

ORIGINAL

**UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION**

In the matter of:

LONG ISLAND LIGHTING COMPANY

(Shoreham Nuclear Generating
Plant, Unit 1)

Docket No. 50-322-OL-4
Low Power

Location: Hauppauge, New York

Pages: 2333 - 2657

Date: Monday, August 6, 1984

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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:
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LONG ISLAND LIGHTING COMPANY
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: Docket No.
: 50-322-OL-4
(Shoreham Nuclear Generating
: (Low Power)
Plant, Unit 1)
:
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Court of Claims
State of New York
Courtroom No. 1
Veterans Memorial Highway
State Office Building
Hauppauge, New York 11787

Monday, August 6, 1984

The hearing in the above-entitled matter reconvened, pursuant to recess, at 9:01 a.m.

BEFORE:

MARSHALL E. MILLER, ESQ., Chairman
Atomic Safety and Licensing Board
Nuclear Regulatory Commission
Washington, D. C. 20555

GLENN O. BRIGHT, Member
Atomic Safety and Licensing Board
Nuclear Regulatory Commission
Washington, D. C. 20555

ELIZABETH JOHNSON, Member
Atomic Safety and Licensing Board
Nuclear Regulatory Commission
Washington, D. C. 20555

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25APPEARANCES:On Behalf of the Applicant:

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Washington, D. C. 20555

On Behalf of the Intervenor, Suffolk County:

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C O N T E N T S

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WITNESSES Direct Cross Redirect Recross Board VoirDire

Dale G. Bridenbaugh)
Richard B. Hubbard) 2362
(Resumed)

G. Dennis Eley)
C. John Smith)
Gregory C. Minor)
Dale G. Bridenbaugh) 2443 2448 2531/ 2544/ 2432/
2552/ 2552 2554
2561

E X H I B I T S

Identified Received

Suffolk County LP-36 2392 2636

Suffolk County LP-37 thru LP-50 2392 2636

ENVELOPE - SEALED FOR ALL PURPOSES, Containing
Suffolk County Exhibits LP-39, 40, 41, 42, 44,
and 50 (See Page 2394)

LILCO Exhibit LP-14 2516 2637

Suffolk County LP-4, 5, 6, 9
and 11 2636

L A Y - I N S

Testimony of John L. Knox
and
Edward B. Tomlinson Pages 2337 thru 2357
(Testimony Omitted from
August 2, 1984.)

Sim 1-1

P R O C E E D I N G S

1
2 JUDGE MILLER: Good morning.

3 Are we ready to proceed? I think we are still
4 on voir dire.

5 MR. ROLFE: Judge Miller, we have two brief
6 preliminary matters. One is a question for the Board and
7 one is something to bring to the Board's attention.

8 The latter matter is that in reviewing the
9 transcripts over the weekend, we noted that the direct
10 testimony of Staff Witnesses Tomlinson and Knox was not
11 bound into the transcript of the Thursday, August 2 testimony,
12 at least in the copy that we received. It was admitted into
13 evidence by the Board and for some reason it appears to have
14 just been left out of the transcript.

15 JUDGE MILLER: All right. Well, we will ask
16 the reporters to check it. If the event that it was
17 inadvertently omitted, it will become part of the transcript,
18 with the appropriate page numbers.

19 (The testimony of John L. Knox and Edward B.
20 Tomlinson, admitted into evidence on Thursday August 2, 1982
21 and inadvertently omitted from that day's transcript follows.)
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23
24
25

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)	
LONG ISLAND LIGHTING COMPANY)	Docket No. 50-322-0L-4
(Shoreham Nuclear Power Station,)	(Low Power)
Unit 1))	

TESTIMONY OF JOHN L. KNOX AND EDWARD B. TOMLINSON

Q. What is your name?

A. (Knox) My name is John L. Knox

Q. What is your position?

A. (Knox) I am a Senior Electrical Engineer (Reactor Systems) in the Power Systems Branch in the Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission. In this position I perform technical reviews, analyses, and evaluations of reactor plant features pursuant to the construction and operation of reactors.

Q. What are your qualifications?

A. (Knox)

In 1962, I received an Associate of Arts degree in Electrical Power System Technology from Montgomery College. In 1971, I received a Bachelor of Science degree in Electronic Systems Engineering from

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the University of Maryland. Since 1974, I have taken a number of courses on PWR and BWR system operation, equipment qualification, and reactor safety.

From 1971-1974, I worked for Potomac Electric Power Company in Washington, D. C. I was assigned to the underground power Transmission Engineering Group and my duties included relocation and restoration of underground power and transmission cables due to the subway construction project. (Prior to this, I spent four years in the Air Force working on the F4 aircraft electronic weapons control systems.)

From 1974 to the present, I have worked for the Nuclear Regulatory Commission involved in the technical review of electrical systems (onsite and offsite power, instrumentation and control). Through 1976, I was a member of the Electrical Instrumentation and Control Systems Power Branch. This branch was split in January 1977 into an I&C branch and a power branch. Since this split, I have been a member of the Power Systems Branch. My present responsibilities include review and evaluation of onsite and offsite electric power systems.

Q. What is your name?

A. (Tomlinson) My name is Edward B. Tomlinson

Q. What is your position?

A. (Tomlinson) I am a Mechanical Engineer (Reactor Systems) in the Power Systems Branch in the Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission. In this position, I perform technical reviews, analyses, and evaluations of reactor plant features pursuant to the construction and operation of reactors.

Q. What are your qualifications?

A. (Tomlinson) I received a Bachelor of Science Degree in 1960 from the U.S. Merchant Marine Academy. My major field of study was marine engineering. Since then, I have taken courses and/or received instruction in hydraulics, machinery vibration, electronics, and PWR/BWR system operation. I currently hold a marine engineer's license for steam and diesel, any horsepower.

From 1960-1961, I was employed as a marine engineer for the Military Sea Transport Service. In this capacity, I was responsible for operation and/or maintenance of shipboard mechanical and electrical systems.

From 1961-1962, I was employed as a field service engineer for the Scintilla Division of the Bendix Corporation. In this capacity, I was responsible for investigating and reporting on the cause of malfunctions in fuel injection systems and ignition systems for industrial and aviation engines.

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From 1963-1968, I was employed as a mechanical engineer for the American Telephone and Telegraph Company. My primary responsibilities included design of mechanical systems for telephone company buildings. These duties included extensive work on standby diesel generator systems and gas turbine generator systems. From 1968-1970, I was employed by International Business Machines Corporation in a similar capacity for military computer facilities.

From 1970-1975, I was employed as a mechanical/marine engineer at Northrop Services, Inc. In this capacity, I was responsible for providing support services to the U.S. Navy on shipboard mechanical/electrical systems associated with new ship construction, including diesel and gas turbine powered main propulsion and auxiliary systems.

From 1975-1977, I was employed as a reactor systems engineer in the Auxiliary and Power Conversion Systems Branch, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission. My responsibilities included review and evaluation of reactor auxiliary systems, including diesel generators.

From 1977-1981, I was employed as a general engineer in the Marine Engineer Division, National Ocean Spray, NOAA. I was primarily responsible for maintenance planning and equipment selection for

shipboard systems, including diesel powered propulsion and electric generating equipment.

From 1981 to the present, I have worked in the Power Systems Branch, U.S. Nuclear Regulatory Commission. My present responsibilities include review and evaluation of diesel engines and their auxiliary systems associated with onsite power systems. I am also assigned to the TDI Task Group for generic review of TDI diesel engines.

Q. Has LILCO submitted an application for a low power license?

A. (Knox) Yes

Q. Does that application presume that the Transamerica Delaval Industries' diesels onsite would not operate?

A. (Knox) Yes

Q. Are any supplemental sources of power indicated in LILCO's low power application?

A. (Knox) Yes

Q. What are they?

A. (Knox/Tomlinson) A 20 MW peaking unit consisting of a single gas turbine powered generator. A 10 MW peaking unit consisting of four (4) separate diesel generators rated at 2.5 MW, each.

Q. Where are they located?

A. (Knox) They are both located on the Shoreham plant site. The gas turbine is located in the 69 KV switchyard which is approximately 300 feet south of the Shoreham reactor building. The four diesel generators are located next to the southwest corner of the reactor building.

Q. Are these supplemental power sources connected to each other or are they independent of each other?

A. (Knox) They are independent of each other.

Q. Does this independence meet the single failure criterion that would be required for the normal safety related diesel generators located at an operating nuclear power plant?

A. (Knox) Yes

Q. Is it the staff's opinion that these alternative sources would be available after a seismic event?

A. (Knox, Tomlinson) Yes

Q. Why?

A. (Knox, Tomlinson)

- (a) The manufacturer has provided assurance that the gas turbine will be structurally sound after a seismic event.
- (b) Diesel generators similar to those being used at Shoreham have been used in marine and locomotive applications, and
- (c) Operating experience during seismic events has demonstrated the capability of similar equipment to that being used at Shoreham to survive a seismic event and to perform its design function after the seismic event.
- (d) LILCO has provided a seismic analysis that the diesel generators and their associated switchgear will survive a seismic event. No Staff review of that analysis has been conducted.

Q. Is it necessary that these alternate power sources be seismically qualified?

A. No. If a seismic event were to occur simultaneous with a loss of offsite AC power, there would be at least thirty days before AC power would be needed at the site. As stated above, the Staff believes the alternate power sources at Shoreham would survive a seismic event. In the event that they failed to survive such an event, repairs could be made or additional sources of AC power could be made available to the site well within the time needed.

Q. Are these supplemental power sources independent of the normal offsite power system at Shoreham?

A. (Knox) Yes

Q. Does this independence meet what would be required for the normal onsite safety related diesel generators located at an operating nuclear power plant?

A. (Knox) Yes

Q. Does the gas turbine unit or the four supplementary diesel generators qualify as an onsite source of AC electric power?

A. (Knox) No

Q. Why not?

A. (Knox) The onsite source of AC electric power for plant operation at 100 percent of rated power is required to supply power to safety loads in a short period of time (approximately 60 seconds) following the limiting design basis event loss of coolant accident. For plant operation at 5 percent of rated power, AC electric power is not required for 55 minutes following the limiting loss of coolant accident. Thus, the gas turbine or the diesel generators need not be qualified to start and supply power to safety loads in a short period of time.

The onsite source of AC electric power for plant operation at 100 percent of rated power is, also, required to supply power to safety loads following design basis events which may cause loss of offsite

power such as seismic, hurricane, and tornado events. In order for the onsite sources to supply power as required, they must be qualified for these events. For plant operation at 5 percent of rated power, AC power is not required immediately following these events since steam driven pumps that are AC independent are available for event mitigation. Thus, the gas turbine or the diesel generators need not be qualified to operate in any of these environments.

- Q. You have mentioned a gas turbine. Will you please describe it and what power it will produce?
- A. (Tomlinson) The 20 MW peaking unit is powered by a gas turbine. This gas turbine is designed for industrial application, but is very similar in design and operation to an aircraft "jet engine." The gas turbine consists of two major sections: i.e., a compressor/combustor section, and a power turbine. In the first section, combustion air under pressure and fuel are combined and burned to produce high pressure gasses. Some of these gasses are used to operate the compressor for pressurizing the combustion air. The remaining gasses are routed to the power turbine where they are expanded and cooled in the process of extracting energy. The power turbine is connected to and drives the ac generator. There is no physical connection between the compressor section and the power turbine. Maximum output of this unit is 20 MW.
- Q. How would it start?

- A. (Tomlinson) The turbine is started using a starting motor which operates on compressed air. On signal, the starting motor engages the compressor section of the gas turbine and accelerates it until it reaches a speed where combustion begins and the turbine can operate independently. Compressed air for starting is supplied from a receiver located near the gas turbine generator enclosure. A compressor is provided to automatically maintain sufficient pressure in the receiver. Starting controls are powered from a 125V, 150 AH lead acid battery.
- Q. What has been the reliability of the gas turbine LILCO intends to use here?
- A. (Knox, Tomlinson) In the 1982-1983 time frame, there were 84 start attempts, of which 82 were successful, for a total reliability of 97.6%. In addition, the gas turbine has been refurbished since being relocated to Shoreham, which enhances its reliability.
- Q. What fuel does it use?
- A. (Tomlinson) The gas turbine operates on #2 fuel oil.
- Q. How does that fuel come to the turbine?
- A. (Knox, Tomlinson) Fuel for the gas turbine generator is supplied from a 1,000,000 gallon capacity storage tank located in a fenced location at the Shoreham site but not within the same fence as the Shoreham unit. There are two fuel transfer pumps associated with

the turbine. One pump is powered from the 125V battery, and the other pump operates on 230V ac. Both pumps take suction from the storage tank and deliver fuel under pressure to the inlet of the gas turbine fuel pump.

Q. How long would the fuel from its storage tank last?

A. (Tomlinson) There is adequate storage capacity for 20 days of operation at maximum output of the gas turbine generator (20 MW). A technical specification requirement to maintain a minimum stored volume of fuel for seven days of operation at maximum continuous output of the gas turbine generator (20 MW) will be imposed.

Q. You have also mentioned four supplemental diesels. Please fully describe them. How would they start?

A. (Tomlinson) Each diesel generator consists of an ac generator driven by a 20 cylinder, turbocharged, 2 cycle series 645 diesel engine manufactured by the Electromotive Division of General Motors. Each diesel generator is rated at 2.5 MW. The diesel engines are started by electric motors which are similar in operation to automobile starter motors, but much larger. The starter motors are designed to operate on 112V dc, and there are two starting motors per diesel engine. Power for the starting motors is from a 112V, 420 AH lead acid battery.

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Q. Does the operation of one of these diesels depend on the operation of any others?

A. (Tomlinson) No. The diesel generators are capable of operating totally independent of each other.

Q. What has been the reliability of these mobile diesels?

A. (Knox, Tomlinson) For the 1982-1983 time frame, there were 279 start attempts, of which 275 were successful on the first attempt, and one was successful on the second attempt, for a total reliability of 98.6% per diesel. When four versus one diesel generator is considered, the reliability of the four-mobile diesel generators (for the Shoreham application were only one is needed to supply minimum required safety loads) approaches 100 percent.

Q. What is the fuel source for these diesels?

A. (Knox, Tomlinson) Two 9000 gallon fuel tankers are located onsite within the fenced Shoreham unit. One of these fuel tankers is connected to the diesel generators fuel transfer pumps at all times, and provides adequate fuel for nine (9) hours of continuous operation at maximum rated load of the diesel generators (10 MW). The other 9000 gallon tanker is available to be refilled, either at a depot offsite, or from the gas turbine generator fuel storage tank onsite. A technical specification requirement to maintain a minimum stored volume for seven days of operation at maximum continuous output of the four diesel generators (10 MW) in the gas

turbine generator fuel storage tank will be imposed. When the fuel supply in one fuel tanker is depleted, the second tanker is connected to the diesel generators to supply fuel while the empty tanker is removed and filled with fuel. Four hours is adequate time to remove, refill, and reposition a 9000 gallon fuel tanker. This represents a worst case condition. In actuality, the plant load will be equal to or less than one half the diesel generators capacity of 10 MW. At these levels, one 9000 gallon tanker can supply fuel to the diesel generators for approximately 16 hours.

- Q. Describe how the electrical power from the gas turbine comes into the Shoreham facility and is routed to the safety related loads.
- A. (Knox) Power from the turbine generator is routed through an existing step up transformer located in the 69 KV switchyard to the switchyard bus. From this bus power is routed through existing cable located in underground concrete encased conduit, the station service transformer, cable bus duct, 4.16 switchgear (Bus 12), cable routed in raceway, cable routed in concrete encased conduit to the safety related switchgear. From the safety related switchgear power is distributed as required by the safety related onsite distribution system.
- Q. Describe how the electric power from the four diesels you mentioned comes into the Shoreham facility and is routed to the safety related loads.

A. (Knox) Power from the diesels is routed through cables around the west side of the reactor building so that they enter the south side of the non-emergency switchgear room. The cables inside the switchgear room are connected through breakers to 4.16 KV switchgear bus 11. From bus 11, power is routed by cables routed in raceways and concrete encased conduit to the safety related switchgear. From the safety related switchgear power is distributed as required by the safety related onsite distribution system.

Q. In regard to this routing, are they independent of each other?

A. (Knox) Yes

Q. Does this independence meet the single failure criterion that would be required for the routing of circuits associated with a normal onsite safety related diesel generator located at an operating nuclear power plant.

A. (Knox) Yes

Q. If LILCO was to lose power to the Shoreham facility from the general power grids, what steps has LILCO said it would take to put the diesels or the gas turbine on line.

A. (Knox) Both the gas turbine and mobile diesel generators would start automatically. The Shoreham operator by procedure would open and close breakers from the control room as required to supply

safety loads. If the gas turbine is unavailable, the control room operator would dispatch a field operator to the nonemergency switchgear room to determine the status of the diesel generators and to open and close breakers as required by procedures. The control room operator then by procedure would open and close breakers from the control room as required to supply power to safety loads.

Q. How do you know?

A. (Knox) The procedures or the capability to supply power to safety loads would be demonstrated by operational testing. This testing will be included as part the Shoreham Technical Specifications.

Q. Would these procedures be followed as to the diesels and the turbine sequentially or simultaneously?

A. (Knox) Sequentially. Both the diesels and turbine start simultaneously on loss of voltage signal. If power is available from the gas turbine the procedure for connecting actual loads to the gas turbine can proceed. If power is not available from the gas turbine procedures for reestablishing power from the mobile diesel generators would start.

Q. How long would it take to have the gas turbine into operation and operating cooling equipment within the Shoreham facility conservatively?

A. (Knox) 10 minutes

Q. What are the conservatisms?

A. (Knox) Time for the control room operator to respond by opening and closing switches.

Q. How long would it take to get the gas turbine operating this equipment realistically?

A. (Knox) 5 minutes

Q. How long would it take to get the diesels we have mentioned on line and operating the cooling equipment conservatively?

A. (Knox) 30 minutes

Q. What are the conservatisms?

A. (Knox) Time for control room and field operator to respond by opening and closing switches.

Q. How long would it realistically take?

A. (Knox) 15 minutes

Q. How many of the diesels are needed to operate cooling equipment needed to shutdown the plant.

A. (Knox) One

Q. Is the gas turbine or the diesels we have spoken about normally used for 100 percent power operation at Shoreham?

A. (Knox) No

Q. What are the normal sources of offsite power to Shoreham?

A. (Knox) There are two sources of offsite power. One source is the 69 KV transmission line from the wildwood 69 KV substation through the Shoreham 69 KV switchyard, the RSS transformer to the safety buses. The other source is the 138 KV transmission line from the Shoreham 138 KV switchyard through the NSS transformer to the safety buses.

Q. From how many different corridors does this power enter the plant?

A. (Knox) Two

Q. How many separate entrances to the Shoreham plant do these sources of power use to enter the plant?

A. (Knox) Two

Q. How many common points are there between these transmission corridors?

A. (Knox) None

Q. Where do they cross or meet?

A. (Knox) They do not cross over or meet.

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Q. How does this compare to what the NRC normally requires for full power operation of nuclear plants.

A. (Knox) This design exceeds our requirements in that the offsite circuits do not pass through a common switchyard which is allowed by GDC 17.

Q. What conditions does the staff see as necessary to allow low power operation with the gas turbine and the mobile diesel generators we have spoken about?

A. (Knox) The following conditions are necessary:

1. The automatic transfer between the two normal offsite power circuits at Shoreham must be removed or disabled during low power operation.
2. A fire barrier or 50 feet of separation must be provided between the cables associated with the mobile diesel generators and the RSS and NSS transformers.
3. A quality assurance program for the gas turbine, the mobile diesel generator, and their associated circuits commensurate with their importance to safety.
4. The circuits associated with the gas turbine and four-mobile diesel generators located in the nonessential switchgear room

must be protected in accordance with the requirements of Appendix R or a procedure must be available so that power can be reestablished around the switchgear room within 30 days from one of the alternate AC power sources.

Q. Why are these necessary?

A. (Knox)

1. The automatic transfer must be removed in order to assure independence between the two normal offsite circuits as well as between gas turbine and mobile diesel generators and to preclude the common failure of the three sources of power.
2. A fire barrier or 50 feet of separation must be provided to assure that there will not be a common failure between the normal offsite circuit and the circuits associated with the mobile diesel generators and between the circuits associated with the gas turbine and the mobile diesel generators.
3. A quality assurance program is needed to assure that maintenance, testing, and operation of the gas turbine, mobile diesel generators, and their associated circuits is performed in accordance with their design specification, with documentation, to assure their continued reliability.
4. Protection or a procedure for rerouting circuits associated

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with the gas turbine and mobile diesel generators located in the nonessential switchgear room is needed in order to assure AC power availability in the event of a design basis fire in that switchgear room.

Q. Do the gas turbine and diesels we have spoken about for low power operations at Shoreham with the imposition of the staff's conditions have a level of reliability that is currently being demonstrated for onsite safety related diesel generator power supplies qualified for full power operation of nuclear plants.

A. (Knox) Yes

Q. What is the basis for your answer?

A. (Knox, Tomlinson) For normal onsite safety related diesel generators, the demonstrated reliability is within 92 to 99%. For the low power application at Shoreham, the staff has considered the combined reliability of the gas turbine generator and the diesel generators. The gas turbine generator has a demonstrated reliability of approximately 97.6%, while the diesel generators, for this application, have demonstrated reliability approaching 100%. The combined reliability, then, also approaches 100%.

Q. What procedures has the NRC analyzed in connection with LILCO's low power application?

A. (Knox) Procedures for connecting power to the safety loads from the gas turbine and the mobile diesel generators.

Q. In your testimony you testified as to various sources of power for Shoreham. Is it credible that with the conditions the staff seeks all these sources of power could be lost so as to prevent restoration of power to run cooling pumps and other emergency equipment within 55 minutes of the loss of power?

A. (Knox) No

Q. Why?

A. (Knox) Because there are three independent sources of AC power. Each source has sufficient capacity, capability, and reliability to assure that structures, systems, and components important to safety perform as intended.

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1 MR. ROLFE: The second thing, Judge Miller,
2 is just a question. You had advised the parties at the
3 beginning of this hearing that at the conclusion you would
4 expect extensive closing arguments from the parties, and
5 in our preparation of those it would be helpful to know
6 if the Board intends to put a time limit on those closing
7 arguments and, two, whether the Board has any objection if
8 counsel splits those closing arguments for purposes of
9 presentation.

10 JUDGE MILLER: As to the time limit, we would
11 prefer not to because we want counsel to feel free. We
12 would hope that their own sense of timing and the counter-
13 productiveness of repetitiousness will be sufficient. I
14 suppose if it got too untoward, we might have to.

15 Do any counsel have suggestions on that, anything
16 that you feel as to time that you think would be available
17 in case of an imposition of the limit? I suppose it
18 might have been on time of day a kind of thing perhaps,
19 but we would all recognize that situation, I am sure.

20 Our thought was that this would simply follow
21 the conclusion of the last testimonial matters and that
22 we would then hear arguments.

23 As I say, we would like to have them in some
24 depth because we would now like to have a counterplay between
25 and among counsel since you will then have had all of the

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1 testimony which has been admitted, the exhibits, and you
2 will know pretty much what the situation is.

3 We are going to ask for the filing of proposed
4 findings three weeks from that date. The proposed findings
5 we wish to have factual in nature, not argumentative and
6 not conclusionary.

7 You may, if you wish, at the same time, and I
8 may have mentioned this before, file a brief or points and
9 authorities, whatever you want, where you can argue all
10 you want to. But the findings of fact, we would like to
11 have pretty objective factual statements and the transcript
12 or other references. You can use footnotes, of course,
13 in your case. Footnotes, in our judgment, should not be
14 in the findings of fact. They shall all be set up by
15 citation.

16 Any other questions that you have in that regard?

17 MS. LETSCHE: Excuse me, Judge Miller, just
18 in response to your question about time for the closing
19 arguments. In the County's view, since there are going
20 to be proposed written findings of fact and presumably
21 counsel are both going to be submitting some kind of brief
22 with arguments in them, in the County's view the closing
23 arguments would not need to be lengthy.

24 JUDGE MILLER: They do not need to be lengthy,
25 but I don't think they should be foreshortened. We would

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1 like to have a full, fair argument on all points that you
2 intend to rely upon. In other words, they are far from
3 pro forma or perfunctory.

4 All right. You may proceed.

5 MS. LETSCHE: Excuse me. There is one other
6 preliminary matter before Mr. Early proceeds.

7 JUDGE MILLER: Yes.

8 MS. LETSCHE: At the end of the day on Friday
9 Judge Johnson had asked a question of Mr. Hubbard, and
10 Mr. Hubbard had indicated that he would check the response
11 to that question over the weekend. Perhaps I just ask him
12 a question or two to get that information.

13 JUDGE MILLER: All right.

14 Whereupon,

15 DALE G. BRIDENBAUGH

16 -- and --

17 RICHARD B. HUBBARD

18 resumed the stand and, having been previously duly sworn
19 by Judge Miller, were further examined and testified as
20 follows:

21 DIRECT EXAMINATION (Continued)

22 BY MS. LETSCHE:

23 Q Mr. Hubbard, do you recall on Friday Judge
24 Johnson asked you a question concerning the scope of IEEE
25 336. Did you have an opportunity to refresh your recollection

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Sim 1-5

1 over the weekend and determine the answer to that question?

2 A (Witness Hubbard) Yes, I did.

3 Q And can you briefly describe the scope of
4 IEEE 336?

5 A Yes. I obtained a copy of IEEE 336, 1971, which
6 is the one referenced in the FSAR, and it does not
7 specifically exclude the inspection and testing of the
8 diesel generator system. It does exclude some of the
9 fluid systems for that.

10 I also looked at the more recent edition, the
11 1980 edition, and it also, if you look at the entire diesel
12 generator, it appears to apply to the diesel generator
13 system.

14 Q You mentioned on Friday also, or you referenced
15 the FSAR in connection with your discussion of IEEE 336.
16 Can you explain what you meant by that reference?

17 A Yes. In Section 8.1 of the FSAR there is a table
18 8.1.7-1 which lists the regulatory criteria for the electric
19 power systems, and at page 2 of that under having to
20 do with standards, Item E refers to IEEE Standard 336, 1971,
21 as being applicable to the onsite AC powersystem.

22 Likewise, at page 28 of Section 8.3 there is
23 a section called "Conformance To Appropriate Quality
24 Assurance Standards" that applies to the onsite power systems,
25 and it says the QA system is in conformance to IEEE 336,

Sim 1-6

1 1971.

2 Q And one other thing, Mr. Hubbard. In the
3 transcript from Friday afternoon in response to one of the
4 questions from Judge Johnson, and I am referring to page
5 2194 of the trascript, your answer refers to IEEE 467. Did
6 you intend to refer to that standard in that response?

7 A No. I was talking about the installation,
8 inspection and testing, and that is IEEE 336.

9 MS. LETSCHE: Thank you, Mr. Hubbard.

10 JUDGE JOHNSON: Thank you.

11 JUDGE MILLER: You may proceed.

12 VOIR DIRE (Continued)

13 BY MR. EARLY:

14 INDEXXXXXX Q Mr. Hubbard, in that last series of questions
15 and answers you referenced to different editions, the 1971
16 and the 1980 of IEEE 336. Which of those editions were
17 you referring to when you claimed to be a co-author of this
18 standard?

19 A (Witness Hubbard) The 1980 edition. There
20 also is an edition between the 1971 one and the 1980 one
21 where I participated in the writing.

22 Q Now when you say the standard didn't specifically
23 exclude diesel generators, I take it then it didn't
24 specifically include them either?

25 A That is correct.

Sim 1-7

1 Q When you say you were a co-author of that
2 standard, doesn't that mean you were a member of the
3 committee or the subcommittee that wrote the standard?

4 A Would you like me to explain?

5 Q I asked does that mean you were a member of
6 that committee?

7 A I was a member of the committee in 1980 that
8 physically rewrote it. We had the direct responsibility
9 for rewriting it.

10 Q Thank you.

11 How many members are on that committee?

12 A For the 1980 rewrite there were nine of us
13 on the committee that was doing the primary writing.

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2 MR. EARLEY: Judge Miller, that's all the voir
3 dire that I have.

4 JUDGE MILLER: Staff.

5 MR. PERLIS: The Staff has no voir dire.

6 JUDGE MILLER: State.

7 MR. PALOMINO: No voir dire, Judge Miller.

8 JUDGE MILLER: All right. I think that concludes
9 the voir dire, then.

10 MS. LETSCHE: Excuse me, Judge Miller. May I
11 have just a few minutes on redirect?

12 JUDGE MILLER: Yes.

13 MS. LETSCHE: On voir dire.

14 REDIRECT EXAMINATION

15 BY MS. LETSCHE:

16 Q Mr. Bridenbaugh, on Friday you indicated that you
17 had had experience with different kinds of generators in
18 your experience with General Electric and otherwise. Is
19 the type of generator with which you have had the experience
20 that you have discussed substantially different from the
21 TDI generators at the Shoreham plant?

