: Okay. Looking at the other portion

12 1 of the record, the record is what we would call noisy. It has
2 hyperbolics in it. There is some ringing associated with it,
3 and that makes for difficult interpretations.

4 JUDGE KELLEY: So that the portion of the record
5 you just characterized comes out on the map as a data void?

6 WITNESS GREENE: That could be one of the reasons
7 that we used for a data void; that is correct.

8 BY MR. PIGOTT:

9 Q Now, you were not looking at S-26 when you gave
10 that answer, were you, or were you looking up further?

11 A If I am looking at this correctly, this is S-26.
12 On this profile, we are looking at the right-hand portion of
13 S-26. Now, I can't tell you whether that is north or south.

14 Q Does that appear to turn a corner; to have run
15 along the strike and then turned a corner? Can you tell?

16 A I can't make that interpretation.

17 Q On the left portion of what you have there as
18 S-26, does the quality of the data -- is it of the same nature
19 as you just described?

20 A Well, I prefer not to answer that, because this
21 was one of the reasons we went to the right portion, because
22 of the line drawings that are on the left portion, and it is
23 difficult, when you have lines over there, to really make a
24 good comparison as far as quality is concerned.

25

rp19-1

1 Q Can you turn to S-27 on that script. Are there
2 any marks on S-27, first of all?

3 MR. CHANDLER: Mr. Pigott, while the gentlemen
4 are looking, could you identify on Plate 2 where S-27 would
5 be?

6 MR. PIGOTT: I don't think they've included
7 S-27 except that it would run directly in shore from -- S-27
8 is a marine advisors' line still.

9 MR. WHARTON: Mr. Chairman, I'd object at this
10 time. I don't have S-27. I don't see S-27 in evidence
11 anywhere and I don't think anybody here knows exactly what
12 line he's talking about.

13 MR. PIGOTT: If I could continue my statement at
14 least to its conclusion.

15 S-27, I believe, is indicated in the Marine
16 Advisors' Report which goes with that raw data and which
17 I'm sure was available to the witnesses as a line directly
18 offshore intersecting with S-26 someplace towards its
19 offshore termination.

20 JUDGE KELLEY: Now let me be clear.

21 Are we still on this disputed memory refresher
22 or are we back somewhere else?

23 MR. PIGOTT: No. We're still on the memory
24 refresher.

25 JUDGE KELLEY: Okay.

1 MR. WHARTON: Mr. Chairman, I object to any
2 reference to S-27, without the Intervenors having a copy of
3 what it is it is referring to. There is no foundation that,
4 in fact, the witnesses did use S-27 at the time, and how
5 they used it. There is no foundation and there is no document
6 here for us to refer to.

7 JUDGE KELLEY: Well, I don't think we should
8 have to re-litigate the use of this piece of paper, or pieces
9 of paper, every time a new question comes on.

10 It is certainly not, as I have said before, the
11 best situation, to not have extra copies for other people to
12 see. On the other hand, this is being used in a limited
13 fashion. It is not being marked or admitted. And it is, as
14 the witnesses have stated, I believe, what they used in compiling
15 this particular study.

16 The clumsy part is that we have to keep looking
17 at it, so that Counsel can have some reasonable opportunity
18 to follow the question. So, lacking other copies, I don't
19 see any way to avoid that. If we need to stop again for a
20 couple of minutes for you to look at S-27, then we will do
21 that, too.

22 The witnesses have this document now, is that
23 correct?

24 WITNESS GREENE: That is correct.

25 JUDGE KELLEY: All right. Could you show

1 Mr. Wharton and Mr. Chandler, if he wishes, what is being
2 referred to?

3 (The witness complies.)

4 JUDGE KELLEY: Okay. Can we go back then,
5 Mr. Pigott, to your question about S-27? Do you want to
6 rephrase it?

7 MR. PIGOTT: Okay, fine.

8 BY MR. PIGOTT:

9 Q Do you have S-27 in front of you now?

10 A (WITNESS GREENE) Yes, as it is identified here, yes.

11 Q Could you comment on the quality of the data
12 reflected in S-27?

13 A I think we would say it was poor quality.

14 Q Is it useable quality? Would it show the presence
15 of structures of one kind or another?

16 A Well, that is a difficult question to answer right
17 here, looking at this. We did not include this profile in
18 our interpretation, as you know.

