

ORIGINAL
UNITED STATES
NUCLEAR REGULATORY COMMISSION

IN THE MATTER OF:

DOCKET NO: 50-322-OL

LONG ISLAND LIGHTING COMPANY
(Shoreham Nuclear Power Plant, Unit 1)

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UNITED STATES OF AMERICA
 NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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In the matter of:	:	
LONG ISLAND LIGHTING COMPANY	:	Docket No. 50-322-01
(Shoreham Nuclear Unit)	:	(OL)

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State Office Building,
 Veterans Memorial Highway,
 Hauppauge, New York

Thursday, 4 October 1984

The hearing in the above-entitled matter was
 convened, pursuant to adjournment, at 9:00 a.m.

BEFORE:

JUDGE LAWRENCE BRENNER, Chairman,
 Atomic Safety and Licensing Board.

JUDGE PETER A. MORRIS, Member,
 Atomic Safety and Licensing Board.

JUDGE GEORGE A. FERGUSON, Member,
 Atomic Safety and Licensing Board.

AGBagb

1 APPEARANCES:

2 On behalf of the Applicant:

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10 RICHARD J. GODDARD, Esq.,

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13 On behalf of the Intervenor, Suffolk County:

14 ALAN ROY DYNNER, Esq.,

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C O N T E N T S

2	WITNESSES	DIRECT CROSS BOARD REDIRECT RECROSS		
3	Stanley G. Christensen)		24253	24287
4	G. Dennis Eley)		24326	24329
5	Dale G. Bridenbaugh)			

6 (Continued)

7	EXHIBITS		For Id	In Evid
8	County Diesel Exhibit No. 72			
9	Depo. ABS witnesses, 7/18/84. Pp 114-130		24274	24333
10	LILCO Diesel Exhibits 41 and 42			24333
11	MORNING RECESS			24310

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P R O C E E D I N G S

JUDGE BRENNER: Good morning.

Whereupon,

STANLEY G. CHRISTENSEN,

G. DENNIS ELEY,

and

DALE G. BRIDENBAUGH

resumed the stand and, having been previously duly sworn,
were examined and testified further as follows:

JUDGE BRENNER: And welcome back to the witnesses
also. We expect to complete your testimony, at least on
this subject, this morning you will be glad to hear.

We are ready for the County to conduct its
redirect examination.

MR. BRIGATI: If I could have your indulgence for
one more minute, Judge, so I can get organized here? I'm
sorry.

JUDGE BRENNER: Surely.

(Pause.)

JUDGE BRENNER: I will note for the record that
we have the appearances for the same three parties that we
have had all week, that is, the Staff, LILCO, and the
County.

MR. STROUPE: Let me just note also,
Judge Brenner, that I will have delivered to you this

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1 morning the errata sheet containing all the joint
2 corrections for the September 20th transcript.

3 JUDGE BRENNER: All right. Thank you.

4 MR. STROUPE: I believe you were correct. You
5 told me last week that your copy had the uncorrected version
6 of the shot-peening testimony and I found that to be true in
7 my copy also.

8 MR. BRIGATI: As a preliminary matter, Judge,
9 while we are talking about appearances, will the record
10 reflect that Professor Sarsten was here for the testimony
11 yesterday? He was sitting over at--

12 JUDGE BRENNER: Well, we don't usually do that.
13 I mean if you need to make a point of it, you can.

14 MR. BRIGATI: I think I would like the record to
15 reflect that fact.

16 JUDGE BRENNER: I personally did not observe
17 whether he was here for all of it or not. I saw him here at
18 times.

19 MR. BRIGATI: Well, Mr. Goddard was sitting here.

20 MR. GODDARD: He was here until approximately two
21 o'clock.

22 JUDGE BRENNER: All right.

23 MR. BRIGATI: I think it is important to note,
24 Judge, because his testimony was being discussed during part
25 of the cross-examination, that he was present.

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JUDGE BRENNER: It is usually not that important because, in my experience -- and I am not talking about this proceeding necessarily -- people who are not present are capable of reading transcript and thereby learning what occurred, too. You can't infer anything from absence. You can infer something from presence, though.

I don't know what your point was, but you made it.

MR. BRIGATI: Thank you, Judge.

JUDGE BRENNER: Go ahead.

REDIRECT EXAMINATION

BY MR. BRIGATI:

Q Mr. Eley, on cross-examination you testified that you did not make any independent calculations under the DEMA rules because you did not believe it was relevant to do so, and "relevant" is your word.

Do you recall that testimony?

A (Witness Eley) I do.

Q You also stated that someone had told you that the DEMA rules were outdated, and that DEMA was going to release a new set of rules.

Do you recall that testimony?

A That's correct.

Q Who gave you that information?

A This was Mr. Bob Ecker, who is the

1 secretary-treasurer of DEMA, and he advised me that the rules
2 were out of date and at present being revised. And he said
3 that they were out of print.

4 And I asked him for an interpretation of the
5 ruling with regard to torsional vibrations, and he said he
6 would not do so because they were out of date.

7 MR. STROUPE: I will again, Judge Brenner, move
8 to strike at this point, that being a form of rank hearsay.
9 I will of course inquire into that further on recross.

10 MR. BRIGATI: Judge, under the Federal Rules,
11 hearsay by an expert is permissible. I don't know how
12 anybody can determine what DEMA's current status is except
13 by checking with them.

14 JUDGE BRENNER: All right. I understand the
15 position.

16 We are going to grant the motion to strike.
17 There is hearsay and then there is hearsay that is just
18 incapable of any probing, and that hearsay we just heard
19 falls in that category.

20 You cannot have a conversation with one person,
21 whether it is an officer of an organization or not, and then
22 we get this witness' interpretation of what that person
23 said. And even if it is accurate, there are just so many
24 better ways, in a sophisticated proceeding with
25 sophisticated parties, to get evidence if the County

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1 believes it had evidence that the DEMA rules are no longer
2 appropriate.

3 So the motion to strike is granted as totally
4 insufficient foundation for any finding of substantive fact,
5 based on what Mr. Eley just told us.

6 MR. BRIGATI: May I ask Mr. Eley a couple of
7 foundation questions to try to reconstruct his testimony, or
8 overcome your objection, Judge?

9 JUDGE BRENNER: You won't be able to if it is
10 going to be based on this conversation he had with that
11 person who is an officer of DEMA.

12 MR. BRIGATI: Regardless of the circumstances of
13 the conversation? Is that correct?

14 JUDGE BRENNER: Yes, given the other reasons I
15 stated, there being so many better avenues of obtaining that
16 information if it is in fact true information. It is going
17 to be incapable of testing by cross-examination here,
18 totally incapable.

19 That is different than the other uses of hearsay
20 sources of information by which an expert can form an
21 opinion on expert-type things. So we have granted the
22 motion to strike.

23 MR. BRIGATI: I understand.

24 BY MR. BRIGATI:

25 Q Mr. Eley, Professor Christensen was asked whether

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1 he was aware of any firing pressures measured with a Piezo
2 transducer in excess of 1680 psi. Do you recall that?

3 A (Witness Eley) Yes.

4 Q And he testified No. Is that correct?

5 A That's correct.

6 Q Do you recall what the reported firing pressure
7 on the Shoreham EDG at full load with the Piezo transducer
8 was?

9 A Yes, I do. It was 1580 psi.

10 Q Professor Christensen also stated that he had
11 reason to doubt the authenticity of that data which was
12 embodied in LILCO Exhibit P-35. Do you recall his testimony
13 in that particular?

14 A Yes, I do.

15 Q Do you share his reservations?

16 A I did a calculation with the Piezo electric data
17 and I found out that the break mean effective pressure for
18 that particular cylinder came to about 91.3 percent of the
19 full load rating, as I told you before. So that that
20 cylinder was not developing full power, and the other
21 cylinders must have been taking more power than full power
22 in the other cylinders.

23 The cylinder that was giving 90 percent power,
24 91.3 percent power, if that had been at the full power
25 rating, I estimated a figure of 1677 psi for the maximum

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1 pressure. And if the other units -- the other cylinders, I
2 should say, were having to provide more power than the
3 normal 100 percent in order to develop 3500 kilowatts at the
4 board, then they would have been in excess of 1677 psi.

5 Q Are you suggesting by your testimony that the
6 engine was not running at 3500 Kw when that Piezo transducer
7 pressure reading was taken?

8 MR. STROUPE: I am going to object to the form of
9 the question. It's a leading question, "Are you
10 suggesting...."

11 JUDGE BRENNER: The objection is sustained. Why
12 don't you rephrase that one and be more careful in the
13 future, because the objection does not fully cure the harm
14 with that kind of question, as you know.

15 MR. BRIGATI: I understand, Judge, and I'm trying
16 to move things along.

17 JUDGE BRENNER: I sustain the objection.

18 BY MR. BRIGATI:

19 Q In your opinion, was the engine operating at 3500
20 Kw when that Piezo transducer reading was taken?

21 A (Witness Eley) It could have been operating at
22 3500 kilowatts with the load on that particular cylinder at
23 91.3 percent and the other cylinders taking up the excess
24 load in order that 3500 kilowatts could be attained at the
25 board. Yes, it could still have been running at 3500

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1 kilowatts.

2 Q And what was the BMEP of the particular cylinder
3 whose pressure reading is reflected in the digital data,
4 LILCO Exhibit P-35, and the crank diagram, LILCO Exhibit
5 P-5?

6 A 91.3 percent of 225 BMEP.

7 Q And what is the BMEP of a cylinder in order to
8 produce 3500 Kw?

9 A 225 BMEP.

10 Q On all cylinders?

11 A That is what you have to attain on all cylinders
12 to be able to get 3500 kilowatts at the board.

13 Q Do you have to attain that in each cylinder?

14 A You have to attain that in each cylinder, yes.

15 Q Professor Sarsten --

16 MR. STROUPE: I believe he is here today --

17 Do you mean Professor Christensen?

18 MR. BRIGATI: No, I said Professor Sarsten.

19 WITNESS ELEY: Could I just qualify my last
20 statement?

21 Some cylinders could be up and some cylinders
22 could be down on that 225 BMEP.

23 JUDGE BRENNER: That is quite a qualification.

24 In other words, you have just changed your previous answer.

25 WITNESS ELEY: Well, if they are all at 225 BMEP

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1 and exactly balanced on each cylinder, then you would
2 develop 3500 kilowatts. If one was down, the others would
3 have to be up in order to develop 3500 kilowatts.

4 BY MR. BRIGATI:

5 Q Professor Sarsten testified that it was possible
6 to calculate the BMEP of a cylinder from the data reflected
7 in LILCO Exhibit P-35. Did you use the method that
8 Professor Sarsten was referring to on that particular
9 occasion?

10 A (Witness Eley) I used a method of plotting the
11 data out on a ressure-volume diagram, then I used a
12 planimeter to work the area, divided it by the length of the
13 diagram and multiplied by the spring rating. And that's the
14 only way, that I know how to do it. That is the only way to
15 do it.

16 Q Mr. Eley, assuming that the pressure in the
17 cylinder from which that Piezo transducer reading was taken
18 was 1580 psi, and assuming further that that cylinder was
19 only developing 91.3 percent of the 225 BMEP needed to
20 produce 3500 Kw in this engine generator set, is it possible
21 for you to estimate the pressure that was present in the
22 other cylinders during that operation?

23 MR. STROUPE: I am going to object to that
24 because I don't see how, based on his previous answers to
25 questions, that could be possible.

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1 JUDGE BRENNER: The objection is overruled. We
2 will let the witness give his answer and an explanation, and
3 then you can come back at it if you need to.

4 WITNESS ELEY: It is dependent upon the balance
5 of the engine. If one cylinder was taking all of the power
6 that was missing from the cylinder which was low, then it
7 would be an excess of 1677, all in the one -- 1677 psi, all
8 in the one cylinder.

9 But if each one of the other seven cylinders was
10 taking part of the loss of power in the one cylinder, then
11 the maximum pressure will be in excess of 1677 psi for a
12 smaller amount spread over those other seven cylinders.

13 BY MR. BRIGATI:

14 Q Can you estimate-- Assuming all the other
15 cylinders were in balance, can you give us an estimated
16 pressure that would be present in the other seven cylinders
17 on the average to make up for the lower pressure in the
18 cylinder whose pressure reading data is reflected in LILCO
19 Exhibit P-35?

20 MR. STROUPE: Judge Brenner, I am going to lodge
21 a relevancy objection here, and asked and answered. This
22 matter was gone into at length in the piston testimony. I
23 sat here in the courtroom and heard it for two days.

24 MR. BRIGATI: I would like to respond to that,
25 Judge.

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1 JUDGE BRENNER: Go ahead.

2 MR. BRIGATI: I believe, on the present state of
3 the record, if you look at the record very carefully, there
4 is a suggestion that the data reflected in Exhibit P-35 and
5 the crank angle diagram, P-5, is representative of the
6 pressure in all of the cylinders of the engine at the time
7 those data readings were taken. And that simply is not
8 scientifically possible.

9 JUDGE BRENNER: All right.

10 How does this relate to any questions asked of
11 these witnesses on the subject of crankshafts? I was going
12 to ask you that before the objection we now have before us.

13 MR. BRIGATI: Mr. Stroupe himself asked about
14 whether we had any knowledge or evidence concerning maximum
15 firing pressures in excess of the 1580 psi reflected in
16 LILCO Exhibit P-35. And I think there is an absolutely
17 direct connection between the evidence I am trying to adduce
18 from this witness and his cross-examination in that
19 particular.

20 MR. STROUPE: Judge Brenner, if I might respond?
21 I believe my questions related to 1680 and 1720
22 psi.

23 MR. BRIGATI: No, Judge, he also--

24 JUDGE BRENNER: Do you have a transcript cite? I
25 don't remember.

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MR. BRIGATI: We will try to find it. We just got the transcript this morning.

JUDGE BRENNER: Why don't you go to another area and come back to this, because I am concerned we are mixing testimony in the other area with this, but I don't know yet, and I want to think about it, and I want to look at the transcript.

I certainly recall questions about the firing pressure.

MR. BRIGATI: May I suggest something?

This is the last question that is pending on this particular line of questioning. If you will accept it subject to a motion to strike if you believe that the evidence is inappropriate, fine. Then we can move on to another subject.

I think that would be the most efficient way of proceeding at this point.

JUDGE BRENNER: All right. I will accept that.

MR. STROUPE: Judge Brenner, I can point out on page 24,162 of the transcript, I asked the question of Professor Christensen:

"....you are indeed aware, are you not, sir, that there is no evidence of any maximum cylinder pressures in the Shoreham EDGs in this proceeding that are measured at a figure higher

1 than 1720 psi?"

2 MR. BRIGATI: Judge, we will find the reference.

3 JUDGE BRENNER: Let him ask the question. I was
4 concerned because I thought you were going to go on with the
5 line, so you anticipated my concern by your last comment,
6 Mr. Brigati.