22 A (Witness Bridenbaugh) My experience with the
23 installation and maintenance of power plant equipment,
24 including electrical generators, includes a fairly broad
25 range of generators, ranging from very small to very large,
the main power generators in the station as well as small

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generators in industrial plants.

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And in my opinion, and in my experience, the basic principles for installation and alignment and work on that type of equipment is basically the same.

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Q I will ask this question of both of you. You both mentioned on Friday your experience in connection with procurement, specifications, and I think for you, Mr. Hubbard, quality assurance and failure analysis.

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In your opinion, or in your experience, is your work relating to compliance with regulations involving those matters on the equipment and components with which you did that work substantially different from regulatory compliance on those matters involving diesel generators?

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MR. EARLEY: Objection. I think we established on Friday the witnesses have essentially no knowledge of diesel generators. They haven't been involved in the design, construction or installation of diesel generators. They were not generally familiar with industry practice with respect to diesel generations, and they have no basis upon which to give any testimony on a comparison between what they have done and what is done with diesel generators.

JUDGE MILLER: Overruled.

WITNESS HUBBARD: My experience would be, first of all, that the diesel generators are like any other electro-mechanical component that has to meet Appendix B. There are

#2-3-SueT1

2 the eighteen criteria Appendix B that applies related to
3 quality assurance. So that things like audits and qualifi-
4 cation of personnel, and handling of special processes, and
5 qualifying vendors for subparts, and doing inspections and
6 tests, that's all very equivalent whether it's a diesel
7 generator or any other equipment that has to meet Appendix B.

8 You don't have an Appendix B that's different for
9 design and manufacture, or construction. I mean, it's the
10 same general criteria that apply and it's the application of
11 those same general criteria.

12 So, I would say that almost all of my experience
13 in QA is relevant to the issues concerning design and
14 manufacture that I address in this particular testimony.

15 Q Mr. Bridenbaugh, on Friday you mentioned, and I
16 believe it was in response to some questions from Judge
17 Johnson, your experience as a field engineer, in particular
18 the levels of your responsibilities as a field engineer.

19 First of all, I believe you stated that you were
20 in that position from 1956 through 1963. Did you mean those
21 dates?

22 A (Witness Bridenbaugh) I didn't mean those dates
23 the way my answer appeared in the transcript. I'm not sure
24 exactly what I said.

25 But I was a field engineer from 1956 through 1963,
and then in 1963 I was promoted to the position of field

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2 engineering supervisor, and I held that position from 1963
3 through 1966. So, basically I was either a field engineer
4 or a field engineering supervisor for ten years.

5 Q Now, can you briefly describe what your duties
6 were as a field engineer?

7 A Yes. As a field engineer, it was my responsibility
8 to work in the power plants or industrial plants on behalf
9 of my company, General Electric, and to, on an installation
10 job to make sure that the equipment that was supplied by
11 the company was being installed in accordance with the
12 company's specifications. In other words, that it was being
13 installed properly and would be operated properly.

14 As a part of that, I also had the responsibility
15 for operator training and for doing the start-up and check-
16 out of the equipment. In maintenance jobs, it was my re-
17 sponsibility to work with the companies, the owners, craft-
18 workers in doing the disassembly, checking and reassembly,
19 and repair and modifications of the equipment, making sure
20 that it operated properly.

21 Q Mr. Bridenbaugh, in your work in connection with
22 installation and training and the other things you mentioned
23 in your answer, did that work vary substantially from --
24 depending upon the particular piece of equipment or component
25 that was involved at the particular time?

A Yes. There was a wide variety, because I worked

#2-5-SueT 1

2 in many different types of plants and installations. I
3 would say that in some jobs where I was working on the
4 smaller turbine drives, for example, say in a papermill or
5 an oil refinery, it was my job almost to work side by side
6 with the millwright or the machinest doing the work. In
7 other jobs, such as my work at the Dresden Nuclear Power
8 Plant, I was essentially the site manager overseeing the
9 work of one or two hundred craftsmen, and my responsibilities
10 were to work with the foreman, the general foreman, to lay
11 out the day's work and to review and inspect work after it
12 was completed.

13 Q In terms of the review and inspection and super-
14 visory experience that you have had, does that work involve
15 making determinations as to whether the work is being done
16 in compliance with particular regulatory requirements?

17 A Yes. In some cases, if the equipment is safety
18 related that has to be done, and in other cases it was to
19 assure that the equipment is being installed in accordance
20 with the manufacturer's specifications or the boiler and
21 pressure vessel code, the specific codes that were involved.

22 Basically, what I was charged with was to help
23 the foreman determine how -- or to interpret the installation
24 instructions and to make sure that it was being properly
25 installed.

Q In your experience, does making that determination

#2-6-SueT 1

2 relating to compliance with regulatory requirements differ
3 substantially from one component to another or from one
4 piece of equipment to another?

5 A Not in a general sense. Basically, when you are
6 dealing with mechanical or mechanical electric equipment,
7 you are usually dealing with foundation plates, you are
8 dealing with the alignment of prime movers to the generator
9 or to the driven unit, and you are dealing with bearings,
10 all types of mechanical equipment, and I find that the
11 concepts are basically the same.

12 MS. LETSCHE: That's all I have on redirect.

13 JUDGE MILLER: Anything further?

14 MR. EARLEY: Yes, Judge Miller.

15 RE CROSS EXAMINATION

16 BY MR. EARLEY:

INDEXXXXXX16

17 Q Mr. Hubbard, in response to one of counsel's
18 questions, you mentioned that diesel generators are the
19 same as any other electromechanical device.

20 I take it by electromechanical device, you were
21 referring to the generator portion of a diesel generator?

22 A (Witness Hubbard) Yes, sir.

23 end #2
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1 Q The diesel engine is a mechanical device, correct?

2 A For the sake of this, yes. This has electrical
3 parts to them. It is hard to draw the line. You have, you
4 know, like the water pumps. You have the control panels for
5 the engine. It is an electro-mechanical device.

6 MR. EARLEY: That is all the questions I have.

7 JUDGE MILLER: Staff.

8 MR. PERLIS: The Staff has no questions.

9 JUDGE MILLER: New York.

10 MR. PALOMINO: No questions.

11 JUDGE MILLER: All right. I think that a written
12 motion to strike the testimony has been filed by LILCO, and
13 I don't think that we have -- well, first of all, is there
14 anything further in addition to the matter set forth in the
15 written motion, LILCO's ground for motion on the record, and
16 then we will give the other parties an opportunity to
17 respond.

18 MS. LETSCHE: Excuse me, Judge Miller. I don't
19 know when you -- if you want to take up that motion now, that
20 is fine. I was going to request Mr. Hubbard and Mr. Bridenbaugh
21 to summarize their testimony. If you prefer to wait on that,
22 that is fine.

23 JUDGE MILLER: We have read their testimony. I
24 think it is not necessary, and I think that perhaps we should
25 get on to the motion first. Proceed.

1 MR. EARLY: Judge Miller, there were three grounds
2 in LILCO's motion. First, the testimony is irrelevant to the
3 issue of public interest, because it doesn't address the
4 good faith showing that was discussed in the Commission's
5 May 16th Order. The second ground is that the testimony is
6 barred on res judicata grounds. It is clear from the testimony
7 itself that it is predicated on alleged inadequacies of
8 LILCO and Stone & Webster's quality assurance program.

9 That issue has already been extensively litigated
10 and decided by the Brenner Board. Third, the third ground
11 is that the witnesses are not qualified to give the testimony.

12 The testimony addresses the adequacy of LILCO's
13 efforts with respect to the TDI diesel generators. To give
14 that testimony, it requires expert knowledge of diesel
15 generators, particularly diesel generators in nuclear service.
16 This is particularly true because not only are the witnesses
17 claiming that there were problems with the diesel generators
18 that were ignored, but it is clear from their own testimony
19 LILCO did take steps to resolve problems with diesel generators.
20 They are going one step even further to conclude that those
21 additional steps taken by LILCO were inadequate.

22 Again, that takes some expertise in diesel
23 generators to understand whether someone knowledgeable would
24 or would not have taken particular steps taken by LILCO.
25 Those are the three grounds set out by LILCO in the motion.

1 I can go into them in detail if the Board would
2 like. One additional ground that I would like to propose
3 with respect to Mr. Bridenbaugh, to the extent any of the
4 testimony addresses quality assurance matters, I believe
5 in voir dire Mr. Bridenbaugh stated that he had not been a
6 member of any quality assurance or any quality control
7 organization, and therefore with respect to him, he does
8 not have the requisite expertise to give quality assurance
9 expert testimony.

10 JUDGE MILLER: Does the Staff wish to go next?

11 MR. PERLIS: The Staff supports the Motion to
12 Strike on the first ground, but not on the other two.

13 JUDGE MILLER: State your grounds.

14 MR. PERLIS: All right. I believe that the
15 testimony given is not relevant to whether LILCO made a good
16 faith effort to meet GDC-17, and that is the sole grounds on
17 which we challenge this testimony.

18 Absent some sort of egregious misconduct, which
19 these gentlemen do not allege, that whether or not there were
20 quality assurance deficiencies in an attempt to meet GDT-17
21 I don't believe is relevant to whether a good faith effort
22 was made to meet those requirements. Therefore, I just don't
23 think this testimony is relevant to any issue before the
24 Board.

25 I do want to make it clear though that we do not

1 agree with the other two grounds for a motion to strike.

2 JUDGE MILLER: County?

3 MS. LETSCHE: Yes, Judge Miller. We oppose the
4 Motion to Strike, and we oppose it with respect to each of
5 the grounds that have been raised either in writing or this
6 morning by Mr. Earley, and I will address them in turn.

7 The first argument that the testimony is not
8 relevant because it is not relevant to the public interest
9 issue raised by the Commission because in the opinion of
10 LILCO, and I take it also in the opinion of the Staff, it
11 does not address LILCO's good faith in attempting to comply
12 with GDC-17, I don't think is a basis to strike this testimony.

13 First of all, that argument is precisely that.
14 It is an argument on the ultimate fact to be determined by
15 this Board. Whether or not particular conduct constitutes
16 good faith is a legal conclusion which the Board, presumably,
17 is going to make.

18 What these witnesses testify to is the facts and
19 the technical facts which they are able to discuss which
20 presumably will be factors in the Board's determination as
21 to whether or not good faith has, in fact, been exercised
22 by LILCO, and I will point out that the good faith standard
23 is not in the Commission's Order related to the public interest
24 finding.

25 That is related to the finding of exigent

1 circumstances.

2 What these gentlemen testify to are facts related
3 to LILCO's attempt to comply with GDC-17 with respect to the
4 TDI diesels, and the facts relating to LILCO's need for the
5 exemption which it is requesting.

6 And they set forth, based on their technical
7 experience, the facts involved in the decisions and the
8 actions by LILCO which led up to LILCO's need for the
9 exemption which is at issue.

10 Whether or not those actions were taken in good
11 faith sufficiently so that the Board could find that exigent
12 circumstances exist for the granting of this exemption is a
13 legal conclusion to be drawn by this Board.

14 What Mr. Bridenbaugh and Mr. Hubbard do in this
15 testimony is present some of the facts which were not included
16 in Mr. McCaffrey's testimony in which he asserts that those
17 actions do constitute exigent circumstances that justify the
18 request for the exemption.

19 The facts contained in Messrs. Hubbard and
20 Bridenbaugh's testimony in the County's view, lead to the
21 conclusion that there are not exigent circumstances present
22 here to justify the granting of an exemption. The point
23 that they make is they set forth the conduct of LILCO, and
24 in a factual manner. Whether or not that conduct is egregious
25 or not, again, is a legal conclusion to be drawn by this Board.

1 What they say, though, is that the need for this
2 exemption is the result of actions taken by LILCO, and that
3 because the need for the exemption is LILCO's fault, in
4 essence, or the results of their actions, which could have
5 been prevented if LILCO's conduct had been different.

6 That there are not exigent circumstances present
7 to justify the granting of an exemption and that it is not
8 in the public interest to condone non-compliance with
9 regulations, which compliance could have been achieved if
10 different actions had been taken by the utility.

11 So, the summary of my response to the irrelevancy
12 grounds for striking this testimony is that whether or not
13 it addresses good faith per se, or asserts that particular
14 conduct constitutes or does not constitute good faith is
15 a legal conclusion to be drawn by this Board, but the testimony
16 provided -- the factual testimony provided concerning the
17 particular actions taken by LILCO in its attempt to comply
18 with GDC-17 are clearly relevant facts which should be
19 considered by this Board when the Board makes a determination
20 as to whether or not there are exigent circumstances to justify
21 the granting of an exemption; whether or not LILCO's conduct
22 constituted good faith; whether or not LILCO's conduct was
23 egregious misconduct, and whether or not it is in the public
24 interest to condone non-compliance with the regulatory
25 requirement when compliance could have been achieved if the

1 applicant had acted differently.

2 The second ground for objection by LILCO is that
3 this testimony is on an issue that has already been decided
4 by the Brenner Licensing Board, and the basis, I take it
5 for that Motion, is that there is some discussion in the
6 testimony concerning quality assurance.

7 It is certainly true that quality assurance is
8 mentioned in Mr. Hubbard and Mr. Bridenbaugh's testimony.
9 However, since the Board has read that testimony, it will know
10 that that is only one element of the testimony that is
11 mentioned. There is also discussion of procurement decisions
12 made by LILCO. The follow up to things that were obtained
13 as a result of LILCO's QA program. Information about testing
14 that was done. Responses or follow up to result of tests.
15 Inspections that were or were not conducted by LILCO and
16 other things, such as LILCO's failure to obtain information
17 from other TDI users concerning the reliability or operation
18 of those machines.

19 So, QA, number one, is just one element of these
20 gentlemen's testimony, and the fact that QA is mentioned is
21 not a sufficient ground to strike the entire testimony.

22 In addition, and this is what is most significant,
23 the discussion in this testimony is not the same at all as
24 the discussion that took place in the litigation before Judge
25 Brenner that was mentioned by LILCO.

Sim 4-1

1 The QA litigation that took place before
2 the Brenner Board was on the entire QA program of LILCO,
3 and whether or not that overall program was adequate.

4 The focus of this testimony is not at all on
5 the program, the general program for QA by LILCO. Here the
6 only thing that is being addressed is the TDI diesel
7 generators, the reason this exemption is being sought
8 by LILCO.

9 Sure, QA is mentioned. QA was relied upon by
10 Mr. McCaffrey in his testimony when he asserted that LILCO
11 had made its best efforts in attempting to comply with
12 GDC 17. That clearly is part of compliance with GDC 17
13 and QA with respect to the components that are supposed
14 to comply with that program.

15 But the discussion here is very limited only
16 to the TDI diesel generators. It is not at all on the
17 entire QA program which was what was addressed before the
18 Brenner Board.

19 As the staff noted, the staff does not support
20 that particular ground for striking this testimony, and
21 in the view of the County there is no basis that is a res
22 judicata basis for striking this testimony.

23 This is a very specific discussion of particular
24 problems with respect to the QA, and more importantly LILCO's
25 response or non-response to the QA that was or was not

Sim 4-2

1 performed specifically with respect to the TDI diesels.

2 The third ground mentioned by Mr. Earley for
3 moving to strike this testimony is that in his opinion
4 Mr. Hubbard and Mr. Bridenbaugh are not qualified to provide
5 this testimony, and that basis for that assertion is that
6 they have not personally designed a diesel generator or
7 have not personally operated a TDI generator.

8 I think that Mr. Hubbard and Mr. Bridenbaugh's
9 qualifications as set forth in the record and summarized
10 by them and brought out during the voir dire questioning
11 by the Board and by the parties makes very clear their
12 extensive experience in nuclear safety regulation and
13 compliance with a very broad range of types of equipment and
14 types of regulatory compliance. It runs the gamut from
15 procurement through design installation maintenance testing
16 and quality assurance.

17 The fact that their testimony concerning the
18 TDI diesel generators is based on their review of documents
19 and their general experience, which might not have been
20 specific to the TDI diesel generators, No. 1, makes them
21 no different from Mr. McCaffrey who testified based solely
22 on secondhand information before this Board, but, more
23 importantly, does not mean that their testimony is not
24 competent.

25 They have the experience and have stated on

Sim 4-3

1 the record that their experience with respect to a wide
2 range of other types of equipment, systems and components
3 is not substantially different from compliance or experience
4 with this specific component.

5 Their testimony does not go into the extensive
6 details suggested by Mr. Earley concerning the actual
7 operation of the TDI diesels. What their testimony goes
8 to is LILCO's failure to conduct tests properly, to follow
9 up on information from tests, to follow up with respect
10 to their contractors and the provider of equipment, and
11 that failure and those kinds of discussions are not component
12 specific at all.

13 I think the gentlemen's are in the record and
14 there is no basis for striking their testimony merely because
15 they may not have had personal hands-on experience with
16 the particular component that is being discussed, given
17 the nature of their testimony.

18 Finally, Mr. Earley's final point about
19 Mr. Bridenbaugh not being part of a QA organization and
20 therefore I think Mr. Earley asserted not competent to talk
21 about the quality assurance portions of their testimony,
22 I have two responses.

23 No. 1, the reason these gentlemen are appearing
24 as a panel is that they do have different experience and
25 together their experience is broader than either would be

Sim 4-4

1 individually, and together they are jointly sponsoring this
2 testimony.

3 Certainly there are some areas of the testimony
4 where one of the gentlemen has more experience and probably
5 could provide more detail than the other. That is what
6 panel testimony is all about.

7 Mr. Bridenbaugh's experience, however, has
8 made clear that during his time with General Electric he
9 participated in the other aspects not being in a QA
10 organization, but the other aspects of providing service
11 to utilities, and in the course of doing that clearly he
12 as well as all the other members of the General Electric
13 organization had to comply with QA requirements.

14 So he certainly has familiarity with how one
15 goes about complying with the QA program, and the mere fact
16 that he was not personally in a QA organization does not
17 make him not competent to discuss how one should properly
18 implement or respond to quality assurance activities.

19 So the County does oppose all the grounds of
20 this motion and asserts that it should be denied.

21 JUDGE MILLER: The State of New York?

22 MR. PALOMINO: The State thinks the motion
23 should be denied for the reasons set forth by the County,
24 Your Honor.

25 MR. EARLEY: Judge Miller, may I respond to just

Sim 4-5

1 a couple of points the County made?

2 JUDGE MILLER: Anything that you haven't previously
3 responded to or anticipated?

4 MR. EARLEY: I would just like to address one
5 point about the quality assurance and the County's assertions,
6 and that is only a part of the issue, if I may.

7 JUDGE MILLER: Go ahead.

8 MR. EARLEY: The County claimed that quality
9 assurance is only a part of this testimony. I would point
10 the Board's attention to page 11 of the County's testimony.
11 The last sentence on that page says "In fact, however,
12 despite obvious warning signals, LILCO and Stone and Webster
13 failed to implement an adequate QA/QC audit program for the
14 design and manufacture of the Delaval diesels."

15 The next question is "Please state the basis
16 or bases for your prior answer."

17 It then goes on on pages 12 through approximately
18 18 or 19 discussing the bases for the conclusions that the
19 QA/QC audit was inadequate. So that is a major portion
20 of the testimony.

21 In addition, the testimony following page 19
22 discusses such things as whether LILCO should have been
23 tracking information with respect to failures. That kind
24 of testimony, although not strictly denominated by some
25 people as quality assurance matters, that sort of program,

Sim 4-6

1 the NPDRS program, the LER program that tracked these
2 things, and this was mentioned by Mr. McCaffrey in his
3 testimony, those things were litigated in quality assurance
4 by the Brenner Board. They were pulled into quality
5 assurance because of their close relationship.

6 So both the bulk of the testimony on quality
7 assurance and the other matters that the County claims are
8 not quality assurance were in fact litigated under the
9 quality assurance banner by the Brenner Board.

10 One other point on quality assurance. The
11 County claims that this was a different discussion where
12 we were talking about the overall program. Quality assurance
13 litigation last 55 days, and in 55 days of hearings and
14 over 10,000 pages of transcript Judge Brenner on several
15 occasions instructed the county to take their best shot
16 at LILCO, to find the best examples they could.

17 The County had access to all of the audit
18 reports that were performed by LILCO and Stone and Webster,
19 and in fact the County had selected audits done on various
20 vendors. I remember some involving the pipe hanger
21 contractors, Berg and Patterson, and others involving
22 Quarter and Company.

23 The fact that the County didn't address TDIs
24 says one of two things. Either, one, at the time the
25 County didn't realize that there was really any significance

Sim 4-7

1 of those audits, which I think would prove LILCO's point
2 that this testimony doesn't address good faith or, second,
3 they are subsumed within the overall litigation. They
4 took their best shot and Judge Brenner found the QA program,
5 including the specifics that were litigated, showed that
6 LILCO had an adequate QA program.

7 JUDGE MILLER: Anything further?

8 MS. LETSCHE: If I might just respond to the
9 final point Mr. Earley made concerning again the Brenner
10 Board litigation of QA.

11 Just a couple of matters. At the time of that
12 QA litigation the TDI diesels had not yet failed. Although
13 the LILCO QA program, the program in general was a portion
14 of the Brenner Board litigation, or was the basis of the
15 Brenner Board litigation, the particular QA related to the
16 TDI diesels, in particular the documents that were not
17 obtained until after the failure of the TDI diesels from
18 TDI itself, were not available in question or discussed
19 at all during that litigation.

20 And the suggestion that the fact that TDIs
21 were not discussed in that litigation which dealt, as I
22 said, with LILCO's overall QA program is simply not pertinent
23 here.

24 The discussion here is of a totally different
25 nature than what was litigated in the QA litigation and

Sim 4-8

1 the information upon which this testimony is based was by and
2 large not available and certainly not part of the QA
3 litigation that took place before Judge Brenner.

4 And the conclusions that are drawn from this
5 testimony submitted by Mr. Hubbard Mr. Bridenbaugh would
6 not have been relevant and clearly were not discussed during
7 that QA litigation because the point here is that if LILCO
8 had acted differently with specific respect to the TDI
9 diesel generators, which is the cause for this exemption
10 requirement, the TDI diesels might never have failed.
11 That is what is at issue before this Board. That was not
12 at issue before the Brenner Board.

13 So the fact that QA, the words QA were used
14 in that proceeding and are also used here is not the basis
15 for striking this testimony, especially in light of
16 Mr. McCaffrey's discussion is his testimony in this
17 proceeding that one of the reasons LILCO's efforts to
18 comply with GDC 17 should be recognized by this Board and
19 should be the basis for this Board's granting an exemption
20 that one of those reasons was LILCO's QA program.

21 The fact that Mr. McCaffrey asserted that as
22 the basis for LILCO's belief that the exemption should
23 be granted should clearly result in the County being
24 permitted to rebut the assertions by LILCO that the QA
25 program, in the County's view, should not provide a basis

Sim 4-9

1 for the granting of this exemption.

2 (Board conferring.)

3 JUDGE MILLER: We will take a five-minute
4 recess.

5 (Recess.)

6 JUDGE MILLER: The Board has re-reviewed the
7 written motion to exclude or to strike the direct testimony
8 of this panel filed previously. July 27 is the date it
9 bears.

10 We have also listened carefully to the arguments
11 of counsel made this morning and we have concluded that
12 the motion to strike the testimony in its entirety should
13 be granted.

14 The grounds upon which the Board strikes this
15 proffered direct testimony is, first of all, the fact that
16 a good deal of it goes to the issue of alleged or perceived
17 negligence, fault or whatever.

18 With the benefit of hindsight and 20-20 vision
19 and all of the rest of it, we think, first of all, that
20 the good faith or bad faith issues as framed by the
21 Commission is not an issue of contributory negligence. We
22 do not think that in this proceeding, in this kind of
23 proceeding with this kind of testimony that contributory
24 negligence is material nor relevant, and we think that that
25 is what the bulk of the testimony goes to.

Sim 4-10 1

2 It appears that these witnesses made an
3 investigation and I believe they stated that they had
4 testified in some state proceeding, it might have been the
5 prudency hearing, I don't know and it doesn't really matter,
6 but the product of this testimony is that this direct
7 written testimony does invade the province of the finder
8 of fact, namely, the Board at this point, or the Appeal
9 Board or the Commission in other contexts.

10 The witnesses purport to set themselves up as
11 making an investigation and then determining whether the
12 conduct of others measures up to their standards, their
13 opinions and so forth. Now that is a function of the Board
14 and not of any witness.

15 By the way, we say parenthetically that we have
16 no quarrel with the qualifications of these witnesses. We
17 consider them to be qualified in the areas in which they
18 have testified *on voir dire*, that they don't have to have
19 hands-on experience to have certain views.

20 We think, however, that the expression here
21 of those opinions is not consistent with (a) the nature
22 of opinion testimony, and this is proffered as opinion
23 testimony in this proceeding. We just don't think those
24 opinions are admissible by this panel and probably by
25 any panel in this proceeding.

We note in passing that many of the instances

Sim 4-11

1 where criticisms are made are not areas in which the Board
2 deems it necessary to inquire. We are not holding an
3 inquiry on the TDI matter. We are not holding an inquiry
4 on whatever the Brenner Board went into and we don't attach
5 any significance one way or the other to the Brenner Board's
6 inquiry or to the prudency investigation or other matters.

7 We are looking solely at the issues framed here
8 and the evidence, testimonial, exhibit and otherwise, which
9 addresses the issues which this Board must decide.

10 We note also in passing that much of the opinions
11 set forth here are conclusionary in nature. They are not the
12 the proper subject of opinion testimony and that they are not
13 relevant.

14 Without attempting to go through them, let
15 me just give a few examples. Starting on page 10, for
16 instance, we notice at the top that the witnesses say "It is
17 our position that LILCO was in effect responsible for," and
18 so forth. Well, we don't want that kind of position from
19 a witness. The Board will decide these matters.

20 We notice the statement further made "That the
21 need for LILCO to seek an exemption is really the result
22 of LILCO's own fault." That is for the Board to say and
23 not the witnesses. They can't set themselves up as the
24 triers.

25 "Our review." They reviewed a number of things,

Sim 4-12

1 but we just don't believe that the resulting testimony is
2 admissible.

3 "The need to seek an exemption is a direct result
4 of their failure to do" so and so. That is a function of
5 the Board.

6 Even the question "In your opinion, LILCO's
7 need for an exemption is as a result of its own failure."
8 Now there are two matters that pertain to that. That is
9 the question on the bottom of 10 and the top of 11.

10 In the first place, we have indicated that
11 good faith efforts cannot be equated with negligence or
12 should have's in a hindsight manner and then suddenly some
13 conclusions are drawn that bingo.

14 Further down in the answer "Our point is that
15 it is not in the public interest." Well, I don't want a
16 witness to have a point. I want him to testify. It is
17 only because they are experts that they can give opinions,
18 but this is not an area for opinion testimony.

19 It is or is not in the public interest, again
20 that is an ultimate issue for the Board.

21 "Nor is it equitable to reward a utility by
22 waiving," now that is argumentative, it is conclusionary
23 and again it invades a problem. I am just giving you
24 examples as we go through.

25 Down at the bottom, "despite obvious warning

Sim 4-13

1 signals, LILCO and Stone and Webster failed to implement
2 an adequate QA/QC audit."

3 The next page, "In our opinion," and they
4 comment on LILCO.

5 On the next one, "We conclude that the survey
6 should have."

7 "Support our view" on the next page, "that LILCO
8 should be deemed to be respnsible for."

9 This is improper opinion testimony and I am
10 not going to belabor the record further. We are going to
11 grant the motion to strike it in its entirety, the
12 proffered written direct testimony of this panel,
13 Mr. Dale G. Bridenbaugh and Mr. Richard B. Hubbard.

14 (The testimony of Messrs. Bridenbaugh and
15 Hubbard was STRICKEN IN ITS ENTIRETY.)

INDEXXXX 16 JUDGE MILLER: Thank you, gentlemen. You are
17 excused.

18 (Panel excused.)

19 JUDGE MILLER: The next witness.

20 MS. LETSCHE: Judge Miller, in light of the
21 Board's ruling on LILCO's motion to strike, the County
22 moves to strike the portion of Mr. Brian McCaffrey's
23 testimony ---

24 JUDGE MILLER: Well, you are out of order now.
25 You are on your case. Stick to your case and put on your

Sim 4-14

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evidence.

MS. LETSCHE: Could I finish my sentence, please.

JUDGE MILLER: No, because it is obvious that when you make a motion to strike the testimony of someone not your witness that you are out of order. Therefore just obey our procedure and we will give you a chance later on to make whatever motions you or other counsel want. This is not the time. This is your case and go on and present your testimony.

