

1 WRBeb

## P R O C E E D I N G S

2 PRESIDING JUDGE: Good morning. We are on the  
3 record.

4 We will note the usual appearances. I don't see  
5 any Counsel for the State present, but we do have Counsel  
6 for the Staff, LILCO and Suffolk County present.

7 We have some preliminary matters to take up  
8 before getting to the testimony of the Staff's witness.

9 One minor, brief preliminary matter is that the  
10 Board has reviewed the Proposed Resolution of Suffolk County  
11 Diesel Generator Contention regarding cylinder heads. In  
12 principle, it is acceptable to us and we have no problem  
13 with it.

14 As a minor point it appeared to the Board on  
15 preliminary reading that with respect to Paragraph E, which  
16 starts on page 3, the procedure spelled out there deals with  
17 the barring over and rolling over of the engines and  
18 checking the engines after that procedure, but does not  
19 spell out what the engines are being checked for and what  
20 the criteria or criterion would be for that check.

21 Under Paragraph F, which seems to deal with a  
22 different routine surveillance procedure, there is an  
23 explanation of that. If the parties believe the explanation  
24 in F applies to E, it was not clear to us on reading the  
25 express agreement that it is to be so applicable.

1 WRBeb 1 office on Thursday evening. Now I realize he was en route.  
2 The first I heard from Mr. Dynner was at 3:35 p.m. on Friday  
3 afternoon.

4 Getting to the merits of the matter, we are in  
5 agreement that the subject matter of the supplemental  
6 testimony is relevant and material. Both sides agree to  
7 that.

8 As to his characterization of it as significant  
9 new information, we do not agree with that. From very early  
10 in this proceeding, he knew from the June report and even  
11 before that, the preliminary report from FaAA about cam  
12 gallery cracking, he knew about the stud-to-stud cracking,  
13 and he knew that as far as FaAA or LILCO knew at that time  
14 -- and it was also true as of the date of the filing of the  
15 testimony -- that there were no circumferential cracks in  
16 the original 103.

17 Now at the time we filed the testimony on August  
18 the 14th, it was true and correct, to the best of our  
19 knowledge and information.

20 The problem was that people are continuing to  
21 document the matters that we have set forth in the  
22 testimony, and in the course of that documentation, two  
23 significant things occurred.

24 The first was that -- and we had to go to  
25 California to confirm this -- that....

1 WRBeb 1 in our testimony was not accurate, and the basic data that  
2 is referred to in that strain gauge data could not be  
3 verified.

4 So then we proceeded further with a piece of the  
5 old 103 block top with the deepest stud-to-stud crack and  
6 cut that up, and that showed, rather than being .5 inches  
7 deep, it was only 3 inches deep.

8 JUDGE BRENNER: Excuse me. A lot of this is in  
9 your testimony. What I'm not clear on is what was done  
10 several weeks ago as opposed to what you first learned about  
11 late last week?

12 MR. FARLEY: I would say essentially,  
13 Judge Brenner, it was the error in the data reduction of the  
14 TDI strain gauge data and secondly, it was the completion of  
15 the destructive examination of a portion of the old 103  
16 block.

17 JUDGE BRENNER: September 6th is when LILCO first  
18 knew it would have to supplement its testimony on that  
19 blocks. Is that what you're telling me?

20 MR. FARLEY: I'm sorry, your Honor, I didn't hear  
21 you.

22 JUDGE BRENNER: Were you telling me that  
23 September 6th is the earliest date at which LILCO knew it would  
24 have new information causing a need to supplement its  
25 testimony on the cylinder blocks?

1 WRBpp 1 County in this proceeding.

2 JUDGE BRENNER: We're not going to have staggered  
3 testimony filing timeframes now.

4 MR. GODDARD: Staff appreciates that.

5 JUDGE BRENNER: That was an unusual accomodation  
6 last time which the staff turned around out of context after  
7 that.