7 Ask the question again, and then you said you
8 will be moving on to another area. Correct?

9 MR. BRIGATI: Yes, sir.

10 JUDGE BRENNER: Incidentally, none of my comments
11 should be taken to mean that I think the area is
12 impermissible. I just wasn't sure at the moment.

13 Go ahead, and we will put it all together later
14 as you suggested.

15 MR. BRIGATI: It was a very involved question as
16 I recall, Judge, and I would like to--

17 WITNESS ELEY: I would estimate--

18 JUDGE BRENNER: Let's get the question back again
19 because at this time I don't remember, even though you do.

20 (Whereupon, the Reporter read from the record
21 as requested.)
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1 WITNESS ELEY: I can only make an estimate. I
2 have not performed any calculation. But I would say 1
3 percent of each unit.

4 BY MR. BRIGATI:

5 Q And what does that translate into in terms of the
6 firing pressure in each of those other seven units.

7 Mr. Eley?

8 A (Witness Eley) 1694.

9 Q 1694 psi?

10 A Yes.

11 Q Thank you.

12 Professor Christensen, you testified that under
13 Lloyd's rules, an engine manufacturer is permitted a 25
14 percent increase in the Z or Zed factor in the crankshaft
15 formula to account for improved hardening processes; do you
16 recall that?

17 A (Witness Christensen) I do.

18 Q Do you know whether shot-peening is an accrued
19 hardening process for purposes of applying Lloyd's rules to
20 the evaluation of a crankshaft?

21 A Yes, I do. It cannot be used.

22 Q What Z factor did you use in evaluating the
23 crankshaft?

24 A I used the 1.

25 Q Do you consider that to be appropriate for this

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1 particular crankshaft under Lloyd's rules?

2 A That is the appropriate figure to use, yes.

3 Q Do you recall that there is also mentioned in
4 Lloyd's rules which, for the convenience of the Board, are
5 embodied in LILCO Exhibit 41, there is a 1.15 Z or Zed
6 factor; do you recall that?

7 A I do recall that, yes.

8 Q Do you believe that that particular Zed factor
9 would be appropriate for use in evaluating the Shoreham
10 replacement crankshafts?

11 A Could I just have that again, because I got
12 a little bit mixed up with Zed factor and another factor,
13 please?

14 Q Do you believe that the 1.15 Zed factor reflected
15 in Lloyd's rules would be appropriate for use in evaluating
16 the replacement crankshafts for the Shoreham engines?

17 A The 1.15 factor is relative to the forging
18 method.

19 Q My question is: Do you believe it is appropriate
20 for use in evaluating the Shoreham replacement crankshaft?

21 A No, because the Shoreham crankshafts were made by
22 a different forging method and the figure which 1.15 refers
23 to.

24 Q And just to clarify the record, Professor
25 Christensen, yesterday you mentioned that you had made some

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1 calculations overnight and produced a figure of 7,078
2 U. S. horsepower for purposes of Lloyd's calculation.

3 Do you recall that?

4 A I do.

5 Q And that calculation was using a Zed factor of
6 1.25 in your Lloyd's calculation at 1680 psi reflected in
7 County Exhibit 36; is that correct?

8 A That is correct.

9 Q Professor Christensen, and that Exhibit 36 is not
10 completely legible in the first -- the second page. Do you
11 have the original copy of that second page before you?

12 A I do.

13 Q Would you read into the record the fourth and
14 fifth lines on that Exhibit?

15 A Could I ask the question: Is that the figure
16 starting at 1800, please?

17 Q No. That's the figure beginning -- I think the
18 words say "Take --

19 A Oh, the top line reads, "Take maximum pressure
20 from 1,500 to 2,000. I have not put the units in here but
21 the units are pounds per square inch.

22 Q And when you say the first line, you mean that is
23 the fourth line on the page; am I correct?

24 A That is correct, yes.

25 Q And below that fourth line, there is a fifth line

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1 with two words that are not terribly distinct on the
2 exhibit. Could you read that into the record for us?

3 A Yes. I foreshortened that to "Max P" meaning
4 maximum pressure, and that refers to the two columns
5 underneath.

6 Q All right. The extreme --

7 MR. BRIGATI: Judge Brenner, do you believe that
8 the second column there is legible enough for our purposes
9 so we can restrict this to the lefthand column?

10 JUDGE BRENNER: Yes, at least on my copy.

11 MR. BRIGATI: Thank you.

12 BY MR. BRIGATI:

13 Q Professor Christensen, could you read into the
14 record the figures reflected in the extreme lefthand column
15 of page 2 of Exhibit 36, as reflected in your original copy?

16 A (Witness Christensen) Yes. I will read the
17 figures going downwards, which are the pounds per square
18 inch figures. The first figure is 1500. The next figure is
19 1600. The following figure is 1700; 1800; 1900; 2000. And
20 the last figure is 1630.

21 Q And just for the sake of orientating this written
22 -- or this testimony to the document, the first number you
23 read of 1500 is psi and it is opposite the number in the
24 second column, 105.4629?

25 A That is correct, yes.

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1 Q Mr. Eley, I believe you were asked about LILCO
2 Exhibit C-17 yesterday and its reference to measured
3 stresses in the replacement crankshaft for EDG 103 being
4 24.6 ksi, do you recall that testimony?

5 A (Witness Eley) I do.

6 Q And do you recall his testimony, Professor
7 Christensen?

8 A (Witness Christensen) I do.

9 Q Were either of you present at the -- let me
10 strike that.

11 It was my understanding at that exhibit that the
12 24.6 ksi stress reading was based on strain gauge readings.
13 am I correct?

14 A That is so, yes.

15 A (Witness Eley) Yes.

16 Q Were either of you present at the strain gauge
17 testing or experimentation which was the foundation for that
18 24.6 ksi calculation?

19 A (Witness Christensen) I was not there when they
20 were taken, no.

21 A (Witness Eley) No, I was not there either.

22 Q Professor Christensen, LILCO Exhibit C-41 shows
23 Lloyd's formula for evaluating crankshaft design; is that
24 correct?

25 A (Witness Christensen) That's correct, yes.

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Q I was beginning the same time you were. I'm

sorry.

A I beg your pardon?

Q Is that correct?

A It is, yes.

Q I believe you testified yesterday that that formula dates back to 1920 or the 1920's; am I correct?

A The original form of the formula goes back to the 1920's, yes.

Q Is the formula, as reflected in LILCO Exhibit C-41, the formula currently in effect under Lloyd's rules?

A To my knowledge, yes.

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1 Q Is that formula as reflected in LILCO Exhibit
2 C-41 the same as it was in 1920?

3 A No. There have been many, many updatings of it.

4 Q Is the formula, as reflected in the Exhibit, the
5 same as it was in 1950 when you were a Lloyd's surveyor?

6 A No.

7 Q Do you know the reasons for the changes in the
8 Lloyd's formula?

9 A Yes. They have done a lot of experimental work.
10 They have done a lot of fatigue testing on full-scale
11 crankshafts, also on models. And they have, also, input
12 from other crankshafts that have failed. And the whole
13 thing is in a continuous updating, continuously being looked
14 at as materials improve, as I mentioned yesterday, with
15 steels. So that will allow them to bring down the safety
16 factors to lower values.

17 Q Okay.

18 Professor Christensen, in response to some of
19 Judge Morris' questions yesterday, you indicated that you
20 believed under Lloyd's rules it was appropriate to evaluate
21 the replacement crankshaft for the Shoreham diesels, as if
22 the continuous rating of the engine was 3900 kw. Am I
23 correctly recalling your testimony?

24 A Yes; I did.

25 Q Did you perform any Lloyd's calculations

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1 concerning adequacy of the crankshaft at a continuous
2 rating of 3500?

3 A I did.

4 Q Did the replacement crankshaft meet Lloyd's rules
5 on the assumption that the continuous rating of the engine
6 was 3500 rather than 3900?

7 MR. STROUPE: Objection. I don't believe the
8 witness is competent to testify unequivocally whether it did
9 or did not meet. There is no preface of opinion for the
10 question.

11 JUDGE BRENNER: No; I'm going to overrule the
12 objection, given all the testimony we have already, both of
13 qualification and of substance. However, you are free to
14 come back and probe his bases. So the objection is
15 overruled.

16 As long as there is an interruption, I was going
17 to ask Professor Christensen, if he can relate that to any
18 portion of your written testimony in which you may have
19 discussed that. Do you believe there's something in your
20 written testimony on that point?

21 WITNESS CHRISTENSEN: Yes, it is contained within
22 this last set of figures, Judge.

23 JUDGE BRENNER: I guess I don't understand your
24 answer. Is there something in your prefile written
25 testimony that addresses your analysis or conclusion as to

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1 compliance of the crankshaft with Lloyd's rules at 3500 kw?
2 WITNESS CHRISTENSEN: Yes, there is data in my
3 testimony on that, yes.

4 JUDGE BRENNER: Do you know at what page?

5 WITNESS CHRISTENSEN: It is within this page of
6 figures that I have here.

7 JUDGE BRENNER: Can Counsel help me?

8 MR. SCHEIDT: 114, Judge.

9 JUDGE BRENNER: And now, perhaps you had better
10 repeat the question to the witnesses. With all this
11 interruption --

12 MR. BRIGATI: I believe I got the answer.

13 JUDGE BRENNER: I didn't hear it.

14 WITNESS CHRISTENSEN: Can I have it again? I
15 feel like a shuttlecock being batted back and forward.

16 MR. BRIGATI: I want you to stop feeling like a
17 shuttlecock.

18 JUDGE BRENNER: Tell your Counsel to stop picking
19 on you during the next recess.

20 I'm just kidding.

21 Go ahead.

22 BY MR. BRIGATI:

23 Q Did your calculations concerning the adequacy of
24 the replacement crankshaft under Lloyd's rules, assuming a
25 continuous rating of 3500 kw rather than 3900 kw, reflect

1 WRBpp

1 that the crankshaft was satisfactory under the Lloyd's
2 standards?

3 A (Witness Christensen) It was inadequate.

4 MR. BRIGATI: Judge, at this time I would like to
5 have another exhibit marked for identification. It consists
6 of an extract from the ABS deposition -- more particularly
7 the deposition of July 13, 1984 -- of three ABS witnesses,
8 Messrs. Woytowich, Blanding, and Giuffra, G-i-u-f-f-r-a.
9 And the exhibit consists of pages 114 through 130,
10 inclusive, from that transcript. And I will note that it,
11 therefore, encompasses two of the pages embodied within
12 LILCO C-42. Those two pages were added to this particular
13 exhibit because, in my opinion, the testimony that is
14 represented by LILCO Exhibit C-42 is not the complete
15 testimony on the subject that that particular exhibit
16 purported to address.

17 JUDGE BRENNER: Don't say too much. All you have
18 to tell me is that you're putting it in to engage in
19 re-direct relating to the questions asked by LILCO on this
20 panel from the LILCO Exhibit C-42, which were pages 129 and
21 130 in the same deposition. Is that what you're telling me?

22 MR. BRIGATI: Yes.

23 JUDGE BRENNER: I don't want any more testimony
24 from you; that's the problem.

25 We will mark it. What's the last number of the

4 WRBpp

1 County's exhibits?

2 According to our records, this would be County
3 Exhibit 72. Is that consistent with your records?

4 MR. BRIGATI: Yes, sir.

5 JUDGE BRENNER: As just identified, it will be
6 marked County Diesel Exhibit 72, for identification.

7 (Whereupon, County Diesel Exhibit
8 No. 72, pages 129 and 130 of
9 depo of ABS witnesses, 7/13/84,
10 was marked for identification.)

11 JUDGE BRENNER: Let me point out one problem.
12 It's not a problem. Let me point something out, since this
13 may affect the way you formulate your questions, and what
14 foundation questions you might ask.

15 Since we are receiving approximately 16 pages of
16 this deposition now for the first time, in terms of
17 evidentiary fashion, we are not going to be able to sit here
18 and read it and see what is on those pages. We were able to
19 do that yesterday when we had to read two pages in front of
20 us. So you need to formulate your questions in order to
21 make the point you want to make, expressly on our record
22 here.

23 MR. BRIGATI: I intend to, Judge.

24 JUDGE BRENNER: All right.

25 Go ahead.

WRBpp

1 BY MR. BRIGATI:

2 Q Professor Christensen, yesterday you were asked
3 about some deposition testimony of ABS witnesses concerning
4 the method of making web calculations out of the ABS rules.
5 And you were shown LILCO Exhibit C-42, which was an extract
6 from that deposition testimony; do you recall that?

7 A (Witness Christensen) I do.

8 Q You were present at the deposition of
9 Messrs. Hoytowich, Blanding, and Giuffra on July 13, 1984,
10 were you not?

11 A I was, yes.

12 Q I would like you to look at page 128 in County
13 Exhibit 72.

14 Let me ask you first, Professor Christesen,
15 whether you have reviewed this extract of testimony this
16 morning?

17 A Yes, I think I have it fairly well in my mind.

18 Q And based upon your review, did the transcript
19 appear to be an accurate rendition of what you heard on the
20 occasion of your -- on the occasion of that deposition?

21 A Yes, I'm sure that is an accurate rendition.

22 Q All right.

23 On the top of page 128, beginning at line 1,
24 there's a question and it states: "Referring you to
25 34.17.4, relating to solid crankshaft webs --" do you see

WRBpp

1 that question?

2 A I do see that question, yes.

3 Q Do you know what the numbers 34.17.4 relate to?

4 A Yes. They relate to the rules in the rule book
5 dealing with calculation of solid web sizes.

6 Q What rules, Professor Christensen?

7 A The ABS rules.

8 Q And farther down on page 128, beginning on line
9 14 and continuing through 17, there is a question which
10 includes the term, "deep re-entering fillet" do you see
11 that?

12 A I do.

13 Q Do you know what a "deep re-entering fillet" is?

14 A Yes. It is the same as the fillet that they have
15 in the Shoreham crankshafts.

16 Q And at pages 129 and 130 of this exhibit,
17 Professor Christensen, beginning at line 21, Mr. Woytowich
18 is quoted as giving the following testimony:

19 "I believe that our normal practice would be to
20 measure that dimension from the boundary of the
21 actual crankshaft material at one fillet to that
22 at its opposite fillet, rather than constructing
23 the arbitrary lines of a face of the web and
24 going between them. Essentially, it makes sense
25 to count only the metal that is actually there."

1 WRBpp

1 Do you see that?

2 A I do.

3 Q Is that how you calculated the web dimensions for
4 determining the adequacy of the replacement crankshafts at
5 Shoreham as reflected in your testimony in this proceeding?