19 Q Yes, I know.

20 A Because it is stated in there which ones we used.
21 And I am uncertain whether we didn't use it because we didn't
22 have it, we didn't have the track line for it, or we rejected
23 it, out of the fact that it was of poor quality.

24 Q Without reference to any particular pieces of
25 paper in front of you, is it fair to say that you approached

1 your job of interpreting in this particular project with
2 a great deal of caution?

3 A That is correct.

4 Q And the interpretations that you placed on the data
5 you have reviewed are conservative?

6 A I am uncertain how you use "conservative."

7 Q Well, in this proceeding, it is a bad word to use.
8 When looking at data, and you had a choice, given
9 the context of this proceeding and you had a choice between
10 erring on the side of including too much or omitting too much,
11 would I be correct in assuming that your error would probably
12 be in including too much?

13 A No.

14 MR. WHARTON: I object to the form of the question
15 as being argumentative. He can ask the question directly.

16 JUDGE KELLEY: Overruled. I think it is appropriate.

17 THE WITNESS: No, I would not answer that that way.

18 BY MR. PIGOTT:

19 Q How would you characterize your approach to let's
20 say the element of inclusiveness of structures?

21 A Well, I think the best way to explain that is
22 in the laborious process that we went through, in going
23 through our interpretation. It was more extensive, a more
24 extensive process, than may normally take place.

25 Generally, what we did is, we went through the

1 profiles at least three times. The first time we went
2 through and picked out structures that boomed out in the
3 profile; that is, that were very, very apparent that they
4 existed, and we plotted those on a map. We then went back to
5 the profiles and made very detailed line drawings of the
6 profiles and looking in detail for any other structures that
7 we could identify, and we mapped those.

8 Then we went back the third time and compared
9 what we had done the first time and what we had done the
10 second time, and we rejected structures that were very weak,
11 or structures we felt we could not correlate from one line
12 to the next.

13 So that we, in a sense, filtered our interpretation,
14 so that what we ended up with, I feel, is a map that holds a
15 great deal of confidence on our part as far as the structures
16 that exist there.

17 Q However, as we went before, the level of those
18 interpretations we must take as a guide; the dashes and the
19 question marks, et cetera?

20 A That is right. When we got into the area of
21 rejecting structures, those that were there, or that we felt
22 we could correlate, that there was something in the records
23 to indicate that there was a disturbance of some sort that
24 could be related to a fault or a fold, that, yes, we felt
25 that we could correlate that, and we would then apply the

1 degree of competence we had on that correlation, which is
2 shown in the inferred symbols and the questionably-inferred
3 symbols.

4 Mike, do you have anything else to add on that.

5 WITNESS KENNEDY: No, I agree with that.

6 MR. FIGOTT: I think that would end the cross-
7 examination of these two gentlemen. Unfortunately, with the
8 problems of documents, it took a little longer than I would
9 have thought, and I am going to have to ask unfortunately,
10 Dr. Kennedy, that you be available for further cross-examination
11 on your further direct evidence.

12 It is now the appointed time.

13 JUDGE KELLEY: Well, we have got a little more
14 time this afternoon. It does seem to me, though, that
15 obviously we are going over to -- the next step would be, if
16 we continue this afternoon, you would do the cross-examination
17 of Dr. Kennedy on the Rose Canyon portion of the Intervenor's
18 direct, followed by the Intervenor's cross, and we can stay
19 here to a maximum of 5:30, so we could get a little more done
20 this afternoon.

21 But we, in any case, would need to have both
22 Drs. Greene and Kennedy tomorrow. Even assuming Mr. Pigott
23 may finish his cross, as I understand it in my own mind now,
24 we would need both of you tomorrow morning for a time, and
25 we would have liked to have accommodated your schedules a

1 little better, but I guess we just can't do that, and we
2 will be calling you back later, which you have indicated
3 was either not possible or not very appealing.