8 Putting that aside, if we were to set a date for  
9 the receipt of supplemental testimony, if any, by the Staff  
10 on cylinder block for near the end of the week of the 8th --  
11 either the 11th the 12th, in that timeframe -- what would  
12 the Staff think of that proposal?

13 MR. GODDARD: The Staff would be ready to file  
14 supplemental testimony by that time.

15 Did you also ask, Judge Brenner, for our position  
16 with regard to the County's request for, I believe, a  
17 two-week suspension?

18 JUDGE BRENNER: No, I did not. But you're free to  
19 offer it.

20 MR. GODDARD: The Staff would support it.

21 JUDGE BRENNER: Why?

22 MR. GODDARD: By virtue of our evaluation of the  
23 significance of the testimony received from LILCO with  
24 regard to the magnitude of exchanges in prior testimony as  
25 opposed to any forewarning of the Staff's evaluation of the

1 WRBagb 1 so that you will not have to bring all your witnesses in  
2 here for a short week. That's the main reason. And the  
3 fact that we will give you some other time for further  
4 witness preparation is a bonus.

5 MR. GODDARD: Judge Brenner, the Staff will be  
6 amenable to proceeding on that basis and having the Staff  
7 panel on pistons cross-examined immediately after  
8 Dr. Sarsten and Mr. Henriksen are cross-examined on the  
9 crankshafts.

10 JUDGE BRENNER: All right. We'll do that. That  
11 will be our testimony for this week. If we have only half a  
12 day left on wednesday, we will not require the County  
13 witnesses to be here to begin their testimony for that half  
14 a day unless they are here anyway.

15 Are they here anyway?

16 MR. DYNNER: No, sir. Professor Anderson is not  
17 here and others -- as you can see Professors Christensen and  
18 Mr. Ely and Mr. Hubbard are here but those are the three who  
19 are here. The others are not.

20 JUDGE BRENNER: All right.

21 Next week, Monday, we would start with the  
22 County's testimony on crankshafts. Unless there is a strong  
23 reason to do pistons first, we would prefer taking up  
24 crankshafts first.

25 Then we will go to the County's testimony on

1 WRBeb 1 other engines they have sold for nuclear standby service,  
2 the 12-, the 16- and the 20-cylinder engines.

3 Q And your knowledge with respect to the 12-, 16-  
4 and 24-cylinder engines, all of that knowledge was obtained  
5 in connection with this case, was it not?

6 A Yes, that is true.

7 Q Let me mention some other names to you.

8 MR. ELLIS: It might be easier, Judge Brenner, I  
9 have some excerpts from DEMA which I can hand out to the  
10 Board and the parties now. I don't intend to introduce it  
11 as an exhibit, but I think it would be convenient for the  
12 witnesses and the parties.

13 JUDGE BRENNER: What do you want them to do?  
14 Look at the names of the members of DEMA?

15 MR. ELLIS: Yes, sir. I can suggest them to him.

16 JUDGE BRENNER: This is going to be material for  
17 some finding later as to whether he can read the names  
18 correctly?

19 MR. ELLIS: No, sir, not as to whether he can  
20 read the names correctly. I just thought it would be  
21 simpler, rather than my suggesting who the members might be,  
22 to have that in front of him.

23 JUDGE BRENNER: You've got testimony through your  
24 witness that has not been contradicted, to the best of my  
25 knowledge. Do you know that?

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1 A I do not have -- I have to think back now.

2 No, I do not have knowledge of how many orders  
3 are summed by individual firms in the United States when  
4 they use DEMA.

5 JUDGE BRENNER: Mr. Ellis, excuse me.

6 Professor Sarsten, in your answer prior to the  
7 last answer you referred to your belief that you saw no  
8 reason why the practices in the United States should differ  
9 significantly from those elsewhere in the world. What you  
10 left unstated, at least expressly, is what the practice is  
11 elsewhere. Could you tell me what that is?