6 A That is exactly what I did; yes.

7 Q Professor Christensen, I would like to direct
8 your attention to County Exhibit 40, about which you
9 testified, I think, yesterday. And I'd like you to turn,
10 particularly, to the drawing that you were testifying about,
11 which is the fourth page of the exhibit -- I'm sorry, it's
12 the fifth page of the exhibit.

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1 Do you have that in front of you, Professor
2 Christensen?

3 A I do.

4 Q I believe you testified yesterday that this
5 drawing is a representation of the cross-section of the web
6 as you believe it should be viewed, am I correct?

7 A That is so, yes.

8 Q At the top of the drawing -- well the drawing
9 basically consists of several rectangles and at the top
10 there is an arc, do you see that?

11 A I do.

12 Q Can you tell us what that arc is intended to
13 represent?

14 A That arc represents the true section going
15 through the fillet which is going around the journal, that
16 is, the 13-inch diameter journal.

17 Q But is that intended to represent metal that is
18 actually there?

19 A That represents metal that is actually there.

20 Q All right.

21 And down at the bottom of the figure there are
22 some numbers on either side of the page, zero and
23 zero-sub-one, do you see that, on the left and right sides
24 of the page, Professor Christensen?

25 A Yes, I do.

WRBagh 1 Q And there is a dotted line running from zero to
2 zero-sub-one, do you see that?

3 A I do, yes.

4 Q What is that dotted line intended to represent,
5 Professor Christensen?

6 A That represents the profile across the web on the
7 pin side.

8 Q And above that dotted line is two rounded-off
9 triangles, do you see them?

10 A I do.

11 Q What are those rounded-off triangles intended to
12 represent?

13 A That represents the boundary of the metal.

14 Q Well maybe you could explain where the boundary
15 of the metal is as reflected by those rounded-off triangles?

16 A Yes, that is the boundary of the re-entrant
17 fillet where it is cut into the web.

18 Q Where is the boundary as reflected in the
19 triangles, Professor Christensen?

20 A The boundary is the solid line.

21 Q Would that be the hypotenuse of the triangles as
22 we see them in this?

23 A That would be so, yes.

24 Q Professor Christensen, have you had an
25 opportunity to personally review ABS's web calculations

WRBagb

1 concerning the Shoreham replacement crankshafts?

2 A No. I have never seen any calculations.

3 Q Were those calculations available at the
4 deposition of the ABS witnesses at which you attended?

5 A No, they were not available to us.

6 If I remember correctly, Mr. Woytowich or one of
7 the gentlemen from ABS said that the gentleman who had made
8 them had left the organization.

9 Q Did Mr. Woytowich know how they were calculated?

10 A No, he did not.

11 Q Did anyone in behalf of the ABS present know how
12 they had been calculated?

13 A No, they did not.

14 Q Mr. Eley, yesterday you were being examined about
15 ABS torsional calculations reflected in County Exhibit 47.
16 Will you locate County Exhibit 47?

17 Turn to page 14 if you will please, Mr. Eley.
18 The top of the page has the words "critical speed for 5.5
19 order," Mr. Eley.

20 Are you oriented into the exhibit?

21 A (Witness Eley) Yes.

22 Q Yesterday you were asked whether those -- whether
23 the calculations reflected on that page did not disclose an
24 ABS calculated torsional stress using only two orders of
25 vibration and you answered that that was correct, ABS

WRB:agh

1 calculated only two orders of vibration.

2 Am I correct?

3 A Yes, that's correct.

4 Q Do you know whether the calculations reflected on
5 that page 14 represented the complete torsional analysis as
6 normally performed by ABS?

7 A No, I think I said that this was -- this looked
8 to me like a rough draft form and we don't know how the
9 American Bureau of Shipping calculated their orders.

10 Q Do the ABS rules provide that only two orders
11 should be summed in undertaking a torsional analysis?

12 A Not that I know of.

13 Q Well have you reviewed the ABS rules, Mr. Eley?

14 A They give a rule for the total vibratory stress
15 but they don't say how it is calculated.

16 Q There was no specific reference in the rules to
17 limiting the analysis to two orders of vibration, is that
18 correct?

19 A That is correct.

20 Q On page 20 of the same exhibit, Mr. Eley, at the
21 top of the page there are the words "Safety factor, desired
22 minimum 1.34," do you see that?

23 A Yes, I do.

24 Q Do you know what the 1.34 figure is?

25 A Yes, that is the figure Mr. Woytowich referred to

1 WRBagb 1 in his deposition when he said that that was the lowest
2 safety margin that had ever been -- that a crankshaft had
3 ever been approved at prior to this time for any other
4 manufacturer.

5 Q Turning your attention to County Exhibit 72,
6 which is the extract of the deposition of the ABS witnesses,
7 can you tell me where Mr. Woytowich made that statement?

8 Let me rephrase the question because I think it
9 will simplify things.

10 Is the testimony of Mr. Woytowich you are
11 referring to contained on page 122 of County Exhibit 72?

12 A Yes. Witness Woytowich says --

13 Q Maybe you could tell us what line that appears
14 on, Mr. Eley, and then you won't have to read it. The lines
15 appear on the left-hand side.

16 A Starting from line 12.

17 Q Through line.....?

18 A 14.

19 Q Thank you.

20 Mr. Eley, in the cross-examination of you, not
21 your cross-examination, you were asked about the safety
22 factor calculations that appear on page 20 of that exhibit.

23 Do you recall?

24 A Yes.

25 Q -- those questions and answers?

2 WRBagb 1

A Yes.

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Q Do you know how those safety factors were

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calculated?

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A These are calculated by the ABS in-house method

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and these are the ones that were compared to that 1.34

6

desired minimum.

7

Q And what do you base your testimony on in that

8

respect, Mr. Eley, how do you know that those safety factors

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were calculated according to the ABS in-house method.

10

JUDGE BRENNER: For example, Mr. Eley, is there

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something in County Exhibit 72 you might want to refer to?

12

MR. BRIGATI: Perhaps I could refer him to page

13

119, Judge?

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JUDGE BRENNER: Go ahead. Thank you.

15

MR. BRIGATI: -- or page 117, lines eight through

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13.

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JUDGE BRENNER: My only concern is that may not

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be how he knows it.

19

MR. BRIGATI: We can clarify that, Judge.

20

JUDGE BRENNER: Okay.

21

MR. BRIGATI: I am simply --

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JUDGE BRENNER: Let's see what he says first.

23

MR. BRIGATI: -- trying to move it along.

24

JUDGE BRENNER: All right.

25

I share your motive which is why I jumped in

WRBagb 1 also.

2 WITNESS ELEY: Yes, I took this from this sheet
3 117 saying that there should be some sheet indicating safety
4 factors.

5 BY MR. BRIGATI:

6 Q Mr. Eley, were you present at the deposition of
7 Messrs. Woytowich, Blanding and Giuffra?

8 A (Witness Eley) I was, yes.

9 Q And you heard the testimony reflected on page 117
10 and page 119 and the testimony in this exhibit concerning
11 the safety factors reflected on page 20 of County Exhibit
12 47?

13 A Yes.

14 MR. BRIGATI: I have no further questions on
15 redirect -- Wait a second, Judge, maybe I do.

16 (Pause.)

17 MR. BRIGATI: I have no further questions on
18 redirect, Judge.

19 JUDGE BRENNER: LILCO?

20 MR. STROUPE: Yes, indeed, Judge.

21 JUDGE BRENNER: I was not going to ask until you
22 added the "indeed," I assumed it was just a figure of speech
23 rather than an estimate of some quantity.

24 MR. STROUPE: I would estimate, Judge, based on
25 the Board's questioning yesterday and on the redirect

1 WRBagb

1 this morning that I might have 30 minutes maximum.

2

JUDGE BRENNER: All right.

3

Why don't you proceed?

4

MR. STROUPE: Judge Brenner, may I inquire one thing before I start my questioning?

5

This morning a motion to strike was made as to certain portions of Mr. Eley's testimony relating to hearsay statements.

6

Mr. Eley also testified yesterday on cross concerning a telephone conversation he had had and I would just like to inquire as to whether I need to go into that or whether the granting of the motion this morning applied as well to the motion yesterday.

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JUDGE BRENNER: Well no, it does not apply automatically -- and I heard the testimony yesterday.

There was also some testimony on either Monday or Tuesday that you were going to come back to and remind me of which you didn't, although we might be able to piece it together later anyway.

You had better point me to yesterday's testimony, and if you want to come back to it we will.

You see, there is not an automatic test, unlike some of these nice mathematical formulas. The mere mention of a telephone conversation does not suddenly make something objectionable.

1 WRBagb 1

2 MR. STROUPE: I understood that completely and
3 that was my reason for asking the question as to whether I
4 should go ahead and go into that.

5 Judge Brenner, I believe it starts on page 24,209
6 of yesterday's transcript and it runs over to 24,210 and
7 runs also over to 211, I believe.

8 JUDGE BRENNER: We denied the motion to strike
9 yesterday on the subject and we are going to stay with that
10 ruling. But you can come back and find out why he knows it.

11 MR. STROUPE: Fine.

12 JUDGE BRENNER: All right.

13 The motion to strike this morning was related to
14 the fact that we don't want any party to cite some official
15 position of DEMA as to the status of their rules based on
16 something somebody told -- who is an officer of DEMA told
17 Mr. Eley and it was that part of the answer which caused my
18 granting the motion to strike this morning.

19 And this answer you are referring us back to, I
20 need to know more about -- if you want to challenge it --
21 about what Mr. Eley may know in his expertise that may cause
22 us to credit it or not credit it.

23 MR. STROUPE: Fine, Judge.

24 MR. BRIGATI: Judge, I don't want to incur your
25 wrath by revisiting old ground, but it occurs to me that I
should bring something to your attention in connection with

WRBagb

1 that conversation with DEMA.

2 JUDGE BRENNER: Not while the witnesses are
3 here. I don't know how much you are going to tell me.
4 Mr. Stroupe is going to have to ask some questions about
5 some other subject that may touch on it and I would rather
6 we have this conversation later for that reason, but I will
7 let you do it later.

8 MR. BRIGATI: Fine.

9 JUDGE BRENNER: And I suppose you would like to
10 have the conversation before we permanently excuse the
11 witnesses?

12 MR. BRIGATI: That would be preferable, yes.

13 JUDGE BRENNER: All right. We will work it out.

14 RE-CROSS-EXAMINATION

15 BY MR. STROUPE:

16 Q Mr. Eley, you testified yesterday did you not,
17 sir, that you had a certain telephone conversation with
18 these two gentlemen in regard to DEMA?

19 A (Witness Eley) That was -- There were two people
20 I talked to at DEMA, one was a project secretary called Judy
21 and we did not get her second name. The other was Robert
22 Ecker, who is the Secretary-Treasurer.

23 Q And I believe you indicated that they told you
24 the majority of their stress levels did not go beyond 2000
25 psi, is that correct?

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A I thought you were referring to DEMA. I'm sorry, I misconstrued your --

Q Did you have a conversation with a Mr. Don Ginter of Colt Industries and a Mr. Joe Smith of Colt Industries?

A There was a telephone conversation with Mr. Don Ginter and Mr. Joe Smith of the diesel design and testing department and Mr. Don Ginter of the diesel engine analytical department on the 27th of September.

Q And did they tell you in that conversation that the majority of their stress levels did not go beyond 2000 psi?

A The statement that was made was the majority of their stress levels did not go beyond 2000 psi and that if we had an engine whose crankshaft stress levels were even close to that of DEMA's we should seriously consider fitting a detuner since the stresses mentioned in DEMA were very high. That was the statement that they made.

Q Now did they tell you whether the 2000 psi referred to a single order or numerous orders?

A No, they did not.

Q So you don't know whether it referred to one or more orders, do you?

A No, I do not.

Q Do you know what sort of engine they were talking about?

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No, I do not. That is the only statement that

2

was made.

3

Q

You don't know what sort of cylinder firing pressures, the T-sub-n's that they were talking about?

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A

No, I do not.

6

What I was trying to establish was their method of adopting the DEMA rules.

8

Q

And you did not talk with them about what methodology they utilized to arrive at a 2000 psi limit?

10

A

I did ask them about the measurement techniques and they said they measured actual displacement rather than single peak and they did not use the square root sum of the squares values.

14

Q

Did you ask them what UTS they assume or what ultimate tensile strength?

16

A

No, I did not.

17

MR. STROUPE: Judge Brenner, I would renew my

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motion to strike this testimony as not being --

19

JUDGE BRENNER: No, we are past the point of

20

a motion to strike, we will put it all together later.

21

BY MR. STROUPE:

22

Q

Professor Christensen, you indicated yesterday in response to some questioning by the Board and this morning on redirect that the formula of Lloyd's dates back to the 1920's, is that correct?

24

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WRBagb

1 A (Witness Christensen) That is correct, yes.

2 Q I believe you also indicated there had been
3 numerous changes since that point in time, is that correct?

4 A That is correct.

5 Q Do you know when the last change to the Lloyd's
6 formula for allowable horsepower for crankshafts was?

7 A Yes. I think the date was -- I can't remember
8 the exact date but it was during the year of 1978, if my
9 memory serves me correctly.

10 Q Do you know what that change was?

11 A Yes. That main change, if I remember correctly,
12 was to bring up the formula from an older formula where one
13 set of units was used and then they brought up the formula
14 to be able to use the international system of units, the SI
15 units -- I couldn't remember the name.

16 Q And isn't that just a change from British units
17 to metric units?

18 A No, there is a bit more in it than that, I think,
19 if I remember correctly. But I cannot remember every one of
20 the details in Lloyd's rules, the book is that thick
21 (demonstrating). I would have to go back and refer.

22 JUDGE BRENNER: Professor Christensen, he is not
23 asking about details, he is asking you about your basis for
24 your answers to your counsel this morning as to the nature
25 of the change in Lloyd's rules.

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WITNESS CHRISTENSEN: Yes, I understand that. I think possibly an earlier change -- again I am trying to quote from memory and it plays tricks with me unfortunately. I think the earlier rule was somewhere around about 1970 but I cannot recall what the changes were at that time.

BY MR. STROUPE:

Q Can I direct your attention, gentlemen, to Exhibit C-16, Section 4 thereof, which is on page 4-1 and it is entitled "Calibration Procedures."

Will you take a moment to look at that section, please, sir, specifically Section 4.4 entitled "Cylinder Pressure."

A (Witness Christensen) I just cannot find it for a moment.

Q That's on page 4-2 of Exhibit C-16.

A I have seen the document now.

Q It is true, isn't it, Mr. Eley and Professor Christensen, that this document, Exhibit C-16, "Field Test of Diesel Generator 103 With 13x12-inch Crankshaft," embodies the data and information obtained that we have been talking about this morning by the Piezo electric quartz transducer?

A It contains information on that, yes.

Q And by reviewing Section 4.4 you can see, can't

2 WRBagb

1 you, that this is the calibration procedure for calibrating
2 the Piezo electric quartz transducers?