MS. LETSCHE: Will you tell me, Judge Miller, when it is proper for me to make this motion?

JUDGE MILLER: Well, I suspect it would be proper at the conclusion of all the evidence. If sooner, you could inquire and we would rule, but we don't want to interrupt every time counsel thinks of something in a tit-for-tat kind of approach. That is not proper legal procedure.

Now go ahead with the presentation of your direct testimony.

MR. BIRKENHEIER: Judge Miller, Suffolk County calls to the stand Mr. Dale G. Bridenbaugh, Mr. Gregory C. Minor, Mr. G. Dennis Eley and Mr. C. John Smith.

JUDGE MILLER: All right. You may come forward.

Sim 4-15

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Whereupon,

G. DENNIS ELEY

C. JOHN SMITH

GREGORY C. MINOR

-- and --

DALE G. BRIDENBAUGH

were called as a panel of witness on behalf of Suffolk County and Messrs. Smith, Eley and Minor having been first duly sworn by Judge Miller and Mr. Bridenbaugh having been previously duly sworn, were examined and testified as follows:

INDEX

JUDGE MILLER: Please be seated.

MR. BIRKENHEIER: Judge Miller, a few preliminary matters, first.

No. 1, the copies of the written testimony which were distributed to the parties and the Board previously have pages beginning with No. 37 running through 49 which were copies, and the quality of the copying of those pages was not all that good and it was hard to read.

JUDGE MILLER: Yes, we recognized that some of it was difficult to read. So I am glad you are correcting that, counsel.

MR. BIRKENHEIER: I will distribute replacements for those pages.

JUDGE MILLER: Fine.

Sim 4-16

(The replacement pages were distributed.)

MR. BIRKENHEIER: Judge Miller, I would also like to distribute at this time a copy of the resume, or the professional qualifications of Gregory C. Minor and have that marked for identification as Suffolk County Exhibit LP-36.

(The document referred to was marked Suffolk County Exhibit LP-36 for identification.)

MR. BIRKENHEIER: In addition to the professional qualifications of Mr. Minor, my colleague is now going to distribute the non-resume attachments to this testimony, and I request that they be marked for identification as Suffolk County Exhibits LP-37 through 50.

JUDGE MILLER: They may be so marked.

These are the documents which are Attachments 4 through 17 of the prefiled testimony.

(The documents referred to were marked Suffolk County Exhibits LP-37 through 50, inclusive, for identification.)

MR. BIRKENHEIER: And, finally, as the parties and the Board will have noted, some of the attachments to this testimony were photographs which were taken of areas on the Shoreham site and which at the request of counsel

INDEX

INDEXXXXXX

Sim 4~17

1 for LILCO the County did not attach to the testimony.

2 LILCO and the County have agreed that these
3 will not be made available for public inspection because
4 of security concerns and therefore I would like to pass
5 out complete sets of these photographs.

6 JUDGE MILLER: Well, what are you going to
7 do, ask that these sets be held as confidential?

8 MR. BIRKENHEIER: I would propose that at the
9 end of the cross-examination the sets be returned, except
10 for one set which will be moved into evidence under seal.

11 JUDGE MILLER: All right. We will have that
12 security measure imposed upon all who have now received
13 copies. We will keep them without disclosing or showing
14 them to other persons. They will be returned uncopied or
15 unmarked in any way at the conclusion of the examination
16 of this panel and that one copy of these photographs -- are
17 you going to mark them in any way?

18 MR. BIRKENHEIER: These pages relating to these
19 photographs have been included among the attachments.

20 JUDGE MILLER: Okay.

21 MR. BIRKENHEIER: So, for example, in the
22 group of attachments there is a sheet labeled "Attachment
23 6" which corresponds to the first photograph, and the
24 photographs have all been labeled on the back.

25 JUDGE MILLER: I see. There will then be one

Sim 4-18

1 set of the photographs which will be received by the
2 reporters as part of the official file in this adjudicatory
3 proceeding and will be sealed and will remain sealed for
4 all purposes until there is further ordering of this Board,
5 Appeal Board, Commission or other duly designated authority.

6 (The envelopes containing the photographs were
7 distributed to the parties, but the reporters did not
8 receive a copy at this time.)

9 (An envelope containing a set of
10 photographs, Attachments 6, 7, 8
11 9, 11 and 17 IS TO REMAIN SEALED FOR
12 ALL PURPOSES, until further orders
13 of the Board or duly designated
14 authority.)

XXXXXXXXXXXX
15 MR. BIRKENHEIER: I guess this really is one
16 last thing, Judge Miller. Just for purposes of making sure
17 we are all talking about the same documents, I would like
18 to go through all the attachments and address the actual
19 exhibit number.

20 JUDGE MILLER: All right.

21 MR. BIRKENHEIER: Attachment 4, which is a
22 scale drawing of the EMD configuration at the Shoreham plant,
23 is Suffolk County Exhibit LP-37.

24 Attachment 5, which is a schematic drawing
25 of the fuel transfer system, is Suffolk County Exhibit LP-38.

Sim 4-19

1 Attachment 6, which is one of the photographs,
2 is Suffolk County Exhibit LP-39.

3 Attachment 7, which is also one of the photographs,
4 is Suffolk County Exhibit LP-40.

5 Attachment 8, a third photograph, is Suffolk
6 County Exhibit LP-41.

7 Attachment 9, a fifth photograph, is Suffolk
8 County LP-42.

9 Attachment 10, which is a cover sheet and
10 appendix to a test procedure, a bi-weekly testing of
11 GM mobile diesel generators, is Suffolk County Exhibit
12 LP-43.

13 Attachment 11, which is one of the photographs,
14 is Suffolk County Exhibit LP-44.

15 Attachment 12, which is table listing various
16 component replacements, is Suffolk County Exhibit LP-45.

17 Attachment 13, which is another table with
18 the same information for Engine 402, is Suffolk County
19 Exhibit LP-46.

20 Attachment 14, which is the third table for
21 Engine No. 3 with the same information, is Suffolk County
22 Exhibit LP-47.

23 Attachment 15, which is the fourth table for
24 Engine No. 2, is Suffolk County Exhibit LP-48.

25 Attachment 16, which consists of two sheets

Sim 4-20

1 from the inspection reports, the installation inspection
2 reports for the EMDs at Shoreham is Exhibit 49.

3 And Attachment 17, which is the last photograph,
4 is Exhibit 50.

5 JUDGE MILLER: They may be so marked.

6 DIRECT EXAMINATION

INDEX 7 Q Gentlemen, beginning with Mr. Minor, would
8 you please state your names and business addresses for the
9 record.

10 A (Witness Minor) My name is Gregory Minor. My
11 business address is MHB Technical Associates, 1723 Hamilton
12 Avenue, San Jose, California.

13 A (Witness Bridenbaugh) My name is Dale G.
14 Bridenbaugh. My business address is the same as Mr. Minor's,
15 MHB Technical Associates, 1723 Hamilton Avenue, San Jose,
16 California.

17 A (Witness Eley) My name is George Dennis Eley.
18 My business address is 1301 Metropolitan Avenue, Thorofare,
19 New Jersey 08086.

20 A (Witness Smith) My name is Christopher John
21 Smith. I work for Ocean Fleets Consultancy Service. The
22 address is 1301 Metropolitan Avenue, Thorofare, New Jersey.

23 Q Gentlemen, do you have before you the testimony
24 entitled "Testimony of G. Dennis Eley, C. John Smith, Gregory
25 C. Minor and Dale G. Bridenbaugh on Behalf of Suffolk County

Sim 4-21

1 Regarding EMD Diesel Generators and 20 Megawatt Gas
2 Turbine," consisting of 49 pages of text and the resumes
3 of Messrs. Bridenbaugh, Eley and Smith?

4 A (Witness Minor) Yes.

5 A (Witness Bridenbaugh) Yes.

6 A (Witness Eley) Yes.

7 A (Witness Smith) Yes.

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#5-1-SueT

2 Q Do you have any corrections to make to that
testimony?

3 A (Witness Bridenbaugh) Yes, we do. We have
4 several corrections, most of which are typographical in
5 nature. And I can read them off at this time.

6 We have prepared an errata sheet which does list
7 all of these corrections. But I assume that they also --
8 I also should read them off. So, let me just start with
9 the first one that is contained on the errata sheet. It
10 is -- the first correction is found on Page 2, Line 20, of
11 the testimony. And there we delete the word "England" and
12 insert the words "United Kingdom."

13 On Page 10 of the testimony, at Lines 8 and again
14 at Line 15, the word "emergency" should be deleted. There
15 is a reference there to an emergency bus, that is not an
16 emergency bus.

17 At Page 11, Line 4, the words "proposed to be"
18 should be inserted after the words "which is."

19 At Page 20, Line 8, the word "emergency" should
20 be deleted.

21 At Page 21, expeditiously is misspelled, and we
22 correct that error.

23 At Page 26, Line 4, the words "temporary procedure"
24 should be deleted.

25 On Page 32, numbered Item Number 14, the word

#5-2-SueT 1

"Jacket" is misspelled, and we correct that error.

2

Similarly, on Page 33, Line 10, the word

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"enunciator" contains a spelling error and we correct that.

4

On Page 35, Line 13, the word "emergency" in

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front of bus should be deleted.

6

Again, on Page 36, Line 6, the word "emergency"

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should be deleted.

8

On Page 39, in the Footnote, the words "as new"

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should be contained within quotation marks.

10

On Page 41, Line 21, we insert after the reference

11

to Footnote 10, a parenthetical expression which states:

12

(SP24.307.07 has now been reissued as TP24.307.07, Revision 0.)

13

And the last one is on Page 47, Line 7, the word

14

"any" should be "many." Add an "m" in front of many.

15

Q Gentlemen, with those corrections, is this

16

testimony true and accurate to the best of your knowledge?

17

A Yes.

18

(Witness Minor) Yes.

19

(Witness Eley) Yes.

20

(Witness Smith) Yes.

21

Q And do you adopt it as your testimony in this

22

proceeding?

23

A (Witness Minor) Yes.

24

(Witness Bridenbaugh) I do.

25

(Witness Eley) Yes.

(Witness Smith) Yes.

#5-3-SueT 1

2 Q Mr. Minor, would you please summarize your
3 professional qualifications?

4 A (Witness Minor) I've had twenty-four years of
5 experience in the nuclear industry, sixteen of those years
6 with General Electric Company and eight years with MHB
7 Technical Associates as a consultant.

8 While I was with General Electric Company, I
9 worked in various responsibilities, including equipment
10 design and system design, and as part of that it included
11 work in equipment qualification and seismic qualification.

12 In addition, I worked at several reactors, two
13 of which were on the Hanford Reservation in Washington,
14 State of Washington, and another in Arkansas where I
15 participated in start-up checkout for that plant.

16 The work that I did in system design and equipment
17 design was largely related to safety related equipment,
18 safety systems and control systems for the nuclear power
19 plants that General Electric built, which were boiling
20 water reactors and Shoreham was one of those. The work
21 that I participated in resulted in components and systems
22 that are installed in all of General Electric's boiling
23 water reactors that they have made for commercial use with
24 the exception of Dresden 1 which was completed before I got
25 there.

The type of work in designing safety related

#5-4-SueT 1

2 system included the effort to achieve the necessary redundancy,
3 diversity, and freedom from single failure to meet the re-
4 gulations that apply to safety related equipment, including
5 the general design criteria. In performing analyses of
6 these systems and components to assure that they did comply
7 with these regulations, we would often perform failure modes
8 and effects analyses, where we would assume or postulate
9 certain failures and look at the effects of those failures
10 on the system performance of its overall purpose or goal.
11 And then assess, if the likelihood of that failure, was
12 large enough to be of concern and therefor need to be de-
13 signed to prevent the failure.

14 The work that I've done with General Electric,
15 excuse me, with MHB Technical Associates since leaving
16 General Electric has included many reviews and assessments
17 of safety systems of reactor systems in general and of the
18 overall performance of nuclear power plant systems for both
19 safety and control purposes.

20 Underlying all of these analyses is ultimately
21 the ability of the plant to meet the regulations which apply
22 to it. These analyses have included several relating to
23 probabilistic studies, some of those being a critique we
24 did in the mid-70s of the WASH 1400 reactor safety study;
25 others included specific plants, one being a nuclear plant
in Sweden, a boiling water reactor where we analyzed its

#5-5-SueT

1 probability of failure and consequences that could result
2 from that. This was done in conjunction with another sub-
3 contractor to us who was Science Application, Incorporated.

4 In addition, we've done plant specific reviews
5 for other plants. I have participated in analyses of con-
6 sequences and system failure probabilities for the Shoreham
7 plant and the Limerick plant specifically, Limerick being
8 a boiling water reactor very similar to Shoreham.

9 My educational background is that I have a
10 Bachelor of Science in Electrical Engineering from the
11 University of California at Berkeley. In obtaining that
12 degree, I took a power systems option dealing with utility
13 systems and power generation systems in addition to the
14 other electronics and electrical engineering courses. I
15 also have a Master of Science in Electrical Engineering
16 from Stanford University.

17 In addition, I have participated in a three year
18 program of advanced engineering courses, given by the
19 General Electric Company, and graduated from that course in
20 a Systems Option.

21 MR. BIRKENHEIER: Judge Miller, I assume that
22 the testimony that Bridenbaugh gave orally before with
23 respect to his qualifications remains in the record.

24 JUDGE MILLER: Yes, it may stand.
25

#5-6-SueT 1

BY MR. BIRKENHEIER: (Continuing)

2 Q Mr. Bridenbaugh, do you have anything to add to
3 those qualifications?

4 A (Witness Bridenbaugh) I would only add that in
5 this particular case, the testimony that is -- that I sponsor
6 here today, I think one assignment that I had with the
7 General Electric Company is of particular relevance, and that
8 is my job between 1973 approximately and 1975 -- '76,
9 I'm sorry. '74 to '76 as manager of performance evaluation
10 and improvement, involved the responsibility of monitoring
11 the performance of all of the boiling water reactors that
12 the General Electric Company had provided and placed into
13 service.

14 And in the course of the responsibility, it was
15 my task to manage individuals who were tracking the per-
16 formance of all of the total plant system, including
17 emergency power systems, control systems and the main power
18 generating units themselves, and to develop a master plan
19 for the company that was aimed at bringing about an improved
20 availability and reliability of the total plant.

21 And I think that is of particular relevance here.

22 Q Mr. Eley, would you please describe your profes-
23 sional qualifications?

24 A (Witness Eley) I began my career with an engine
25 builder in U.K. called George Clark and Northeast Marine.

#5-7-SueT 1

2 They built diesel engines. They had a license to build a
3 specific type of engine called the Sulzer . So I spent
4 a four year apprenticeship with this company in actually
5 building diesel engines.

6 I went through various departments during
7 apprenticeship. Departments I can recollect offhand are
8 like machine shop, fitting shops, erecting shops, and
9 basically what I did was to manufacture various components
10 and build those engines from start to scratch.

11 Once the engines had been built I then also went
12 into various departments to reinstall those previously
13 built engines into ships for ships propulsion units and
14 diesel generator units.

15 While still at George Clark and Northeast Marine
16 I was promoted to the drawing office where we did various
17 functions. I, at that stage, was responsible for testing
18 the engines under test bed conditions. And we would analyze
19 the data and ascertain whether those engines were built to
20 standard and suitable for the purpose for which they were
21 intended.

22 On completion of my apprenticeship, and having
23 served a period of time in the drawing office, my company
24 asked me to develop the ability to test engines up to
25 40,000 shaft horsepower. And it was my responsibility to
design completely testing facility at the site, and this

#5-8-SueT 1

I did, including the structural steel work.

2 At the age of approximately twenty-two, I decided
3 to change my employment from an engine builders yard to
4 extend the amount of experience that I had and joined the
5 company of -- well, it was not British Shipbuilders at the
6 time, but it was a company called Austin & Pickersgill which
7 is now part of the British Shipbuilders group. And at that
8 time, it was my responsibility to technically vet the
9 machinery that was to be supplied on board the vessels that
10 included all the machinery, the main engine propulsion units,
11 the diesel generator sets, the pumps, compressors, all of
12 the machinery that was on board the vessel. It was my
13 responsibility to determine whether that machinery was
14 suitable for the purpose for which it was intended and to
15 instigate the purchase and procedures for actually bringing
16 that about.

17 JUDGE MILLER: May I inquire? Technically vet.

18 WITNESS ELEY: Yes.

19 JUDGE MILLER: Could you tell us what vetting is
20 and then what technical vetting is? I'm just curious.

21 WITNESS ELEY: Certainly. When we -- before we
22 purchase a piece of equipment for a ship, it is necessary
23 to ensure that the equipment we are purchasing is suitable
24 for the purpose for which it was intended. In other words,
25 to be particularly relevant, if we knew that the electrical

#5-9-SueT 1

2 loading on a particular vessel was 3,000 kilowatts, for
3 want of a better word, we would look at that loading
4 schedule and recommend -- put out a purchase specification.
5 Okay. We would ask for an inquiry -- sorry, we would ask
6 for a submittal from an engine builder giving those details
7 of what their machinery is, we would look at that machinery
8 and determine whether it was suitable for use on board the
9 ship.

10 And in order to do so, we would use various
11 rules and regulations. And I can cite you one instance
12 which is the Lloyd's classification for steel ships. Another
13 one is the American Bureau of Shippings classification for
14 steel ships. We would use these kinds of rules and regula-
15 tions in order to determine whether any particular component
16 was suitable for the purpose for which it was intended.

17 JUDGE MILLER: Sometimes one hears the term
18 "vetting" as applied to personnel, especially those engaged
19 in intelligence operations. Does that have the same meaning
20 as vetting as you are using it?

21 WITNESS ELEY: Well, basically the meaning as I'm
22 using is what I've said, Judge, that we would look at the
23 submission from t's engine builder.

24 JUDGE MILLER: Personnel, people. How would you,
25 in using the term "vet" apply it, if you would at all, to
a person? And I'm not saying now as it applies to your

#5-10-SueT1

2 technical discussion here. The word "vet", v-e-t, what does
3 it mean when it's applied to persons?

4 WITNESS ELEY: I'm not sure I understand the
5 context of the question, Judge.

6 JUDGE MILLER: No context at all? Are you
7 familiar with the word "vet", v-e-t?

8 WITNESS ELEY: Yes.

9 JUDGE MILLER: Setting aside your description,
10 which gives me a good idea of the technical vetting, I'm
11 inquiring what other meanings, or what generic meanings,
12 are attached to the word "vet" if you know?

13 WITNESS ELEY: Okay. If I was vetting a person
14 for a particular job, I would look at that person's
15 qualifications and I would vet those qualifications to see
16 whether he was suitable for the job he was going for.

17 JUDGE MILLER: Okay. Thank you.

18 WITNESS ELEY: Once I decided that the components
19 that I was looking at were suitable, having made due regard
20 to the rules and regulations, et cetera, I would then
21 instigate the purchase and procedures for that whilst in
22 employment.

23 I also went on various sea trials during that
24 period to ascertain whether indeed the equipment, once it
25 had been brought on board, did match up to its requirements.
And that was also a part of the function. This gave us

#5-11-SueT 1

2 feedback in order that we knew that our decisions that we
3 made in the first place were indeed correct.

4 Once I had completed that task, at the age of
5 twenty-six I then changed my employment again to my present
6 employer. And I then worked for a company called -- the
7 parent company was Ocean Transport and Trading. And they
8 are a European shipping company engaged in the carriage
9 of cargo worldwide. And at one stage, they had a hundred
10 and ten vessels in the fleet. They now have approximately
11 twenty-six vessels in the fleet.

12 But for the next twelve years of my career, I
13 spent this in a seagoing capacity as a marine engineer at
14 sea. And I, over those twelve years, held all of the positions
15 on board from Junior Engineer to Fourth Engineer to Third
16 Engineer to Second Engineer to Chief Engineer. And in all
17 of those positions, one had various responsibilities for
18 the operation of the plant, for the maintenance of the plant,
19 et cetera.

20 For instance, when I was a Fourth Engineer, I
21 was completely responsible then for the overhaul and
22 maintenance of diesel generating equipment of various types.
23 Whichever ship we went on, whatever type of equipment that
24 was on there, we were responsible for the overhaul and
25 maintenance of that.

end #5 24
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1 As a third engineer we then had not only the
2 overhaul and maintenance to do, we then had the responsibility
3 for the efficient operation of that plant. In other words,
4 we would take indicator cards from it. We would determine
5 that the engines were suitably balanced, and we would make
6 sure they were running in efficient modes. That was the
7 responsibility as a third engineer.

8 As a second engineer, you were then responsible
9 for the control of the staff which were, indeed, daily
10 performing those tasks that you had previously done, and as
11 the chief engineer, you would be responsible for the overall
12 effective running of the plant and have the control of all
13 of that staff beneath you.

14 At the completion of my twelve years at sea, I
15 then come into the same company in a shoreside capacity of
16 consultant, and my company then diversified -- intended to
17 diversity its interest somewhat from the shipping field, and
18 some of my present job functions are to obtain consultant
19 work for my company, and to operate a field testing service.
20 I think most of that is not really relevant here, so I will
21 limit that to what I have said so far.

22 My society memberships, I am associate member
23 of the Institute of Marine Engineers. I am a member of the
24 Institute of Port Engineers. I am a member of the SDM Task
25 Group on Pollution Abatement Equipment. I have also been

1 accepted as a member of the Society of Naval Architects
2 and Marine Engineers.

3 That, by the way, is not in my resume. My
4 licenses and certificates are as follows: I have a combined
5 First Class Certificate of Competency for Steamships and
6 Motorships, and I have a Higher National Certificate in
7 Mechanical Engineering. If you might bear with me, Judge,
8 I would like to explain to you what they are, because they
9 are not really the same as over here.

10 The Department of Trade in Industry in the UK
11 have certificates of competency which they issue on the
12 results of both examination procedures and also on practical
13 ability. For instance, to gain a second engineer's
14 certificate on board a ship, one would need to have at least
15 24 months of practical training on board the vessel, and to
16 have oral examination with regard to the various -- with
17 regard to it safety and its -- your capability to operate
18 it.

19 In addition to that, for the second engineer's
20 certificate, there is a six months course which goes into
21 engineering knowledge, electro-technology, naval architecture,
22 design drawing, and this type of areas.

23 For the chief engineer's certificate, one needs
24 to do a further two years training, and at the completion
25 of that one can take the higher examination. The examination
is of a similar nature materials wise, but it has a higher

6-3-Wal

1 standard to it.

2 In addition to that, the higher national certificate
3 is obtained in conjunction with ones apprenticeship training.
4 During the training period, there are college cources taken
5 and it took me three years to obtain the ordinary national
6 certificate, and some of thc subject matter that I took at
7 that time was materials, the study of materials, the study
8 of machines, the study of thermo-dynamics, the study of
9 fluids, and the study of mathematics.

10 For the higher national certificate, it was a
11 further two year course which was taken again during my
12 apprenticeship, and again that was around about the 21-22
13 year old period.

14 That is it, gents. Oh, I might add that during
15 the -- when one obtains the combined first class certificate
16 of competency, one has to take a further six months training
17 course in order to run on a steamship as well. In other
18 words, with a turbine. So, in order to run on a turbine
19 vessel, one would need a further additional six months
20 training.

21 A further test in front of a government body,
22 and they would approve your ability to run on both a steam
23 or diesel vessel. In order for one to obtain these certificates
24 in the first place, one also has to take a fire fighting
25 course, which the Department of Trade and Industry have some

6-4-Wal

1 recognized fire fighting courses. They combine this with
2 local fire departments. Approved fire departments, and we
3 go through that training, and we are unable to obtain the
4 certificates of competency until such time as we have
5 established that we have the ability to fight fires on board
6 ships.

7 Q Mr. Smith, would you please describe your
8 professional qualifications?

9 A (Witness Smith) I have been employed by ocean
10 fleets for the past twenty-two years. I joined them back
11 in 1962 as an engineer cadet, and I served a five year
12 cadetship. The first two years were at college studying
13 mechanical engineering. I then did two years at sea as an
14 engineer cadet, getting a basic grounding in the operation
15 of the engineering department and all the machinery therein.

16 The final year was a year going around the basic
17 shore establishments the company had. We had our own machine
18 ship for engine maintenance. We also have chemical material
19 testing laboratory. We worked on the ships as they came
20 into ports, doing maintenance on all the machinery in the
21 engine room, and also worked in the drawing office where
22 we have our own engineering design and drawing office.

23 The latter, I finished my time off and spent six
24 months in there working on the modifications of eight of our
25 ships. We were changing them over to semi-automatic operation,

6-5-Wal

1 and it required the modification of some of the main engine
2 systems and fuel processing plants, and also the diesel
3 generators, and I was involved in designing and actually
4 drafting the drawings.

5 After finishing my time, I then started sailing
6 on the company ships to the Far East and West Africa starting
7 as a junior, and working my way up through fourth and third
8 engineer.

9 As fourth engineer, as Mr. Eley has already
10 stated, in our company the fourth engineer is responsible
11 for the running and the maintenance, and also the record-
12 keeping of all the diesel generators on board the ship, which
13 are of numerous makes and depending on the ship can be from
14 anything from two to five per ship.

15 Once I got up to third engineer, and I had done
16 two years at sea, I then went back to college again for six
17 months to study for my second engineer's license, Board of
18 Trade -- or Department of Trade and Industry license of
19 competency. After I acquired that, I went back away to sea
20 again, and for the next two years I was serving on medium
21 sized semi-automatic ships where it was only required to
22 carry two engineers , the chief and myself as a second.

23 In that position, I was pretty well the sole
24 person operating the engine room, and that involved all the
25 day-to-day operation, maintenance of the engine room plant.

1 That included the main diesel engines and three diesel
2 generators.

3 One of those ships was quite interesting, because
4 the main diesel generator and -- the main diesel engine and
5 the three diesel generators which were built by A. P. Allen
6 in England, were the only ones afloat, and so we had a lot
7 of contact with the company because they were very interested.
8 All the other applications were in shoreside generation and
9 pumping situations, and they wanted to see how they were
10 operating in shipboard generation and being used a prime
11 mover.

12 Another interesting thing was that we had a
13 shaft alternator, so that the main engine was as well as
14 driving the propeller on the ship, also supplied all the
15 electric power while we were at sea.

16 After sailing on the medium sized ships, I then
17 went on to our boat carrier division, and the next two ships
18 I went out were new ships, which required going out to Japan
19 to the shipyard, and standing by the ships prior to the
20 finishing of the ships, doing inspection work, testing work,
21 all systems in the engine room had to be tested. We also gave
22 advice and recommendations for modifications. Went on the
23 sea trials, and after the sea trials we went through all the
24 inspection of the machinery that is normal after a sea trial
25 to open up selectively the main engine -- to the wear and tear

1 under normal operation.

2 After those two ships, I went back to college
3 again, to again study for my chief engineer license. After
4 my chief engineers license, I continued sailing at sea in the
5 capacity of chief engineer -- sorry -- in the capacity of
6 second engineer up until recent years.

7 Of interest at the moment, if I can just describe
8 the last ship I was on, again it was a new ship which I had
9 to go out to Japan for. It consisted of the electrical
10 plant -- with five main diesel generators, one emergency
11 generator, all deadline black start. In the event of a
12 blackout on board the ship, the emergency generator fast starts
13 and is usually on line supplying certain emergency loads.
14 One steering gear, some of the navigational equipment and
15 some of the engine room ventilation.

16 The main generator, which is in the standby mode,
17 blackstarts, and comes into line in about twenty seconds and
18 then sequentially loads up all the important systems in the
19 engine rooms, like the cooling systems and oil systems with
20 both the main engine and for the diesel generators.

21 These systems have to be tested frequently. A
22 new regulation that came out a couple of years back by the
23 Department of Trade and Industry insists that we check the
24 emergency generator in its auto start mode before we leave
25 every port. They give us a dispensation if we leave two ports

1 in the same day.

2 But aside from that, it has all got to be tested.

3 As Mr. Eley has already mentioned, one of the
4 requirements of the government for issuing us our licenses
5 is that we must attend recognized fire courses. I have
6 been on two; one up in Scotland, one Liverpool. They are
7 both run by the local fire departments to government outlines.

8 And these are courses on the science of fire and
9 fire fighting. The management of fire fighting parties, the
10 safety of fire fighting parties, and also fifty percent of it
11 in actual physical fighting of fires.

12 A lot of them are actually inside a three story
13 high mock-up, steel mock-up, and I say we get a good all around
14 training in that respect.

15 Q Gentlemen, are the attachments to your testimony
16 which were earlier distributed and marked as exhibits, Nos.
17 37 through 50, documents which you rely on and refer to in
18 your testimony?