12 DR. SARSTEN: Yes. The standard practice  
13 elsewhere in the world is to sum 24 orders for a forestroke  
14 engine. That is, orders from one-half to 12. That is, for  
15 example, as specifically stated in the proposal for the new  
16 CIMAC rules for torsional vibration where, in 1979 they  
17 mention 24 orders as standard. That's the first 12 for  
18 four-stroke engine.

19 BY MR. ELLIS:

20 Q Professor Sarsten, you say the practice  
21 elsewhere, am I to understand that that is -- that these  
22 manufacturers you're talking about are in Europe?

23 A (Witness Sarsten) This would hold for the world  
This was for the main classification  
They are combining to see if they can arrive at

3 WRBop 1 experience with respect to what DEMA uses, how the standard  
2 was developed, the methodology, or what the American  
3 manufacturers in this country do in the application of the  
4 DEMA standard. And he has not, before this case, used the  
5 DEMA standard for crankshaft torsional stresses. I think,  
6 under the circumstances, I do not think even a liberal  
7 standard would be met to permit a conclusion. And he is an  
8 expert in the application of the DEMA standard.

9 JUDGE BRENNER: Could I get Mr. Ellis' last  
10 question read back, please?

11 (Whereupon the reporter read the record as  
12 requested.)

13 JUDGE BRENNER: Well, we'll certainly hear a  
14 response from the Staff and then from the County if it  
15 wishes to make one. If the Staff would prefer to ask  
16 Professor Sarsten some questions in the nature of redirect  
17 or voir dire prior to making a response, we'll give it  
18 leeway to do that also.

19 MR. GODDARD: Fine.

20 JUDGE BRENNER: Do you want to do that now?

21 MR. GODDARD: Yes, I would.

22 VOIR DIRE EXAMINATION

23 BY MR. GODDARD:

24 Q Dr. Sarsten, it is your testimony that based upon  
25 your professional engineering judgment, the DEMA rules are



4 WRBagh 1 verification of the accuracy of such computer programs

2 JUDGE BRENNER: Incidentally, as long as I have  
3 interrupted this much, previously in talking about ALCO,  
4 with which you have had prior experience, I believe you  
5 stated that it was a member of DEMA when you were there, am  
6 I correct or did I get that wrong?

7 WITNESS SARSTEN: Let me see. I think ALCO then  
8 -- this was in the -- around 1960, was a member of DEMA.  
9 I'm not quite sure of this.

10 They are now, I think, listed as the White Motor  
11 Corporation.

12 JUDGE BRENNER: All right. That was my next  
13 question. Thank you.

14 WITNESS SARSTEN: Here we have them: White  
15 Superior Division. They are now a part of White Motor  
16 Corporation of Springfield, Ohio and, as such, they should  
17 still be members.

18 MR. ELLIS: Judge Brenner, I may not have been as  
19 clear as I should have been.

20 JUDGE BRENNER: Do you want to strike him because  
21 he doesn't know anything about DEMA?

22 MR. ELLIS: It's his interpretation of DEMA that  
23 I --

24 JUDGE BRENNER: I understand. I want to see what  
25 else he knows to see if that may be pertinent. You're not

4 WRBagb 1 challenging him as an expert in the performance or analyses  
2 of torsional vibration, are you?

3 MR. ELLIS: No, sir.

4 JUDGE BRENNER: But you didn't ask him about what  
5 he knew, so I thought I would ask that part and then put it  
6 together with what he said he didn't know.

7 MR. ELLIS: Yes, sir, I understand.

8 JUDGE BRENNER: And in addition, if we were to  
9 grant your motion, you have not yet gotten to Mr. Henriksen,  
10 who is the co-author of much of the same answers, and you  
11 would have to work your way through him, even if we granted  
12 the motion.