3 A Yes, I have seen that, yes.

4 Q And doesn't this indicate that the transducers
5 were calibrated before and after the cylinder pressure test?

6 A Are you speaking of the transducer which is used
7 for the torsional vibration test, or am I getting mixed up
8 with the transducer which was used for the pressure test?
9 Because I seem to be switching from one area to another.

10 Q I am talking about the transducer referred to in
11 4.4, Professor Christensen.

12 A I was looking at the previous one, I'm sorry. I
13 would like to go to 4.4 now.

14 (Witness Christensen reviewing document.)

15 Yes, I do note that that was a pressure test
16 which was done statically, yes, for the pressure
17 transducers.

18 Q Professor Christensen, will you turn to figure
19 A-11.

20 A Could you give me some idea of where I might find
21 that to save time, please?

22 Q It is in the appendix after the text, Professor
23 Christensen.

24 A Yes, I have found it.

25 MR. BRIGATI: Judge, may I inquire how this

2 WRBagb 1 relates to the prior examination that followed Mr. Stroupe's
2 cross-examination?

3 JUDGE BRENNER: Well I think I recall something
4 of it.

5 Judge Morris asked him about his testimony -- I
6 frankly don't remember whether it was Professor Christensen
7 or Mr. Eley -- but one of the witnesses about the accuracy
8 of the Piezo electric transducer which stemmed from previous
9 testimony by the witnesses.

10 MR. BRIGATI: But Mr. Stroupe is questioning
11 these witnesses about a document that they did not prepare.

12 JUDGE BRENNER: Well that doesn't matter. That's
13 true, we have had a lot of testimony like that,
14 Mr. Brigati. Your first objection was how it relates and
15 that objection is overruled. It does indeed relate to
16 examination since Mr. Stroupe inquired.

17 BY MR. STROUPE:

18 Q Mr. Eley and Professor Christensen -- Strike
19 that.

20 Professor Christensen, you indicated that this
21 was a static test. Doesn't in fact Figure A-II indicate
22 this was a dynamic step-down test?

23 A (Witness Christensen) First of all, I don't see
24 any reference to the words static dynamic downturn test or
25 something that you said there, please....

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Q Professor Christensen, let me direct your

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attention to Figure A-11.

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Can you not look at that, sir, and tell that the calibration test that was performed was a stepdown test that involved testing the instrument dynamically rather than statically?

WRBeb

1 0 MR. BRIGATI: I object to the question on the
2 basis that there is no foundation that this witness is
3 familiar with this document or the diagram here for all of
4 the procedures that were followed in this testing sequence.
5 And I think that in order to ask him any questions about it,
6 Mr. Stroupe is going to either have to let him have the
7 opportunity to read the document in its entirety so he can
8 orient himself into it, or establish that
9 Professor Christensen is sufficiently familiar with the
10 details of the document to be able to interpret this
11 drawing.

12 JUDGE BRENNER: Your objection is overruled for
13 this reason:

14 The witness offered an opinion, his conclusion on
15 the accuracy of the instrument, and Mr. Stroupe is entitled
16 to come back and question that opinion. Any time the
17 witness' answer is "I don't know because I haven't reviewed
18 this whole document" or anything of that nature, we will
19 accept that as the witness' answer, and then we will
20 evaluate what we think of that answer, based on what the
21 particular question was.

22 Right now the particular question is "Can you
23 tell from looking at that one page," and if the answer is
24 "No, I cannot tell unless I read the entire document," that
25 may be the answer and then we will evaluate what we think

WRBeb

1 of such an answer from the witness when we look at the
2 document ourselves in terms of drafting our decision.

3 He opened the area up with his testimony, and as
4 I said, any time the answer is "I don't know," that will be
5 the answer.

6 WITNESS CHRISTENSEN: Could I have that term
7 again that you just used, because I don't see that term on
8 this page? Otherwise it might be a lot easier for me if I
9 could, and then I could get some orientation.

10 JUDGE BRENNER: Your answer is you cannot answer
11 the question as it was phrased?

12 WITNESS CHRISTENSEN: I cannot answer that
13 question as it is given to me. If it could be redrafted I
14 think I am technically capable of answering the question.

15 JUDGE BRENNER: It is up to you, Mr. Stroupe.

16 MR. STROUPE: Let me make one attempt at
17 redrafting it.

18 JUDGE BRENNER: You might want to ask him if he
19 has seen this document before. It is not absolutely
20 necessary but it may be pertinent later.

21 BY MR. STROUPE:

22 Q Have you reviewed this document before,
23 Professor Christensen?

24 A (Witness Christensen) I feel sure that I have
25 looked at it before, but the amount of attention that I

2 WRBeb

1 gave to it I cannot remember. But I can certainly read the
2 diagram.

3 Q You have given in this proceeding, haven't you,
4 sir, testimony in both piston testimony and crankshaft
5 testimony, testimony relating to cylinder pressures or
6 firing pressures?

7 A I have, yes.

8 Q Have you tried to read all the data that you had
9 available to you, including testimony filed by LILCO and
10 exhibits attached thereto, to be able to reach the opinions
11 and conclusions that you've reached?

12 A Yes. That is also based on other material that I
13 have, and other experiences, apart from what is presented
14 here.

15 Q And I would refer you again to page 4-3 that we
16 have been talking about, the Section 4.4. And I ask you if
17 the sentence that says the step output of the transducers
18 was recorded on tape, coupled with the diagram shown in
19 Figure A-11, showing a quick release valve, would it
20 indicate to you, Mr. Christensen, that the calibration
21 procedure utilized for the quartz Piezo -- the Piezo quartz
22 transducers was indeed a dynamic calibration test rather
23 than a static test?

24 A There is not enough information on this diagram
25 for me to come to a conclusion, so the answer is no, but....

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1 And the "but" is this:

2 I would have to know the volume of the vessel
3 here to come to any conclusion. I would have to know the
4 characteristics of the valves and how quickly that would
5 release that pressure.

6 And unless that pressure is being released at the
7 same rate of the pressure change in the cylinder, then you
8 cannot call this a dynamic test which is comparable with the
9 pressure change in the cylinder related to time or time rate
10 of change.

11 Q Well, would you call it a static test in that
12 event?

13 A It would depend, as I said earlier, on the rate
14 of pressure drop from that vessel. There is definitely not
15 enough data here for an engineer to come to any reliable or
16 valid conclusion on that diagram.

17 JUDGE BRENNER: Mr. Brigati, while there is a
18 break here anyway, there may have been some conference
19 calls, prehearing conference calls involving Counsel for all
20 parties, including the County, that you were not on. But we
21 discussed what the Board's procedure had been with respect
22 to cross-examination of witnesses through use of documents
23 other than the witnesses' testimony because we had some
24 inefficiencies in prior parts of this proceeding when
25 documents were brought in for the first time and shown to

WRBeb

1 to witnesses.

2 And we said that absent the need for surprise
3 and/or absent the fact that the need for the
4 cross-examination was perceived for the first time only very
5 close to the time in the examination, Counsel should inform
6 the other party that they would seek to ask their witnesses
7 questions on a certain document, so that the witnesses would
8 have an opportunity to refresh their recollection with the
9 document, or to review it for the first time.

10 However, we exempted from that any of the
11 prefiled exhibits. And in effect, although I may not have
12 stated it this way during the conference call, it was that
13 we would presume knowledge on the part of all witnesses, for
14 the given subject, of course, but within the confines of the
15 given subject of, all witnesses of all parties with the
16 exhibits of other parties.

17 And that was an attempt to ease the efficiency of
18 the need for all the foundation, "Are you familiar with
19 this?" and so on and so forth.

20 But it is open, as I did say to you just before
21 on the record, for a witness at any time to say "I am not
22 familiar with it. I can't answer the question without that
23 familiarity because...."

24 And we have got answers like that now, and we can
25 evaluate the record.

WRBeb

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MR. BRIGATI: Thank you for the clarification.

2

Judge. I was not present on that particular occasion.

3

JUDGE BRENNER: It's a matter of whether we get

4

the foundation first, or only decide we may need it later,

5

but in the end we get the whole record and can decide on our

6

view of the worth of the answers, given the material

7

presented and the witnesses' answers.

8

Mr. Stroupe.

9

BY MR. STROUPE:

10

Q Professor Christensen, isn't it true that by

11

utilizing FFT analyses to compute transfer functions, it is

12

possible to perform a calibration for any rate of change of

13

pressure as shown in Figure A-11?

14

A (Witness Christensen) Could you give me the

15

definition for FFT? I cannot recall the initial letters.

16

Q Fast Forier Transform.

17

A I know the term, Fast Forier Transform, yes. But

18

as I mentioned earlier, this document here which I am

19

looking at now -- and I wish to state this -- this is one of

20

the "huts." I cannot do it on the information presented

21

here.

22

The big "but" is all the way through my analysis

23

work here I have never been able to come to a complete

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evaluation of data presented to me because there always

25

appears to be some little bit missing here, or something is

WRBeb

1 given as a fact which I cannot accept as a fact.

2 I well know the Fast Forier Transform.

3 Q Mr. Eley, in response to some questioning on
4 redirect by Mr. Brigati, you indicated that the 1530 psi
5 would have to be 1677 psi to produce 225 BMEP in that
6 cylinder, did you not?

7 A (Witness Eley) Yes, I did.

8 Q Isn't it possible that a small shift in the top
9 dead center could give a 225 BMEP without a resultant
10 increase in the peak pressure?

11 A A small shift in the top dead center? You're
12 referring to--

13 Q I said a shift.

14 A A shift. A shift in the top dead center could
15 alter the maximum pressure.

16 Q Well, that wasn't my question, sir.

17 Do you want me to repeat the question for you?

18 A Yes, please.

19 Q Is it possible that a small shift in the top dead
20 center could give 225 BMEP without a resultant increase in
21 the cylinder pressure?

22 A Yes, it could.

23 Q And did you hear Professor Sarsten's testimony
24 and Mr. Henriksen's testimony that they believed it is most
25 likely that the top dead center on the Shoreham EDGs has a

WRBeb

1 small shift in it?

2 A I don't recollect that, no.

3 A (Witness Christensen) Could I make some
4 contribution here?

5 Q Certainly. Go ahead.

6 A Within my own work in this area, a small shift,
7 yes, will make some difference. But here you are telling me
8 on one page that you are calibrating and checking
9 everything, and now you want to come in with a small shift.
10 It is so easy to check if there is a small shift.

11 A (Witness Eley) When I....

12 Q Did you have something to add, Mr. Eley?

13 A When I determined the BMEP for that cylinder, I
14 took all the Piezo electric data and phase angles, et
15 cetera, and I plotted it out perfectly for every five
16 degrees of that data.

17 Q When did you make this plot that you referred to
18 in your testimony yesterday and today?

19 A Quite recently, but I don't remember the date.

20 MR. STROUPE: I would move at this time that we
21 be allowed to have a copy of that data, that plot, since he
22 has based some of his testimony on it. We have never seen
23 that curve or those calculations.

24 JUDGE BRENNER: Is there any objection to that,

25 Mr. Brigati?

WRBeb

1

MR. BRIGATI: No, Judge.

2

Do you want to introduce it as an exhibit?

3

MR. STROUPE: I said I just want to look at it.

4

JUDGE BRENNER: How soon do you want to look at

5

it?

6

MR. STROUPE: I would like to have it now so I

7

could determine if there are any questions on recross that I

8

would like to ask about it.

9

JUDGE BRENNER: All right.

10

Why don't you ask all your other questions, which

11

I hope will not take too much longer, and then we'll take a

12

break.

13

MR. STROUPE: Fine.

14

BY MR. STROUPE:

15

Q Professor Christensen, do you recall

16

Judge Morris questioning you yesterday with regard to the

17

propagation potential of a crack or defect of a few microns

18

with regard to the Shoreham crankshafts?

19

A (Witness Christensen) I think I can recollect

20

what was discussed yesterday, yes.

21

Q And do you recall giving your opinion to this

22

Board that you believe a crack of a few microns in Shoreham

23

crankshafts would indeed propagate?

24

A That is not exactly what I said.

25

First, I came into an area where we were

WRBeb

1 : talking about small cracks, and I was thinking, when
2 Judge Morris mentioned that to me, that he was speaking of a
3 crack in a critical area, and then I realized that he was
4 possibly speaking of a crack in any area.

5 Then I believe I made some additional words which
6 were to the effect that if the crack was in a critical area,
7 it would propagate most likely, but if it was in an area of
8 very, very low stress, then I could not see it propagating.

9 Q So it would be your opinion that if a crack of a
10 few microns was located in a critical area of the Shoreham
11 EDGs, the crankshafts of the EDGs, it would indeed
12 propagate?

13 A No. With my knowledge of fatigue failure I am
14 going to say that if there is a small deviation from the
15 norm in a very, very critical area, and it does not have to
16 be a large deviation, I am going to say, with my knowledge
17 of fatigue failure, yes, it will grow and eventually fail.
18 The crankshaft will fail.

19 Q Professor Christensen, isn't it true, in order
20 for a crack or a defect of a few microns in the Shoreham
21 EDGs to propagate, it would require a stress of
22 approximately 120 ksi, or 120,000 psi?

23 A I could not give you an answer to that off the
24 top of my head.

25 Q Could you calculate it?

1 WRBeb

1 A Yes, if I sat down quietly somewhere, I am pretty
2 sure I could come to some valid conclusion on that, yes.

3 Q How long do you think it would take you,
4 Professor Christensen?

5 A As I mentioned yesterday, I cannot carry a lot of
6 data in my head, and I've to very often refer to books and
7 texts and references to get things out. And I would have to
8 start finding my references, and I do not have them now here
9 with me.

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WRBpp

1 Q Professor Christensen, do you recall having a
2 discussion based on a series of questions and answers with
3 Judge Morris yesterday, with reference to Lloyd's rules on
4 the continuous power requirements?

5 A I do, yes.

6 Q And I believe you stated your opinion that you
7 would take Lloyd's to mean that the continuous power
8 requirements for the Shoreham EDG's would be 3900 Kw; is
9 that correct?

10 A That would be the normal custom and practice in
11 design work, yes.

12 Q And do you recall stating in that same series of
13 questions and answers that the Shoreham original
14 crankshafts -- the 13 x 11-inch crankshafts -- did not meet
15 the 3900 Kw horsepower rules under Lloyd's?

16 A They didn't even meet the 3500 Kw.

17 Q And they did not meet ABS either, did they?

18 A I did some calculations in that area and, to my
19 knowledge, they did not meet ABS rules, no.

20 Q They did not meet DEMA either, did they?

21 A I can't say, because DEMA is not a code of rules
22 to design crankshafts to. That I thought we had
23 established.

24 Q Professor Christensen, was it also your testimony
25 yesterday, in response to Judge Morris's questioning, that

1 WRBpp

1 you would take it -- that it would be your opinion that
2 Lloyd's section 3.6.1, which requires the 10 percent
3 overload for a short periods of up to 15 minutes, would
4 necessitate the engine being able to operate at 4,290 Kw?