19 A (Witness Smith) Yes.

20 A (Witness Eley) Yes.

21 A (Witness Minor) Yes.

22 A (Witness Bridenbaugh) Yes.

23 MR. BIRKENHEIER: Judge Miller, the witnesses
24 are ready for voir dire.

25 JUDGE MILLER: We will take just about a ten minute

1 recess and then we may have voir dire.

2 (Short recess taken.)

3 JUDGE MILLER: Are we ready for voir dire.

4 MR. ROLFE: Yes, Judge Miller.

5 MR. BIRKENHEIER: Judge Miller, I believe two
6 of our witnesses have not returned.

7 (Pause.)

XXX INDEX

8 CROSS EXAMINATION

9 BY MR. ROLFE:

10 Q Mr. Smith, you did not begin any review of LILCO's
11 proposed low power operation and configuration for providing
12 AC power until approximately June 19 of June 20, is that
13 right, sir?

14 A (Witness Smith) That is correct.

15 Q And it was not decided that you would be a
16 witness until approximately June 29, is that right, sir?

17 A I am not sure what the date was that it was
18 decided that I was going to be a witness.

19 Q Do you know the date that Suffolk County advised
20 LILCO that you would be a witness?

21 A Not offhand. Not the exact date.

22 Q Do you have any reason to disagree with me if I
23 were to tell you that it was June 29?

24 A No.

25 Q Now, Mr. Smith, you have never worked at a nuclear

1 power plant, have you, sir?

2 A No.

3 Q And prior to being retained by Suffolk County with
4 respect to this proceeding, you have never consulted with
5 respect to any power generation source at a nuclear power
6 plant have you, sir?

7 A At a nuclear power plant, no.

8 Q And you have no experience in interpreting or
9 applying NRC regulations, do you, sir?

10 A Of regulations yes, but not specifically NRC
11 regulations.

12 Q You have no experience in the operation or
13 maintenance of gas turbines, do you, Mr. Smith?

14 A Only what I have read in my studying for my
15 hobby.

16 Q You have never actually operated or had the
17 responsibility for maintaining a gas turbine, have you?

18 A No, not hands on.

19 Q Have you ever worked for a utility company,
20 sir?

21 A No. As I said, I have been employed by Ocean
22 Fleets since I left school.

23 Q And all of your experience with diesel engines
24 and diesel generators has been with respect to diesel generators
25 or diesel engines in marine use?

1 A That is correct.

2 Q I take it it follows, then, that you have no
3 experience with stantionary diesel generators, is that
4 right, sir?

5 A If you mean by, 'stantionary' diesel generators
6 actually on land as opposed to on ships, yes.

7 Q Now, it is also true, is it not, Mr. Smith, that
8 you have no experience with EMD diesel generators.

9 A Not until I started reviewing the work for this.

10 END 6.
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Sim 7-1

1 Q Is it also true that you have never participated
2 in the formulation of industry standards applicable to
3 diesel generators?

4 A (Witness Smith) No, only applying them.

5 Q And I take it that since you have had no
6 previous experience with EMD diesel generators, you also
7 prior to this consulting job on behalf of Suffolk County
8 had no knowledge of the industry experience with EMD
9 diesel generators; is that correct, sir?

10 A I am sorry. Can you say that again?

11 Q Certainly. Isn't it true that prior to this
12 consulting job for Suffolk County that you had no knowledge
13 of the industry experience with respect to EMD diesel
14 generators?

15 A Yes, prior to this, no.

16 Q Now, Mr. Eley, you have never worked at a
17 nuclear power plant, have you, sir?

18 A (Witness Eley) I have not.

19 Q And prior to being retained by Suffolk County
20 with respect to this proceeding and with respect to the
21 TDI diesel generators in that licensing proceeding, you
22 had never consulted in any job with respect to a power
23 generation source at a nuclear power plant; is that
24 correct?

25 A That is correct.

Sim 7-2

1 Q And you have no experience in the interpretation
2 or application of NRC regulations; is that right, sir?

3 A Prior to what I am doing now?

4 Q Yes, sir.

5 A No.

6 Q And have you ever worked for a utility company,
7 sir?

8 A I have not.

9 Q Do you have any experience with stationary,
10 meaning land-based diesel generators?

11 A In my deposition I explained the extent of
12 my land-based experience was limited to that of the plant
13 that was fitted to the first company that I worked for,
14 which was George Clark Northeastern Marine. They had their
15 own diesel generating equipment in-house, but my involvement
16 with that was very superficial in nature. I was an
17 apprentice at that time.

18 Q And that was the time when you were involved
19 in the testing that you described this morning in response
20 to Mr. Berkenheier's question?

21 A No. The testing that I was responsible for
22 was in a more responsible capacity than what I told you
23 there. It was the testing of the diesels that were built
24 within that facility.

25 Q Sir, can you find for me in your testimony
the reference to that testing, either in your testimony or

Sim 7-3

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in your resume attached to your testimony?

A I am sorry. Could you repeat the question, please?

Q Yes, sir. You mentioned some testing earlier this morning that was done while you were employed by I believe it was George Clark, and I was wondering whether you had mentioned that testing either in your direct testimony or in you resume filed with your direct testimony?

A I would have to check back through. I don't know whether I have or not.

Q At the time you were just serving an apprenticeship; is that right, sir?

A No. This was at the end of the apprenticeship period. I was promoted to draftsman at the end of my apprenticeship, and once promoted to draftsman then I had responsibility for testing.

Q Nor, Mr. Eley, you have never operated a GM EMD diesel generator, have you?

A No.

Q And you have never maintained a GM EMD diesel generator, have you, sir?

A No, I have not.

Q And prior to doing whatever work you have done for Suffolk County with respect to this proceeding, you had no familiarity with industry reputation of GM EMD diesel

Sim 7-4

1 generators; isn't that right, sir?

2 A That is correct.

3 Q And I take it similarly you have not had
4 operating or maintenance experience with respect to TDI
5 diesel generators?

6 A That is correct.

7 Q It is also true, is it not, Mr. Eley, that you
8 have no experience in operating or maintaining gas turbines?

9 A That is correct.

10 Q Mr. Eley, you recall when you were deposed
11 on June 7 in this case that at that time you had no opinions
12 concerning the EMD diesel generators; is that right, sir?

13 A That is correct. The information that we had
14 at that time it was very superficial in nature, and copies
15 of the data that we had in our possession then were handed
16 over to you.

17 Q Is it also true that you did not reach any
18 opinions until approximately July 11 or 12?

19 A Yes. I had no conclusions at the deposition.

20 Q Now, Mr. Minor, you have never operated a
21 nuclear power plant, have you, sir?

22 A (Witness Minor) You mean as a station operator?

23 Q Yes, sir.

24 A No, I have not.

25 Q And you have never been licensed to operate a

Sim 7-5

1 nuclear power plant, have you, sir?

2 A That is correct.

3 Q Now, Mr. Minor, you mentioned that you were
4 experienced as a design engineer with General Electric.
5 Isn't it true, sir, that that experience was limited to
6 control equipment or control room equipment?

7 A No.

8 Q It was limited to instrumentation and control
9 equipment?

10 A Instrumentation and control systems which at
11 one particular time in the job I had included the design
12 of some of the emergency cooling systems and other related
13 systems all the way from the hydrogen recombiners to the
14 MG sets and the various systems that had to have elementary
15 diagrams and parts lists prepared for particular plants.

16 Q That design experience did not include experience
17 in designing diesel generators or diesel generator sets,
18 did it, sir?

19 A No, it did not.

20 Q And it also did not include any design
21 experience with respect to gas turbines; is that right?

22 A That is correct.

23 Q And it also did not include any direct experience
24 in the design of electrical transmissions systems or
25 transmission routes from either diesel generators or gas

Sim 7-6

1 turbines to other systems in the plant, isn't that right,
2 sir?

3 A A part of that system you are referring to,
4 you are correct, it did not include that, but when you
5 begin to get to the point where it begins to deliver loads
6 into the emergency buses and into the emergency equipment,
7 the equipment used to mitigate accidents, in those areas
8 the systems design we were talking about earlier does apply.

9 Q Well, if we could delineate, I guess, if we
10 could delineate, I guess, if we could consider the power
11 generation source and then the cables which relay the
12 power from that generation source, you have never had
13 any experience in design of either of those two items, have
14 you, sir?

15 A Define those two categories again.

16 Q The power generation source, that being either
17 the diesel generator set or the gas turbine, and then you
18 have got the cables that actually take the power from that
19 source to wherever it is going, whatever bus it is going
20 to, if we stopped it there before we get to the bus, you
21 have never had any experience in the design of either the
22 power generation source or the system responsible for carrying
23 the power from that source to the bus?

24 A By design here do you mean the -- well, can
25 you explain what you mean design? How are you limiting

Sim 7-7

1 design?

2 Q Well, I am trying to find out what you meant
3 when you said somewhat broadly on direct testimony this
4 morning that you had this experience as a design engineer
5 with General Electric which involved extensive systems in
6 a nuclear power plant.

7 A Yes. The experience I was referring to dealt
8 mainly with the systems from the bus inward within the plant
9 and how the actual power was obtained for specific loads
10 which are used to mitigate accidents.

11 Q And that experience was gained while you were
12 at General Electric; is that right?

13 A In terms of design work, that is correct, and
14 since then of course I have had numerous opportunities
15 to assess other plants and other systems in comparable
16 areas and in some cases extending beyond that bus.

17 Q And since you left General Electric approximately
18 eight years ago you have been with HMB?

19 A Yes, that is correct.

20 Q And do I understand correctly, sir, that
21 HMB spends approximately 50 to 80 percent of its time on
22 an annual basis in testifying and preparing testimony?

23 A That is a very hard number to tie down. I
24 recall being asked a question similar to that in the
25 deposition and at that time I couldn't tie it down either. I

Sim 7-8

1 don't really know if that is a good estimate or not.

2 Q But that was the estimate you gave in your
3 deposition, was it not, sir?

4 A I think I gave a qualified estimate that said
5 I couldn't really assess it accurately.

6 Q Well, with those qualifiers, I am correct, am
7 I not, that you did say that in some years it would be
8 as much as 50 percent and in other years it would be more
9 like 80 percent devoted to testimony?

10 A Yes, with the other part being studies or
11 analyses for other parties not related to litigation.

12 Q Now, Mr. Minor, you have never been responsible
13 for operating any type of power generation equipment, have
14 you, sir?

15 A Well, we have to define what you mean by that.
16 As a young engineering employee for Pacific Gas and Electric
17 Company in California, I had the opportunity to be responsible
18 for a test procedure for testing generators on hydro plants,
19 and the PG&E field operator seemed to think that I had
20 a lot of responsibility for operating their plants when
21 I would tell what type of test they had to perform on those
22 generators and determine their adequacy. But I think in
23 the terms that you are defining that probably the answer
24 is no.

25 Q The job to which you referred was a summer job

Sim 7-9

1 that you held?

2 A That is correct.

3 Q You have never been responsible for the operation
4 of a diesel generator, have you, sir?

5 A The operation, no, I have not.

6 Q And you have never designed a diesel generator
7 I believe you said?

8 A I believe I answered that earlier.

9 Q And you have also never been responsible for
10 the operation or design of a gas turbine; is that right, sir?

11 A That is correct.

12 Q Mr. Bridenbaugh, I am not going to repeat the
13 voir dire that was gone into in your earlier testimony, but
14 just a couple of additional things, however. You have never
15 been licensed to operate a nuclear power plant, have you,
16 sir?

17 A (Witness Bridenbaugh) No, I have not.

18 Q And it is true, is it not, that as of June
19 27 you didn't have any opinions concerning the diesel
20 generators, the EMD diesel generators at Shoreham; is that
21 right, sir?

22 A I had not completed my review nor formed an
23 opinion, no.

24 Q Now you have no experience in designing
25 electrical transmission systems, do you, Mr. Bridenbaugh?

Sim 7-10

1 A No, I don't.

2 Q And, similarly, you have no experience with
3 respect to overall reliability studies concernig electrical
4 transmission systems; is that right, sir?

5 A That is correct.

6 Q Is it also correct, sir, that you have had
7 no responsibility for operating a gas turbine?

8 A I have never been a gas turbine operator, nor
9 have I operated a gas turbine. I have had some responsibility
10 for gas turbine operation, however. In one of my assignments
11 as field engineering supervisor for General Electric I had
12 the responsibility for the installation of a steam turbine
13 unit for the utility which was Arizona Electric Power Co-op.

14 In conjunction with that facility there was
15 also a General Electric furnished gas turbine generator at
16 that site and the design of the total plant included the
17 use of that gas turbine. In a combined cycle function,
18 the exhaust from the gas turbine was used as a force draft
19 fan for the boiler.

20 I was responsible for GE to coodinate some of
21 the work involved in making the gas turbine operate in that
22 mode.

23 Q Yes, sir, but you were not resposible for
24 overseeing the installation of that gas turbine, were you?

25 A No. That gas turbine was installed before I

Sim 7-11 1

took over that task.

2

Q When did you last have any direct experience with gas turbines, Mr. Bridenbaugh?

3

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A It would be during the period of 1963 through 1966.

5

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Q And there was only that one experience; is that right, sir?

7

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A There was that one experience. Also, my responsibilities at that time included the coordination of work for the General Electric Company in Southern California, Arizona, New Mexico and Nevada for all utilities other than Southern California Edison.

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I do recall that one of the jobs that I followed at that time was working on the rebuild of some gas pipeline pumpers for El Paso Natural Gas I believe it was.

14

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Q Well, in following that job, did you have any direct supervisory responsibility?

17

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A I had direct supervisory responsibility, but I was not at the job site.

19

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Q So you were not making day-to-day decisions concerning the operation, maintenance or installation or that gas pipeline pumper, were you?

21

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A No.

24

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Q Now, Mr. Bridenbaugh, isn't it true that you have had no experience with Pratt and Whitney gas turbines

Sim 7-12 1

of the type that is located at Shoreham now?

2 A That is true.

3 Q And also as of June 27 when your deposition
4 was taken you had no opinions concerning the gas turbine
5 at Shoreham and had at that time performed no analysis
6 of it?

7 A That is correct, I had not yet done that work.

8 Q Indeed, as of June 27 you testified that most
9 of your time spent with respect to this low-power proceeding
10 had been involved in simply keep track of correspondence;
11 is that right, sir?12 A I don't recall if I testified to that effect.
13 I know that at that same deposition we did talk about my
14 involvement and I indicated that I had also attended
15 a company/NRC meeting at which the low-power motion was
16 discussed in some detail and I also attended the prehearing
17 conference at which the initial part of the proceeding was
18 begun.19 Q And is it true, Mr. Bridenbaugh, that you didn't
20 reach any opinions, or didn't reach the opinions that you
21 ultimately express in your testimony here until approximately
22 July 12 or July 13?

23 A That is true, yes.

24 Q Mr. Smith, one more question for you. Am I
25 correct that you have had no previous experience in operating

Sim 7-13

1 or maintaining TDI diesel generators?

2 A (Witness Smith) TDIs, no.

3 MR. ROLFE: Your Honor, LILCO has no further
4 voir dire of these witnesses.

5 JUDGE MILLER: Staff?

6 MR. PERLIS: The staff has no voir dire.

7 MR. PALOMINO: The State of New York has
8 no voir dire.

9 JUDGE MILLER: You may proceed.

10 Pardon me. Judge Johnson may have a question.

11 BROARD EXAMINATION

12 BY JUDGE JOHNSON:

13 Q I would like a point of clarification, please,
14 Mr. Minor. I believe you said that part of your instrumenta-
15 tion control duties for General Electric were the preparation
16 of elementary diagrams?

17 A (Witness Minor) No.

18 Q Would you tell the Board what elementary
19 diagrams are, please?

20 A Certainly. The individual nuclear plants
21 have to have basically the same systems applied to them as
22 other nuclear plants. However, for each plant there
23 are specific and unique characteristics that have to be
24 incorporated into the design of the overall system.

25 So there is a step in the design process where

Sim 7-14 1

you make a unique drawing for that particular plant which describes the components and how they are arranged and how they are interconnected and interrelated on one drawing, and with that drawing you have parts lists and you have other documents that refer to specific manufacturing or installation requirements that may apply to that particular system.

end Sim 7

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2 It may be special separation requirements. For
3 instance, the system diagrams that we were making in the
4 early 70s were some of the first diagrams where we were
5 requiring electrical separation to prevent fire from damag-
6 ing more than one redundant safety division, which would be
7 like, say, damaging more than one of the sources of power
8 coming from the emergency diesel generators. And you would
9 put requirements on the elementary telling which parts of a
10 particular elementary had to be separated one from another
11 to maintain the level of redundancy to achieve the ultimate
12 system characteristic.

13 And this was done for, I think I had responsibility
14 for some fifteen or eighteen of the systems on the nuclear
15 plant.

16 Q These are more functional diagrams than they
17 are actual hardware diagrams? You don't go into the details
18 of the hardware, just the -- as you illustrated the separation
19 of portions of systems and systems themselves?

20 A I believe the answer to your question categorically
21 is yes, but specifically this would deal with the overall
22 system and how components are interrelated, interconnected,
23 tied together and feed back and forth information to one
24 another, so that they can respond to signals, safety signals,
25 and protection system initiation signals.

 Then, that drawing would call for a detailed level

#8-2-SueT 1

of drawing that would go into some of the specific characteristics at another level for particular components.

2

And my other responsibility that I have mentioned earlier of component design, I did design of specific components in control and instrumentation work.

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Q Components such as what, please, sir?

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A Some of the major systems such as the powering, monitoring equipment that was used to monitor the reactor core power level and provide output signals which would initiate the reactor protection system or initiate certain safety functions. And those output signals had to be carried to particular systems to actuate their performance for mitigating purposes.

In other words, turn on cooling pumps or the signals that turn on the emergency diesel generator, the low level signal comes out another of the systems that I was designing as Manager of the Systems Design.

So, it's components that create signals that initiate safety action.

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Q Essentially, electric components, correct?

A Yes. They were largely electronic components. I also had responsibility for some mechanical equipment at a system level that was almost totally mechanical, the hydrogen recombiners, for instance, and the --

Q You mean, you actually designed the hydrogen

#8-3-SueT 1

recombiner?

2

A We had responsibility for the system of the hydrogen recombiner, most of which was mechanical but it also had certain electrical requirements that had to be put on elementary diagrams to make sure the functions were monitored, controlled and performed properly.

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JUDGE JOHNSON: Thank you, sir.

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JUDGE MILLER: You may proceed.

9

REDIRECT EXAMINATION

10

BY MR. BIRKENHEIER:

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12

Q Mr. Eley, approximately how many makes of diesel generators have you operated in your career?

13

A (Witness Eley) I think I listed those in a prior deposition, I would say, but the ones I can think of offhand are Diahatsu, Yanmar, Allen, Ruston, Paxman, quite a few. I wouldn't like to total it exactly, but each time we go on board a ship unless it's a similar class of ship, then it is more than likely that the diesel generating equipment would be of a different nature.

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And what we would normally do under those circumstances is to, if we hadn't seen this particular equipment before, will be to refer to the various instruction manuals and the prior test results and the running parameters, and we would ascertain from the materials that we had on board just how to run that plant effectively.

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2 Q Mr. Eley, do the different makes of diesel
3 generators on which you have worked in the past differ
4 significantly from make to make?

5 MR. ROLFE: Your Honor, I object to the relevance
6 of that question. The witness has already testified that
7 he has no experience with either EMD diesels as we have in
8 Shoreham or TDIs, so to the extent he is going to talk
9 about differences between other makes which have nothing to
10 do with this it's irrelevant. To the extent he tries to
11 compare them with EMDs at Shoreham, the witness has no
12 qualifications to do so.

13 MR. BIRKENHEIER: Judge Miller, this question
14 is relevant precisely for the reason that Mr. Rolfe says
15 it is irrelevant. The witness has testified that he has
16 experience with a large number of different type of diesel
17 generators.

18 And the real question about what -- with respect
19 to experience or lack of experience with EMDs or TDIs is
20 the question, how significant is that. Now, how do these
21 diesel generators relate to each other.

22 JUDGE MILLER: We don't normally get into this
23 amount of argument over relevance on voir dire examination
24 of expert witnesses.

25 How many more questions do you have on, what
do you call this, redirect qualifications, whatever it is?

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How much more do you have?

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MR. BIRKENHEIER: I suspect that I probably would have about six to eight more questions.

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JUDGE MILLER: That's quite a bit. I'm not sure that you are entitled to it, but we are going to give you a little latitude. You can shorten it.

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WITNESS ELEY: Can I reply?

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JUDGE MILLER: Yes.

9

WITNESS ELEY: There are minor differences, superficial in nature. They all have crankshafts, pistons, con rods, cylinder heads, turbinechargers. Really, it would be the same.

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BY MR. BIRKENHEIER: (Continuing)

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Q Mr. Eley, what -- are there any significant differences between diesel generators in marine applications and diesel generators in land-based applications?

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JUDGE MILLER: You know, this is really getting into direct. We have no objection to you putting it into the record because we want a complete record.

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I have grave doubts that voir dire is the proper place to do this. You are getting into matters that are in dispute. Fine. We will let you ask questions, but I think you should do it in your direct testimony rather than in voir dire, re-something.

25

MR. BIRKENHEIER: I'm certainly willing to do it

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2 whenever you would prefer that I do it, Judge Miller. My
3 only request is that the grounds which LILCO has raised
4 this motion to strike the testimony of these witnesses is
5 based on the differences between, or their lack of experience
6 with marine diesels, not be used as a ground of the motion
7 to strike their testimony until I've had a chance to develop
8 the record on that particular issue.

9 JUDGE MILLER: Well, normally you would have
10 covered their qualifications in that regard. You've seen
11 the motion to strike. In their examination and amplifica-
12 tion of their qualifications have been fairly extensive.

13 Now, to keep on going back and forth on what is
14 getting into argumentative matters, that really get into
15 the merits of some of these things, rather than true voir
16 dire I'm getting a little bit concerned about it.

17 I think it would more properly be as part of your
18 direct case really. It goes to credibility rather than to
19 qualifications. Credibility in the sense of what they are
20 doing, not only in their background and expertise but as
21 applied to a particular situation. And you will be given
22 ample opportunity to do that. We deem that to be relevant
23 and it will be permitted.

24 But I don't think we are going to go back and
25 forth on voir dire now just by virtue of one of you raising
questions and the other doing so. You have had your chance

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2 in full; you've seen the motion. We have let counsel go
3 fairly far, as a matter of fact, on the voir dire examination.

4 I think now is the time to get down to the merits
5 of the case.

6 MR. BIRKENHEIER: Well, Judge Miller, I will go
7 forward with this at a time when you prefer that I do it.

8 JUDGE MILLER: You may proceed.

9 BY MR. BIRKENHEIER: (Continuing)

10 Q Gentlemen, would you please summarize your
11 testimony?

12 A (Witness Bridenbaugh) I will summarize a part of
13 it and then Mr. Smith will summarize the other part of it.

14 In the course of our review of the proposed action,
15 we have evaluated LILCO's proposed AC emergency power systems
16 and have found that low power operation of Shoreham at up
17 to five percent power relying on the alternate AC system would
18 not be as safe as operation with fully qualified onsite
19 emergency power sources that satisfy all of the applicable
20 regulatory requirements.

21 This is true because neither the EMD diesel system
22 nor the 20 megawatt gas turbine are designed for compliance
23 with single failure and other important design criteria.
24 For example, the four EMD diesels have a number of common
25 critical components such as fuel supply, starting systems,
electrical distribution systems, which have the potential

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1 to disable the four unit system as a result of one of a --
2 of a numerous number of failure possibilities.

3 The 20 megawatt gas turbine, which is a single
4 active power generator, can obviously fail due to a number
5 of single failures. The 20 megawatt gas turbine, a unit
6 newly relocated to the Shoreham site, with its remote,
7 unmanned location, nearly nonexistent control and monitoring
8 devices in the main control room, and an inadequately developed
9 surveillance testing program, adds further to its unreliability.

10 The total alternate system being a more complex
11 array requiring numerous manual actions is more susceptible
12 to human failure than would be a qualified automated system.

13 Mr. Smith will summarize further some of the EMD
14 findings.

15 (Witness Smith) The areas that we are voicing
16 concern was the EMDs, their fire detection and suppression
17 system is just about nonexistent, only consists of local
18 hand-held extinguishers, and we think that the ability for
19 them to detect and/or people to suppress the fires are
20 minimal.

21 The starting battery which involves all four
22 machines, but is located in one machine, is a large battery
23 array, is an area of danger as far as explosion, in that
24 these, when being charged, do generate a large amount of
25 hydrogen and are not segregated in what we would consider a

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safe way.

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The alarms and monitoring of the EMDs is of a local nature and requires really somebody to be in attendance of the machines to be aware of how they are functioning, so the first thing really that will happen that will make control room operators aware is when one actually fails and they cease to still produce power.

And also the test procedure, the test procedure that is being put forward for regular testing of this machinery, and this machinery is old machinery, the test procedure is very limited in its scope. And we think there is cause for concern in this area to prove that these machines continually are in a fit state to serve the job they are intended.

Coming lastly to the maintenance histories, and from what we've seen and what we have been supplied with, the maintenance histories only go back so far. We find discrepancies in the maintenance histories, and also that the number of either component changes due to failure or wearing out well before the time they are expected to be worn out, is excessive.

I'm afraid that my company would sack me if I looked after a plant and had that many component failures. We feel there is an area of concern in this, in the number of components that are being used up by these, or have

#8-10-SueT

historically, been used up by these machines.

2 MR. BIRKENHEIER: Judge Miller, id this be
3 an appropriate time for me to proceed with a few additional
4 questions on direct?

5 JUDGE MILLER: You may.

6 DIRECT EXAMINATION

7 BY MR. BIRKENHEIER:

INDEXXXX 8 Q Mr. Eley, do diesel generators in marine applica-
9 tions differ significantly from diesel generators in land-
10 based applications?

11 A (Witness Eley) There are --

12 MR. ROLFE: Your Honor, I object to the question
13 on the grounds that the witness has already testified that
14 he has no experience with land-based diesel generators. So,
15 how can he answer the question by definition?

16 JUDGE MILLER: I think he has indicated some
17 knowledge. I'm not sure as to the extent of it. But that's
18 what the witness can tell us.

19 We are interested, since you are tendering wit-
20 nesses who have expertise in diesel generators --

21 WITNESS ELEY: If I might relate it to --

22 JUDGE MILLER: Wait a minute, to diesel generators
23 in marine application and aboard ship, as the gentleman said,
24 he would get sacked if certain things weren't -- what we are
25 curious is to see if there are some correlations and what are

#8-11-SueT1

2 the limitations on the correlation between your experience,
3 your knowledge as experts of marine applications to these
4 things and land-based.

5 You may tell us, describe it for me both ways,
6 if you will, please.

7 WITNESS ELEY: Judge, I have studied the EMD
8 instruction manuals and looked at the various systems in
9 those manuals, and I find that there are some differences
10 but of a nature which wouldn't affect the results as we
11 see them here.

12 To give you a for instance, there might be some
13 differences in the way a particular component is cooled on
14 board a ship. You have plenty of salt water available. On
15 a land-based generator, it may be cooled. There are dif-
16 ferences but of a very small nature.

17 The major components are very much of a similar
18 ilk. There are some differences in operation, in other
19 words from a vibration point of view, for instance. There
20 could be some excitation from the propulsion plant aboard
21 the vessel which would be somewhat different to a land-based
22 facility.

23 But basically the overall engine is somewhat
24 similar. It's like if you look through the EMD instruction
25 manuals they cite the differences between the two with
regard to the -- some of their requirements in the.e. There

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is not a great deal, no. Very similar.

2 JUDGE MILLER: What about the differences that
3 go beyond the examination of manuals or written materials?
4 What about differences, if any, from the mode or method of
5 operation and the environment at sea over a given period
6 of time and whatever differences it may be in the use at
7 a power plant? That kind of thing.

8 Do you have any information that would be helpful
9 to the Board in evaluating that?

10 WITNESS ELEY: I have looked at the test procedures
11 and things that have been put forward here. And I've got
12 no reason to believe that the procedures that we adopt on
13 board ships -- if I might just say, we are trying to
14 manufacture electrical power. That is the objective of
15 the exercise.

16 On board a ship, we do exactly the same thing.
17 We manufacture electrical power so that the -- all of the
18 machinery that we have on board has the capability of running.
19 It's exactly the same procedure. If I might go through the
20 procedure, what we would do, we would normally start the
21 generator somewhat similar to that, to the method of starting
22 here, maybe it's with a different medium. But we would start
23 it in a similar manner.

24 We would run the generator. We would check the
25 generators in a similar manner. We would put these machines

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2 on to the boards in a similar manner. We would run up the
3 speed, we would parallel them, we would synchronize them,
4 we would load share them.

5 In the event of black-out procedures, the black-
6 out procedure is somewhat similar. Your emergency
7 generators -- I think Mr. Smith has already gone into this.
8 The emergency generating procedure, all of a very similar
9 nature.