4 MR. WHARTON: Could I ask about the availability
5 of Dr. Greene tomorrow? How long?

6 JUDGE KELLEY: Okay. Dr. Greene, you had a change
7 of plane and if you juggled things a bit, how long could you
8 stay?

9 WITNESS GREENE: Well, my present flight is at
10 10:00. I would have to check and see what later flights are
11 available to me.

12 JUDGE KELLEY: That wouldn't give us much time at
13 all. Well, could you check and just let us know first thing
14 in the morning? I think you will have to bear in mind that
15 you just may have to be recalled if you have to leave early.

16 WITNESS GREENE: Yes.

17 MR. CHANDLER: Do I understand, Mr. Wharton,
18 that, say, within half an hour, you could not conclude your
19 cross-examination of, for example, these two gentlemen, if
20 that were to be varied a little bit?

21 MR. WHARTON: Well, I don't think I am next, for
22 one thing.

23 MR. CHANDLER: No, I understand that, under the
24 procedure we had discussed earlier.

25 MR. WHARTON: What was your question, again? For

1 all of us to finish our cross-examination?

2 MR. CHANDLER: No. If you would be able to --
3 assuming you did cross-examination of Drs. Greene and Kennedy,
4 on the reports that are in the SER, that could be concluded,
5 so that Dr. Greene would essentially be completed, and that
6 tomorrow, we would resume with the cross of Dr. Kennedy by
7 the Applicants, then yourself, and the Staff.

8 MR. WHARTON: I don't believe we can do it in
9 half an hour, no.

10 JUDGE KELLEY: I don't see how, either.

11 MR. CHANDLER: It is worth a shot.

12 JUDGE KELLEY: Sure, but I don't think that that
13 would work, given the scope of the thing and the fact that
14 the Greene-Kennedy testimony is pretty important in the case
15 to everybody, really.

16 So we can do a little more this afternoon.

17 Mr. Pigott, I guess you could pick up on your
18 direct on Dr. Greene and go for 20 minutes or so.

19 MR. CHANDLER: Can Dr. Greene step down?

20 JUDGE KELLEY: Yes. Thank you.

21 (Witness Greene was excused.)

22 JUDGE KELLEY: I would just note, too, I am sure
23 the Board will have some questions of these witnesses, both
24 of them. That would have to be fit in, so we will just have
25 to go over to tomorrow.

1 BY MR. PIGOTT:

2 Q Dr. Kennedy, are you a member of the San Diego
3 Association of Geologists?

4 A (WITNESS KENNEDY) No, I am not.

5 Q Would you describe for us how you came to be
6 placing these particular articles in this -- I believe it
7 was a field trip-type meeting, was it not?

8 A This book was compiled for a number of different
9 small field trips for the National GSA meeting that met here
10 in San Diego.

11 Q Can you describe for us how such a book or meeting
12 is put together? The solicitation of papers, et cetera?

13 A Well, commonly, at a national or section meeting
14 for a society, like the Geological Society of America, people
15 within the school sponsoring that particular meeting, in
16 this case San Diego State University, put together a number
17 of different field trips, and various people are asked to
18 contribute to those guide books that can give overviews for
19 the area that the trips are planned.

20 Q Were you personally requested to put together such
21 an overview?

22 A We were asked, yes.

23 Q Okay. When you say "we," who are you referring to?

24 A In the case of the different articles, I was
25 asked for the one that I am sole author for, and Mark Legg

1 and I were asked for the Mexico work, and Gary Green and I
2 were asked for the other paper.

3 Q Okay. And can you estimate for us approximately
4 how much time went into writing, let's say, the article,
5 "Implications of Fault Patterns of the Inter-California
6 Continental Borderline Between San Pedro and San Diego?"

7 A As I mentioned earlier, Gary Green wrote the
8 initial draft of that paper. We have been involved in a
9 research effort on the Southern California Borderline for
10 many years.

11 My direct input came mainly by way of review and
12 contributions in the San Diego area and on review and
13 corrections on the map. Maybe I spent in the order of a few
14 days to a week; something on that order.

15 /////
16
17
18
19
20
21
22
23
24
25

1
2 Q And I believe you used the word "speculative"
3 with respect to these articles at one time. Could you --
4 first of all, did you use that word in the context of these
5 articles?

