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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 understand
8 it as well as I would if I were sitting at the table with
9 you. 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

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.

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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 prefiled written
25 testimony that addresses your analysis or conclusion as to

2 WRBpp 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 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 than the forging 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 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 approved hardening processes; do you
16 recall that?

17 A (Witness Christensen) I do.

18 Q Do you know whether shot-peening is an approved
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

2 WRBeb 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 pressure-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.

1 WRBeb 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