10 That's all I can say really. To me, the
11 operating procedures, the overall maintenance procedures
12 are very similar indeed.

13 BY MR. BIRKENHEIER: (Continuing)

14 Q Mr. Smith, are you familiar with any diesel
15 generators that are used in both marine and land-based
16 applications?

17 A (Witness Smith) Most diesel generators are used
18 in marine and land-based installations. The EMDs themselves
19 are used both as marine, prime movers in marine diesel
20 generators.

21 I would say most of the diesel generators I've
22 worked with are used. There are as many units working ashore
23 as there are working on board ship.

24 end #8
25 Joe flws

1 MR. BIRKENHEIER: I have no further questions at
2 this point, Judge Miller. I would, however like to move
3 the direct testimony of this panel into evidence at this
4 time, along with --

5 JUDGE MILLER: You have included all your exhibits
6 that are associated with it?

7 MR. BIRKENHEIER: Yes.

8 JUDGE MILLER: All right. You have nothing further
9 then with the panel in direct?

10 MR. BIRKENHEIER: That is correct.

11 JUDGE MILLER: I think this would be a convenient
12 point then to have a lunch recess until 1:30, and then we will
13 presume with -- I take it the panel is ready then for cross
14 examination?

15 MR. BIRKENHEIER: Yes.

16 JUDGE MILLER: We will take up cross examination
17 by opposing counsel when we come back at 1:30.

18 MR. BIRKENHEIER: Thank you.

19 (11:45 a.m.)

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AFTERNOON SESSION

22

(1:30 p.m.)

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JUDGE MILLER: I believe the panel is available
for cross examination. Does anybody care to cross examine?

25

MR. ROLFE: Yes, Your Honor.

1 I do have certain motions to strike some of the
2 testimony for these witnesses, but I will wait until after
3 cross examination is completed to bring those up.

4 JUDGE MILLER: All right.

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5 CROSS EXAMINATION

6 BY MR. ROLFE:

7 Q Mr. Eley, in your testimony you purport to address
8 whether operation of Shoreham at up to five percent power with
9 LILCO's proposed AC power sources would be as safe as operation
10 would be with the TDI diesel generators, is that right, sir?

11 A (Witness Eley) I was asked by my counsel to look
12 at the question of these generators running under a five
13 percent condition, but with regard to that of a reliable on-
14 site power source.

15 And in order to make those comparisions, we used
16 the FSAR.

17 Q And you compare, therefore, the LILCO power
18 sources with the TDI's as they were described in the FSAR,
19 is that right, sir?

20 A We used the FSAR, yes, in conjunction with my
21 colleagues here, who were more familiar with the FSAR
22 procedures. I had not met them before that time.

23 Q Well, did you participate in the purported
24 evaluation of whether the power sources at Shoreham and
25 proposed to be used in the low power testing are, and I

1 quote from your testimony, 'as safe as,' the originally
2 proposed onsite AC power system?

3 A Yes, I participated.

4 Q And that is your testimony, is it not?

5 A Yes, it is.

6 Q Now, in performing this evaluation of whether the
7 power configuration proposed by LILCO is as safe as that
8 originally proposed in the FSAR, did you consider at all the
9 availability of black start deadline gas turbines at Holtsville,
10 Southold, Easthampton, and Port Jefferson?

11 A The gas turbines that were considered was the gas
12 turbine that is fitted at Shoreham, and I do believe that they
13 have an either/or function. You cannot use -- if I am
14 incorrect here, my colleagues will correct this -- but I do
15 believe that you cannot use both the gas turbine and the EMD
16 together with one another, so we did consider the gas turbine
17 and the EMD.

18 Q Well, what do you mean you can't use the gas
19 turbine and EMD together?

20 A (Witness Minor) When he is finished, I would
21 like to add something to that, if I may.

22 Q You will get a chance on redirect, Mr. Minor.

23 A (Witness Eley) I do believe that in the test
24 procedures, in order to utilize the EMDs, then the gas turbine
25 is isolated prior to the use of the EMDs. And I wasn't sure

1 that there is any facility to parallel both sites of equipment
2 with one another.

3 Q Is that for testing purposes, or do you believe
4 that in an emergency situation both the EMDs and the 20 megawatt
5 gas turbine could not both start at the same time?

6 A I didn't say that they both could not start at the
7 same time.

8 Q What do you mean? They both can't be used at the
9 same time?

10 A Yes.

11 Q There wouldn't be any need to have both of them
12 providing power at the same time to the same loads would there,
13 Mr. Eley?

14 MR. BIRKENHEIER: Judge Miller, I believe Mr.
15 Minor earlier expressed that he wanted to add something to
16 the answer that Mr. Eley had given, and that he was not
17 given a chance to give an answer. I ask that he be given
18 that chance now.

19 JUDGE MILLER: I don't recall that. Who are you
20 talking about?

21 MR. BIRKENHEIER: Mr. Eley had previously indicated
22 that he would like Mr. Minor to correct -- Mr. Minor at
23 that point had expressed that he wanted to add something
24 to the answer.

25 JUDGE MILLER: That may well be, but neither

1 one of them is a cross examiner. But you people cross examine
2 as you focus, and they can do the same thing. They don't have
3 to accept the wishes of any witness in cross examination.

4 They may, but they are not required to.

5 Go ahead.

6 BY MR. ROLFE: (Continuing)

7 Q Now, Mr. Eley, you are aware, are you not, that
8 in the event that power was lost at Shoreham and had to be
9 restored, LILCO has deadline black start gas turbines at
10 Holtsville, Southhold, Easthampton and Port Jefferson which
11 would be capable of providing that power to Shoreham?

12 A (Witness Eley) I am aware that there is a gas
13 turbine in the plant that is being supplied there as an offsite
14 power source, which is mounted onsite.

15 I also know that there are various offsite power
16 sources which supply from an offsite power source, but the
17 actual positioning of that offsite power I know not.

18 Q So, in considering whether operation of the plant
19 at five percent power is as safe as it would have been with
20 the originally proposed onsite AC power system, you don't
21 take into consideration those gas turbines at all, do you, sir?

22 A I know that there is an offsite power source that
23 can supply to the plant. I also know that there is an onsite
24 gas turbine which can supply power to the plant. That is
25 the limit of my knowledge.

1 Q So, the answer to my question was that I was
2 correct. You did not consider any of those offsite black start
3 deadline gas turbines in your analysis of whether operation
4 of the plant as proposed by LILCO would be as safe as
5 operation would have been with the originally proposed onsite
6 AC power system?

7 A I am in areas where compare the EMDs with the
8 FSAR, as written.

9 Q So that is all you did. You just looked at the
10 EMDs and compared the EMDs with the originally proposed TDI
11 diesel generators, is that right, sir?

12 MR. BIRKENHEIER: Just a point of clarification.
13 Is this question limited to Mr. Eley?

14 MR. ROLFE: Yes.

15 MR. BIRKENHEIER: Because it is a jointly sponsored
16 answer.

17 WITNESS ELEY: Yes. We made a comparison between
18 the EMDs and the FSAR, and that -- I did this in conjunction
19 with my colleagues here, Mr. Minor and Mr. Bridenbaugh. They
20 -- it was a combined effort. They explained various procedures
21 that were adopted.

22 BY MR. ROLFE: (Continuing)

23 Q Do you understand your testimony, Mr. Eley?

24 A (Witness Eley) Sorry?

25 Q Do you understand your testimony?

A Yes.

1 Q So you are prepared to discuss it?

2 A Yes, I am.

3 Q Now, is it true that you also did not make any
4 comparison of the integrated sources -- strike that. Isn't
5 it true that in performing your analysis, and arriving at
6 your conclusion with respect to whether the proposed power
7 sources now available at Shoreham would be as safe as the
8 originally proposed onsite AC power system, you did not
9 consider the 20 megawatt gas turbine at Shoreham and the EMDs
10 at Shoreham together.

11 MR. BIRKENHEIER: Might we please have a
12 citation of the portion of the testimony that you are
13 referring to?

14 MR. ROLFE: Certainly. At pages 5 and 6 of the
15 prefiled testimony . It says: In particular, this testimony
16 addresses the reliability of the EMDs and gas turbine starting
17 and running, and their overall availability compared with
18 a fully qualified onsite emergency AC power system for purposes
19 of this evaluation. This testimony compares the EMDs and 20
20 megawatt gas turbine to LILCO's originally proposed onsite
21 AC power system (the three diesels procured from Transamerica
22 Delaval, Inc) as it was envisioned by the FSAR.

23 WITNESS ELEY: My knowledge of the gas turbine,
24 which is limited, and my areas in the combined effort were
25 mainly addressed to the generators as compared with the

1 generators as given on the FSAR.

2 Q Now, Mr. Eley, if you will look at page 7 of
3 your testimony, you see the first question? It says: What
4 is your conclusion?

5 And you go on to state that your conclusion is
6 that low power operation of the Shoreham plant at up to five
7 percent power, relying on LILCO's proposed alternate AC
8 power system, would not be as safe as such operation with
9 onsite emergency AC power sources that were fully qualified
10 and satisfied all applicable regulatory requirements.

11 Do you see that, sir?

12 A Yes, I do.

13 Q In fact, you didn't compare the entire AC power
14 system proposed by LILCO with the power system that would
15 have been available had an onsite emergency AC power source
16 as described in the FSAR been available, isn't that right,
17 sir?

18 MR. BIRKENHEIER: Again, is this question just
19 directed to Mr. Eley personally as opposed to the rest of
20 the panel?

21 MR. ROLFE: To Mr. Eley. To Mr. Eley's testimony
22 along with everyone else's.

23 MR. BIRKENHEIER: Well, it is everybody else's
24 testimony.

25 JUDGE MILLER: Well, let's not quibble. We are

1 not getting consensus testimony. We are not getting consensus
2 cross examination. Any examiner has the right to ask of any
3 witness, or group of witnesses, the state of his knowledge and
4 the state of his testimony, and the witness can tell us what
5 it is, or what it isn't. You have a right to cross examine
6 each and every witness, or not any, but that is the option
7 of the examiner.

8 When it says our conclusions, it didn't say
9 except for X, Y, or Z witness. It said ours, so each of
10 you may be interrogated if that be the purpose of the cross
11 examination.

12 Proceed.

13 WITNESS ELEY: I was aware that it says here
14 LILCO's proposed alternate AC power system. I was aware that
15 the gas turbine did supply power. I was aware having
16 discussed this with colleagues, that this could be used in
17 an either/or situation. That is my understanding of how the
18 gas turbine power would be applied in this regard.

19 BY MR. ROLFE: (Continuing)

20 Q Yes, sir; but in arriving at your conclusion,
21 isn't it true that what you did was you looked at the EMDs
22 in isolation and compared them with the originally proposed
23 TDIs, and then Messrs. Minor and Bridenbaugh looked at the
24 20 megawatt gas turbine in isolation, and compared it with
25 the originally proposed TDIs, but no where did you put those

1 two power sources together, and looked at the combined
2 availability of the EMD diesels and the 20 megawatt gas
3 turbine as well as all the offsite sources and compare that
4 as a system?

5 MR. BIRKENHEIER: Objection, Your Honor. Asked
6 and answered.

7 JUDGE MILLER: Don't think so. I haven't heard
8 a clear cut answer to that yet. You may answer.

9 WITNESS ELEY: That discussion took place on
10 that issue with regard to whether both could be parallel
11 with one another. And yes, they did look at the gas turbine
12 and yes, we did look at the EMD, and then a combined effort
13 between the two of us -- or the four of us -- that kind of
14 combined effort gave us the facts that I presented to you,
15 that it was an either/or situation as we understand it.

16 You can either use the gas turbine. In fact,
17 it says in your -- in some of the procedures that before the
18 EMD is to be used, the gas turbine is to be isolated.

19 BY MR. ROLFE: (Continuing)

20 Q Do you understand, Mr. Eley, that in the event
21 of a loss of power, both the EMDs and gas turbine would start
22 automatically?

23 A (Witness Eley) Yes, I do.

24 Q And do you understand then that either upon
25 starting would be available for use to supply plant emergency

1 loads?

2 A I do know that either of those facilities can
3 supply the power, yes.

4 Q Well, then, would you explain to me what you
5 mean by it being an, 'either/or' situation in terms of not
6 looking at the availability of the EMDs and the gas turbine
7 at the same time?

8 A Greg Minor explained to me that both systems
9 could not be parallel with one another. In other words, both
10 could not supply power at the same time.

11 Q Well, do you understand, Mr. Eley, that if power
12 were needed to supply the emergency loads at low power testing
13 up to five percent of rated power, you wouldn't need the
14 combined power of both the 20 megawatt gas turbine and the
15 EMD diesels?

16 A That is right. What we were comparing, remember
17 -- we were comparing those systems with the individual systems
18 of the -- mentioned in the FSAR. In other words, each one of
19 the three generators could supply power to the system on its
20 own.

21 Q Yes, sir, so that each one of the three generators
22 would act independently, is that right, sir?

23 A That is right.

24 Q Now, for example, when you made certain assertions
25 in your testimony about not meeting the single failure

1 criteria, in reaching those conclusions you were not looking
2 at a combined system which included both the EMDs and the
3 20 megawatt gas turbine, were you, sir?

4 MR. BIRKENHEIER: Mr. Rolfe, could you please
5 direct the witness to the statements you are referring to?

6 JUDGE MILLER: He does, you know, have a right
7 to test the witness' recollection, too. If that is what
8 he is doing, he wouldn't have to point to it, so I am going
9 to leave that one to the cross examiner. He has a choice
10 on that question.

11 WITNESS ELEY: I wonder if you could point
12 me to the relevations.

13 BY MR. ROLFE: (Continuing)

14 Q Do you remember, sir, that in your testimony you
15 do make certain assertions that the single failure criterion
16 is not met?

17 A (Witness Eley) Yes, I do.

18 Q Okay. I am not --

19 JUDGE MILLER: If it will help the witness --

20 WITNESS ELEY: I wonder if you could address me
21 to that.

22 BY MR. ROLFE: (Continuing)

23 Q Well, I am not referring to any particular one
24 of those assertions. I just want to now understand the
25 ground rules here. When you reached those conclusions about

1 whether the single failure criterion was met, did you consider
2 the EMDs and the 20 megawatt gas turbine, together as an
3 integrated -- as an electrical system which was available
4 to supply AC power, or did you consider the EMDs by themselves,
5 and apply the single failure criterion to them alone, and
6 consider the gas turbine by itself, and apply a single failure
7 criterion to it alone?

8 MR. BIRKENHEIER: Objection, Your Honor. I believe
9 this has been asked and answered.

10 JUDGE MILLER: I don't believe so. Have you answered
11 this before, Mr. Witness?

12 WITNESS ELEY: I applied the single failure
13 criteria to the EMDs and in conjunction with it, Greg Minor,
14 as I said before, Greg and Dale --

15 JUDGE MILLER: You weren't asked about Greg and
16 Dale. Now, you were asked a certain specific question. I
17 don't think you have answered, although your counsel seems to
18 think so. You are being asked on your own now. If you don't
19 know, it is alright to say so. We are not requiring you to
20 know what you don't know, but make it clear, please.

21 MR. BIRKENHEIER: Judge Miller, the witness has
22 stated previously that his work involved EMDs, and that
23 was the --

24 JUDGE MILLER: Now look. He doesn't recall giving
25 it, and I don't either. Don't tell me what he may have said

1 in a manner which might unfairly refresh his memory. Let's
2 have the witness answer queries, and without any coercion.
3 Just tell it --

4 WITNESS ELEY: My recollections of the moment
5 of the single failure criteria in my testimony referred to
6 the single failure criteria of the EMDs.

7 BY MR. ROLFE: (Continuing)

8 Q Now, Mr. Eley, you were talking a moment ago
9 about paralleling and the fact that the 20 megawatt gas
10 turbine and the EMDs can't parallel. Isn't it a fact that
11 the three TDI diesel generators also do not parallel?

12 A (Witness Eley) That is correct, but each one
13 of them has a separate boost system.

14 Again, Mr. Minor is fully familiar with the
15 electrical side of the business.

16 JUDGE MILLER: Please now, you have done this
17 three times, and I have tried to tell you. You are required
18 to testify. Now, if there is something you don't know, or
19 you are relying on someone else, just say so. That is all
20 right. There is nothing wrong with it, but don't keep telling
21 us that your brother and --

22 WITNESS ELEY: It was discussed between a lot
23 of us, and the efforts on the electrical side were directed
24 towards Mr. Minor and Mr. Bridenbaugh.

25 JUDGE MILLER: What do you know about it? Suppose

1 they hadn't been there, and suppose they are not here now.

2 What do you know about it, if anything?

3 WITNESS ELEY: Okay. I know that the -- I have
4 gone over the starting ability of each EMD, and the control
5 section of EMD. I have gone over the supply lines, again,
6 with my colleagues, on the actual electrical supply to the
7 boosts, and I have reviewed the procedures that have been
8 adopted with regard to putting this plant on line.

9 BY MR. ROLFE: (Continuing)

10 Q Let me ask the rest of the panel.

11 JUDGE MILLER: Who are you asking now. Make it
12 clear.

13 BY MR. ROLFE: (Continuing)

14 Q I will ask anyone that wants to answer this one,
15 Judge Miller. Did any of you in expressing or arriving at
16 these opinions about the applicability of the single failure
17 criterion, consider the EMDs and the 20 megawatt gas turbine
18 as a combined system to provide electrical -- AC electrical
19 power to Shoreham in the event it is needed?

20 End 9.
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Sim 10-1 1

2 A Yes, and I would like to explain that, if I
could.

3 Q I believe you have answered my question.

4 A And I would like to explain it, if I could.

5 Q I would appreciate if you would wait until
6 redirect and let me ask the questions.

7 Mr. Eley, if you would turn to page 10 of your
8 testimony, please. You were asked to describe certain
9 common features shared by the EMDs that render them
10 susceptible to single failures, and I believe the first one
11 that you describe is a single electrical output circuit from
12 the EMD control cubicle.

13 A (Witness Eley) Yes.

14 Q Would a failure of that electrical output circuit
15 from the EMD control cubicle cause the 20 megawatt gas
16 turbine to be unable to supply AC power to the plant?

17 A No.

18 Q Now in No. 2 of that question you talk about
19 a single starter system.

20 JUDGE MILLER: I am sorry. I must have missed
21 that. Did you ask a question?

22 MR. ROLFE: Yes, Your Honor.

23 JUDGE MILLER: What was the answer?

24 MR. ROLFE: The answer was no. The question

25 was ---

Sim 10-2 1

JUDGE MILLER: No, I heard the question, but I didn't hear the response. Thank you. Go ahead.

MR. ROLFE: Okay.

BY MR. ROLFE:

Q In No. 2 in that answer is a single starter system consisting of one battery array, one battery charger and one starter control mechanism. Is there anything about the starter system of the EMDs that would have any effect on the ability of 20 megawatt gas turbine to start?

A (Witness Eley) No.

Q Do you agree with that, too, Mr. Minor?

A (Witness Minor) The two are related in the systems analysis. You cannot ignore ---

Q No, sir. My question went to the starting system.

A That is what I am saying. The two are related in the systems analysis and you cannot ignore their interrelationship. You are asking only if the battery shorts out, for instance, on the EMDs, does that keep you from starting the gas turbine. No, it does not. In the system level you have to consider the two together.

MR. EARLEY: Mr. Minor, is it true that even if the EMD set were to fail, that that would have no effect on the ability of the 20 megawatt gas turbine to start and power the necessary emergency plant systems?

Sim 10-3

1 A In general that is true. But if you are going
2 to rely on your EMDs, it is because your gas turbine has
3 failed to provide the power you would like to provide. So
4 the two are related and you cannot ignore that inter-
5 relationship.

6 Q Well, are you saying that you won't rely on the
7 EMDs until the 20 megawatt has failed to start because
8 the 20 megawatt would get power to the plant in three minutes,
9 whereas the EMDs might take a little longer?

10 A Based on the procedures, the procedures call for
11 trying to bring loads in from the gas turbine first.

12 Q But the operation of one of those power sources,
13 in other words, the operation of the EMDs does not affect
14 the operation of the 20 metawatt gas turbine, does it,
15 Mr. Minor?

16 A I think I stated earlier they are not directly
17 related, but you have to consider them at a system level
18 because you are basically dealing with a single failure
19 from a gas turbine and a four-unit diesel system which has
20 single failure characteristics which are not favorable, and
21 you are comparing those to three TDI diesels.

22 So you have to consider the interrelationships
23 between the two alternate pieces of equipment that you are
24 looking at, and some of those interrelationships deal with
25 their single failure points.

Sim 10-4

1 Q Well, Mr. Minor, isn't it true that you could
2 have a single failure in the 20 megawatt gas turbine and
3 you would still have the EMD diesels available to supply
4 power to the plant?

5 A Provided the failure in the gas turbine was not
6 a consequence of the similar event that caused the failure
7 in the EMD such as, for instance, an earthquake.

8 Q Well, let's talk about the earthquake for a
9 minute. In an earthquake the only testimony here has been
10 that the plant would have 30 days to restore AC power;
11 is that right?

12 A Say that again. The only testimony here, is that
13 what your statement was?

14 Q I withdraw that question. It was kind of
15 confusing.

16 Gentlemen, if you would turn, please, to page
17 11 of your testimony.

18 Now, Mr. Eley, here you are talking about a
19 single output line on the EMD diesel generator; is that
20 right, sir?

21 A (Witness Eley) Yes, these are the ones that
22 are referred to in the FSAR. Yes.

23 Q And you compare the single output line for the
24 EMDs with the output lines for the originally proposed TDI
25 diesels; is that right, sir?

Sim 10-5 1

A Yes.

2 Q And you go on on page 12 to conclude that the
3 EMDs are less reliable because a single failure in the
4 output line would make all four of the EMDs unable to
5 supply emergency AC power; is that right?

6 A That is correct.

7 Q All right. Now, Mr. Eley, I think we have
8 already established, have we not, that a failure in that
9 output line from the EMDs would have no effect on the output
10 line from the 20 megawatt gas turbine; is that right, sir?

11 A Yes.

12 Q And isn't it also true, Mr. Eley, that there
13 hasn't been any failure on the output line for these
14 machines?

15 A Could you repeat that question, please?

16 Q Isn't it true that there has not been any failure
17 on the output line from these machines?

18 A The output line from which machines?

19 Q From the EMDs, excuse me.

20 A I don't know whether there has been any failure
21 or not.

22 Q Isn't it also true, Mr. Eley, that the staff
23 in its supplemental evaluation report has required that
24 LILCO have available an alternate routing of AC power
25 from the EMD diesels around the normal switchgear rooms

Sim 10-6

1 so that there will be an alternate feed from the EMD
2 diesles?

3 A I believe that has been proposed, yes, but I
4 don't know of the details of that.

5 Q Well, you have heard testimony to that effect
6 in this proceeding from LILCO that such an alternate routing
7 will be available, have you not, sir?

8 A No.

9 JUDGE MILLER: Have you heard testimony or has
10 LILCO put it on, or have you not heard testimony on this
11 particular point? I am not sure, Mr. Eley.

12 WITNESS ELEY: I have discussed with colleagues
13 yet again that there is going to be some kind of additional
14 supply line put in there. Its routing or the extent of
15 it or what its function will be, I know not.

16 JUDGE MILLER: And you are not acquainted with
17 the testimony put on by LILCO, the utility here then?

18 WITNESS ELEY: No, I am not.

19 BY MR. ROLFE:

20 Q Now, Mr. Eley, your testimony next beginning
21 on page 12 starts focusing upon the so-called common starting
22 system for the EMDs; is that correct, sir?

23 A (Witness Eley) That is correct.

24 Q Now isn't it a fact, Mr. Eley, that each of these
25 EMDs has its own separate starting motors, and in fact

Sim 10-7

1 each one has two starting motors?

2 A That is correct.

3 Q And isn't it further a fact, Mr. Eley, that
4 only one of the EMDs is needed to supply the power to start
5 and maintain the emergency systems to mitigate postulated
6 accidents?

7 A That is correct.

8 Q And isn't it also a fact that the only common
9 mode of failure in the EMDs is the battery?

10 A No.

11 Q Well, what others are there, sir?

12 A Okay. If there were any problems in the battery,
13 you would have problems with starting the whole bank of four
14 machines. Also, in the electrical equipment like we will
15 take one, for instance, the stepping switch, if there was
16 a fault in the stepping switch, then that would also be
17 problematic to all four machines or this single point failure
18 there also.

19 Q Well, Mr. Eley, isn't it true that each of
20 these machines can be started manually?

21 A Yes, they can.

22 Q And if each one were started manually, then one
23 could in fact override this stepping switch; is that not
24 right, sir?

25 A You would still need an electrical supply to

Sim 10-8 1

start the system.

2 Q Yes, sir. Well, then we are back to the battery
3 which was the one I asked about originally. But you would
4 not need the stepping switch, would you?

5 A I would have to look at the system yet again
6 to see how the manual system started.

7 Q You don't know that now?

8 A I don't recollect offhand.

9 Q Do you know, Mr. Eley, whether there have been
10 any failures of the battery on these EMDs?

11 A I don't know of any.

12 Q Do you know even whether there have been any
13 failures on the batteries on any EMDs in use at either a
14 commercial or nuclear application?

15 A I don't know.

16 Q Similarly with respect to the battery charger,
17 which is another item you address in your testimony,
18 Mr. Eley, isn't it a fact that the battery charger on these
19 EMDs at Shoreham has never failed?

20 A I don't know.

21 Q Do you know whether there have been any reports
22 of failures of battery charters on EMDs used at other
23 nuclear plants?

24 A No.

25 Q Mr. Eley, isn't it a fact that the starter

Sim 10-9

1 control mechanism on these EMDs has never failed to function
2 properly?

3 A I don't know.

4 Q Do you know the answer to that, Mr. Smith?

5 A (Witness Smith) Whether the starter to start
6 a system up on these EMDs has ever failed?

7 Q Yes.

8 A Well, there is some uncertainty about the history
9 of these EMDs when we were going over the records earlier
10 on this week. There are several areas where we found there
11 are discrepancies in the history. So we have no idea of
12 the full history of these machines. So it is quite possible
13 there has been failure, but it is just not recorded.

14 Q You don't know one way or the other?

15 A No.

16 A (Witness Eley) There have been changes of the
17 starters themselves. So if one changes the starters, one
18 would assume that there have been some problems with starting.

19 MR. ROLFE: Your Honor, may I have one moment,
20 please.

21 (Pause.)

22 BY MR. ROLFE:

23 Q Mr. Eley, isn't it true that the starters could
24 have been changed on those machines merely because of the
25 age of the starters or in maintenance and it does not

Sim 10-11

1 necessarily indicate a failure of the starter just because
2 the starters have been changed?

3 A (Witness Eley) If you look at the overhaul and
4 maintenance procedures which are given in the EMD instruction
5 manual, if my memory serves me correctly, I think the hours
6 involved before one needs to inspect the starter is 16,000.
7 I do believe that these starter motors changed in somewhat
8 less than those hours. If my memory serves me correctly,
9 I think it was just a question of looking at the various
10 parts of the starter and a change of brushes I think was the
11 reference that was made in the manual.

12 Q Now, Mr. Eley, you would agree, would you not,
13 that a failure in the EMD starting system has no effect on
14 the 20 megawatt gas turbine?

15 A I agree, yes.

16 JUDGE MILLER: I didn't hear you.

17 WITNESS ELEY: I agree, yes.

18 JUDGE MILLER: Thank you.

19 BY MR. ROLFE:

20 Q And would you also agree, Mr. Eley, that when
21 one compares the starting reliability of the EMDs at
22 Shoreham, even if we account for 275 out of 279 starts, that
23 the starting reliability is just as good as the industry-wide
24 figures for nuclear qualified diesels?

25 A The starting reliability to me is only factor.

Sim 10-12 1

2 One needs to consider running reliability in conjunction with
3 the starting reliability. Just because you start an engine
4 doesn't mean that it is going to run reliably for the rest
5 of its periods.

6 Q Yes, sir, but all I ask you about right now is
7 starting reliability. Do you agree that the starting
8 reliability for these EMDs at Shoreham has been as good
9 or better than the industry starting reliability for nuclear
10 qualified diesels?

11 A I wouldn't care to comment on that. I don't
12 know.

13 Q You don't know?

14 A No.

15 Q Do you know that, Mr. Smith?

16 A (Witness Smith) These figures you are quoting,
17 I think they are only taken over the last couple of years,
18 aren't they, and these machines have only run about an
19 average of 150 to 200 hours over the last couple of years.
20 So they are not really relative to the overall life of these
21 machines and we have no records of their starting reliability
22 going back to 1960, or whenever it was that they were built.

23 Q Do you know how many hours in fact these machines
24 have run over the period of time when that starting
25 reliability record was built up?