5 A I think that was the figure I arrived at, yes.

6 Q And why, sir, wouldn't you take that figure, the
7 4,290 Kw to be the continuous figure or the continuous power
8 for purposes of the Lloyd's allowable horsepower formula?

9 A I would take that, as a prudent engineer, and I
10 would take it in every area where safety was concerned, so
11 far as a crankshaft in a nuclear power station was
12 concerned.

13 Also, I have been in this area where I have had
14 to take financial responsibility for lots of things. If I
15 was in this area and an engine works, that is what I would
16 design my engine to, to prevent the failure such as we have
17 seen and to maintain the good name of the company that I
18 represented.

19 Q Professor Christensen, do you recall stating
20 yesterday in response to some of my questioning that Lloyd's
21 rules will allow up to a 25 percent increase for surface
22 treatment such as shot-peening?

23 A I don't think you asked me anything about what
24 Lloyd's would increase, but I am going to say is this: that
25 what you asked me, I think, was in terms of an approved

1 WRBpp

1 treatment, but I cannot recall every word that I proffered
2 yesterday.

3 Q Do you recall stating that you had talked to
4 Lloyd's and that you were told that an allowance for
5 shot-peening of up to 25 percent could be allowed?

6 A I am sure I never said that.

7 Q Have you changed your opinion from yesterday,
8 sir, on any allowance that Lloyd's might give for
9 shot-peening?

10 A You asked me to make a calculation, I believe on
11 Tuesday evening, on the assumption that the figure of 1.25
12 was used for the Z factor to calculate the horsepower. I
13 cannot recall you asking me whether Lloyd's gave approval to
14 shot-peening, because if you had asked me that as a direct
15 question, I could have given you a very definite answer.

16 Q What would your answer have been?

17 A No.

18 Q Did you have any discussions with anyone after
19 your testimony yesterday, which might have changed your
20 opinions or conclusions on shot-peening?

21 A I had discussions yesterday, yes, but not to
22 alter my conclusions, no.

23 Q Nobody discussed shot-peening allowances under
24 Lloyd's with you?

25 A I cannot recall what we spoke about at dinner.

WRBpp

1 what we spoke about in the evening. Obviously, when
2 engineers get together, they talk shop.

3 MR. BRIGATI: Judge, I think if Mr. Stroupe has
4 something to impeach the witness with, it's about time to
5 bring it out, isn't it?

6 JUDGE BRENNER: I think so too.

7 MR. STROUPE: I'm waiting for the copy of
8 yesterday morning's transcript to come in. I've got the
9 afternoon version.

10 Judge, I'll move onto some other questions while
11 I'm waiting.

12 JUDGE BRENNER: How much more do you have?
13 Because you've exceeded your estimate.

14 MR. STROUPE: Maybe 15 minutes, Judge Brenner.

15 JUDGE BRENNER: I want to finish the
16 testimony today and we're leaving at 12:45. Those are my
17 problems. I know you have your own problems with material
18 you have to cover, but I just wanted to say that, for your
19 consideration.

20 MR. STROUPE: Thank you.

21 JUDGE BRENNER: I think maybe we had better take
22 a break at this time.

23 MR. STROUPE: I was going to say if we could take
24 a break, we could use the time to look at the transcript.

25 JUDGE BRENNER: All right. We'll come back at

2 WRBpp 1 11:00.

2 (Recess.)

3 JUDGE BRENNER: You may continue, Mr. Stroupe.

4 BY MR. STROUPE:

5 Q Professor Christensen, could I direct your
6 attention, sir, to page 24,038 and 39 of the transcript of
7 Tuesday, October 2, 1984?

8 A (Witness Christensen) I do not have the
9 transcript here.

10 JUDGE BRENNER: Mr. Stroupe, we don't have our
11 copy available, so see if you can ask your question --

12 MR. STROUPE: Why don't I read it into the
13 record?

14 BY MR. STROUPE:

15 Q Do you recall the following question being asked,
16 Professor Christensen, from page 24,038, line 3:

17 "Did you give any consideration to a surface
18 hardening in making your calculations under
19 Lloyd's rules, for purposes of your testimony?"

20 A (Witness Christensen) I think I can remember the
21 question, but I don't say I can remember the answer. But I
22 know it was a truthful one, so I should be able to remember
23 it quite easily.

24 Q Do you remember answering:

25 "Yes, the first thing we have to answer on

2 WRBpp

1 on that is that Lloyd's would have to know a lot
2 about the surface hardening techniques in the
3 first place. That would be looked at by Lloyd's
4 metallurgists. It would be discussed with the
5 engineering people, who were dealing in these
6 specialist areas, so they would come up with an
7 answer. They would possibly put shafts through
8 tests in their own testing establishment, the
9 Crawley. And they would not give an easy answer
10 to that. They would want to be fair, they don't
11 want to hold back advancement in engineering and
12 you can see that they do allow a figure there
13 which is shown in the rules for hardening, to
14 approved systems of hardening."

15 Additional answer: "Witness Eley: 'I agree.'"

16 Could you just give me a yes or no first?

17 A The answer is -- I can't give whether the answer
18 is no or yes, because somebody was coughing when you first
19 started to read the question and I did not hear the first
20 part, I'm sorry.

21 JUDGE BRENNER: Give him the transcript.

22 (Transcript handed to Witness.)

23 MR. BRIGATI: In order to represent my client, I
24 have to have a transcript.

25 JUDGE BRENNER: Why don't you share it with

1 WRBpp

1 Mr. Stroupe, if he has no objection.

2 MR. BRIGATI: Can I look over your shoulder?

3 MR. STROUPE: As long as you don't look at my
4 notes.

5 JUDGE BRENNER: Come on. I want to get done
6 today.

7 MR. STROUPE: He can certainly look over my
8 shoulder.

9 JUDGE BRENNER: All right. As soon as he is done
10 reading we will assume he has read it and we'll be able to
11 read it later, and then just put the question directly to
12 him.

13 (Panel reading.)

14 JUDGE BRENNER: Mr. Goddard, do you have an extra
15 copy of the transcript?

16 MR. GODDARD: We do not, sir. But I have
17 finished reading this so you may use it.

18 (Handing document to Judge.)

19 JUDGE BRENNER: Thank you, Mr. Goddard.

20 Gentlemen, have you finished reading it? We're
21 waiting for you.

22 WITNESS CHRISTENSEN: I have finished reading it
23 now, Judge, yes.

24 BY MR. STROUPE:

25 Q Does that accurately reflect your testimony from

1 WRBpp

1 that day?

2 A (Witness Christensen) Yes. I feel it accurately
3 reflects what I have said, yes.

4 Q And was there any intention in that answer,
5 Professor Christensen, to refer to shot-peening?

6 A I think without really reading it word for word,
7 that I indicated here that shot-peening was not an approved
8 -- was not a process which was approved by Lloyd's. That is
9 what I have tried to indicate.

10 Q Can you show me anywhere in that answer or,
11 indeed, in the answers that thereafter follow, where you
12 tried to indicate that?

13 A Yes, I think I have indicated that all the way
14 through by saying that Lloyd's would have to have a lot of
15 input to this to find out whether the shot-peening process
16 could be approved.

17 Q Well, didn't you just tell this Board this
18 morning, Professor Christensen, on redirect, that Lloyd's
19 will not approve shot-peening?

20 A I did state that, yes.

21 Q Are you now changing your testimony?

22 A I don't think I am changing my testimony here
23 because I cannot see anywhere here where I have said that
24 Lloyd's would approved it. If you could point it out to me,
25 I'd be very happy to look.

2 WRBpp

1 Q That's not my question, Professor Christensen.

2 Didn't you state to the Board on re-direct this
3 morning, that Lloyd's would not grant an allowance for
4 shot-peening?

5 A I have stated that, yes.

6 Q And didn't you, just a moment ago, say that you
7 would have to make the submission to Lloyd's before you
8 could see what Lloyd's would do with regard to shot-peening?

9 A I did say that, yes.

10 Q Which is true?

11 A Both are true. In the first place, the question
12 that was asked this morning was: "Do Lloyd's approve
13 shot-peening as a hardening process?" and I said, "No." I
14 have never said yes here. All I have said here, is that
15 they would want to know a lot of information before they
16 would give approval. That is what I think is the meaning in
17 this context here.

18 Q So you cannot state, can you, Professor
19 Christensen, unequivocally, that Lloyd's would not give
20 approval for shot-peening?

21 A I have not stated that. I have stated that if
22 they give approval, they want to have a lot of information
23 about it. And I am stating that, at this point in time, or
24 when I inquired to Lloyd's, they did not give approval for
25 shot-peening process. I cannot say any more than that, I

1 WRBpp

1 don't think.

2 Q Well, can you give me a yes or no to my original
3 question?

4 MR. BRIGATI: He's answered the question, Judge.

5 JUDGE BRENNER: Put the question again.

6 BY MR. STROUPE:

7 Q Professor Christensen, can you state,
8 unequivocally on the record for this Board, that Lloyd's
9 rules would not give any allowance for shot-peening?

10 A (Witness Christensen) The answer is at this
11 point in time, yes, but. The "but" is this: to my
12 knowledge, they have not been approached by any crankshaft
13 manufacturer to get approval for a shot-peening process.
14 And it is on that basis that no approval has been given,
15 because they have never been asked. That is the way that I
16 see it, and that is the way I am stating it.

17 Q Are you saying, or did you mean to infer from
18 that answer, Professor Christensen, that you are aware of
19 every submittal that has been made to Lloyd's rules by any
20 engine manufacturer?

21 A I am not aware, obviously, of every submittal
22 that has been made to Lloyd's.

23

24

25

WRBagb

1 Q Mr. Eley, on redirect this morning you were asked
2 some questions about ABS's calculations of safety factors as
3 contained in Suffolk County Exhibit 47, do you recall that?

4 A (Witness Eley) Yes, I do.

5 Q And you stated that the calculations set forth on
6 page 20 of Suffolk County Exhibit 47 appeared to be
7 calculations by an in-house method, is that correct?

8 A That's correct.

9 Q You did not mean to imply or infer, did you,
10 Mr. Eley, that the calculation set forth on page 17, I
11 believe, of this Suffolk County Exhibit 47 was an ABS
12 in-house method?

13 A Is this one with "Crankshaft Safety Factor by
14 CIMAC Method" on the top?

15 I don't have the numbers.

16 Q Yes, sir.

17 A No.

18 Q Have you had a chance, Mr. Eley, to compare that
19 series of calculations and those inputs with the CIMAC
20 formula?

21 A I can hardly read those inputs at all on this
22 left-hand column at all, I can't really say. It is just a
23 computer run. I don't really know what it is.

24 Q I'm talking about the symbols on the right-hand
25 side with the explanation thereafter.

WRBagb

1 A Yes, I have.

2 Q Do those appear to be the symbols of inputs that
3 CIMAC customarily utilizes in their draft rules?

4 A Yes.

5 Q Mr. Eley, do you also recall testifying this
6 morning that it appeared from Suffolk County Exhibit Number
7 47, page 14, that ABS summed two orders in arriving at the
8 sum of the orders?

9 A No, I don't remember saying that.

10 Q And do you recall stating that you would assume
11 that ABS probably did other calculations?

12 A Yes.

13 Q You don't know that for a fact, do you, sir?

14 A No.

15 Q Have you made any inquiry of anyone to attempt to
16 find out about that?

17 A No, I have not.

18 Q Whenever the system of summing the orders was
19 used by ABS, they did indeed approve the torsional critical
20 speed arrangement for the Shoreham replacement crankshafts,
21 did they not?

22 MR. BRIGATI: Asked and answered.

23 JUDGE BRENNER: Could I get the question again,
24 if you want to still pursue it?

25 MR. STROUPE: Yes.

WRBagb

1 BY MR. STROUPE:

2 Q And didn't, ABS, Mr. Eley -- regardless of what
3 methodology was utilized to calculate the torsional stresses
4 -- approve the torsional critical speed arrangements for the
5 Shoreham replacement crankshafts?

6 A (Witness Eley) Yes, they did based on the
7 submitted data by TDI.

8 JUDGE BRENNER: All right. It doesn't matter,
9 given that it is just an asked and answered objection.

10 MR. BRIGATI: Judge, could you instruct my
11 witnesses not to answer the questions until you have ruled
12 on my objection?

13 JUDGE BRENNER: Yes, but I think it was my fault
14 there and I will take the blame. I was still thinking about
15 it, although I have been looking down at some papers while
16 thinking about it so the witness probably didn't realize
17 what occurred since I also had to have Mr. Stroupe repeat
18 the question for my benefit so I will take the blame that
19 time.

20 Why don't you go ahead, Mr. Stroupe?

21 BY MR. STROUPE:

22 Q Mr. Eley, you also testified again with regard to
23 Suffolk County Exhibit 47 as to those various safety factors
24 on page 20, did you not?

25 A (Witness Eley) Yes.

1 WRBagb

1 Q Isn't it logical to assume, sir, that based on
2 ABS' approval of the torsional critical speed arrangement
3 for the Shoreham EDG's that ABS in fact determined that the
4 Shoreham replacement crankshafts met their desired minimum
5 safety factor?

6 MR. BRIGATI: Objection, that calls for
7 speculation on the part of the witness and it is argument.

8 JUDGE BRENNER: Overruled.

9 WITNESS ELEY: This data to me shows that they
10 approved it for use -- together with a letter -- they
11 approved it for use on board a ship on the data that was
12 submitted to them, assuming that this shot-peening did in
13 fact give a 20 percent increase in the safety factor.

14 BY MR. STROUPE:

15 Q Could I now get a yes or a no to my original
16 question, Mr. Eley?

17 MR. BRIGATI: I think that answer was responsive,
18 Judge.

19 JUDGE BRENNER: I have an opinion on it but -- as
20 to whether or not the answer was sufficiently responsive but
21 I don't want to offer it because I think a cross-examiner is
22 entitled to try to get it in terms that are easier to deal
23 with than from the cold transcript; one way or the other.

24 Can you answer directly and we will take your
25 other answer as the explanation?

1 WRBagb

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WITNESS ELEY: I would like to leave my explanation as the answer.

JUDGE BRENNER: I am sorry is your answer "yes, but" with the explanation or "no, but" with the explanation?

A (Witness Eley) I would like the question repeated, please?

MR. STROUPE: Can we get the question read back?

(Whereupon, the Reporter read from the record as requested.)

JUDGE BRENNER: All right. We have your explanation, Mr. Eley. I want to know whether we should put a "yes, but" in front of it or a "no, but."

WITNESS ELEY: "Yes, but."