6 A (WITNESS KENNEDY) If not the word "speculative,"
7 at least it is to present a model, conceptual model, I might
8 have used the word "speculative."

9 Q Is there a degree of difference between the ty;
10 of research and the intensity of scrutiny that goes into,
11 well, these particular articles versus the two articles that
have spent much more time on that are found in the SER?

13 A Well, there is a tremendous amount of effort that
14 predates the writing of an article like that. Years of work
15 has brought us to a point that we could write an article like
16 that in a very short amount of time, obviously.

17 The actual time spent on reviewing the records for
18 such a large area, I mean, there is years of effort in looking
19 at the records and getting to a point that we could write
20 that very quick article, but the actual time spent on writing
21 that article versus the one that you are referring to, that
22 we did for the NRC, certainly more time went into that, for
23 the article itself.

24 Q And there would be a much more -- would there be
25 a different level of review and intensity in putting together

2
1 the article on the SER?

2 A No, I don't believe so.

3 Q With respect to the article, "Implications of
4 Fault Patterns of the Inner California Continental Borderland
5 between San Pedro and San Diego," am I correct in understanding
6 that you had before you the two surveys by USGS?

7 A Yes, we did have.

8 Q And none of the other data that was later used
9 in coming to your report for the NRC?

10 A I believe that is correct. I am not certain that
11 there wasn't other information that we used that we also
12 looked at for the review for the NRC.

13 Q And in any event, in your contribution to the
14 article, you contributed with respect to the area south of
15 Oceanside, and east of the San Diego trough, is that correct?

16 A That is correct.

17 Q So you did not have involvement with respect to
18 the area of the South Coast Offshore fault, and the
19 Cristianitos zone of deformation that we have been discussing?

20 A Well, I have certainly looked at all of the
21 profiles, of course, through the borderland, but with respect
22 to putting together that paper and the development of that
23 map, that is correct.

24 Q I am turning to the other article, which begins on
25 page 29, "Faulting Offshore San Diego and Northern Baja

3
1 California, which you wrote with Mark Legg. Mark Legg²³¹⁵ was a
2 student author, is that correct?

3 A The work here represents a portion of what Mark
4 Legg had been working on for a number of years for his
5 doctoral dissertation at Scripps Institution, so he was the
6 principal author, not a -- he was a student at the time, but
7 not to be misconstrued with student author, or second author.

8 Q Oh, no, that was not what I meant.

9 A No, okay. Okay.

10 Q I mean, his status was that of a student seeking
11 a degree at the time he wrote this?

12 A That is correct.

13 Q And your contribution, looking at figure 1, did
14 you draft figure 1?

15 A No, that was drafted by Mark.

16 Q With respect to the conclusions set forth in that
17 article, looking at page 41, I believe that you would limit
18 your opinions to the areas north of the Mexican border, is
19 that correct?

20 A That is correct.

21 Q And you expressed no opinion on the continuation
22 of the various faults into Mexico?

23 A I am aware of what is in the literature, and have
24 given thought and consideration to this problem in a model
25 and conceptual sense, but it is not an area that I have worked

4
1 in myself.

2 Q Likewise, over the page, on page 42, last line of
3 the -- the last line before conclusions, where it says the
4 occurrence of moderate size, M_L 5 to 6 earthquakes along this
5 fault zone within heavily populated regions of the San Diego
6 coastal area could cause extensive damage. That estimate is
7 not yours, is it?

8 A That estimate, and that statement doesn't sound
9 unreasonable to me, and could have come from discussions
10 between myself and Mark Legg and other people on the faculty
11 at, say UCSD, other places.

12 Q Would that be your opinion of the maximum earth-
13 quake to be expected along the Rose Canyon fault within this
14 area?

15 A I don't feel I am in a position to answer that
16 kind of question. I haven't done any magnitude type studies
17 on the Rose Canyon fault zone.

18 Q How should we characterize this last statement,
19 then, which you don't really disavow, but don't really
20 accept either?

21 A No, I think it says the occurrence of moderate-
22 sized earthquakes along this zone, in other words, what is
23 meant by that, if a moderate earthquake of that size were to
24 be generated, that it certainly could cause damage. The gee
25 whiz of that statement is that damage could be caused, I think,

5 1 from that size earthquake.