A I don't think we have got it on here, but I

Sim 10-13₁

know it is only a couple of hundred hours.

2 Q Where did you learn that information, sir?

3 A If you look at the logs books that we were
4 referring to the other day, you can go back and look at the
5 period of time that those figures were made and you can
6 get to within a couple of hours how many hours the machines
7 have run.

8 Q But you are not familiar, are you, sir, with the
9 starting reliability of diesels at nuclear plants in the
10 industry?

11 A Say that again?

12 Q I said are you familiar with the reliability
13 figures industry-wide for nuclear qualified onsite diesel
14 generators?

15 A I don't know what the average is for them across
16 the industry.

17 Q Well, you will agree that the starting figures
18 for these diesels, regardless of how many hours they run,
19 shows that they have been started at least 279 times or
20 they have been attempted to be started at least 279 times
21 over that period; is that right?

22 A Yes, that is correct.

23 Q And can you compare that, sir, with the number
24 of times that an onsite qualified diesel generator at a
25 nuclear plant would be started in the course of, let's say,

Sim 10-14 1

a three-year period? .

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A I am just trying to add it up in my head the

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requirements for the three years. I am not sure of the

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number of times you would start the qualified diesel in

end Sim 5

three years. I would have to work it out.

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#11-1SueT1

1 Q Now, if you would please turn to Page 17 of your
2 testimony, and here you are discussing the fuel supply
3 system of the EMDs.

4 It is correct, is it not, Mr. Smith that each
5 EMD diesel has its own separate 130-gallon day tank?

6 A (Witness Smith) That is correct.

7 Q And that those day tanks can be filled while the
8 machines are not in operation?

9 A That's correct.

10 Q Now, is it true, Mr. Smith, that the equalizer
11 line connecting those day tanks has a blocked valve which
12 can be operated manually?

13 A A block valve whereabouts?

14 Q In the equalizer line?

15 A A block valve?

16 Q Yes, sir, for each of the day tanks?

17 A Yes.

18 Q So that if there were a rupture in any of the day
19 tanks supplying the EMDs that tank could be isolated so that
20 that rupture wouldn't affect the other day tanks; is that
21 right, sir?

22 A If somebody had seen the rupture, yes, and was
23 aware of it.

24 Q Now, you also talk about the potential failure
25 of the fuel line and the hose connecting the tanker to the

#11-2-SueT1

2 EMDs, and one of the points you make is that hose is susceptible
3 to construction in the area.

4 Are you aware of the testimony which Mr. Gunther
5 gave at the beginning of last week that the security area
6 has been changed so that all the construction is now outside
7 the fence and not around the EMDs?

8 A No, I wasn't aware of it.

9 Q Were you also -- strike that.

10 Isn't it true, Mr. Smith, that even if there were
11 a rupture in the fuel line feeding the EMDs that the EMD
12 diesels could be filled through an alternate fill on the
13 402 machine?

14 A That is again correct, but the -- he would still
15 have to be aware that the rupture has happened before you
16 can use the alternate. On a dark night in that area, you
17 could get to the point of where you get to fuel starvation
18 before anybody realizes that something is wrong.

19 (Witness Eley) I would just like to say also
20 that in the equalizing line, if a failure occurred between --
21 in the line itself, before the isolating valve, then that
22 will be a communal failure in all four machines.

23 Q Are you aware, Mr. Eley, or Mr. Smith, how often
24 that area is patrolled at night, or whether it's lighted so
25 that someone would be able to see a rupture in the fuel line?

A (Witness Smith) I don't -- I'm not aware that the

#11-3-SueT 1

2 lighting there still exists when we are in a black-out
3 situation. I know that -- I'm aware of where the EMDs
4 are located, the ground that they are on would absorb a
5 large amount of fuel before anybody was aware of it. If
6 they were on a concrete pad, I admit that it would be very
7 obvious. But on the crushed rock, it would all disappear.

8 Q Isn't it true, Mr. Smith, that with respect to
9 the lighting, for example, that the lighting is powered by
10 an inverter which is powered by a DC source of electricity?

11 A I thought that was only for the emergency light-
12 ing inside. I didn't think it went for the outside light-
13 ing. And actually when we were on our 2nd of July site
14 visit, this question of emergency lighting outside was
15 brought up, and we were told that there was no emergency
16 lighting outside the building.

17 Q You don't know one way or the other?

18 A I don't -- well, I can only go on the information
19 that we were told by people from the plant.

20 Q Are you aware of LILCO's plans to bury that fuel
21 line?

22 A I gather there have been some proposals to bury
23 it, but I think that's as far as it got.

24 Q And if the line were buried, then that would
25 remove the concern about any missile hitting the fuel line,
would it not, sir?

#11-4-SueT1

2 A It would remove any problem about a missile
3 hitting the buried section of the line, but you still have
4 the line coming above the surface at a point, and you still
5 have the flexible connection.

6 Q Now, it's true, is it not, Mr. Smith, that the
7 fuel supply for the EMDs would have no affect on the
8 operation of the 20 megawatt gas turbine?

9 A As mentioned before, the only effect it would
10 have is that in the event of a black-out we are isolating
11 the gas turbine when we commit ourselves to the EMDs. If
12 there has been a leakage in the fuel supply and we've lost
13 most of the fuel to the EMDs, and we are halfway through
14 the procedures to connect up the EMDs, which is isolating
15 the gas turbine, yes, it will affect the gas turbine.

16 Q It wouldn't affect the starting of the gas
17 turbine would it, sir?

18 A No, I can't see how it would directly affect
19 the starting of the gas turbine.

20 Q And it would not directly affect the operation
21 of the gas turbine, would it?

22 A Only as I've just said, that in the operation is
23 if you committed to use the EMDs and you isolated the gas
24 turbine, yes, that would affect it.

25 Q Well, in fact, Mr. Smith, if we were to apply
26 this single failure criterion to the EMDs and the 20 megawatt

#11-5-SueT 1

2 gas turbine together, and assuming that we wouldn't even be
3 using the EMDs unless the 20 megawatt gas turbine had failed
4 to start, then under the traditional analysis applied we
5 would not have to postulate a fuel line failure or a fuel
6 system failure in the EMDs, isn't that right, sir?

7 MR. BIRKENHEIER: Mr. Rolfe, I'm not sure that
8 I understand that question. Could you repeat it for me,
9 please?

10 MR. ROLFE: Certainly.

11 BY MR. ROLFE: (Continuing)

12 Q Mr. Smith, I believe that in your testimony, one
13 of the reasons that you have postulated that the single
14 failure criterion for LILCO's proposed AC power system is
15 not met is because of a possible fuel line failure; is that
16 right?

17 A That's correct.

18 Q Now, under the traditional single failure criterion,
19 if we have already postulated one single failure, and in this
20 instance since the EMDs would only be used after the 20
21 megawatt gas turbine, in order for us to be using the EMDs at
22 any particular time we would have to postulate that the 20
23 megawatt gas turbine had failed; isn't that right?

24 A Yes.

25 Q Well, you are aware that the plans call for the
26 20 megawatt gas turbine to provide power to the site within

#11-6-SueT 1

two to three minutes I believe; is that right?

2 A Yeah, I think it's three minutes.

3 Q And you are also aware that the procedures call
4 for the EMDs to provide power to emergency systems within
5 fifteen minutes; is that right?

6 A There are various figures they've given for what
7 the EMDs are meant to comply with.

8 Q Well, you will agree with me, won't you, that the
9 EMDs take a little bit longer than the 20 megawatt gas
10 turbine to get power to emergency loads?

11 A Yes, because of the manual procedures required
12 which is an uncertain length of time.

13 Q And it's further true, is it not, that both --
14 in the event of a loss of offsite power, both the 20 megawatt
15 gas turbine and the EMDs would start automatically; is that
16 right?

17 A They should, yes.

18 Q And if both operated the way they should, then
19 LILCO would use the 20 megawatt gas turbine to actually
20 supply the emergency load since it would provide power more
21 quickly; is that right?

22 A Yeah, and they still have a decision to make of
23 which one they are going to choose.

24 Q Do you agree that under normal circumstances
25 they would use the 20 megawatt since it would be up and

#11-7-SueT

running and available more quickly than the EMDs?

2 MR. BIRKENHEIER: I object to the question. I
3 believe it's calling for speculation on the part of the
4 witness about LILCO's intention for the use of its equip-
5 ment.

6 JUDGE MILLER: I don't think that's speculative.
7 A standard practice is being asked about. If he doesn't
8 know he can say so, but I believe the witness has indicated
9 that he is knowledgable.

10 You may answer.

11 WITNESS SMITH: I wouldn't know. I would assume
12 they would go for the first one they got.

13 BY MR. ROLFE: (Continuing)

14 Q Now, let's go back to the single failure criteria.
15 If we postulate that the 20 megawatt gas turbine has failed
16 and is not available, then the single failure criterion
17 would not require us to postulate a failure in the fuel
18 system of the EMDs; is that right?

19 MR. BIRKENHEIER: Mr. Rolfe, are you asking for
20 an interpretation of the regulation and its requirements?

21 MR. ROLFE: Judge Miller, I'm asking the witness
22 for his understanding. It's his testimony that the single
23 failure criterion --

24 JUDGE MILLER: The witness may be asked about
25 his understanding and explain it if he deems it necessary.

#11-8-SueT 1

2 WITNESS SMITH: Okay. Can you repeat that, Mr.
3 Rolfe, please?

4 BY MR. ROLFE: (Continuing)

5 Q Certainly. If we apply the single failure
6 criterion, as you purport to do in your testimony, isn't it
7 true that if we postulate a failure of the 20 megawatt
8 gas turbine that we don't have to postulate a failure in
9 the fuel system of the EMD diesels, because that would be
10 a double failure?

11 A If you take the two of them as a whole system,
12 yes.

13 Q Well, isn't that what LILCO proposes, sir, to
14 take the two of them in addition to all the other offsite
15 sources as a whole system?

16 A Yes.

17 Q All right. Now, Mr. Smith, if you would look at
18 Page 20 of your testimony, at the top of the page, you
19 talk about the reliability of the EMDs being affected by
20 the location of breakers.

21 Which breakers are you referring to, sir?

22 A The four individual breakers which connect the
23 separate EMDs on to the EMD bus.

24 Q And, again a failure of those breaks would not
25 have any effect on the ability of the 20 megawatt gas
turbine to provide power to emergency loads at the plant;

#11-9-SueT 1

isn't that right?

2 A Only in the ways that we stated before.

3 Q Can you explain to me what ways?

4 A Again, that is -- we keep going backwards and
5 forward on this. The failure would affect to the gas
6 turbine if the choice had been to go for the EMDs and they
7 suddenly find there is a failure there, of having to go
8 back to the gas turbine.

9 Q Well, unless you are postulating a double failure,
10 and that is one in the breakers and one in the gas turbine
11 then there is no reason that if the breakers fail you
12 couldn't go back to the gas turbine and get power; is that
13 right?

14 A Well, it's unlikely they would go back to the
15 gas turbine because if it wasn't running first it would
16 have failed.

17 Q Well, in that case you have already postulated
18 one failure and you are postulating a second failure;
19 is that right, sir?

20 MR. BIRKENHEIER: Mr. Rolfe, what sort of
21 failure are you talking about here?

22 MR. ROLFE: The failure --

23 JUDGE MILLER: No, wait a minute. This is not
24 a colloquoy. Do you object?

25 MR. BIRKENHEIER: Yes. I object to the question

#11-10-Sue

1 as I believe it is general. He has not explained what sort
2 of failure he is talking about and the witness can't answer
3 it based on that.

4 JUDGE MILLER: Is that correct, the witness can't
5 answer it in that state of the question?

6 Or, do you know what he is talking about?

7 WITNESS SMITH: Well, we keep getting this --
8 you must look at the whole system, and the way they purport
9 of using the system. If we are -- to the point where we
10 are using EMDs they have already committed the gas turbine
11 has failed, because this is part of the procedurals of
12 connecting up the EMDs, is check whether the gas turbine is
13 running or not running. We then carry on to the EMDs if
14 the gas turbine is not operational.

15 JUDGE MILLER: He is asking you whether that is
16 a single failure, or are you not indeed postulating a double
17 failure when you come to that conclusion?

18 That's why you keep going back and forth.

19 WITNESS SMITH: Sorry. Okay. By the time you get
20 to that point, you would then have a double failure.

21 BY MR. ROLFE: (Continuing)

22 Q Now, Mr. Smith, would you please look at the
23 questions that begin in the middle of Page 20 of your
24 testimony where you begin to talk about fire protection?

25 Isn't it true, sir, that these EMDs at Shoreham

#11-11-SueT

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have not suffered any fires since they have been in operation?

A Not that I know, but we have an incomplete history of them.

Q Now, Mr. Smith, the EMD diesels at Shoreham use low pressure fuel lines to the fuel injectors, do they not, sir?

A What do you call low pressure?

Q As compared to the fuel lines on the TDI diesels?

A I assume you mean on the TDIs, the fuel line from the fuel pump to the injector itself?

Q Yes.

A Yes, it is relative -- it is lower, relatively. But you've got thirty or forty PSI, I think it is.

Q Because the fuel lines for the TDI diesels are pressurized before the fuel goes into the injectors, whereas with respect to the EMDs that's not the case; isn't that right, sir?

A Yeah, the actual step-up pressure takes place inside the injector itself.

Q And if you had a rupture of a fuel line on the EMDs you would be much less likely to get fuel spraying all over the engine than you would with a rupture for the fuel lines in the TDI diesel generators; isn't that right, sir, because the lines aren't pressurized?

#11-12-SueT

1 A If you had a rupture, you could get just as much
2 volume of fuel out if not more.

3 Q But it wouldn't spray as it would from a
4 pressurized line, would it, sir?

5 A Well, it's difficult to say. It depends on what
6 type of a rupture you get. If you get a fine crack in that
7 pipe even with thirty PSI you get a pretty good amount of
8 spray coming out.

9 (Witness Eley) On the TDIs as well, you also
10 have a supply system to that which is at low pressure
11 because of the head on the tank. You would also have the
12 low pressure supply to the TDIs as well as the high pressure
13 supply, so you've got both kinds of supply to the TDIs.

14 Q Well, isn't it a fact, gentlemen, that at least
15 partially as a result of the fact that the EMD diesels
16 throughout the industry use a low pressure fuel line to the
17 injector that there have been no major fires in operating
18 EMD diesels at commercial or nuclear applications?

19 A (Witness Smith) I wouldn't know. I don't
20 know if anybody has got a full history of the fire record
21 of all the EMDs in operation.

22 Q Do you know that, Mr. Eley?

23 A (Witness Eley) I'm not familiar with the history
24 of them. But I would just like to say that the low pressure
25 supply line, the low pressure fuel supply line, could indeed

#11-13-Sue¹

1 still spray to the extent that fires could be caused from
2 them.

3 Q All right. Now, gentlemen, it's true that you
4 wouldn't likely get a fire on one of these EMDs unless
5 the machines were operating; is that right?

6 A The likelihood is a lot less.

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1 Q And when the machines were operating, you would
2 have cooling air flowing through the engine and through the
3 vents on either side of the housing?

4 A (Witness Smith) There would be some air flow inside
5 the housing, yes.

6 Q And if there were a fire, then the smoke from that
7 fire would be pushed out of those vents, would it not, sir?

8 A It is difficult to say, because it depends where
9 the fire is. If the fire is very close to the turbo charger,
10 it is quite possible that the majority of the smoke would
11 actually be drawn inside the engine, so you won't see it.

12 Q At some point, smoke would certainly be pushed
13 out those vents, would it not, Mr. Smith?

14 A You would assume at some point, but that is
15 very difficult to say. Unless you say specifically the
16 location of the fire, how it is burning.

17 Q And isn't it also true, Mr. Smith, that there
18 are surveillance cameras which allow surveillance of the
19 EMDs from the control room?

20 A That is correct.

21 Q And smoke coming out of the housing from any of
22 those EMDs would show up on that surveillance camera, would
23 it not?

24 A I assume that if they had -- if the place were
25 lit, and somebody was looking at the TV, yeah, they would be

1 able to see it.

2 Q All right. Now, you talk about what happened in
3 the event there were a fire in one of these units, and you
4 talk about the difficulties that the fire fighters would have,
5 and what not, and the fact that some of the water might get
6 sucked into the air intake for these units.

7 Isn't it true, Mr. Smith, that the air intake
8 for these units is curved and comes in somewhat of a U-shape,
9 with the intake being pointed down toward the ground?

10 A The intake for the actual engine air, yes.

11 Q So it is not likely is it, Mr. Smith, that that
12 air intake would suck up any water -- at least a stream of
13 water being used for fire fighting, is it sir?

14 A Not a direct stream, but large amounts of spray,
15 yes. And I would assume that when they were fighting these
16 things they would be using large amounts of spray.

17 Q Well, Mr. Smith, maybe it would be helpful if you
18 could look at Attachment 6, which has been designated Suffolk
19 County Exhibit 39, which is one of the pictures, Judge Miller,
20 which is in the envelope. For the Board's information, it is
21 the picture of the 4 EMD diesels.

22 Mr. Smith, am I correct that the air intake for
23 these generals is that blue, hooded apparatus on the end of
24 each one?

25 A Yes. That is the combustion air intake.

1 Q Now, isn't it true, Mr. Smith, that these EMD
2 diesels are housed units designed to be used in all kinds of
3 weather?

4 A That is correct.

5 Q In fact, they were peaking units, is that right,
6 sir? That is what their use were when they were at New England
7 Power Company?

8 A I believe that is what they were last used for,
9 yes.

10 Q And as peaking units, they were run unmanned, is
11 that right, sir?

12 A I think so, yes.

13 Q And they were designed to operate in snow storms
14 as well as heavy rain storms, weren't they, sir?

15 A I assume they were designed to put up with most
16 of the natural elements.

17 Q That one would find in a New England winter, is
18 that right?

19 A Well, I haven't experienced a New England winter,
20 sir.

21 Q Now, on page 24 of your testimony, you talk about
22 the potential of fire from the battery charger on the units.
23 You are aware, are you not, Mr. Smith, that the battery charger
24 on these units has never caused a fire on them?

25 A On these specific units, or just on EMDs in
general?

1 Q On these specific units.

2 A Not that I know, but as I said before we have a
3 fairly incomplete record of them.

4 Q Well, the records you have don't show any fires
5 being caused by the battery charger, do they?

6 A That is correct.

7 MR. ROLFE: Judge Miller, may I have one moment,
8 please?

9 JUDGE MILLER: Yes.

10 (Pause.)

11 BY MR. ROLFE: (Continuing)

12 Q Now, Mr. Smith, again focusing on the battery. The
13 battery is ventilated underneath, is it not, sir?

14 A (Witness Smith) Underneath what?

15 Q Underneath the battery, in other words. There
16 are ventilation holes under the battery compartment.

17 A I think if you look at one of the photographs you
18 can see quite well how the battery is isolated. Can we
19 show that?

20 Q Certainly. If you look at Attachment 9, you
21 can see quite well the ventilation to and from the battery
22 compartment. You have the little holes in the bottom which
23 are not very large, plus the holes up near the top, just below
24 the floor plate.

25 Q Isn't it true that when the EMDs are in

1 operation, that air is blown over the battery compartment
2 by the generator?

3 A I don't know how much air is blown over that
4 specific area.

5 Q So you don't know whether the air being blown
6 over that battery by the generator would tend to dispell
7 any gases which might build up, do you?

8 A Did you complete that? I thought you stopped
9 at half a question, there.

10 Q No. I asked you if you knew that.

11 A Knew how much air was flowing over the batteries?

12 Q Do you know whether the air that is pushed over
13 the batteries by the generator would dispell the gases that
14 you fear might build up and cause a fire?

15 A I would say while they were running that the
16 chances of being some form of air circulation inside is
17 quite good, but the batteries are still being charged when
18 they are stopped, and that is the time where I think there
19 could be a distinct problem.

20 A (Witness Eley) These things could produce about
21 32 cubic feet of hydrogen an hour, and your lower explosion
22 limit would be about four point one, four point two percent
23 by volume. So there is a possibility of fire.

24 In a normal battery system that we are aware of,
25 one would use explosion-proof fittings, within the area of the

1 section where they are mounted, and you would ventilate.
2 Sometimes it is necessary to ventilate with an FD -- actually
3 remove the amount of gases that is being generated from a
4 separate supply.

5 Q Now, Mr. Eley, you are familiar with the location
6 of the EMD diesels at the Shoreham site, are you not?

7 A Yes. I did make a visit to the plant.

8 Q And you are also familiar with the location of
9 the twenty megawatt gas turbine?

10 A Yes, sir.

11 Q Can you estimate about how far apart those two
12 power sources are?

13 A I would say they are far apart. I wouldn't like
14 to make an estimate of the distance.

15 Q They are far enough apart, are they not, so that
16 one wouldn't expect to fire in the EMD diesels to incapacitate
17 the 20 megawatt gas turbine in any way.

18 A That is a fair assumption.

19 Q Now, gentlemen, at page 26 of your testimony,
20 you discuss the testing procedures for the EMDs. Mr. Smith,
21 are you aware that the Supplemental Safety Evaluation Report
22 No. 6, by the NRC Staff, will require the testing of these
23 EMDs and the connecting of them to load while they are being
24 tested?

25 A (Witness Smith) Not the actual wording you are

1 referring to. Can I -- I am not sure which one you are
2 referring to.

3 Q Certainly. In the --

4 MR. BIRKENHEIER: Mr. Rolfe, would you provide
5 him a copy, please? Or else wait while we go and get our
6 copy.

7 JUDGE MILLER: He is entitled to see it if he
8 wishes.

9 MR. ROLFE: Yes, sir. Your Honor, we are providing
10 the witnesses with a copy. It does have some markings on
11 them which are irrelevant for this purpose.

12 For the record, let me just state that the witness
13 has been provided a copy of Supplement 6 to the Safety
14 Evaluation Report for Shoreham, dated July 1984.

15 MR. BIRKENHEIER: Judge Miller, if we can just
16 wait for a few seconds until my colleague gets a copy for
17 us to use.

18 (Pause.)

19 JUDGE MILLER: Let's take a fifteen minute
20 recess at this time, to enable you to get all your documents.
21 If you have anything else you are going to talk to the
22 witnesses about, or show to them, tell counsel so they
23 can procure them.

24 MR. ROLFE: I will do that.

25 (Short recess taken)

JUDGE MILLER: Well, where is everybody?

1 I believe you were referring to SSER No. 6?

2 MR. ROLFE: Yes, Your Honor.

3 JUDGE MILLER: Does the witness have one copy
4 of SSER No. 6? Fine. Now, what is your question?

5 BY MR. ROLFE: (Continuing)

6 Q My question, Mr. Smith, is if you look at page 8-4
7 of SSER-6, isn't it a fact that the NRC Staff is requiring
8 LILCO to test the EMDs in all facets of their operation;
9 their ability to start, their ability to start automatically,
10 their ability to pick up load and to carry load -- full load,
11 for an hour?

12 A (Witness Smith) Yes, but the system is not
13 tested on a regular basis in all aspects. They only test
14 the automatic start on a one off basis.

15 Q I beg your pardon? On a what basis?

16 A One off.

17 Q Every six months? Is that what you mean?

18 A Yes. The bi-weekly testing procedure is only a
19 partial test.

20 Q Mr. Smith, you have never had any involvement,
21 have you, with preoperational or surveillance testing for
22 diesel generators at a nuclear plant?

23 A Not at a nuclear plant, but as I mentioned
24 earlier, the similarity in the black start capability is
25 between what we are discussing now -- the systems we have

1 on board ship are very, very similar. We are testing that
2 equipment on a highly regular basis.

3 Q Well, are you aware, Mr. Smith, of how often
4 the TDI diesel generators have to test their ability to
5 start automatically and pick up load?

6 A I am not sure what the exact time period is,
7 but the TDIs of the qualified diesels -- these are old diesels
8 of indeterminate history.

9 Q Yes, sir. But you can't compare then the testing
10 frequency to be required for the EMDs with the testing
11 frequency for the TDIs, can you?

12 A No, but as I say, because of their age, I would
13 consider the frequency would have to be operated.

14 Q Now, Mr. Smith and Mr. Eley, would you please turn
15 to page 29 of your testimony, where you begin talking about
16 the alarms on the EMDs, now, Mr. Smith, I think we already
17 established that before LILCO bought the EMDs at Shoreham,
18 they were used as peaking units by New England Power Company,
19 isn't that right, sir?

20 A (Witness Eley) Yes.

21 A (Witness Smith) Yes.

22

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Sim 13-1

1 Q And the machines in fact were designed by EMD
2 to be used as peaking units; isn't that correct?

3 A (Witness Smith) Not peaking units specifically.

4 Q That is one of the units for which they were
5 specifically designed?

6 A It is one of them, yes.

7 Q And isn't it also true that typically peaking
8 units are run at unmanned locations?

9 A I am not aware of all the locations they are run.
10 I know some of them.

11 Q Well, in fact, these four EMDs at Shoreham were
12 run unattended since approximately 1967 by New England
13 Power Company, isn't that right?

14 A I have no information on what attendance there
15 was.

16 Q Now you make the point that there are 38
17 different alarms, I believe, on the TDI diesel generators.
18 If you would look at page 32 of your testimony for a minute,
19 you will see that is a table of the alarms on the Shoreham
20 TDI diesel generators.

21 Isn't it fact, Mr. Smith, that only 10 of
22 those 38 alarms have any indication in the control room?

23 A Yes. But I think you will find that the ones
24 that are not specifically indicated in the control room
25 will be indicated under engine fault or a group heading, and

Sim 13-2

1 I think we mention that on the next page.

2 Q Now, Mr. Smith, isn't it a fact that if either
3 the TDI diesels or the EMD diesels were being used in an
4 emergency situation that the alarms would not be heeded
5 anyway?

6 A Heeded?

7 Q Heeded. In other words, nobody would shut
8 the machine down because of an alarm in an emergency situation,
9 would they?

10 A I don't know. With the EMDs you don't have the
11 option anyway.

12 Q Well, let's compare that with the TDIs. Isn't
13 it a fact that if an alarm went off with respect to the
14 TDI diesel generators when they were being used in an
15 emergency to provide AC power to the plant's emergency
16 cooling systems that one would not shut the TDIs down because
17 of an alarm going off?

18 A Yes, but it would enable the operator to
19 possibly correct a problem before they actually shut it down.
20 Take for an example, a lubricating oil filter slowly choking
21 up, the alarm goes off before the shutdown signal is given
22 so that they could see the alarm and get down to the machine,
23 swing the filters, rectify the fault and you would have no
24 interruption of the electrical power from the TDIs. You
25 don't have that facility on the EMDs. The first thing you

Sim 13-3

1 know is the things quit.

2 Q Is there no low lube oil in indicator on the
3 EMDs?

4 A There is, but the indication only comes up
5 simultaneously with a shutdown signal.

6 Q Well, isn't it true, Mr. Smith, that a number
7 of the alarms on the TDIs which actually show in the control
8 room are alarms indicating that the TDIs have in fact
9 already shut down, and I will refer you to the alarms, for
10 example, for diesel system inoperative, overspeed shutdown,
11 generator voltage regulator power failure, generator PT and
12 blow fuse.

13 A Well, you would have to go through them each
14 one because there are some which are indicated that shut
15 down and also there are some that are indicated preceding
16 shutdown. So you have got to specify which specific system
17 you are talking about.

18 Q Well, did you specify those in your testimony,
19 sir?

20 A I don't think we specified each one, which
21 would precede and which one gave an alarm preceding a
22 shutdown.

23 A (Witness Eley) The point we are trying to make
24 is that there is a possibility of manual intervention before
25 the machine actually shuts down with regard to the onsite

Sim 13-4

1 power source, whereas all of the alarms give a shutdown
2 signal to the EMDs so that manual intervention is less
3 likely.

4 Q Gentlemen, it is true, is it not, that in the
5 event the four EMDs were running and one of them shut down
6 because of an alarm, that would not have any effect on the
7 other three EMDs?

8 A (Witness Smith) It is hoped that it wouldn't,
9 but I notice when we saw the July 2nd test, there was a case
10 where one tripping off affected another machine and it came
11 off on reverse current because of the change in the load
12 shared between the machines.

13 Q Well, you are aware, are you not, Mr. Smith,
14 that the situation which caused that problem in the July
15 2nd test has been remedied?

16 A I believe there has been a report out saying
17 that they have done work on it and they have run tests since
18 then.

19 Q Now the lack of alarms, as you perceive it,
20 on the EMDs would not have any effect on the operation of
21 the 20 megawatt gas turbine, would it, Mr. Smith?

22 A Only in the way that we have mentioned before,
23 that if you were committed to the EMDs, the lack of alarms
24 would mean that you could have something in the process
25 of shutting down before you even knew about it, and in that

Sim 13-5 1

respect, yes.