BY MR. STROUPE:

Q Mr. Eley, let me direct your attention again to Suffolk County Exhibit 47 to the page that you testified about this morning -- or yesterday -- that contains the conclusions 1, 2 and 3. It follows the Goodman diagram in that exhibit.

A (Witness Eley) Yes, I have it.

Q You testified yesterday did you not, sir, in response to questioning I believe by the Board that you were concerned about the difference in results noted under conclusion 3.

A Yes.

WRBagb

1 Q And you recall testifying yesterday, don't you,
2 sir, that the CIMAC draft rules assume that torsional and
3 bending stresses occur simultaneously and at the same
4 location?

5 A Yes.

6 Q And you also know, don't you, Mr. Eley, that in
7 the Shoreham replacement crankshafts torsional stresses and
8 bending stresses do not occur simultaneously or in the same
9 location?

10 MR. BRIGATI: Asked and answered. This is an
11 examination that has already gone before us.

12 MR. STROUPE: Judge, I think this is foundation
13 leading up to a question I believe I am entitled to ask.

14 JUDGE BRENNER: I was going to say I think it
15 could have been foundation. I was going to ask Mr. Stroupe
16 but he answered before I asked. And it relates to the
17 questions I believe that I had asked the witness which were
18 follow-up to a subject that Mr. Stroupe had earlier asked
19 the witness on. But this is his first opportunity since my
20 questions.

21 WITNESS ELEY: Yes, that is an assumption of the
22 ABS rules -- in the CIMAC rules and it is probably not -- I
23 don't know for sure, but it is probably not in the same
24 place actually.

25 BY MR. STROUPE:

1 WRBagb

1 Q And couldn't this well account for the
2 difference, Mr. Eley, in the measured stresses submitted
3 with the TDI application for ABS approval and those
4 calculated by either CIMAC or ABS?

5 A (Witness Eley) I couldn't say.

6 Q You know, don't you, Mr. Eley, that the measured
7 stresses in the Shoreham EDG's replacement crankshafts are
8 lower than the predicted stresses under either CIMAC rules
9 or ABS rules?

10 A Yes, I do.

11 Q Can you still not answer the prior question?

12 A I still have concerns that they are not in close
13 proximity to one another.

14 Q Wouldn't you expect that in view of the
15 assumptions as to torsional and bending stresses in the
16 CIMAC rules?

17 A Yes, I would.

18 Q Professor Christensen, do you recall yesterday in
19 response to Judge Morris' questions talking about square
20 root sum of the squares and root mean square?

21 A (Witness Christensen) I do, yes.

22 Q That is SRSS or RMS?

23 A I always have a problem with initial letters and
24 there are so many of them now I always like to use the full
25 words. If you could give me the full words, I would be much

1 WRBagb

1 happier in answering the question.

2 Q Professor Christensen, I am going to ask you to
3 assume a simple sinusoid curve whose values range between
4 plus- or minus-1.

5 Can you do that?

6 A Yes, I have done it.

7 Q Will you agree with me that the mean of the
8 function curve is zero?

9 A I would do so, yes.

10 Q Would you also agree with me that the peak value
11 would be one?

12 A You stated it was one so it would be one.

13 Q Well do you know that it is one?

14 A You just told me it is one.

15 Q I'm asking you if it is one.

16 MR. BRIGATI: Objection. He is badgering the
17 witness. He has an answer.

18 MR. STROUPE: Judge Brenner, all I want is the
19 witness' independent knowledge. I don't want him to agree
20 with me if he thinks I am incorrect.

21 MR. BRIGATI: He stated it as an assumption.
22 Judge, and that is the way Professor Christensen has
23 responded.

24 JUDGE BRENNER: He stated the assumption slightly
25 differently than what he is asking.

1 Professor Christensen, is it your answer that
2 based on the assumption presented in the earlier question
3 that that is correct, that the peak value would be one?

4 WITNESS CHRISTENSEN: I thought that I had been
5 asked to construct a sinusoidal with a peak value of one.
6 And when I am asked to assign a value, a peak value of one
7 to a sinusoidal, I am also going to assume that it was not
8 stated because it is usual custom and practice that the peak
9 value in the opposite direction will be minus-1. That is
10 what I am trying to get to the bottom of here now, Judge.

11 JUDGE BRENNER: All right. Fine.

12 Now we have it.

13 BY MR. STROUPE:

14 Q That is precisely what I stated in my original
15 assumption question, Professor Christensen:

16 Assume a sinusoid curve with a range and value of
17 plus-1 to minus-1.

18 Do you understand that?

19 A (Witness Christensen) That is what I have on my
20 paper, yes.

21 Q Based on that assumption will you agree that the
22 mean of the function curve is zero?

23 A The mean of the function curve is zero because
24 you have got just as much area above it as you have below
25 it.

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1 Q And isn't it also a fact that the peak value is
2 one?

3 A You stated it was one.

4 Q Is it true that it is one or is it not true,
5 Professor Christensen?

6 A It can be any value you like, you assign to it or
7 you measure or you get. I don't know. You told me I had to
8 assign a value of one to it and that is exactly what I did
9 and so therefore from what you have told me I know it is
10 one.

11 JUDGE BRENNER: All right. We have it. Move
12 on. We will put the record together on it.

13 BY MR. STROUPE:

14 Q Isn't it a fact, Professor Christensen, that the
15 root mean square on this curve is one divided by the square
16 root of 2 or approximately 0.7?

17 A (Witness Christensen) Somewhere on that order,
18 yes. This is only for the half wave though.

19 Q And is it also not a fact, Professor Christensen,
20 that RMS is not the same as the mean as you testified
21 yesterday?

22 A I may have got befuddled yesterday. But what I
23 am talking of as root mean square values here is relative to
24 finding in electrical usage a mean value of that half
25 function.

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MR. STROUPE: LILCO does not have any further questions, Judge Brenner.

JUDGE BRENNER: Mr. Goddard, did you have anything?

MR. GODDARD: No recross, Judge Brenner.

JUDGE BRENNER: We just have a very few questions.

EXAMINATION BY THE BOARD

BY JUDGE BRENNER:

Q Professor Christensen, you testified in response to a question from your counsel this morning that the ABS deponents did not know how to calculate the dimension of the web of the crankshaft in order to apply the ABS rules.

What is your basis for that?

A (Witness Christensen) The basis for that, for the way I have done it is really --

Q That's not my question.

A I beg your pardon?

Q My question is what is the basis for your statement that the ABS personnel did not know how to select the dimension of the crankshaft web in order to apply their rules to it?

MR. BRIGATI: Judge, I am not sure that that was the witness' testimony.

JUDGE BRENNER: All right. Well let him correct

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1 it if I have got it wrong

2 WITNESS CHRISTENSEN: No, I think I understood
3 what you meant, Judge, although what I understood I said was
4 a little bit different from what you said. But I am
5 accepting that we are both on the same wavelength and we are
6 meaning the same thing.

7 BY JUDGE BRENNER:

8 Q Well tell me what you said.

9 A (Witness Christensen) I cannot exactly refer to
10 what I said -- go back to what I said now without going back
11 on the transcript, but I have a pretty good idea of what I
12 said. I don't think I was so blatant to say that ABS didn't
13 know what they were doing.

14 But what I am prepared to say is this: that if
15 you were to take a section where failure is likely to occur
16 in bending across the crank web what you will see is exactly
17 what I have drawn there.

18 And the ABS deposition I believe -- if I could
19 just refer to that, to their words, may I?

20 Q Yes.

21 (Pause.)

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1 A Yes. I would like to go back to page 129, and
2 the upper part of page 130 in the deposition given by the
3 representatives of the ABS.

4 On the bottom of page 129, Witness Woytowich
5 says--

6 Q Professor Christensen, in the interests of time,
7 we have had testimony on that already, and I am familiar
8 with it, and you, yourself, referred to it a number of days
9 ago. But I thought I heard something different from you
10 this morning, or something in addition this morning. But I
11 have your answer now.

12 Your view of what ABS did or knows how to do in
13 terms of the dimension of the web would be based on that
14 portion of the deposition?

15 A Yes, where they say metal-to-metal, Judge, or
16 boundary-to-boundary.

17 Q Okay. Thank you.

18 A Thank you.

19 Q I will look with interest at what the transcript
20 earlier this morning said, and correct myself in my own mind
21 if I was indeed wrong.

22 JUDGE BRENNER: That's all we have.

23 Does the County have any follow-up?

24 MR. BRIGATI: Yes, sir.

25 JUDGE BRENNER: We have been through a lot of--

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MR. BRIGATI: Judge, I have follow-up.

2

JUDGE BRENNER: How much?

3

MR. BRIGATI: About two questions, one if I get the right answer.

5

JUDGE BRENNER: Go ahead.

6

I will know how to judge the answer based on whether you ask a second question.

7

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FURTHER REDIRECT EXAMINATION

9

BY MR. BRIGATI:

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Q

Professor Christensen, did you ask any representative of Lloyd's Register whether they would give credit for shot-peening as a surface hardening process in evaluating a crankshaft?

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And when did you do that, Professor Christensen?

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(Witness Christensen) Some time ago when I believe I first read something about shot-peening being a usual process for surface hardening of crankshafts. And I thought that time had passed me by and I was not up to date.

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1 And I made inquiry of the senior surveyor in
2 engineering for the whole of North America in Lloyd's
3 Registry of Shipping in New York.

4 Q And you said "some time ago,"
5 Professor Christensen. Was that a year? Was it six years?
6 Can you give us a slightly better idea of what you mean by
7 "some time ago"?

8 A Yes, soon after the first report of the
9 crankshafts came out. I believe it was on the failed
10 crankshaft at Shoreham when there was reference to
11 shot-peening being a usual process, which was entirely new
12 to me, it being a usual process. Because I knew of it but I
13 did not think it was usual.

14 Q Was that in 1983, Professor Christensen?

15 A It would be in the latter part of 1983 or the
16 early part of 1984; somewhere about then.

17 Q And what did the senior surveyor from Lloyd's
18 respond to your inquiry?

19 MR. STROUPE: I am going to object to this
20 question.

21 JUDGE BRENNER: It is sustained. I am not going
22 to be able to evaluate that kind of answer. We have got
23 sophisticated parties in this proceeding, and I don't know
24 how important some of these details are going to be to the
25 parties. I will know more when I get the proposed findings.

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1 and when the Board has to reach a decision on the issues in
2 controversy.

3 But for parties in a proceeding like this to
4 expect us to make substantive findings based on what
5 somebody told somebody is just very shocking to me. I will
6 just put it that way.

7 Now when there is a lot of other evidence on the
8 point and sometimes you just have some outside input that
9 may clarify things, that's one thing. But when it becomes
10 the only evidence on a point, it just isn't going to
11 suffice. And whether or not we have actually struck that
12 kind of testimony or not, I can tell you it is not worthy of
13 much weight, if any, when we put it together later.

14 And in this instance, I am going to grant the
15 motion.

16 MR. BRIGATI: I take it I don't need to respond
17 to the objection then, Judge.

18 JUDGE BRENNER: Fine.

19 MR. BRIGATI: I have no further questions.

20 JUDGE BRENNER: All right.

21 MR. BRIGATI: I would like to move into evidence
22 the County's Exhibit C-72 and LILCO's Exhibits C-40 and
23 41-- I think it is 40 and 41, and the other Lloyd's
24 extract.

25 JUDGE BRENNER: What about C-42 while you are in

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1 a moving mood?

2 MR. BRIGATI: C-42 is encompassed within the
3 scope of C-72, so I don't see any reason to burden the
4 record with that. But if you would like it--

5 MR. STROUPE: I have no objection to the
6 admission.

7 MR. GODDARD: No objection.

8 JUDGE BRENNER: All right.

9 We will grant the motions on the depositions, and
10 let's move C-42 into evidence, too, since the record is
11 already burdened with the double identification.

12 MR. BRIGATI: No objection, Judge.

13 MR. STROUPE: Fine.

14 JUDGE BRENNER: On the depositions, remember our
15 comments in prehearing orders, and also the fact that we
16 will look on the parts that were focused on in hearing, even
17 though they may be in evidence, and I guess the same comment
18 would apply to any of these exhibits including C-41 also.
19 I'm not sure if it was necessary to move C-41 into evidence,
20 but we will admit it into evidence.

21 However, I expect the findings will focus on
22 those parts of C-41 that were asked about, and not suddenly
23 some section that was never inquired into unless it is a
24 non-controversial matter and needed only for
25 non-controversial explanation.

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(Whereupon, County C-72 and
LILCO C-40, 41 and 42, having
been previously marked for
identification, were received
in evidence.)

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JUDGE BRENNER: All right.

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Mr. Brigati, did you still need to discuss-- You
said you wanted to revisit one of the motions to strike
before we dismiss the panel.

10

MR. BRIGATI: Oh, yes, Judge.

11

12

Do you want to get the panel out of here so I can
discuss it?

13

JUDGE BRENNER: You are so elegant.

14

The other option....

15

16

If you gentlemen would not mind? Maybe you would
welcome the occasion.

17

(Witness panel temporarily excused.)

18

JUDGE BRENNER: Off the record.

19

(Discussion off the record.)

20

JUDGE BRENNER: Back on the record.

21

22

I am not sure what you wanted to do, but go ahead
and I'll know.

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MR. BRIGATI: On the subject of this hearsay
testimony concerning DEMA rules and their being outdated, in
ruling on that you should be aware that DEMA is a committee

1 consisting of representatives of engine manufacturers
2 scattered around the country, and that the committee itself
3 meets very infrequently, and the affairs of the committee
4 are run by this Mr. Ecker who was referred to by Mr. Eley,
5 who is located in Ohio.

6 And Mr. Ecker advised Mr. Eley that the committee
7 will not be meeting until November of this year, and does
8 not take any action except as a committee.

9 Therefore, it would have been pretty impractical
10 to adduce testimony in the customary way concerning what
11 this is. Of course we could have brought Mr. Ecker here, if
12 he would have been willing to do so or willing to come, for
13 what is a relative modest point. And if there were any real
14 controversy over the status of DEMA, LILCO certainly would
15 have the opportunity to correct any misimpression that might
16 be created by Mr. Eley's conversation with Mr. Ecker.

17 The conversation was pointed and direct, and it
18 was brought up in the context of the issues in this
19 proceeding. And it is my understanding that under the
20 Federal Rules of Evidence that an expert is permitted to
21 rely on hearsay testimony concerning foundational material.

22 And it is also my understanding that in
23 administrative proceedings, the rules of evidence are
24 somewhat relaxed.

25 JUDGE BRENNER: The last two points are correct.

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1 within limits. The limits are the reliability and probaty
2 of the testimony. It is not a difficult, technical point
3 that we are talking about in which it is reasonable -- or
4 even a non-difficult technical point. It is not a technical
5 point at all from the point of view of the experts'
6 professional area of pursuit that we are discussing.