2 Q Looking at your -- have taken it down,
3 unfortunately, map 42, I believe it is, the California map?

4 A Yes. Do you want it back up?

5 Q I guess we should really look at it.

6 MR. WHARTON: Mr. Chairman, I believe there is
7 a -- there was a motion to introduce them into evidence. I
8 believe Mr. Chandler has had a chance to review, and I would
9 move that map sheet 42 and the accompanying literature with
10 that be introduced into evidence at this time.

11 MR. CHANDLER: On the contrary, Mr. Chairman.
12 Mr. Chandler has not been provided a copy of the map, or of
13 the enclosed document. Mr. Chandler was provided a copy and
14 when the Board didn't have a copy, Mr. Chandler provided his
15 copy to the Board. Mr. Chandler has not received a copy of
16 the text that accompanies it yet.

17 MR. PIGOTT: I am more interested in proceeding.
18 I think it is an official map of the State of California,
19 and the Board can take judicial notice of it. Nuts to all
20 these copies.

21 JUDGE KELLEY: It is late in the day for that.
22 This is the great big map we looked at earlier,
23 right?

24 MR. CHANDLER: I believe that is the one behind
25 the board.

6 1 JUDGE KELLEY: Whether by official notice or
2 otherwise, I am going to admit it into evidence at this point.

3 MR. CHANDLER: And the accompanying literature?

4 JUDGE KELLEY: Can I see that?

5 MR. CHANDLER: Yes. Will the Staff receive a
6 copy and will the reporter be provided with the requisite
7 number of copies?

8 JUDGE KELLEY: The introducer is Mr. Wharton, I
9 believe. How about copies for Mr. Chandler and the reporter?
10 Okay. This is in effect a legend for the map, correct?

11 MR. WHARTON: Yes, it is.

12 MR. PIGOTT: Perhaps we could have a description
13 of what it is.

14 JUDGE KELLEY: That would be useful at this point.
15 We are going to admit the map. Would you just describe this
16 map sheet 42, its function?

17 WITNESS KENNEDY: The booklet with map sheet 42 is
18 a short discussion of the techniques used, and the general
19 findings of the overall marine geophysical survey of the area.

20 JUDGE KELLEY: But it is in effect a part of, and
21 integral to the map itself?

22 WITNESS KENNEDY: Very definitely. It is the
23 explanation.

24 JUDGE KELLEY: Thank you. Well, it, too, then,
25 will be admitted as Intervenor Exhibit -- did we give the

7
1 reporter a number?

2 MR. WHARTON: Number 3.

3 JUDGE KELLEY: Number 3.

4 MR. WHARTON: Yes, it might be preferable if the
5 map was labelled as 3 and the text labelled as 3(a).

6 JUDGE KELLEY: Did you get that? 3 for the map,
7 3(a) for the map sheet.

8 (Whereupon, the abovementioned
9 document was marked as
10 Intervenor's Exhibit No. 3(a))
11 (Intervenor's Exhibits 3 and 3(a)
12 were thereupon received into
13 evidence)

14 BY MR. PIGOTT:

15 Q Looking at the map 42, Dr. Kennedy, you have
16 extended your knowledge to the Mexican border, is that
17 correct? And you have not extended beyond the Mexican
18 border?

19 A (WITNESS KENNEDY) That is correct. The surveys
20 stop at the Mexican border.

21 Q With respect to the Spanish Bight, am I correct
22 in interpreting your map that that does not extend to the
23 Mexican border?

24 A The Spanish Bight fault, it does not extend to
25 the Mexican border, that is correct.

8 1 Q How about the Coronado faults?

2 A No, it does not either.

3 Q Does the Rose Canyon fault zone extend to the
4 Mexican border?

5 A As defined in this paper, yes it does.

6 Q When you say as defined in this paper, it sounds
7 as though that it is expressing something other than your
8 opinion, is --

9 A No, this is my paper, and that is my opinion, yes.

10 Q So your statement is that the Rose Canyon fault
11 zone extends to the Mexican border?

12 A Yes, that is correct.

13 Q But you have no knowledge as to what happens to it
14 beyond that point?

15 A That is correct also. I would like to add to
16 that position. It is, a major fault such as the Silver Strand
17 fault I don't believe stops magically at the international
18 boundary, but I have no strong feelings for how far it
19 continues into Mexico or what its relationship to other
20 en echelon faults might be.