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Q Well, again, in that case the EMDs would shut down because of a failure and we would be back into postulating the double failure; is that right, sir?

A Yes.

A (Witness Eley) Yes.

A (Witness Minor) Mr. Rolfe, can I add something to that question?

MR. ROLFE: I would prefer, Mr. Minor, if you would wait and pick that up on redirect.

BY MR. ROLFE:

Q Now, gentlemen, if you would turn to page 4 of your testimony.

You discuss there whether the EMDs are started and loaded in the same manner as qualified onsite AC power sources and you make the point that they are not because onsite AC power sources have to be available within 10 seconds; is that right, sir? Mr. Eley or Mr. Smith.

A (Witness Eley) Yes.

Q Now isn't it true that that 10-second requirement is there to allow the onsite AC power source to meet full power accidents or transients?

A (Witness Smith) I don't know whether they just purely considered full power or any emergency situation for the 10-second requirement.

Sim 13-6

1 Q Well, you are aware, are you not, Mr. Smith,
2 that even in the most limiting accident which would be the
3 loss-of-coolant accident at five percent power that no power
4 would be needed from the EMDs or the 20 megawatt gas turbine
5 for 86 minutes?

6 MR. BIRKENHEIER: Judge Miller, I object to that
7 question on the ground that it is beyond the scope of these
8 witnesses' direct testimony. They do not address the timing
9 requirements or the need for onsite power during a situation
10 in which the plant is operating in full power.

11 JUDGE MILLER: Well, they have the 10-second matter
12 there and I think it ought to be explored.

13 Go ahead. Do you have an answer to the question?

14 MR. BIRKENHEIER: Judge Miller, if I may add, the
15 question doesn't go to that 10 seconds. The question is
16 addressing the timing on which the power is needed, and
17 according to LILCO that is at a plant operating at full
18 power, and the reasons that the requirement was added or
19 the requirement exists.

20 JUDGE MILLER: The point simply is, however,
21 that in the direct testimony they do go into the time of
22 response factors under various circumstances, and this
23 is cross-examination. I don't think it outside the scope
24 yet, although we don't intend to let it go very far.

25 You may rephrase the question.

Sim 13-7

1 MR. ROLFE: Thank you, Judge Miller.

2 BY MR. ROLFE:

3 Q Mr. Smith, are you aware that even in the most
4 limiting accident, that being the loss-of-coolant accident
5 at five percent power, that AC power from the EMD diesels
6 or the 20 megawatt gas turbine would not be needed for at
7 least 86 minutes.

8 A (Witness Smith) I am not aware of the exact
9 time that is required.

10 Q Well, you contrast in your answer to the question
11 beginning on page 34 the manual operations necessary to
12 start the EMDs with the automatic starting of the TDI
13 diesel generators.

14 Isn't it a fact that in nuclear plants when
15 they are designed for operations that have to be done in
16 less than a certain time period, and let's say less than
17 a minute or so, that it is typical to design those operations
18 to be performed automatically?

19 MR. BIRKENHEIER: I object to the question,
20 Judge Miller. This is addressing the specifics of the
21 design features which are not addressed in this testimony.

22 JUDGE MILLER: He is cross-examining, however.
23 You may answer.

24 WITNESS SMITH: The actual comparison we were
25 making with the EMDs is the fact that there is a big

Sim 13-8

1 uncertainty in the time required for them to actually get
2 load on line with the EMDs because of the human intervention.
3 There are some questions there that if any number of events
4 happen to the operator, we dn't know eactly how long it is
5 going to take for that power to be supplied the EMDs.

6 BY MR. ROLFE:

7 Q Well, those procedures have been drilled, have
8 they not, Mr. Smith?

9 A (Witness Smith) They have been drilled. I don't
10 know how many times they have been drilled, but I know for
11 a fact that in a blackout situation it doesn't matter how
12 many drills you have, when you bring the actual situation
13 up and it is a completely different kettle of fish. And
14 if it is the middle of the night pouring with rain, the
15 operating complying with all these pre-requirements before
16 he puts the thing on the board might be totally different.

17 The drill that we saw on July the 2nd, or the
18 test on July 2nd was what you would call in ideal conditions.

19 Q Well, under that so-called idealcondition, isn't
20 a fact that using the EMD diesels that power was restored
21 to the emergency loads within approximately nine minutes?

22 A On the July the 2nd test, yes.

23 Q And are you aware, sir, that the NRC staff
24 in its supplemental safety evaluation Report No. 6 required
25 that lights be installed around the area of the switches

Sim 13-9

1 necessary to isolate the NSST?

2 A Yes, I gather they made some suggestions for
3 emergency lighting in that area.

4 Q Now, Mr. Smith, if you would look at your
5 testimony on page 37, in the second paragraph there you
6 talk about the necessity for operators manually to manage
7 the load of the EMDs from the EMD control cubicles.

8 Isn't it a fact, Mr. Smith, that the operators
9 do not manually manage the load on these EMDs, but the EMDs
10 automatically adjust to the loads themselves?

11 A Yes. That comment came in after the July the
12 2nd test when we noticed that if you have all four machines
13 on line and they are only loaded up for the minimum power,
14 it is a very low load, and it was while we were discussing
15 it that one of the LILCO personnel said, oh, yes, if this
16 happened, what we would do is we would shut a couple of them
17 down just to manage the load better, to actually load the
18 machines up and getting a higher load onto each individual
19 machine for their better operation.

20 Q Well, Mr. Smith, just so I am clear on what
21 you are saying, if I understand you correctly, the statement
22 on page 37 in the second paragraph is incorrect in that
23 it is not necessary for operators manually to manage the load
24 of the EMDs; is that right?

25 A Well, from what we saw on July 2nd, yes, it was.

Sim 13-10 1

2 Q No, sir. I am talking about in the normal
3 configuration and if these EMDs were ever needed to provide
4 emergency power to the plant.

5 A I think that manual operation would still be
6 necessary for the continuing running of the EMDs.

7 Q You do not believe that these machines will
8 automatically adjust themselves to load?

9 A They have automatic load adjusting systems through
10 them.

11 Q And in fact, Mr. Smith, when they were used
12 by New England Power Company at remote locations as peaking
13 units, they did have to automatically adjust to load because
14 there was no one around to manually adjust them; isn't that
15 so?

16 A Yes, but there is a big difference in balancing
17 load between machines when you have actually got the
18 machines running at 50 or 75 percent load. But if you are
19 running it around about 5 or 10 percent load, they have
20 a hard time. The governors have a real hard time balancing
21 or controlling the machines at the very light loads and you
22 run the risk of one of the machines going into reverse
23 current, which I believe happened on July the 2nd.

24 Q And if one of the machines went into reverse
25 current, as it did on July 2nd, then it would trip off; isn't
that right?

Sim 13-11₁

A That is correct.

2 Q And in that case the other machine still running
3 would pick up the load being carried from the machine
4 that tripped out, right?

5 A They should, yes.

6 Q And so in that case you would eventually get
7 to a situation where you would have enough machines running
8 to carry the load comfortably that they were seeing, right?

9 A Well, we have kind of gotten to a guessing game
10 here now where we are just saying maybe it will do this
11 and maybe it will do that.

12 Q No, sir, no maybe's. Isn't that what would
13 happen in the event that one of them tripped out because
14 it was seeing too little load?

15 A That could happen.

16 Q Isn't it a fact that that is what happened on
17 July 2nd?

18 A Well, it was a combination of things that
19 happened on July 2nd.

20 Q Now you are aware, are you not, Mr. Smith,
21 that as of July 2nd when that demonstration was done that
22 the machines had not been completely tested and adjusted
23 for final acceptance?

24 A At the time I didn't know what stage they were
25 at in their fitting out at Shoreham.

Sim 13-12 1

Q Do you now understand that to be the case?

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A Well, all I have seen is that since the July 2nd test they have carried out another test which they didn't have the problems which were shown on July the 2nd.

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Q Now, Mr. Smith, will you now turn with me to the part of your testimony that talks about the maintenance records of these EMDs at Shoreham.

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You stated earlier, both you and Mr. Eley, that prior to this consulting job for Suffolk County that you had had no experience in either maintaining or operating EMD diesels; is that right?

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A That is correct.

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A (Witness Eley) That is right.

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Q So whatever information you have based your opinions on concerning maintenance and the proper maintenance interval has all been acquired by reading EMD manuals or publications, I assume; is that right?

17

18

A (Witness Smith) That and also general diesel experience over the last 20-odd years.

19

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Q Now on page -- I have got a note that says 35, but I am not sure it is correct, you make the point that one of the inspection reports for these diesels says that several of the parts are used and approaching overhaul. Are you familiar with that comment?

23

24

25

A Yes. That comment is actually on the report

Sim 13-13

1 which is one of our attachments. I think it was the
2 Systems Report for the installation of these machines at
3 Shoreham.

4 Q Okay. Do you recall which attachment that
5 is, sir?

6 A No, but I can tell you in a couple of seconds.
7 The quote is on page 39, but the attachment is Attachment
8 16.

9 MR. BIRKENHEIER: Judge Miller, for the record
10 that is Suffolk County Exhibit LP-49.

11 JUDGE MILLER: Thank you.

12 MR. ROLFE: Thank you, Mr. Smith.

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BY MR. ROLFE: (Continuing)

2 Q It's true, is it not, Mr. Smith that the notation
3 used in approaching overhaul does not indicate that the part
4 is defective in any way?

5 A (Witness Smith) No, it's just -- I would assume
6 well worn.

7 Q Well, in normal maintenance procedures if one
8 were writing a report and a component or several components
9 needed replacement, one would certainly specify that
10 definitely without leaving it to the reader's imagination;
11 isn't that right?

12 A Actually this statement is a qualifying statement
13 for the upper part of that report.

14 It goes into a bit more detail of the specifics
15 of what's worn.

16 Q And doesn't that notation go on to say: Recommend
17 monthly surveillance to inspect and advise LILCO of any
18 abnormal conditions?

19 A That's what it says.

20 Q Now, do you know, Mr. Smith, how many hours of
21 operation one would expect on these EMD diesel generators
22 during low power testing?

23 A No, I don't know exactly what number of hours
24 is going to be required.

25 Q Well, isn't it a fact that qualified onsite

#14-2-SueT1

1 diesel generators at other nuclear plants in use for full
2 power operation see only fifty to a hundred hours of use
3 a year?

4 MR. BIRKENHEIER: I object to that question, Judge
5 Miller, as being beyond the scope of this witness' testimony.
6 They don't talk about the number of hours of service required
7 on an annual basis at nuclear power plants by the diesel
8 generators.

9 JUDGE MILLER: Well, it's related because it's
10 expressing view. If he doesn't know, he can say so. If
11 he does have knowledge, he may tell us that.

12 You may answer.

13 WITNESS SMITH: I'm sorry. Could you repeat the
14 question?

15 BY MR. ROLFE: (Continuing)

16 Q Yes. Are you aware that typically qualified
17 onsite diesel generators at nuclear power plants in use for
18 full power operation see only fifty to a hundred hours a
19 year of operation?

20 A Yeah, I'm not sure of the exact figure, however.
21 I'm willing to take your word for it.

22 Q And you would expect during the limited period
23 of low power testing that these EMDs would see something
24 less than that in terms of their hours of operation, would
25 you not?

#14-3-SueT

1 A I have no knowledge of the exact hours they are
2 going to be run.

3 Q Well, when you see a report or a notation on a
4 maintenance report that says that components are used and
5 approaching overhaul, you certainly wouldn't expect that
6 kind of notation if the maintenance crew expected the parts
7 to fail within fifty to a hundred hours, would you, Mr.
8 Smith?

9 MR. BIRKENHEIER: I object to this question,
10 Judge Miller. It's calling for the witness to speculate
11 about --

12 JUDGE MILLER: I think that's right. The
13 objection is sustained.

14 BY MR. ROLFE: (Continuing)

15 Q Now, Mr. Smith, will you look at Pages 38 and
16 39 of your testimony where you talk about your concern
17 that some of the power assemblies have been replaced, in
18 your opinion, too frequently?

19 Isn't it true, Mr. Smith, that it is the normal
20 practice for electric utilities who use peaking units to
21 perform recommended maintenance on those units in advance
22 of the recommended maintenance period when the normal
23 recommended maintenance period would fall during a peak
24 period for the utilities load demand?

25 A Yeah, but I can't see a discrepancy of that

#14-4-SueT 1

six thousand hours being applicable.

2 Q You are familiar with that practice, however,
3 are you not?

4 A It's logical in doing any maintenance.

5 Q Now, you go on to say at the bottom of Page 38
6 that EMD operating manual states that repowering should
7 take place at twelve thousand hours.

8 Do you see that?

9 A Yeah.

10 Q In fact, it's true, is it not, Mr. Smith, that
11 the EMD maintenance instruction applicable to these diesels
12 suggests repowering at eight thousand hours?

13 MR. BIRKENHEIER: Judge Miller, I object to this
14 question. I see that Mr. Rolfe is beginning to use a
15 document which we were provided during the break, entitled
16 "EMD Maintenance Instruction M.I.1723," which is dated
17 April, 1967.

18 In our discovery request, we asked for all of
19 the maintenance materials that LILCO had in its possession
20 and that request, of course, was made a continuing request
21 by your Order early in May, and yet we did not receive a
22 copy of this particular document, although it was responsive
23 to our request, until the last break just a matter of maybe
24 fifteen or twenty minutes ago.

25 MR. ROLFE: Your Honor, may I respond to that?

#14-5-SueT 1

2 Judge Miller, this document was not in LILCO's
3 possession until LILCO received the County's testimony and
4 went out to try to find maintenance documents to see
5 whether the allegations made in Mr. Smith's, in this panel's,
6 testimony were correct. And that's the way the document was
7 located by LILCO.

8 I do not have the discovery request in front of
9 me, and I do not -- I can't quote the discovery request that
10 was made. I do recall that there were requests for mainte-
11 nance records concerning the machines and all maintenance
12 records were provided. Even if that kind of request was
13 made, I don't know that this kind of document, which is a
14 maintenance procedure from GM, would fall within it.

15 But this is not something that LILCO had in its
16 possession; it's not something that LILCO's witnesses relied
17 on in any way for their testimony. It is pertinent to an
18 assertion which this witness has voluntarily made in his
19 prefiled direct testimony in which, according to the mainte-
20 nance instruction from General Motors, is just wrong.

21 JUDGE MILLER: Well, do you represent that this is
22 a document pertaining to the EMD operating manual which was
23 at the time of the request in the possession of LILCO and
24 was rather in the possession of, and a document put out by,
25 General Electric?

Who did put it out?

#14-6-SueT

2 MR. ROLFE: General Motors put it out. It was
3 not in LILCO's possession. I can't represent who may have
4 had possession of it.

5 JUDGE MILLER: All right. It wasn't in LILCO's
6 possession, and that it was obtained by LILCO following
7 the examination of the prefiled testimony of the witnesses,
8 which at Page 38 and elsewhere, refers to EMD operating
9 manual. Is that your representation?

10 MR. ROLFE: Yes, Your Honor. It was obtained
11 for me at my request by LILCO's consultants when I asked
12 them to look through this testimony and tell me what they
13 thought of it.

14 JUDGE MILLER: Well, it would appear -- I can
15 only go on the representation of both counsel, it would
16 appear that the document was not something that was with-
17 held and that, therefore, it is proper to examine since
18 the witness has alluded to it.

19 So, we will overrule that objection.

20 MR. BIRKENHEIER: Judge Miller, I just want to
21 point out, I accept Mr. Rolfe's representation about this
22 document. I would like to point out, however, the witnesses
23 have not seen this document prior to this, and I would
24 request that Mr. Rolfe direct them to the specific portions
25 of the document about which he intends to ask them.

MR. ROLFE: I will be happy to do that, Your Honor.

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1 Judge Miller, for the record, I would like to
2 have this document marked as LILCO's LP Exhibit 14. It is
3 a document entitled "Maintenance Instruction, M.I. 1723,"
4 from the Electro-Motive Division of General Motors. And
5 it's --

6 JUDGE MILLER: It may be marked.

7 MR. ROLFE: Thank you, sir.

8 (The document referred to is
9 marked LILCO's Exhibit LP-14
10 for identification.)

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11 JUDGE MILLER: What page are you directing your
12 witness' attention to?

13 MR. ROLFE: Page 5, Your Honor.

14 BY MR. ROLFE: (Continuing)

15 Q Mr. Smith, can you please look at Page 5 of
16 this document, which is LILCO LP Exhibit 14, in approximately
17 the middle of the page and tell me whether I'm correct that
18 this maintenance procedure calls for the unit to be repowered
19 every eight thousand hours of operation?

20 A That's what this document says. But the mainte-
21 nance procedure put forward by Power Systems who are the
22 people who have got the contracts, their procedure is an
23 attachment to Mr. Iannuzzi's and Mr. Lewis' testimony, states
24 sixteen thousand hours for power units for change-out, so
25 I assumed those were the figures that LILCO was going to go by.

#14-8-SueT 1

2 Q So, you will agree with me, will you not, Mr.
3 Smith that this exhibit which is dated April 1967 is the
4 maintenance program which was recommended by GM, EMD at
5 the time these units at Shoreham were constructed or
6 manufactured?

7 A Actually, this one is different. If you look
8 at the maintenance manual that LILCO referred to in several
9 of their test procedures, the hours are completely different.
10 They refer to twelve thousand hours for the changing out
11 of each individual power unit.

12 (Witness Eley) Yes, or would come from that.
13 And I've actually made a note on my sheet here. So, it
14 would appear there is some controversy between the two
15 pieces of data here.

16 Q Yes, sir. My question was simply: Is this
17 the maintenance instruction which was applicable to these
18 units at the time they were manufactured?

19 A (Witness Smith) Well, it seems to be several.

20 Q Now, Mr. Smith, will you agree with me that
21 this document calls for turbochargers to be replaced at
22 eight thousand hours of operation rather than thirty-two
23 thousand hours of operation, as you allege at Page 40 of
24 your testimony?

25 And again I refer you to Page 5 of Exhibit LILCO
LP-14.

#14-9-SueT 1

2 A Yes. But again we have the same problem as
3 each individual document gives a different number of hours,
4 and the documents that we referred to were either the
5 ones that Power Systems were referring to or the ones, the
6 maintenance schedule inside the instruction book which
7 LILCO referred to themselves in their test procedures.

8 Q Now, do you know, Mr. Smith, when that manual
9 to which you make reference was put into effect?

10 A Sorry, into effect by who, by LILCO or --

11 Q By anyone?

12 A By EMD, the date on the manual was '68, was it?
13 I'm not sure of the date. I would have to go and have a
14 look.

15 Q What about the date of the maintenance contract
16 where you say the various intervals for maintenance were
17 set out?

18 A The maintenance contract from Power Systems,
19 I gather that's a fairly recent one because they say this
20 is one that we've given to LILCO when they got the contract
21 for maintaining these machines.

22 Q You don't know whether the GM maintenance in-
23 struction which we've marked as LILCO Exhibit LP-14 was
24 in effect at the time these machines suffered the turbo-
25 charger problems, do you?

A I assume Power Systems were looking after the

#14-10-SueT 1

2 maintenance, then. That they had the same contract. I
3 think that they mentioned something when they were -- Mr.
4 Iannuzzi and Mr. Lewis were here earlier on in the week.

5 Q The answer to my question is no, you don't
6 know which one was in effect at the time the turbochargers
7 failed, do you? Or, were replaced, excuse me.

8 A No. I'm not sure which one was in effect.

9 Q All right. Now, at the top of Page 41 of your
10 testimony, sir, you refer to the fact that EMD turbochargers
11 have a history of problems. Do you see the part of the page
12 to which I am referring?

13 A Yeah.

14 Q Now, isn't it true, Mr. Smith, that the document
15 to which you make reference there is a document describing
16 the evolution of the Electro-Motive turbochargers for
17 application in marine and oil drilling diesel engines?

18 A This specific document does, but this was just
19 an accumulation of data that made us give this opinion.

20 Q Now, Mr. Smith, you are aware, are you not,
21 that there are a number, a large number, of EMD diesel
22 generators in use at nuclear plants throughout this country?

23 A Yeah. I don't know the number, though.

24 Q And you are further aware, I take it, that those
25 diesel generators have the same engines and the same genera-
tors and the same turbochargers as are found on the EMDs at

#14-11-SueT

Shoreham?

2 A Specifically, I don't know whether they are
3 exactly the same, but I'm taking your word for it.

4 Q Well, do you know, sir, whether the NRC has
5 ever investigated the turbocharger problem if it is as
6 widespread as you would have us believe from your testimony?

7 A I am unaware of the NRC doing any investigation
8 into turbocharger failures.

9 Q It's true, is it not, Mr. Smith, that the EMD
10 turbochargers have somewhat of a unique design, in that
11 they are powered at light load by a gear train and powered
12 at more full loads by the exhaust from the engine?

13 A That is a quick description of how they operate.

14 Q And isn't it also true that the problems which
15 have been encountered with EMD turbochargers in the industry
16 have resulted when the machines have been run at light
17 loads, something less than fifty percent?

18 A I gather some of the failures have been due to
19 the drive system because of light load running, but --

20 Q And isn't that the case, Mr. Smith, because at
21 light loads the turbocharger is being powered by the gear
22 train until you get excessive wear on that gear train,
23 whereas when it's running at higher loads you don't have
24 any wear on that gear train because the turbocharger is
25 being powered by the exhaust gases?

#14-12-SueT

2 A I believe that once you get over that seventy-
3 five percent load that the gear drive does disengage.

4 Q And as a matter of fact, EMD makes different
5 maintenance recommendations for turbochargers, depending
6 upon the extent of the load that the engines are likely
7 to see; isn't that right, sir?

8 A Well, Mr. Lewis, when he was here earlier on
9 this week, started mentioning a whole bunch of different
10 change-out hours depending on the load of operation that
11 these machines are being put to. But, when we were refer-
12 ring to this, we were only referring to the maintenance
13 recommendations that Power Systems had put to LILCO.

14 And that stated specifically just one time. And
15 they didn't mention at all whether if you run them on light
16 load you've got to do this. If you run high load, you've
17 got to do this. They said just at a straight number of
18 hours this is when you change them out.

19 Q Well, isn't it a fact, Mr. Smith, that the
20 document to which you make reference in your testimony at
21 Page 41, the document from General Motors, specifically
22 talks about the problems with these turbochargers when the
23 engines are being run at light loads?

24 A This document does make reference to light loads
25 on here.

Q And, in fact, the EMD diesels at Shoreham, when

#14-13-SudT

2 they are tested are required to be tested at full load,
3 are they not, sir?

4 A (Pause.)

5 I'm just trying to think of which test procedure
6 they -- I think they run to about seventy-five percent load,
7 isn't it?

8 Q Well, if you will look at that Supplemental
9 Safety Evaluation Report Number 6 again, and look at the
10 bottom of Page 8-3 over to the top of Page 8-4, I think
11 you will see that the staff rejected LILCO's proposal to
12 test the machines at fifty percent of rated load and instead
13 will require as part of the Shoreham technical specifica-
14 tions that each diesel generator be loaded to 2.5 megawatts,
15 or that all four mobile diesel generators be loaded to ten
16 megawatts every two weeks; isn't that right, sir?

17 A That's what it says here.

18 (Witness Eley) Could I just say one thing? If
19 my memory serves me correctly, one of the turbochargers had
20 a failure from the blading on the turbocharger rotary itself
21 which pierced the -- am I correct?

22 (Witness Smith) That's correct. That wasn't a --
23 the dry failure.

24 (Witness Eley) So, that wasn't a dry failure at
25 all there. That turbocharger failed in a different situation
to what we are referring to here.

#14-14-SueT

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Q And that turbocharger was replaced, was it not,
Mr. Eley?

3

A Yes, it was.

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Q And there have been no problems subsequent to
that replacement with the turbocharger now on the machine;
is that right?

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A Not that I'm aware of.

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1 MR. ROLFE: I have no further questions of this
2 panel.

3 JUDGE MILLER: Staff?

4 MR. PERLIS: A few very brief questions.

5 CROSS EXAMINATION

6 BY MR. PERLIS:

7 Q Mr. Smith, do you know how long the plant could
8 safely last without AC power during low power operation?

9 MR. BIRKENHEIER: I object to that question, Judge
10 Miller. This is beyond the scope of the testimony. The
11 witnesses don't address the question of time available for
12 consequences to reach any point.

13 JUDGE MILLER: Well, the witnesses do purport
14 to make comparisons, and if the time available is well over
15 most time factors, that would certainly have a bearing on
16 the Board's mind on relevancy.

17 Therefore, the objection is overruled. We will
18 let it stand.

19 WITNESS SMITH: I am not aware of the specific
20 time.

21 BY MR. PERLIS: (Continuing)

22 Q Are you aware of general time?

23 A (Witness Smith) I know it is more than minutes.

24 Q Mr. Eley the same question . Do you know how
25 long the plant could safety last without AC power during low
power operation?

1 A (Witness Eley) No, I do not.

2 Q Could you gentlemen please turn to page 36 of your
3 testimony. I would direct your attention to the last sentence
4 on the page. And in particular, could you two gentlemen tell
5 me what you meant by, 'a timely manner' in that sentence?

6 A (Witness Eley) Well, Mr. Smith actually saw this
7 test that was taking place at that time, so I will let him
8 answer that one.

9 A (Witness Smith) I think I mentioned this earlier,
10 because of what was required of the operator, there was no
11 guarantee of what length of time it was going to take him.

12 Q Well, Mr. Smith, how could you make a judgment
13 as to whether actions could be taken in a timely manner
14 if you don't know what time the operator has in which to
15 perform those actions?

16 A Again, I just say that we are unsure of the time
17 the operator was actually going to complete this.

18 Q Could you give an estimate as to how long it would
19 take the operator to complete those actions?

20 A We would say it is a completely open-ended
21 question. Any number of incidents that could be postulated
22 happening to the operator --

23 JUDGE MILLER: Aren't you referring up above now
24 to certain conceivable eventualities, when you say to perform
25 those necessary tasks?

1 I think you should tell us what you mean by
2 those necessary tasks, because I think that is time related
3 to your conclusions, is it not? Or if it isn't, tell me what
4 you are talking about.

5 WITNESS SMITH: Well, it is the tasks which
6 are laid out on one of the attachments of one of the test
7 procedures. I think if we referred to that, we could see
8 exactly which ones we were talking about.

9 JUDGE MILLER: Would that be those that are
10 described up at the top -- the fourth line of page 36? Isn't
11 that a description of those necessary tasks in the last
12 paragraph?

13 WITNESS SMITH: Yes, that is correct.

14 JUDGE MILLER: Okay. If it isn't then I would
15 need to know, but I can assume that those are the tasks you
16 refer to.

17 WITNESS SMITH: Yes.

18 BY MR. PERLIS: (Continuing)

19 Q I would again ask you: Could you tell me what
20 specifically you meant when you said that operator actions
21 could not be performed in a timely manner?

22 MR. BIRKENHEIER: I object Judge Miller. I don't
23 believe that is the statement these witnesses have made in
24 their testimony.

25 JUDGE MILLER: Agreed certain things increase
the chances that the operator will be unable to complete his

1 assigned task in a timely manner, and I think the witnesses
2 have described the assigned task that he refers to as those
3 that are set forth at the top of the page.

4 The objection, therefore, goes to the criteria
5 for timeliness in that respect.

6 MR. BIRKENHEIER: That it does. My only point,
7 and perhaps it is a minor one, is that I believe Mr. Perlis
8 asked why they thought the task could not, as in an absolute
9 sense, be performed in a timely manner.

10 JUDGE MILLER: I don't see the difference. If
11 there is a difference I will ask him to relate the question
12 to the testimony.

13 MR. PERLIS: I will rephrase the question.

14 BY MR. PERLIS: (Continuing)

15 Q Could you please explain specifically your basis
16 for the statement in your testimony that the chances are
17 increased that the operator will be unable to complete his
18 assigned task in a timely manner, with specific reference to
19 what you meant by, 'timely manner?'

20 A (Witness Smith) When we said in timely manner,
21 I personally was thinking about the time it took the operator
22 to complete it when he did his walk through, or when the test
23 was run on July 2nd, which was then quoted as eight minutes,
24 I think it was, or just over eight minutes.

25 JUDGE MILLER: How many minutes --

1 WITNESS SMITH: Eight minutes. We could see that
2 certain elements could come in and stretch that time a lot
3 longer. How long, who knows?