7 We are talking about whether or not an official
8 body is saying that their rules are no longer alive and
9 breathing, and that they are no longer applicable. And for
10 something like that you cannot expect--

11 First of all, I disagree with your saying that it
12 is a modest point. It may prove to be later, but I
13 certainly cannot make that determination now. And to hear
14 for the first time at a hearing that the County wants to put
15 in evidence that the DEMA rules are no longer applicable to
16 crankshafts because Mr. Eley had a conversation with one of
17 the DEMA administrators is not the kind of thing we are
18 willing to credit.

19 If you have that kind of evidence, there are
20 other ways to adduce it. Certainly bringing a witness in
21 was one way. Another way is at least to get something in
22 writing so we can have a better basis to judge the
23 reliability of the matter.

24 And also it would have achieved notice to the
25 other parties, which is a point related to our willingness

WRBeb

1 to credit the matter because where you have notice of a
2 point to the other party through a writing referenced in
3 your testimony, then I could turn to the other party and
4 say why are you objecting to that for the first time at
5 hearing, or in the prehearing but several weeks after having
6 seen the testimony, on the basis of the fact that the
7 testimony is not reliable?

8 The County went through its task of adducing this
9 evidence and showing the basis, and the basis is something
10 that you, LILCO, would be capable of probing, both because
11 of the nature of the basis is no longer just what somebody
12 said to somebody, and secondly, because they would have had
13 time to perform that task.

14 Now all of those-- Whether any of those would
15 change the bottom line, I don't know, but you would
16 certainly be a lot closer. And right now you are just not
17 even close. And I am going to stay with the initial ruling,
18 although I want to check with my Board members.

19 MR. BRIGATI: That's fine, Judge. But it is my
20 impression that an awful lot of hearsay has come into
21 evidence in this proceeding, and some over objection.--

22 JUDGE BRENNER: That's true.

23 MR. BRIGATI: -- most not over objection because
24 the County does not believe in objecting unnecessarily to
25 evidence.

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1 But I have heard your ruling.

2 JUDGE BRENNER: And I did try to draw the
3 distinction between what I think are most of those rulings
4 and this one.

5 I may also tell you that just because something
6 has not be struck or precluded from being admitted by a
7 prehearing ruling does not mean that we are going to
8 consider it probative and reliable when we look at it later
9 and compare it. Some of the hearsay may turn out to be on
10 non-controversial points, in which case it may have been
11 efficient to get it in that way.

12 If the point is controversial, we will be able to
13 judge that better later when we get the findings, although
14 we certainly have some sense of it now. We may decide that
15 it is not probative. We have already put the parties on
16 warning about ABS in advance because we had some prehearing
17 concerns, and we will put it together.

18 So you are free to write your findings. I know
19 it is easy for a Judge to say it will go to the weight of
20 the evidence, but it is a true point. And I think if you
21 look at the findings of this Board, at least in the past,
22 there are matters which we have stated we would not credit
23 because it was not sufficiently reliable, given the basis
24 for the matter as compared to the bases for the viewpoint of
25 another witness who disagreed on the point.

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1 So we take very seriously the weight of the
2 matter, and this is one of the factors.

3 The reason we granted the motion this morning is
4 because we did determine that the weight would be zero.

5 Let me check with my Board members, since you did
6 take the time to give us your reasons more fully, and we
7 appreciate having it. It just does not change my result,
8 but I'll find out in a moment whether it changes theirs.

9 MR. STROUPE: Do you need a response from me,
10 your Honor?

11 There is maybe one point that I would like to
12 make, and that is that, quite frankly, Suffolk County has
13 had ample opportunity, as you observed, Judge Brenner,
14 particularly when one considers that they had the
15 opportunity to request to file rebuttal testimony to LILCO's
16 testimony filed on August 14th which, indeed, included a
17 tremendous amount of information about DEMA.

18 JUDGE BRENNER: Actually, you understated your
19 case.

20 MR. STROUPE: There are some other things I could
21 state, too.

22 JUDGE BRENNER: The materiality of the DEMA
23 limits has been talked about since at least the drafting
24 of the contention which predates the filing of testimony,
25 and I suspect even predates that.

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MR. STROUPE: Not only that, we also had available a person as a live witness who had formerly been head of the DEMA Technical Committee and was knowledgeable in that area. It was subject to cross-examination by the County.

JUDGE BRENNER: I think we have heard enough.

Did the Staff want to add anything?

MR. GODDARD: Nothing.

(The Board conferring.)

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1 JUDGE BRENNER: Judges Morris and Ferguson say
2 they will support me this time.

3 I did want to excuse the witnesses formally. Why
4 don't we have somebody let them come back in. All I wanted
5 to do was to thank them. We are finished with them, am I
6 correct, in terms of all examination?

7 We can, perhaps, go to some of the matter.

8 MR. STROUPE: I think Mr. Ellis and Mr. Dynner,
9 perhaps, want to talk to you about pistons.

10 Whereupon,

11 Stanley G. Christensen,

12 G. Dennis Eley,

13 and

14 Dale G. Bridenbaugh,

15 resumed the stand and, having been previously duly sworn,
16 were examined and testified further as follows:

17 Welcome back, gentlemen, you don't want to get
18 too comfortable because we're going to tell you that you can
19 go at this time.

20 I don't know whether we're going to start the
21 piston testimony today. My sense of it is that it probably
22 doesn't pay, anymore, to do that. Does anybody disagree?

23 MR. STROUPE: I don't think Mr. Ellis does. I
24 think he feels that --

25 JUDGE BRENNER: Here he is.

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1 MR. STROUPE: I think he feels it would be better
2 to start at the same time so he can finish it.

3 JUDGE BRENNER: That's consistent with what he
4 said the other day. Do you want to insist on starting your
5 examination of the County's piston witnesses today?

6 MR. ELLIS: No, sir.

7 JUDGE BRENNER: All right.

8 Then we can, indeed, let the witnesses go, some
9 of you, for now. Forgive me, I don't remember whether -- I
10 guess we will see all of you back on some aspect of future
11 testimony, at least. So we will only say farewell for now,
12 rather than a permanent good-bye. I do want to comment on
13 the fact that, as I don't have to tell you after your days
14 sitting here, it is the object of all parties in this
15 hearing to make things easier for themselves, and not
16 necessarily easier for you as witnesses. And you find that
17 even from parties that do not disagree with you. What they
18 are trying to do is to get findings down, get your testimony
19 down on the transcript, in a way from which they can write
20 findings that will be meaningful to a lay reader. And that
21 often makes for a difficult process. Then the difficulties
22 are compounded by the fact that not everybody in the room
23 agrees with you. So that gets more difficult. And then you
24 have parties interrupting each other or interrupting your
25 flow of thought with objections and rulings from the Board

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1 and so on. And then they expect you to remember what is not
2 always a very simple question, five minutes later, when they
3 also -- as I am sure Counsel may have advised you -- expect
4 you to listen to the argument on the objections. Because
5 there may be some things in there that are pertinent to what
6 you have to do next. And this is all very, very difficult.
7 And I think I understand that. I'm sure I don't under it as
8 well as I would if I were sitting at the table with you.
9 But we appreciate that those difficulties exist.

10 My personal opinion is the adversary process
11 works in the end, but it probably doesn't seem like it's
12 working while you're in the midst of it. And that's the
13 best I can do. But we appreciate those difficulties and do
14 thank you for your assistance in trying to explain the
15 information further than you had given in your initial
16 written testimony.

17 So, I hope you enjoy your break from the hearing,
18 and we'll see you again in future hearings. Thank you all
19 very much.

20 (The witness panel excused.)

21 JUDGE BRENNER: Okay, we can talk about
22 scheduling. We had meetings in chambers at the end of the
23 day yesterday discussing scheduling matters and some matters
24 relating to scheduling.

25 The first question we have is: what the time

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1 estimate might be by the parties for cross-examination of
2 the County's piston testimony, now that the testimony is
3 going to be revised. We received revised copies yesterday.
4 The revisions are deletions to the testimony.

5 Mr. Ellis?

6 MR. ELLIS: Yes, Judge. I appreciate the Board
7 giving me last night to review that testimony. I have
8 reviewed it, and the County deletions, and there is a change
9 or two. And I can give the Board an estimate but there's a
10 band of tolerance there that I want to explain.

11 My estimate is that I think that we can complete
12 our cross-examination of the County in three to four hours.
13 And it would be my hunch that we would complete the entire
14 piston cross-examination -- recross, redirect -- my sense of
15 things is it could easily be done in a day.

16 That could vary though, depending on some points
17 I now want to raise. I need to discuss this further with
18 Mr. Dynner.

19 Some of the testimony is not clear to us. There
20 is one portion that is excised without any indication of its
21 excision and I just wanted to be sure that that was an
22 oversight, that there aren't other omissions that are
23 unmarked.

24 The pagination, I think, is just a function of
25 the computer, but it's a little different from the existing.

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There is an answer without a question that I want to review.

There is, I think a -- I'm trying still to understand this structure, which I would prefer not to go forward today.

We would also like some additional time other than just this overnight to consider whether LILCO wants to file any motions to eliminate further portions of the testimony that should be deleted, given the deletions that have been made. And, for example, there's a portion of the contention that we think may -- should go as a result of the deletions, and there are some other portions of the testimony that we may want to file a motion with respect to. We would also, of course, give the party a new cross-examination plan in timely fashion so that it would deal with the new testimony.

There are also some other portions of the testimony at the beginning, pages 3 and pages 2, that may have to be conformed to the deletion.

A final comment I may make, I think circumstances compel it. We welcome the deletions because, of course, they eliminate controversy where we hope none should exist. But, obviously, I find the timing a little disturbing. The County filed 33 pages in July and now approximately 20 of the 33 pages are gone. And this is after LILCO has spent a

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1 substantial amount of time responding to it, preparing for
2 cross-examination and the like. And it happens on the eve
3 of when we are to begin our cross-examination.

4 So while we welcome the deletions, as they
5 certainly eliminate areas of controversy that shouldn't be
6 in controversy, we wish the timing had been otherwise. I'm
7 sure there are reasons, good reasons, why that could not be
8 controlled by the County. But that's a comment I felt
9 compelled to make.

10 JUDGE BRENNER: When I think the serendipity, if
11 you will, of having a break in the hearing at this time is a
12 good one. Because if you had asked for more time prior to
13 beginning your cross examination, based on the fact that you
14 have only received the revised testimony late yesterday
15 afternoon, we would have certainly had to consider seriously
16 such a motion. And the fact that we have to break now,
17 anyway, will take care of many of those problems.

18 MR. DYNNER: Judge Brenner, since Mr. Ellis felt
19 compelled to make the extensive comments he did, I feel
20 compelled to make a short answer to them, because I thought
21 a portion of his comments were totally unnecessary, and I
22 don't know why he made them.

23 Obviously, as I explained when we put this
24 amended testimony, or the deletions, on the record the other
25 day, that the reason for these deletions arose out of much

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1 of the cross-examination on the pistons. And Mr. Ellis is
2 quite right when he said that he was sure that the County
3 had good reasons. If Mr. Ellis was sure that the County had
4 good reasons for the time that it took to make these
5 deletions, he did not have to make the statement he was
6 compelled to make. It's the kind of thing that I feel is
7 totally unnecessary in these proceedings. It adds nothing
8 to them except to get the lawyers squabbling. I don't wish
9 to squabble. But I think if, in the future, those types of
10 comments or statements on the record can be eliminated, it
11 would be better for all of us. We will meet with Mr. Ellis
12 in order to resolve, quite appropriately not on the record,
13 his concerns about some of the potential problems with his
14 ability to read the deletions properly. And we will get
15 those resolved before we go back in session. Thank you.

16 MR. ELLIS: Let me just state --

17 JUDGE BRENNER: Stop. No, I'm not going to let
18 you. I'm not going to let you, Mr. Ellis, no matter how
19 hard you try, so make it easy on yourself.

20 Thank you.

21 I will observe, generally, and whether the
22 parties want to infer any applications of the present
23 circumstances, that's up to them, that lawyers seem to get
24 along much better off the record next door in chambers than
25 they do here, when discussing the very same subject matter.

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1 Nevertheless, it is necessary to put some things on the
2 record.

3 Mr. Goddard, could you give us an estimate for
4 the length of time for Staff's cross-examination of the
5 County's testimony on pistons?

6 MR. GODDARD: Not more than one hour, Judge
7 Brenner.

8 JUDGE BRENNER: Would the parties still wish to
9 begin pistons on October 22? That would be our next hearing
10 date.

11 MR. ELLIS: That's fine with LILCO.

12 JUDGE BRENNER: The other option is to begin the
13 blocks on that day and hold the pistons until we finish the
14 litigation of the blocks.

15 MR. ELLIS: If we could proceed with the pistons
16 on that date, I think it might be better. Maybe the pistons
17 -- I was thinking the pistons might be in the same findings
18 track with the crankshaft?

19 JUDGE BRENNER: No. I'll get to that next, but
20 that will not be the case. Crankshafts will be on a
21 separate -- on an advanced findings track and pistons and
22 blocks will be on the same findings track, regardless of
23 which one is done first. At least that is what we
24 intended. But we will discuss it in a moment.

25 MR. DYNNER: Judge, I was just going to give you

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1 my views on the schedule. We would, on reflection, suggest
2 the possibility of starting with the blocks on the 22nd.
3 The reason I say that is purely logistical. We will, for
4 the 3 or 4 hours, have to bring people in from California.
5 It would be more convenient for the witnesses and, if it
6 does not disturb the Board's sense of how things might
7 proceed, if we could, perhaps, do the piston
8 cross-examination at the conclusion of the block
9 cross-examination, it would make our logistics a heck of a
10 lot easier. And it might even make other parties logistics
11 easier. And I throw that out as a suggestion and not as a
12 firm position.

13 JUDGE BRENNER: I'm surprised you're not
14 thinking of your own logistics as a lawyer. And let me
15 suggest you are such a generous person that maybe it doesn't
16 matter, compared to your witnesses logistics. Let me
17 suggest this to you: you may have considered it and you may
18 not have. Even though I said the findings date will be the
19 same for blocks and pistons, we certainly don't expect that
20 parties wait until the close of the record on all issues,
21 before they begin work on their proposed findings on a
22 subject. And by doing the pistons first, you will be able
23 to get a lot more of your work on the pistons subject as
24 lawyers, while blocks are being litigated.

25 MR. DYNNER: Only if we can be in two places at

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1 the same time.

2 JUDGE BRENNER: Oh, no. You have more than one
3 attorney. It's up to you. You put your resources where you
4 think best. But there is that possibility.

5 We will decide the point and let you know during
6 the break period, because it will depend on how much weight
7 I want to give to the time estimates, which I will think
8 about for myself. And also Judge Ferguson's schedule, which
9 I will also address on the record before we close this
10 morning.