21 Q The Silver Strand, you do have mapped to the
22 Mexican border?

23 A That is correct.

24 Q Yeah, I didn't ask you about that. I asked you
25 about the ones that did not.

9 1 A Oh, excuse me, the Rose Canyon fault zone, then,
2 instead of the Silver Strand fault, excuse me.

3 Q Earlier today, you quoted a slip rate on the Rose
4 Canyon fault zone of one to two meters per ten thousands years,
5 or was it thousand years?

6 A Thousand, one thousand.

7 Q Per thousand years. That is a horizontal slip
8 rate, is that correct?

9 A I reported two, but yes, the one that you just
10 quoted referred to the horizontal separation.

11 Q And when was this data gathered?

12 A Through a period of about six years mapping in
13 the San Diego area.

14 Q Which six years?

15 A The work began officially in about 1966, and
16 mapping through the area of La Jolla, Point Loma, and south
17 along San Diego Bay, actually wasn't -- didn't culminated
18 until approximately 1975.

19 Q Have you done any work since then?

20 A In the offshore region only.

21 Q Well, I was thinking onshore for purposes of
22 slip rate. I was looking at the slip rate. Have you done
23 additional slip rate work since then?

24 A 1975 was the last work that I have done in the
25 onshore region and that would include work on slip rates in

10

1 the onshore part of the Rose Canyon.

2 Q Do you have -- are you aware of a report by Dr.
3 Tureet that postdates your work with respect to slip rate on
4 the Rose Canyon fault zone?

5 A Yes. I think I know the report that you are
6 referring to.

7 Q And it questions several of your conclusions, does
8 it not?

9 A It does, which I might add I take as a compliment.

10 Q Do you maintain that your conclusions and your
11 data are the accurate ones?

12 A I do.

13 Q You have to find out. Can you tell us what
14 information precisely that you need in order to measure slip
15 rate on any particular fault?

16 A Well, you certainly have to have information
17 related to separation, as I have pointed out, these rates are
18 based on mapped separations having to do with offset
19 stratigraphic intervals, and you certainly have to have
20 information on the age of those offset stratigraphic
21 intervals. Ideally, one would have piercing points within
22 the section.

23 Q Did you have piercing points within the section
24 on the Rose Canyon fault?

25 A There are several places within the section that

1 have been interpreted as piercing points or near-piercing²³²³
2 points. It is -- in this particular case, these are
3 interpreted as piercing points. They are not like a single
4 circles being cut in half and being able to -- we didn't certain-
5 ly have that kind of precision.

6 Q So you accepted some interpretive piercing points
7 for the purposes of your calculations, is that right?

8 A Yes, we did.

9 Q Okay, who interpreted them?

10 A I have done part of the interpretation. There
11 have been others that I have talked to through the years that
12 have had similar interests in this area.

13 Q Who?

14 A Gee, many people within the geological survey,
15 many people at Scripps Institution where I reside, people at
16 San Diego State University, discussions with many of my
17 colleagues. Do you want a list of names?

18 Q I would like to know who primarily you rely on
19 in coming to this interpretation, yes.

20 A Primarily on myself.

21 Q And anybody else?

22 A Not primarily, no.

23 Q Secondly, then.

24 A Oh, let us see. Phil Kern, Gary Petersen, George
25 Moore of the USGS, Jack Bedder (ph), Bob Yerkes, Gary Green.

12

1 Do you want me to just keep going?

2 Q No, I would like you to stop when you run out of
3 names.

4 A Okay, well.

5 Q Are there any publications that you rely on,
6 other than your own?

7 A Most certainly. Many of the people, as a matter
8 of fact, that I just mentioned, have done detailed
9 stratigraphic work in the San Diego area, and I have discussed
10 this work with them and have used that information in coming
11 to my conclusions.