13 MR. ELLIS: No, sir, because the answers that I,  
14 would have stricken do not have Mr. Henriksen on them.

15 JUDGE BRENNER: All right. That would take care  
16 of that problem if we get to that point.

17 I suppose it would help you to know now, so we  
18 can take a moment.

19 Does the County have anything to add, either by  
20 way of argument or questions to Professor Sarsten?

21 I'll get back to you for your argument,  
22 Mr. Goddard, I wanted to hear from the County.

23 MR. ELLIS: Judge Brenner, while you're waiting,  
24 would you like me to give you some of the questions and  
25 answers that I have in mind?

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1 experience in the interpretation and application of DEMA.  
2 That does not mean that his other testimony on ABS or other  
3 matters is similarly infirm. But I certainly think this  
4 one is. He does not bring to the Board the kind of  
5 expertise with DEMA that I think is plainly required by even  
6 the most liberal standard.

7 JUDGE BRENNER: Maybe I should accept your  
8 invitation to give us the particular answers that you would  
9 strike if your motion were granted.

10 MR. ELLIS: Yes, sir.

11 On page 12, we would strike the portion of the  
12 answer at the top of the page relating to testimony that 24  
13 orders are now normally used. There is no basis for that  
14 with respect to DEMA.

15 We would also strike his portion of the testimony  
16 on page 13 relating to the DEMA standard, the second  
17 paragraph of that answer in the middle of the page and also  
18 the next question and answer and the following question  
19 involving the computer program, it follows the question:  
20 "How do your results compare with those by FaAA," that would  
21 also go out.

22 To the extent that his answer on page 17, he is  
23 there both with Mr. Henriksen, his answer should not be  
24 accepted with respect to DEMA.

25 There was one other one I think as well, Judge

4 WRB:agh 1 regard as to what he believed was the appropriate procedure  
2 in terms of the number of orders to meet DEMA and he talked  
3 about his experience with what has been done over the years  
4 to his knowledge. So to say there is no evidence -- that's  
5 why I said your statement was a strong one.

6 MR. SCHEIDT: Well --

7 JUDGE BRENNER: You may not agree with it or you  
8 may later show in findings that he was speaking in  
9 generalities and then when he was attempted to be pinned  
10 down by cross-examination could not support it in the detail  
11 necessary to believe the statement, but that's different  
12 than saying there is no evidence in the record.

13 And I would add that it's solely based on my memory.  
14 That would certainly be the kind of thing I would want to  
15 search for in the transcript before making a ruling on it,  
16 but I don't have to make a ruling on that point now.

17 (The Board conferring.)

18 JUDGE BRENNER: We are going to deny the motion.  
19 Professor Sarsten, as everybody can see, is clearly an  
20 expert in the performance of analysis of torsional vibration  
21 that is sufficient to give the testimony he is giving.

22 He has also testified and has sufficient  
23 expertise to be permitted to give the testimony on what he  
24 thinks the proper standard practices should be. He has  
25 explained candidly as to how he is applying what he has

1 WR3eb 1 County will rapidly and efficiently be able to obtain from  
2 LILCO.

3 MR. ELLIS: Judge Brenner, what does the Board  
4 contemplate we do after these witnesses are completed?

5 JUDGE BRENNER: These two witnesses?

6 MR. ELLIS: Yes, sir.

7 JUDGE BRENNER: I thought the Staff has agreed we  
8 could go to its witnesses on pistons.

9 Am I correct, Mr. Goddard?

10 MR. ELLIS: I think the Staff said that but I  
11 think the Board had indicated that would be one of the  
12 things it would consider.

13 JUDGE BRENNER: I'm sorry, I meant to say that  
14 that was very good news to us because we did not want to  
15 require the County's witnesses to be here this week for a  
16 number of reasons, the inconvenience to the County's  
17 witnesses due to lack of notice that some of them would have  
18 to be here this week, and more importantly, the fact that  
19 they are going to be efficiently engaging in discovery this  
20 week, and that could be one of the reasons why we won't need  
21 a full two-week break.