11 While on the subject of the revisions of the
12 piston testimony the parties do have things to discuss,
13 which will be discussed among the parties off the record,
14 involving logistical things.

15 I'm not going to ask you now for a statement of
16 why the changes were made substantively, Mr. Dynner. I
17 understand they were made as the result of information
18 coming in through this record, and perhaps other sources.
19 But as I read it, and it was not a studied reading -- it was
20 only since late yesterday and this morning -- but as I read
21 it, I had some questions in my own mind as to why certain
22 portions were remaining in while some other portions were
23 remaining out. And in order to understand that better, I
24 need to know precisely why the deletions are being made.
25 And it may be that when the County has a further chance to

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1 look at this testimony, that there may be some further
2 changes. And that changes may be deleted material going
3 back in or non-deleted material going out. Or maybe the
4 changes would stay the same as you are giving them to us
5 now. But you can key the explanation that we're going to
6 want to get from you on the record when we resume, to the
7 general observation I just made.

8 In addition, it may be that some of the
9 sub-issues can be identified as no longer being in
10 controversy. While, at the same time, getting a precise
11 identification of the issues that still are in controversy
12 within the context of pistons. And that, in itself, maybe
13 enough to help explain to me why some of the deletions were
14 made and others were not made.

15 Let me give you one general observation. There
16 is, at least, one place in the testimony where it appeared
17 to me that the conclusion was left in on a particular
18 point. And that the material that was deleted was either
19 the explanation for the conclusion or the additional details
20 on why the conclusion is important to the County's
21 witnesses.

22 If my observation is right -- and it may not have
23 been, I'm just mentioned it so you will be able to look at it
24 during the break period -- if my observation is right
25 then deleting the details does not assist either the

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1 efficiency of the proceeding or -- because now the area is
2 going to have to be inquired into anyway as to the bases for
3 the witnesses' conclusions so long as the conclusion remains
4 -- and it also confuses me, getting back to my other point,
5 as to what the County has in mind that is still in
6 controversy. So we need to come back to this subject. It
7 may be that the first time we will come back to it will be
8 October 22nd and regardless of whether we are going to hear
9 the piston testimony that day, I would like the parties to
10 be prepared to address these points again that day

11 However it also may be appropriate -- and I will
12 leave it up to the parties -- for certain stipulations to be
13 agreed upon and filed with the Board as to what is still in
14 controversy. Whether they will go so far as to involve
15 stipulations of fact, I don't know and I haven't thought
16 through and you will have to think about that. But at least
17 stipulations as to what issues are in controversy and what
18 issues are not in controversy. That will help the Board
19 focus on what findings we are going to be asked to make well
20 in advance of actually getting the proposed findings and
21 that helps us as we hear the testimony that we will be
22 hearing from the County witnesses.

23 MR. ELLIS: Judge Brenner --

24 JUDGE BRENNER: You don't have to discuss the
25 substance of any of it. I just want you to consider all

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1 these things.

2 MR. ELLIS: The problem with the procedure from
3 my perspective is that it invites a moving target.

4 JUDGE BRENNER: Well moving only during the
5 immediate next week or so. Obviously this cannot continue
6 up until very close to the 22nd; whatever is going to be
7 done, should be done next week.

8 MR. ELLIS: Are we then not able to prepare or
9 think about preparing whatever motion we might want to
10 prepare? Because we would want to proceed now but if we are
11 going to get a phone call at the end of next week saying Oh
12 by the way we want to add this and subtract this, I think
13 that is an intolerable situation.

14 JUDGE BRENNER: I can solve that problem by
15 saying don't do anything further, the matter is going to
16 stay where it is.

17 It seems to be that it is a part of the same
18 process, that you would think about what motions you may
19 want to file while discussing the matters among the
20 parties.

21 You are going to have a hard time moving to
22 strike something on the basis that a party voluntarily
23 deleted something else, it seems to me. But you think about
24 that, and maybe you can show me something I am not thinking
25 of.

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1 See if you can get yourself out of an adversarial
2 -- a total adversarial posture for a little while during the
3 next week and think about some of the things I have said
4 here. And then if at the end of the next week nothing has
5 happened, you can all go back to your other more adversarial
6 posture and do whatever you think you have to do on behalf of
7 your clients.

8 MR. DYNNER: If it helps the Board's thinking,
9 I will just simply point out that the deletion of direct
10 testimony by the County does not necessarily mean that the
11 County is withdrawing portions of its contention. It may
12 mean, as you well know, that the County will rely upon the
13 record as it stands at this time.

14 JUDGE BRENNER: I understand that very well and I
15 tried to phrase my comments in such a way as to show that I
16 recognized that and many other possibilities as well. And
17 if I didn't phrase it in that way, I certainly had your
18 point in mind nevertheless.

19 But it seems to me that there is some movement
20 here and what the movement means I don't know yet. And
21 whether or not it would lead to some new basis for a partial
22 settlement on some part of the contention I have no idea.
23 But I want you to think about that as long as -- as well as
24 the processes we have just discussed where the County will
25 have to come back and precisely identify what is still in

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1 controversy and what is not still in controversy, if there
2 is anything in the latter category. We can leave it at
3 that, I believe.

4 I will say one more thing which is obvious to
5 you: Certain remedies may have been not suitable for a
6 larger scope of matters being in controversy but they may
7 become more suitable if the scope of that which is in
8 controversy is narrowed and that would be part of the
9 thinking process also.

10 All right. I did want to discuss the findings
11 schedule for crankshafts. Is there something further on
12 pistons, Mr. Ellis?

13 MR. ELLIS: No, your Honor.

14 JUDGE BRENNER: I recognize your problem, I don't
15 know how to solve it other than by some solution that I
16 think might turn out to be worse than the problem.

17 MR. ELLIS: Yes, sir.

18 JUDGE BRENNER: All right. We had informed the
19 parties yesterday in chambers that we did want to set a
20 schedule for proposed findings by the parties on the issue
21 of crankshafts, but I did offer the parties an opportunity
22 to consider whether there was an substantive reason why that
23 would not be an appropriate thing to do. And I will invite
24 that now, if there is any comment.

25 (No response.)

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1 JUDGE BRENNER: Hearing none, the schedule in
2 accordance with the regulations -- I hope I remember them
3 correctly -- would be 30, 40, 50 and 55 days as suggested
4 for calendar days in the sequence of LILCO, then the County
5 and the State together, then the Staff and then LILCO's
6 reply.

7 We want to set page limitations also and we
8 advised the parties of what our thinking was in chambers and
9 gave the parties an opportunity to think about it and get
10 back to us today. Whatever page limits we set, we would
11 apply those limits to the County and the State together.
12 And if there is some problem that I don't presently perceive
13 involving applying that page limitation to the County and
14 the State together, I am sure we will hear about it in a
15 timely fashion but otherwise we will apply it in that way.

16 The precise dates adjusted for the calendar would
17 be as follows -- and tell me if I have made a mistake after
18 you have had a chance to consider it:

19 November 5 -- these are received dates and they
20 have to be received by the Board and all participating
21 parties -- November 5 for LILCO's proposed findings;
22 November 15 for receipt of the proposed findings of the
23 County and the State. And for the Staff, I thought we would
24 set November 27. The actual date would be the 26th, but the
25 Thanksgiving holiday occurs in that interim so we will give

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1 the Staff an additional day and make it November 27. Then
2 the date for receipt of LILCO's reply would be December 3rd.

3 Page limitations. Have the parties -- I don't
4 know if you have discussed it among yourselves. You know
5 what our suggestion was yesterday. If there is no
6 difference of opinion from the parties, we are going to
7 apply our suggestion.

8 Mr. Ellis?

9 MR. ELLIS: Judge Brenner, we have not had an
10 opportunity to do the kind of research I wanted, which is to
11 go back and look at what we had done and to see what kind of
12 reduction factor would be reasonable to see how many pages
13 of transcript. But we did have an opportunity to discuss it
14 last night to consider the kinds of issues that have been
15 raised in the crankshaft testimony and generally the number
16 of days devoted to it. And we do not really believe the 65
17 pages is adequate.

18 We believe that -- when we all discussed it we
19 thought that given our experience in this hearing even if we
20 cut everything by half that we would be much more
21 comfortable with, and think it would be more appropriate
22 given the nature of the issues and the testimony, to have
23 page limitation on the order of 150 pages for both reply --
24 both the submission and the reply.

25 Does the Board also contemplate that we would

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1 also submit a draft opinion as we did before?

2 JUDGE BRENNER: No, I thought I established that
3 in the prehearing conference order. That is going to cut
4 down on the number of pages. We are going -- there are some
5 experiments that are noble and there are some experiments
6 that are less noble, and we draw inferences from the
7 previous findings format and have decided to change it. And
8 we are returning to the -- well I described it in my written
9 order. You can go back and look at it.

10 If there is any question as to the format, the
11 two of us -- I am citing this only for format purposes,
12 participated in a recent decision in the Limerick proceeding
13 and that is the format we have in mind for this proceeding
14 now. That was an August issuance.

15 MR. ELLIS: In concluding that 65 would be too
16 little, we took into account the number of pages that have
17 been prefiled, the number of days that have been devoted to
18 the hearing and the number of exhibits that have been
19 discussed that it may be appropriate to cite and make use of
20 in the findings and we simply came to the conclusion that 65
21 would not be adequate in our view to cover all the issues.

22 JUDGE BRENNER: 150 sounds like much too much to
23 me.

24 Let me hear from the other parties.

25 MR. DYNNER: We will try to live with 65.

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1 Obviously the number of pages which the Board sets will be
2 applicable to all parties, so if there is an increase we
3 obviously would want the benefit of that.

4 JUDGE BRENNER: Yes, of course.

5 Staff?

6 MR. GODDARD: The Staff would favor a lower
7 limit, preferably in the area of the 65 pages suggested by
8 the Licensing Board.

9 JUDGE BRENNER: All right. We will discuss it as
10 a Board this morning and get back to you on the record this
11 morning.

12 But before we do that, let me see if there are
13 any other subjects we have to discuss this morning.

14 I have one but I don't know if the parties had
15 any others.

16 (No response.)

17 JUDGE BRENNER: Hearing none, I did want to
18 announce to the parties that, as you may know, Judge
19 Ferguson is a part-time member of the Atomic Safety and
20 Licensing Board panel. For the last month he has been a
21 non-member during his sleeping hours and a member during his
22 waking hours.

23 Nevertheless he reminds us from time to time that
24 he is a professor at a university and he has students and
25 classes and so forth. He has been able, with a lot of

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1 effort, to make arrangements to be here with us each and
2 every day so far in this hearing. The length of the hearing
3 is longer than we had initially anticipated.

4 What I am leading up to is the fact that we do
5 not know yet whether Judge Ferguson will be able to be here
6 at all future sessions and it has been my practice to try to
7 announce in advance when the Board will be proceeding on a
8 quorum basis. We will not know for sure for some period of
9 time, but it may be that at the very next session we will be
10 proceeding on a quorum basis, so I want to let you know that
11 as a possibility. It may be that schedules can be worked
12 out and we will be able to proceed as a full Board for
13 almost all of the sessions, if not all of the sessions.
14 That is as far as I can go at this time.

15 All right. We will take a 10-minute break and
16 come back and give you the page limits.

17 (Recess.)

18 JUDGE BRENNER: Back on the record for this
19 momentous decision.

20 Seriously, we did consider it. The page limit is
21 90 pages. We think that is larger than is necessary but we
22 think it gives some margin of comfort. We have received
23 findings in the past in this proceeding that were simply
24 more verbose than necessary. We don't need the testimony
25 and the record regurgitated back word-for-word. The object

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1 of proposed findings is to synthesize and analyze the
2 testimony for us, and we think 90 pages are more than
3 sufficient -- or at least sufficient to achieve that goal.

4 As we have stated, the 90 pages is for the total
5 number of pages. So when LILCO files its proposed findings,
6 it will have as many pages for the reply as the difference
7 between 90 pages and the number of pages it files in its
8 initial proposed findings.

9 The other parties do not have the right of reply
10 so but the sequence is such that they are replying to the
11 findings filed prior thereto and they therefore will get the
12 90 pages in those findings. If there is any need for any
13 variation of the page limits, emergency urgent requests for
14 relief can be filed, but they are not going to be looked up
15 with favor and they therefore have got to be very seriously
16 felt and very well-based. So there is that safety valve at
17 least in case we are all wrong.

18 The length of the record and the length of the
19 number of pages of transcript is not necessarily
20 proportional to the volume of findings needed.

21 The only other matter is sometimes the parties
22 without the right of reply to findings filed after that
23 party have a problem and again we can receive special
24 motions about that subject. But if that comes to pass, we
25 are going to be mindful of the page limitations also.

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1 So that if there is some problem and -- I will
2 leave it at that. Maybe the problem will not come up.

3 If there is nothing else that need be discussed,
4 we will be in recess now. We expect to be back on October
5 22nd -- in fact, we will be back here on October 22nd at
6 10:30.

7 MR. DYNNER: I think you were going to mention
8 and discuss among yourselves whether we were going to come
9 back and do the pistons or whether we were going to defer
10 the pistons.

11 JUDGE BRENNER: Yes, I'm sorry, I probably did
12 not make that clear. I did not mean we could make that
13 clear to you today. We will announce that as soon as we
14 can, some time during the break period and communicate that
15 to you.

16 In fact I haven't worked out the schedule of the
17 proceeding beyond October 22nd. We will be in session for
18 more than just that day that week but I do not know how many
19 days that week and I do not know what the schedule will be
20 for future weeks and we will let you know about that just as
21 soon as we can also.

22 Right now don't make any commitments that will
23 preclude having people here for October 22nd and
24 thereafter. So I do not want to hear that somebody made
25 commitments because they thought they would be free.

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We will let you know soon and once we let you know then of course you can rely on what we tell you from that point.

Thank you for your time this week and I hope you enjoy the break in the hearing, even though it won't be a break in your work load, as we well know, and we will be back in session on October 22nd at 10:30.

(Whereupon, at 12:30 p.m., the hearing in the above-entitled matter was recessed, to reconvene October 22, 1984 at 10:30 a.m.)

CERTIFICATE OF OFFICIAL REPORTER

This is to certify that the attached proceedings before the
UNITED STATES NUCLEAR REGULATORY COMMISSION in the matter of:

NAME OF PROCEEDING:

Long Island Lighting Company
(Shoreham Nuclear Power Plant,
Unit 1)

DOCKET NO.: 50-322-OL

PLACE: Hauppauge, L.-I., New York

DATE: October 4, 1984

were held as herein appears, and that this is the original
transcript thereof for the file of the United States Nuclear
Regulatory Commission.

(Sigt) William R. Bloom, Anne G. Bloom
(TYPED)

William R. Bloom & Anne G. Bloom

Official Reporter

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