12 Q Could you describe precisely the piercing points
13 that you inferred or used for coming to your separation?

14 A Certainly one of the key piercing points lies
15 within the Pliocene part of the section, which I have
16 interpreted as a feather edge, within the San Diego Formation.
17 It can be seen to the southeast of the Rose Canyon fault zone
18 in the area of Tecolote Canyon, it is facies or feather
19 edge.

20 Q I am sorry, what was the name of the canyon?

21 A Tecolote Canyon. This feather edge, which has
22 been questioned by others, is based on a molluscan fauna,
23 very near-shore fauna, and other parameters to suggest a very
24 near-shore environment. This similar facies lies on the west
25 side of the fault zone in the Pacific Beach area.

1 Q When you say similar, is that exact? What is your ²³²⁵
2 level of confidence on that?

3 A That is the interpretation.

4 Q That is your interpretation?

5 A That is correct.

6 Q Are you referring to a document when you answer
7 these questions? Do you have a paper or something on this
8 that you are now referring to, or is this from memory?

9 A This is information that I have first-hand that
10 I have no question about.

11 Q No, I mean as we sit here now, Dr. Kennedy, here.

12 A I am not referring to a document.

13 Q Okay, you are testifying from memory?

14 A If you want to call it that, yes.

15 Q It is either one or the other.

16 JUDGE KELLEY: Mr. Pigott, let me interrupt. I
17 don't know that this is a particularly logical breakpoint, but
18 I did commit to the management that we would be out of here
19 at 5:30. It is about 5:27. Could you break here and pick
20 up in the morning?

21 MR. PIGOTT: Yes, I could.

22 JUDGE KELLEY: Okay. A couple of items. As we
23 indicated earlier, we will start tomorrow at eight o'clock,
24 an hour earlier than usual, partly because we didn't cover a
25 lot of ground today, and partly because some of our witnesses

1 are not available all day, and we would like to maximize the
2 time that we got with them, so it will be here at eight
3 o'clock.

4 MR. PICOTT: I have a low power license document.
5 Do you want me to file that tomorrow then, or --

6 JUDGE KELLEY: Now or -- well, tomorrow is okay.

7 MR. PICOTT: Okay, thank you.

8 JUDGE KELLEY: Yeah, I won't read any low power
9 license papers tonight. I would -- with regard to emergency
10 planning, gentlemen, I had mentioned this morning, we have got
11 a lot of papers. I am a little unclear as to where we got
12 on the contentions, stipulations on contentions and things of
13 that sort, and I think we could profitably spend a little time
14 tomorrow reviewing just what is before the house on emergency
15 planning, where we are on contentions specifically, what the
16 time frame is for getting these things decided, now that we
17 have got these various memos turned in, so maybe when we get
18 through with Drs. Green and Kennedy we can spend not a lot of
19 time, but ten or fifteen minutes on those topics, just by way
20 of an update, and I will also try to have a ruling on Dr.
21 Luco's subpoena or not, tomorrow after we finish with Green
22 and Kennedy.

23 I don't have anything else. Is there anything
24 else that has to be raised at this point?

25 Okay, well, we will adjourn, then, until tomorrow

1 morning at eight o'clock.

2327

2 (Whereupon, at 5:27 p.m., the hearing was
3 adjourned, to reconvene at 8:00 a.m., Tuesday, June 30, 1981.)

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

This is to certify that the attached proceedings before the

NUCLEAR REGULATORY COMMISSION

in the matter of: SAN ONOFRE NUCLEAR GENERATING STATION

Date of Proceeding: June 29, 1981

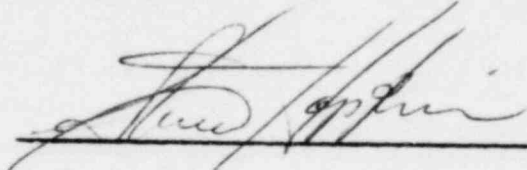
Docket Number: 50-361/362 OL

Place of Proceeding: San Diego, California

were held as herein appears, and that this is the original transcript thereof for the file of the Commission.

Steve Hopkins

Official Reporter (Typed)



Official Reporter (Signature)