22 And we know we are not going to hear about any  
23 discovery disputes unless they are absolutely, positively  
24 matters of the utmost importance and privilege.

25 MR. ELLIS: I hope not, Judge, but I hope that is

1 WRBeb 1 Incorporated. They were then, I believe, already associated  
2 with White Motor Company in Auburn, New York, at the time.

3 Q So is it your testimony then that until  
4 approximately 1972, the number of orders normally used by  
5 manufacturers in Europe was one rather than 24?

6 A No, that was not my testimony. My testimony was  
7 that it was not universal for the computer calculations  
8 submitted to the major classification societies -- I am now  
9 speaking actually of one, Det Norske Veritas -- to include  
10 force vibration. Before roughly 1972, it was not  
11 universal.

12 When you make forced calculations you will  
13 include normally a large number of orders, now usually 24,  
14 because if we are in a loop it doesn't make any difference  
15 really how many orders you include as long as you have the  
16 data available.

17 Q Well, then as I understand your testimony, it was  
18 proper in '65 and prior to use just one order in connection  
19 with torsional stress analysis.

20 A For forced vibrations, yes.

21 I seem to recollect that Porter had summed some  
22 orders but it is very laborious and will not be done by hand  
23 unless in very special cases and then only a few orders.

24 Q I take it you would agree with me that when a  
25 classification society or an organization like DEMA sets a

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1 A Well, I've been sitting all evening punching  
2 these in. I have them in the computer printout. The third  
3 order is a relatively large order.

4 Q All right. Would you look, please, at the  
5 Exhibit C-17, page 3-14, Professor Sarsten?

6 MR. ELLIS: For the Board's convenience, that's  
7 the crankshaft report.

8 WITNESS SARSTEN: Which page?

9 BY MR. ELLIS:

10 Q 3-14, Professor Sarsten.

11 Do you have that before you?

12 A (Witness Sarsten) I do.

13 Q Let me direct your attention to the stress for  
14 the third order. It says, "The amplitude and displacement  
15 for the third order," — it says, ".001." Do you see that,  
16 sir?

17 A I do.

18 Q That's very small in relative contribution, isn't  
19 it?

20 A I thought you were asking about the magnitude of  
21 the harmonic excitation. The others would depend upon the  
22 specific example cited. It may be large, it may be small.  
23 Depending upon the vibratory system being considered.

24 Q Well, is the third order, then, a fairly minor  
25 contributor to the summation process that you go through?

1 WRBop 1 vertical scale mean, four, five, six; then seven, eight,  
2 nine?

3 WITNESS SARSTEN: Those are the various shafts.  
4 There are different stresses in each of the various shafts  
5 along the engine.

6 JUDGE BRENNER: Thank you.

7 Mr. Ellis?

8 BY MR. ELLIS:

9 Q Professor Sarsten, getting back now to the third  
10 order with respect to the Shoreham 13 x 12-inch  
11 crankshafts. Am I correct that I heard you say that that  
12 would contribute no more than .001 to the summation of  
13 stresses to meet the 7,000 PSI DEMA standard?

14 A (Witness Sarsten) That would be the maximum,  
15 yes, if it were phased correctly.

16 Q So that would be less than 1 percent of the 7,000  
17 allowable?

18 A I'm not good at mental arithmetic, but it would  
19 be less than 1 percent of the allowable.

20 Q Would you agree with me, then, that this is not a  
21 major order in terms of summing stresses for the DEMA  
22 allowable?

23 A No, I would not. In this specific case, it turns  
24 out that this order has a low value. It may not in other  
25 cases.



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1 and a half and fourth order, why did you select those two  
2 for depiction on your graph?

3 A Because those were the orders which, in the speed  
4 range we were considering, the rate of speed plus/minus 5  
5 percent, had significant stress levels and some of them were  
6 near resonance, so therefore, the magnitude of stresses  
7 caused by the single orders were largest.

8 JUDGE BRENNER: Mr. Ellis, while you've paused, I  
9 wonder if I could ask a question about that also?

10 MR. ELLIS: Yes, sir.

11 JUDGE BRENNER: Professor Sarsten, in giving your  
12 results for the largest single order at 450 rpm at the  
13 bottom of page 13, you report that -- this is in the very  
14 last line of that page -- you report that as approximately  
15 3800 psi. Whereas -- do you have that?

16 WITNESS SARSTEN: Yes.

17 JUDGE BRENNER: Whereas, on page 15 in the next  
18 to the last line of the first answer, you report that as  
19 being 3608 psi. Why is that figure different? Am I missing  
20 something?

21 WITNESS SARSTEN: Yes. The one figure is the  
22 results as they came out of the computer. The second figure  
23 are the results corrected or refined to take into account  
24 the measured values of the front end amplitude of the  
25 engine.

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1 JUDGE BRENNER: Which is the refined one?

2 WITNESS SARSTEN: The 3608 calculated value of 3  
3 -- where was it -- 3800 psi came out of the computer. This  
4 was based on the fourth order harmonic amplitude given by  
5 the owner's group data and, I believe, calculated by Failure  
6 Analysis Associates.

7 On page 15, the figure 3608 psi is the same  
8 figure diminished, or scaled down slightly, to agree with  
9 the measured front end amplitude due to the fourth order.

10 JUDGE BRENNER: I'm still confused, I'm sorry.  
11 Because when I look at your Exhibit 3, which is the graph,  
12 the measured value below that, what looks like it might be  
13 the 3608 point -- it's thought to be precise from that  
14 exhibit -- but a little above 3500, falls on the eighth  
15 position of the shaft. Whereas you still have a higher  
16 value which looks like about 3800 falling on the ninth  
17 position of the shaft. So aren't they two different values  
18 for two different shaft positions?

19 WITNESS SARSTEN: Actually the figure given is  
20 for the most highly stressed shaft, which is the ninth  
21 shaft, in this case. We have only one measured value at 450  
22 rpm.

23 JUDGE BRENNER: And the measured value is for the  
24 ninth position?

25 WITNESS SARSTEN: Right. Perhaps I should have

1 WRBpp 1 A (Witness Sarsten) The 7,096.

2 If you'll look, the difference between them is  
3 the ratio of 0.693, which is the measured value, to .690,  
4 roughly, which was the calculated front end displacement.

5 Q Professor Sarsten, you say on page 12 that the 12  
6 orders that Dr. Chen summed include the most significant  
7 ones. How did you make that determination?

8 A I did not look at the orders individually. I  
9 would assume that -- an assumption again -- that Dr. Chen  
10 would take the most significant orders if he had only 12  
11 available orders on his computer program. He would, of  
12 course, choose the most significant ones.

13 Q What do you mean by the most significant ones,  
14 the largest?

15 A I would assume he chose the largest orders, yes.  
16 I do not know that. It's purely an assumption.

17 Q Were you here when Dr. Chen testified and  
18 identified the orders which he summed?

19 A I heard his testimony. I perhaps would have to  
20 have that re-read if I were to try to identify his orders.  
21 But again, it would be purely an assumption.

22 Q Did you make any calculations of the third 12  
23 orders. In other words, you computed the first 24, did you  
24 make any calculations for 36?

25 A Not in this case. I have done, in previous

1 WRBagb 1 analysis, is that correct?

2 A There are finite element calculations and finite  
3 element calculations. It depends upon the depth of the  
4 analysis.

5 In the case of crankshafts, it requires a very  
6 complex model with very, very many node points to achieve  
7 sufficient accuracy.

8 Q Well have you -- Are you familiar with a book  
9 written by Dr. Johnston on finite element analysis?

10 A No, not Dr. Johnston's book, no. I usually use  
11 Zienkiewicz.

12 Q Is that a European author?

13 A That's a European author. He's in the University  
14 of Swonsea, Wales.

15 Q When I said Dr. Johnston, did you know that I  
16 intended Dr. Paul Johnston of F&AA at Stanford?

17 Did you know who I meant?

18 A No, there are two Johnstons.

19 JUDGE BRENNER: There is at least one other  
20 Dr. Johnston but I guess he doesn't count.

21 MR. ELLIS: The only one I had ever heard before  
22 was Sam Johnston and he wisely kept out of all this kind of  
23 stuff.

24 JUDGE BRENNER: Yes, but I know you're fond of  
25 quoting him so I mentioned him.

2 WRBagb 1 would be significant in terms of the interpretation and  
2 application of the ABS standard?

3 A According to the ABS standards they can approve  
4 the crankshaft also on other premises than the torsional  
5 vibration levels.

6 Q Yes, but that wasn't my question, Professor  
7 Sarsten. Do you want me to repeat it or have it repeated  
8 again?

9 A Yes, please do.

10 MR. ELLIS: Repeat the question, please.

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

13 WITNESS SARSTEN: There are many if's and but's  
14 in that long question. It's a little perhaps hard to answer  
15 it.

16 Could you rephrase it and break it down into  
17 simpler parts which I can retain in my somewhat porous  
18 memory?

19 MR. ELLIS: Sure, Professor Sarsten, I would be  
20 glad to.

21 BY MR. ELLIS:

22 Q Professor Sarsten, on pages 16 and 17 you said  
23 you already testified that ABS "...was among the societies  
24 that you had in mind when you gave that testimony and  
25 there you said that you prefer to assess the adequacy of

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1 the crankshaft based upon the large amount of data  
2 represented by the appropriate classification  
3 societies' rules and their experience in the  
4 interpretation of these rules."

5 ABS' experience in the interpretation of its  
6 rules is important, isn't it?

7 A Yes. But I was not referring to the ABS  
8 specifically here because the ABS has not perhaps the widest  
9 experience in diesel engine crankshafts that some of the  
10 other major classification societies have. Their rules are  
11 not very -- their rules do not take into consideration the  
12 torsional vibratory stresses when dimensioning the  
13 crankshafts, for example.

14 Q Is it your testimony that the American Bureau of  
15 Shipping is not competent to issue standards relating to  
16 torsional stresses for crankshafts for medium-speed diesels  
17 such as the one at Shoreham?

18 A No. I only said that the torsional vibratory  
19 stresses do not enter specifically into their scantling  
20 rules or dimensioning rules for the crankshaft.

21 Q But they do take into account the dimensions in  
22 approving a crankshaft, don't they?

23 I'm sorry. They do take into account the  
24 torsional vibratory stresses in deciding whether to approve  
25 a crankshaft or not?

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1 MR. SCHEIDT: This is the way it was provided to  
2 the parties by the ABS when it was copied at the time of the  
3 deposition. And the second page to which Mr. Ellis is  
4 referring is the runoff or the extra section of the  
5 righthand margin of the page that precedes it.

6 JUDGE BRENNER: Particularly since we are dealing  
7 with numbers, I'm not going to speculate on whether there  
8 are any digits missing in between the two pages.

9 MR. ELLIS: Well, let me just ask a short  
10 question that may end this.

11 BY MR. ELLIS:

12 Q Professor Sarsten, can you tell how many orders  
13 summed from looking at the page that I referred you to,  
14 which is the page immediately prior to the one that is  
15 largely blank?

16 A (Witness Sarsten) I have not seen this before so  
17 it's a little difficult. My testimony ends on page 173. I  
18 have not seen this before.

19 Q I understand you haven't seen -- you have seen  
20 the transcript before?

21 A The main transcript, not the attachments.

22 Q Right.

23 Now, can you tell, from looking at that  
24 calculation how many orders were summed?

25 A I would have to go through it in detail, the

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1 ABS's interpretation of its own rules is important?

2 A The ABS's interpretation of its own rules is, of  
3 course, important. And, of course, they're the only ones  
4 who can move upon this if the crankshaft meets the rules  
5 or not. I can only say that the stress I have calculated is  
6 above that which the rules allow using 24 orders. It's  
7 clear that ABS can accept any stress level they want to, do  
8 it in any fashion they wish to. They can approve the  
9 crankshaft on any other basis than torsional vibration if  
10 they so wish. I've only stated the calculated stresses, and  
11 the allowable stress levels.

12 Q And your testimony, then, is based on the use of  
13 24 orders which, you say, is standard practice in Europe  
14 these days to sum orders to torsional stress?

15 A That is true. I'm aware also that ABS is one of  
16 the classification societies sponsoring the so-called CIMAC  
17 rules. The matter of 24 orders is not under contention as  
18 far as, you understand, an accepted practice for all these  
19 classification societies.

20 Q Do you know why ABS did not use 24 orders in the  
21 promulgation of its standard that sets 5,035 as the  
22 allowable?

23 A Did not use 24 orders in the -- could you --

24 Q Why didn't ABS specify 24 orders when it  
25 established its allowable for summation at 5,035 psi.



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1 WITNESS SARSTEN: I did not measure one myself. I  
2 read some testimony to that effect.

3 JUDGE BRENNER: I'm sure we will hear  
4 more about that in at least one other context.

5 MR. ELLIS: Judge Brenner, I would move to strike  
6 that, since he doesn't have any basis for that testimony as  
7 to how low it went, 300 and whatever it was rpm.

8 JUDGE BRENNER: I'll tell you what. I won't rely  
9 on his figure for it and you remind me to ask somebody that  
10 you think knows on behalf of LILCO at the appropriate point.

11 MR. ELLIS: Yes, sir. I think we can do that.  
12 That panel has already testified, I believe. But --

13 JUDGE BRENNER: Well, somebody who knows a bit  
14 about blocks might know about it.

15 MR. ELLIS: They do. Mr. Youngling will know,  
16 Judge Brenner.

17 JUDGE BRENNER: That's one of the major reasons  
18 ascribed for why there are problems with the 103 cylinder  
19 block, is that correct?

20 MR. ELLIS: That's right. I'm just telling you  
21 who would know, Youngling.

22 BY MR. ELLIS:

23 Q Dr. Sarsten, another question about ABS. I take  
24 is it fair to say since you have not reviewed the ABS  
25 calculations, and don't know how many orders they use in  
26 summing, that you have no opinion regarding the adequacy or

1 WRBeb 1 conventional materials.

2 A Right.

3 Q But in terms of assessing whether the crankshaft  
4 is adequate or not, you would agree with me that if the  
5 tensile strength were very high, and the summation of  
6 the orders were close to the allowable, that would be less  
7 significant than if the tensile strength were substantially  
8 lower?

9 A As there is nothing in the DEMA rules about this,  
10 we cannot speculate on what we would like to do. The rules  
11 are straightforward. As far as I am concerned, there is a  
12 limit of 7,000 psi for the summation of the orders,  
13 irrespective of the material employed.

14 Q Well, let me just give you a hypothetical.

15 If the steel used in the crankshaft in issue had  
16 an ultimate tensile strength of -- instead of 100 or 102  
17 ksi, if it had 100,000 ksi, would you be concerned that the  
18 summation of the orders then was 7096?

19 A It is not my prerogative to be concerned or not.  
20 It is to judge if the vibratory torsional stresses are above  
21 or below this limit.

22 I concede, if we were looking at the adequacy of  
23 the crankshaft in another context, that would be something  
24 we could discuss, but not here.

25 Q What do you mean by the "adequacy of the