4 BY MR. PERLIS: (Continuing)

5 Q But you did not have any specific time in mind?

6 A I have no specific time.

7 MR. PERLIS: Thank you. I have no further
8 questions.

9 JUDGE MILLER: State of New York?

10 MR. PALOMINO: Yes, sir.

11 CROSS EXAMINATION

12 BY MR . PALOMINO:

13 Q Mr. Minor, were you present last week, on Tuesday,
14 when Mr. Lewis testified?

15 A Yes. I was present when Mr. Iannuzzi and Lewis
16 testified as a panel.

17 Q Did you hear Mr. Lewis testify that the Shoreham
18 EMDs have quadrupled redundancy?

19 A Yes, I believe he did make that statement.

20 Q Do you agree with that evaluation of the Shoreham

21 --

22 MR. ROLFE: Objection, Your Honor. This goes
23 beyond the scope of cross examination, and I think what we
24 are seeing here is a tag team approach between the County
25 and New York State, which Your Honor held the other day was

1 not going to be permitted in this proceeding.

2 JUDGE MILLER: Yes, but I don't think that
3 generally the counsel has been cross examining, which was
4 what I indicated that people on the same side can't cross
5 examine each other's witnesses, but I don't see that he has
6 been abusing his interrogation.

7 What he is doing, as I understand it, is directing
8 the attention of the witness to some preceding testimony which,
9 in part at least, they referred to anyway, so I think you may
10 answer that question.

11 BY MR. PALOMINO: (Continuing)

12 Q Do you agree with that evaluation?

13 A (Witness Minor) Only in a very limited scope,
14 and it is part of what we were talking about earlier in this
15 cross examination. The EMD diesels do have four units, and
16 I will agree with that. And they have certain components
17 in each of those which are redundant, one to another, but
18 when you look at the power coming from the EMD block of
19 generating devices, you have to consider it as one output of
20 power.

21 So, basically it is one power source. Fundamentally
22 one cable coming from the EMD cubicle to the non-emergency
23 switchgear room. Therefore, the quadruple redundancy he was
24 referring to is in a very limited nature, and you have to
25 consider the common points after that which effectively make

1 it a single unit. It is a bit of the same single failure
2 problems and characteristics that the gas turbine has.

3 And, therefore, you have to consider each of
4 those elements as a block of power, and compare that to the
5 TDIs, which are onsite, and the emergency generating sources
6 as originally proposed by LILCO, where each of them is an
7 independent source, and there are three blocks of power
8 available.

9 Q Mr. Smith, before, in testifying, a situation
10 was set up whereby it was assumed that the turbines would
11 not work and that, therefore, there was resort to EMDs, and
12 that the EMDs failed because of a blockage in the single fuel
13 line that feeds all four of them.

14 Now, single failure rule or postulation aside,
15 is that system of EMDs with that configuration as safe an
16 operation as the three independent TDIs, if they were fully
17 qualified --

18 MR. ROLFE: Excuse me. I object to the relevance
19 of the question, Your Honor. There is no other rule but
20 the single failure rule, which is applicable, and we can
21 postulate remote situations from now until the end of the
22 year --

23 JUDGE MILLER: We won't go quite that long.

24 MR. PALOMINO: I think, Your Honor, that one of
25 the standards they have to show is that the system that they

1 are proposing is as safe an operation as the one would be
2 with fully qualified operating TDIs. And that is the question
3 I am asking, is that system as safe.

4 JUDGE MILLER: You may answer.

5 WITNESS SMITH: The thing is with the TDI you
6 have three. Any failure of one still does not affect the
7 other two, whereas with the alternate supply, the failure
8 of one does affect the others.

9 MR. PALOMINO: I have no further questions.

10 JUDGE MILLER: Any redirect?

11 MR. BIRKENHEIER: Yes.

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12 REDIRECT EXAMINATION

13 BY MR. BIRKENHEIER:

14 Q I direct this question to everyone on the panel.
15 Do you agree that if there is a failure of the gas turbine,
16 in order for there to be a failure in the EMD, you must
17 postulate a second failure?

18 A (Witness Minor) In general, no, I do not. The
19 reason I would not agree with that is that the gas turbine
20 as a generating unit to supply power for emergency loads
21 has many mechanisms that can cause it to be non-available.

22 First of all, it is dependent on the system
23 operator to make actions to bring it on line. In other
24 words, it is requiring communications and actions by other
25 people offsite to help achieve its ultimate ability to supply
loads.

1 So, it may not even have failed and not be
2 available.

3 Secondly, the gas turbine and the EMDs supply
4 power to common areas, and by that I am referring specifically
5 to the non-emergency switchgear room. The cable tray coming
6 from the EMDs comes around near the reactor building, and
7 through the block wall into the non-emergency switchgear room.
8 The line from the gas turbine comes through the RSST, the
9 transformer -- the reserve station transformer -- and it
10 comes through the similar block wall in that same area.

11 Those two sources of power are both subject to
12 problems during earthquakes in that particular area, with
13 failure of the block wall.

14 Similarly, when it gets inside that non-emergency
15 switchgear room, there is the potential of fire of a magnitude
16 which could damage both of those sources of power, since they
17 both go to a relatively close area within the non-emergency
18 switchgear room to connect to the buses they have to connect
19 to.

20 Third, the two systems in order to be brought
21 on line, either one of them, require human intervention,
22 particularly with the EMDs, and when you have human operators
23 following procedures, there is the possibility that they
24 will make errors in that procedure regardless of how well
25 you may think the procedure is laid out.

1 There is the possibility of making errors, and in
2 this particular case, for instance, if an error resulted in
3 closing both loads -- excuse me -- closing both generating
4 sources then on the same load, and they were not synchronized,
5 the action of that could cause both of them to trip off, in
6 which case you would have either of them.

7 It would be single failures in those type of events
8 that could cause both sources to be lost or the only source
9 that is available to be lost when the other one was just not
10 available for other reasons.

11 Q Gentlemen, counsel for the NRC staff asked
12 questions about the amount of time that would be available
13 in the event of a loss of offsite power.

14 Does the amount of time available, or that would
15 be available in the event of loss of offsite power at low
16 power operation at Shoreham affect your conclusions about
17 the relative reliability of the alternate AC -- to the
18 alternative proposed AC power system relative to a set of
19 qualified outside AC power sources?

20 A (Witness Bridenbaugh) I would say no, because
21 when you do the comparison, you have to postulate identical
22 circumstances for each -- for the situation in which you are
23 judging each of the systems.

24 So, therefore, the amount of time would not
25 affect that comparison.

1 A (Witness Minor) May I add something to that?
2 There was some discussion in the cross examination about
3 times at which you automate, and times in which you rely on
4 human action, and there is the unwritten ten minute rule in
5 the United States, which in other countries is a thirty minute
6 rule.

7 Whereby, if you need important safety actions
8 to be taken within that period of time, and they involve
9 human interaction and human activities which may be complex
10 or it may be something that you don't want to take a chance
11 in having them performed incorrectly during stressful periods,
12 you would automate those system actions.

13 That is exactly the approach that was taken on the
14 TDIs. They are automated to start, synchronize, load,
15 distribute that load properly to the systems that need the
16 power the most, isolate from the ones that don't, and in
17 other words, take the actions that are necessary to be sure
18 that you have load to the sources that really need the power.

19 We are dealing here with a system which certainly
20 is important to safety, and is being used to supply an alternate
21 means of powering those same loads. Yet, we are involving
22 a great deal of human interaction. We are involving numerous
23 steps and numerous different areas where these steps have
24 to occur.

25 Some of them outdoors, some of them indoors,

1 some of them in non-Class I structures, some of them in
2 Class I structures, seismic Class I, that is.

3 So, my own point of view is that this is -- if
4 you were designing this as a permanent installation, even
5 for operation at five percent power, you would probably not
6 leave this as a manual system.

7
8 End 15.
9 Mary fols.

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Sim 16-1

1 Q Gentlemen, Mr. Eley stated in response to a
2 question by Mr. Rolfe that he did not consider black start
3 turbines at Holtsville and other locations at LILCO
4 facilities in reaching the overall conclusions that he
5 expresses in his testimony.

6 Let me ask you all this first. Is that true
7 for all the members of the panel?

8 A (Witness Minor) That we did not include
9 Holtsville?

10 Q Yes.

11 A That is correct.

12 Q Could any of you explain why you did not
13 consider the Holtsville or other remote gas turbines?

14 A Our approach to this problem was to set out
15 the initiating event which is the event that GDC 17 is
16 designed to protect against, that is the loss of offsite
17 power and supplying power to emergency loads with a capable
18 and qualified onsite source.

19 Now having that, we looked at the alternate
20 sources that were available, but we kept the premise that
21 you had a loss of offsite power. We did not say that you
22 had a loss of offsite power until somebody may have gotten
23 another unit somewhere else back on line not knowing any
24 of the circumstances surrounding that. That just doesn't make
25 sense in this kind of evaluation.

Sim 16-2

1 We are trying to compare relative reliability
2 of the two approaches. The relative reliability of the
3 alternate configuration, considering the block of the power
4 coming from the gas turbine and the block of the power coming
5 from the EMDs with the reliability of three independent
6 TDI sources to provide redundant capability of loading
7 emergency buses and providing power to the pumps that are
8 necessary for core cooling.

9 That was the premise we set out with and therefore
10 Holtsville didn't enter into it.

11 Q How is it that the power from the remote gas
12 turbine, such as those in Holtsville, enters the Shoreham
13 site?

14 A Well, the answer is that it comes over the same
15 transmission lines that enter the plant which would provide
16 69 KV or for other systems it may be 138 KV to the site. So
17 that if you have lost offsite power ---

18 MR. ROLFE: Objection, Your Honor. The witness
19 is now making speeches beyond the question. The question
20 was how does it come into the plant. He testified that it
21 came in on the 138 or the 69 KV transmissions lines and
22 nothing else is required.

23 MR. BIRKENHEIER: I will ask another question,
24 Judge Miller.

25

Sim 16-3 1

BY MR. BIRKENHEIER:

2 Q How did the manner in which the power from the
3 remote gas turbines is transmitted to the Shoreham site
4 affect your evaluation, or let me rephrase that, your
5 determination not to consider those sources?

6 A (Witness Minor) The offsite power system, and
7 by that I mean the 69 and the 139 KV lines and the 69 and
8 the 138 KV substation are subject to a multitude of impacts
9 and effects that could be the initiating event that causes
10 the loss of off-site power.

11 Therefore, if you presume that you have lost
12 your transmission lines and therefore do not have offsite
13 power to provide your on-site loads, then the availability
14 of the Holtsville gas turbine would have no impact on the
15 situation at the plant. You still have no offsite power
16 because you have no transmission path for that to reach
17 the plant.

18 To get beyond that requires a very mechanistic
19 analysis where we assume certain types of transmission lines
20 have failed and certain have not or certain generating
21 sources offsite are available and certain are not and
22 its gets beyond the scope of any reasonable analysis of
23 the comparison asked for by the Commission in its order.

24 Q Gentlemen, previously Mr. Rolfe in a question
25 referred to an alternate electrical feed coming out of the

Sim 16-4

1 EMD control cubicle and running to I believe the emergency
2 switchgear. Does any panel member know whether such an
3 alternate feed exists?

4 A (Witness Bridenbaugh) Two of us, Mr. Minor
5 and myself, were at the plant on Saturday afternoon and it
6 did not exist as of Saturday afternoon. It is my understanding
7 that it has been discussed, but no commitment has been
8 made to install it.

9 A (Witness Minor) Similarly, I would say the
10 same, but there was a discussion in testimony earlier this
11 week where it was talked about as a proposal, but there are
12 some concerns that I think would have to be ironed out that
13 are not apparent in that proposal that they have been ironed
14 out, specifically how do you tie into the emergency switch-
15 gear room and bring it to the outside of the plant out on
16 the other wall of the emergency diesel facility with any
17 kind of retained reliability of the operation inside the
18 emergency switchgear room. It would be a very strange
19 connection if they made it, and it sounds like a bunch of
20 large extension cords.

21 MR. BIRKENHEIER: Your Honor, I move to strike
22 all of this as not being responsive. The question was
23 is there any tie-in now in existence period.

24 JUDGE MILLER: The motion to strike for responsive-
25 ness is available to the cross-examiner and not to the direct

1 examiner. He is in redirect. We will let the answer
2 stand.

3 MR. BIRKENHEIER: Mr. Minor, had you finished?

4 WITNESS MINOR: Yes, I had

5 BY MR. BIRKENHEIER:

6 Q Mr. Smith, in response to a question by
7 Mr. Rolfe you stated, as I recall, that you assumed that
8 the EMD housing was designed to allow these EMDs to operate
9 in adverse weather conditions, including heavy rain.

10 Does that fact affect your conclusion about the
11 possibility that water spray could be drafted into the
12 machines if one of them is burning and the others continued
13 to operate?

14 A (Witness Smith) No. The effect of a hose
15 actually playing on the side of one of those cabinets, if
16 they were applying boundary cooling, which I would assume
17 that any fire brigade would do to prevent the fire from
18 spreading, the impact of the fire hose on the side of the
19 casing in the area of that air intake would be totally
20 different to rain or snow or a winter that as postulated,
21 and it is high probably that the water would be drawn inside.

22 Q Mr. Eley, in response to a question by Mr. Rolfe
23 you stated that there were two separate startup motors on
24 each EMD, each of the Shoreham EMDs.

25 A (Witness Eley) Yes, I did.

Sim 16-6 1

Q Are those startup motors redundant?

2

A Yes, they are completely redundant. There are

3

two separate air compressors with two separate ---

4

Q I am talking about the EMDs.

5

A Oh, I do beg your pardon. Sorry.

6

There are two starter motors, electric starter

7

motors on the EMDs, and if either one of those two failed

8

to operate, then there is a possibility that the machine

9

would not start, whereas the old Astot, the original Astot

10

they had onboard, if one Astot motor failed, then the other

11

one could indeed start the machine.

12

So there is a difference between the Astot

13

motors that were originally fitted and the electric starting

14

motors.

15

Q So both of the electric motors are required

16

to start the EMDs or one of the EMDs?

17

A As far as I know, yes.

18

Q And those starters are not redundant?

19

MR. ROLFE: Objection, leading.

20

WITNESS SMITH: No.

21

JUDGE MILLER: It was leading. The answer

22

may stand but avoid leading.

23

MR. BIRKENHEIER: Okay.

24

BY MR. BIRKENHEIER:

25

Q Mr. Smith, in response to a question by

Sim 16-7 1

2 Mr. Rolfe -- I am sorry. Mr. Rolfe asked you a series
3 of questions about replacements of starter units and potential
4 explanations.

5 Do the repair records for the EMDs at Shoreham
6 indicate that starters have been replaced on individual
7 machines on a number of occasions?

8 A (Witness Smith) Yes. I think we listed the
9 actual number. I think it was 13 which are listed in the
10 maintenance records as having been replaced. There is one
11 specific occasion where on just one page of the maintenance
12 record there is a more than usual number of starter motors
13 being replaced.

14 Q Do you have any estimate of how long an operating
15 hour span those replacements were made over?

16 A The one page I was referring to, it was only
17 a matter of a short number of hours between replacements,
18 and as far as I know the procedures never asked for a whole
19 starter motor replacement. They only asked for inspection
20 of it and replacement of individual components if necessary,
21 but not for starter motor replacements.

22 Q Mr. Eley, do you recall a series of questions
23 by Mr. Rolfe about the maintenance schedules set forth
24 in the document which he provided to you during the afternoon
25 break?

A (Witness Eley) Yes.

Sim 16-8

1 Q Do you recall the date of the operating manual
2 which is referred to in the LILCO procedures?

3 A I don't recall the date of the operating manual
4 at all that was utilized, but I did make some comments
5 on the General Motors' recommendations, and I superimposed
6 those figures on here and they differ somewhat from what
7 we were given here today.

8 MR. BIRKENHEIER: Judge Miller, while I
9 continue with my questioning, I would like to have the
10 opportunity to obtain a copy of the maintenance manual to
11 refresh the witness' memory.

12 JUDGE MILLER: Yes.

13 BY MR. BIRKENHEIER:

14 Q Mr. Smith, you may recall a series of questions
15 asked by Mr. Rolfe about the installation and inspection
16 reports of the EMDs at Shoreham. Do you recall those?

17 A (Witness Smith) That is correct.

18 Q In your opinion, are parts that are nearing
19 overhaul in as good an operating condition as parts that
20 are not nearing overhaul?

21 A No, they are not in as good condition. By that
22 statement it indicates that there is some doubt in how
23 long they are going to last before they are going to have
24 to be replaced.

25 MR. BIRKENHEIER: Judge Miller, I have no

Sim 16-9 1

2 further questions other than that I would like the opportunity to refresh the witness' memory.

3 JUDGE MILLER: We will give you leave to go
4 back and re-examine when you get the material that you need.

5 MR. BIRKENHEIER: Okay.

6 JUDGE MILLER: With that explanation, I take it
7 you are through with the redirect examination?

8 MR. BIRKENHEIER: Yes.

9 JUDGE MILLER: Very well.

10 Recross limited to the scope of redirect.

11 MR. ROLFE: I will keep it so limited, Judge
12 Miller.

13 RECROSS-EXAMINATION

14 BY MR. ROLFE:

15 Q Mr. Smith, when you talk about approaching
16 overhaul, doesn't that mean approaching the manufacturer's
17 recommended maintenance intervals for those components?

18 A (Witness Smith) No. The reference here is
19 approaching overhaul is that the parts are obviously indicating
20 wear and tear which means they are going to have to be changed
21 not because of the number of hours because the machines are
22 nowhere near the number of hours which require overhaul.

23 Q Do you know for a fact what that means when
24 Morrison and Knutsen uses it on a maintenance form like
25 that?

INDEX

16-10

1 A I can only assume that they are indicating
2 that things will need to be replaced fairly soon.

3 Q How soon?

4 A I think in their testimony Mr. Lewis and
5 Mr. Iannuzzi stated a period of a thousand hours, but that
6 is purely a matter of judgment.

7 Q And you haven't inspected the parts personally,
8 have you, sir?

9 A No, I haven't had the opportunity.

10 Q Now, Mr. Minor, you said in response to
11 Mr. Birkenheier's question that a system operator or system
12 operator action was required for the 20 megawatt gas turbine
13 to come on line. In fact, that 20 megawatt gas turbine
14 will start automatically upon a loss of voltage; is that
15 not right, sir?

16 A (Witness Minor) That is correct. The loss
17 of voltage causes a start of the gas turbine.

18 Q And since there is a loss of voltage, the gas
19 turbine would come up to speed and provide power to the
20 69 KV line and on into the plant through the RSST, would
21 it not?

22 A In that far, yes.

23 Q And that would require no action by the system
24 operator, would it?

25 A Up to that point it would not.

Sim 16-11 1

2 Q Now, Mr. Minor, isn't it a fact that operator
3 error of commission or omission is considered a single
4 failure by the NRC?

5 A There are words in the GDC introduction that
6 consider that, yes.

7 Q Now you talk about the 20 megawatt gas turbine
8 and the EMD diesels supplying power to common areas. In
9 fact, they supply power to buses, do they not, Mr. Minor?

10 A Would you start that question again? I didn't
11 hear the introduction to that.

12 Q Certainly. You mentioned earlier that you
13 considered that to be a problem because the 20 megawatt
14 gas turbine and the EMD diesels supply power to common
15 areas, I think was the term you used. In fact, the EMD
16 diesels provide power to Bus 11 and the 20 megawatt gas
17 turbine would generally provide power to Bus 12; is that
18 right, sir?

19 A Yes, but those weren't the buses I was talking
20 about.

21 Q Now, Mr. Minor, you and Mr. Bridenbaugh stated
22 that you hadn't seen any evidence of any alternate tie-in
23 completed by LILCO and indeed I believe Mr. Shiffmacher
24 testified that the tie-in had not yet been begun.

25 You are aware, however, are you not, that the
safety evaluation report, Supplement 6 requires that some

Sim 16-12 1

2 alternate routing procedure be provided around the normal
3 switchgear room; isn't that right, sir?

4 A I don't recall the words being what you just
5 quoted. If you want to point me to the words, I would like
6 to refresh my memory on that. It seemed to me it said
7 something different than that.

8 MR. ROLFE: If Your Honor will indulge me
9 for one moment I will try to find that.

10 (Pause.)

11 Your Honor, I think rather than taking up
12 the Board's time by going through this lengthy document,
13 that there is no need to ask the question. It is either
14 in there or it is not in there.

15 JUDGE MILLER: The document would show.

16 MR. ROLFE: That is right.

17 BY MR. ROLFE:

18 Q Mr. Minor, you were asked the question why
19 this panel didn't consider all of the gas turbines located
20 at Holtsville, Port Jefferson, South Holt and East Hampton
21 which are deadline black-start gas turbines, and you stated
22 that you didn't consider those because they were offsite
23 and they would be part of a loss of offsite power, and you
24 further went on to say that you were trying to compare the
25 relative reliability of the 20 megawatt gas turbine with
the TDIs and the EMD diesels with the TDIs.

Sim 16-13 1

A I don't believe that is quite what I stated.

2

Q I apologize if I have mischaracterized it. My

3

question is, however, did you make any attempt to determine

4

the overall safety of operation of the plant at five

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percent power by considering the compositability of LILCO

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to restore AC power through whatever source within the

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time frames necessary in the event of a postulated accident

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or transient?

end 16

Sue fols

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#17-1-SueT 1

A (Witness Minor) Yes.

2

Q And in making that attempt, did you consider the
Holtsville deadline black-start gas turbine?

3

4

A I need to define what we did before I can answer
your second question. May I?

5

6

Q I would prefer if you just answered my question,
sir.

7

8

MR. BIRKENHEIER: The witness has stated that he
can't answer the question without the --

9

10

JUDGE MILLER: He can say that he can't answer
it. That will be the state of the record.

11

12

BY MR. ROLFE: (Continuing)

13

Q Is that through the comparative risk assessment
that Mr. Weatherwax (phonetic) performed, Mr. Minor?

14

15

A It's the combination of the work that was done
in this panel's testimony regarding relative reliability and
the work that was done on the panel that will be heard another
day that has to do with the overall chances of getting into
a core vulnerable condition or a more severe condition, given
that you have a loss of offsite power.

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And there you deal with the chances of restoring
power through various mechanisms. And that is where I was
talking about the relative reliability of, for instance, the
LILCO grid and it was -- uses an input to that particular
analysis.

#17-2-SueT 1

Q Yes, sir. Well, I don't want to get into that
2 now, because that will be the subject of another day.

3 Mr. Smith, you talked about the number of
4 starters that you saw in the maintenance records that had
5 to be replaced, and I assume that your reference was to
6 Suffolk County Exhibit LP-11, wherein it was shown on a
7 couple of days in 1978 that starting motors in these diesels
8 had to be replaced; am I correct, sir?

9 A I'm not sure of the exact page you are referring
10 to? May I get a copy?

11 (Mr. Earley hands the witness a document.)

12 That's one of the pages where several starter
13 motors are indicated as being changed.

14 Q Mr. Smith, isn't it a fact that the page you
15 have in front of you, which is Suffolk County Exhibit LP-11,
16 refers to starters being replaced in the year 1978?

17 A That's the year of this page, yes.

18 JUDGE MILLER: Could you otherwise identify that
19 page as an exhibit, please?

20 MR. ROLFE: It's a page out of one of the log
21 books proffered by Suffolk County.

22 JUDGE MILLER: I know what it is. I want the
23 record to reflect what page you are talking about.

24 MR. ROLFE: I'm sorry.

25 JUDGE MILLER: By date or number or whatever.

#17-3-SueT 1

MR. ROLFE: It is Suffolk County Exhibit LP-11.
Maybe the witness could identify it more specifically, since
I gave him my copy.

WITNESS SMITH: It's Suffolk County LP-11. One
of the pages out of those log books, individual log books,
of the EMDs that we saw.

JUDGE MILLER: Does it bear a certain date? How
could you find that one among the --

WITNESS SMITH: The date at the top of it --
it doesn't specify which machine, but the date of the first
line is 9/29/77. And the last date on the bottom is some-
thing 29/78.

JUDGE MILLER: Okay. Thank you.

BY MR. ROLFE: (Continuing)

Q Mr. Smith, isn't it a fact that the starters
referenced in that exhibit were fixed or replaced at that
time and that there have been no other problems with the
starting motors on those machines since?

A Yes, but I would have to go back and have a look
through the books again to see whether that was the last
time anything was changed on them.

MR. ROLFE: I have no further questions.

JUDGE MILLER: Staff.

MR. PERLIS: Just a very brief question.

25

#17-4-SueT 1

RE CROSS EXAMINATION

2 BY MR. PERLIS:

3 Q Mr. Minor, I believe you were the person who
4 talked about a ten minute rule for automatic operations.5 Is there a need to have power restored during
6 low power operation within ten minutes of any postulated
7 event?

8 A (Witness Minor) No.

9 MR. PERLIS: I have no further questions.

10 JUDGE MILLER: State of New York.

11 MR. PALOMINO: I have no questions.

12 JUDGE MILLER: Then, I guess there is nothing
13 further except you had to ask to examine regarding a certain
14 document.15 MR. BIRKENHEIER: I have one follow-up question
16 to the questions that were asked by Mr. Rolfe.

17 REDIRECT EXAMINATION

18 BY MR. BIRKENHEIER:

INDE XXXXX 19 Q Mr. Minor, you referred to the buses to which the
20 gas turbine and EMDs supply their power, and began an answer
21 that you had not meant buses 11 and 12 when you were talking
22 about this topic, but you did not get a chance to finish
23 your answer.

24 What bus or buses are you talking about?

25 A (Witness Minor) Mr. Rolfe limited his discussion

#17-5-SueT)

1 to buses 11 and 12 which are the incoming buses, and the
2 point where you pick up either RST or NSST sources. When
3 you get down to switching power to individual loads, for
4 instance, during the tests of the gas turbine, for instance,
5 in that instance you lock out one of the emergency diesel
6 generators, one of the onsite diesel generators, and you
7 bring in the load from the gas turbine to power some pumps
8 off of that bus.

9 Part of the action there is to switch from the
10 NSST to the RSST by closing certain breakers and opening
11 other breakers. If you fail to do that properly and brought
12 in an NSST source which, in this case, may be coming from
13 the diesels at the same time you had the gas turbine on, or
14 you had not locked out the onsite gas turbine and it had
15 started during the simulated deadline start, events of that
16 nature could cause more than one unit to be applied to the
17 same load. And if you did that, you could have unsynchronized
18 units closing in on the same load which would be enough to
19 knock them off line.

20 This is just an example of the places where that
21 could occur. Obviously, any loads that you bring these
22 sources to, you want one source of power because at that
23 point they are unsynchronized with one another and with the
24 offsite grid because it has been lost.

25 MR. BIRKENHEIER: I have no further questions,

#17-6-SueT 1

Judge Miller.

2 Judge Miller, at this time I would like to
3 renew my motion to move into evidence the testimony of
4 this panel along with the exhibits which were marked for
5 identification earlier today, Suffolk County Exhibits LP-36
6 through 50.

7 JUDGE MILLER: Judge Bright has some questions.

8 BOARD EXAMINATION

9 BY JUDGE BRIGHT:

INDEXXXXX 10 Q I just want to clarify a few things here on the
11 gas turbine situation.

12 Mr. Minor, you start on Page 44 at the bottom
13 and talk about, let's see, setting the thing up -- if it is
14 set up for remote control then the LILCO system operator in
15 Hicksville can do it, it was my understanding that this thing
16 is always going to be put in the black-start deadline
17 situation.

18 Do you have information to another effect there?

19 A (Witness Minor) Pardon me, Judge Bright. I'm
20 not sure I understand your question.

21 You are talking about the statements on Page 44
22 and 45?

23 Q Yes.

24 A And would you repeat your question? I'm sorry,
25 I was looking while you were talking.

#17-7-SueT1

Q Okay. I was just reading through this and suddenly we start talking about the system operator in Hicksville is going to do something with this machine perhaps, and I'm just asking you whether this thing is ever supposed to be out of the deadline black-start condition?

A I would suspect if you are going to be using it as a backup or an alternate source of power to replace the EMD diesels it should be in remote start, or -- excuse me, it should be in black line dead-start and not in the remote position. That would be the way you would normally leave it.

Q Okay. So, you have no information that it would ever be in any other position unless somebody made a mistake?

A Or unless it had been started as part of a test and had been left in the wrong position.

Q Then, you make a statement at the bottom of that paragraph, the last sentence, that if it failed to start properly the only way you could do anything about it would be to dispatch an operator to the gas turbine.

And then you make the statement: And that would take too long.

On what do you base your conclusion that that would take too long?

#17-8-SueT

2 A The comparison of length of time here as compared
3 to the goal in the test procedure, let's say, of having
4 power restored here, ten minutes I believe their goal was,
5 you would normally take two to three minutes to make the
6 determination that it was available and to actually get
7 the load on. If at that point, something went wrong and then
8 you started from there to dispatch an operator to go through
9 the process of getting out of the plant, walk to the switch-
10 yard, get into the gas turbine trying to figure out what's
11 wrong and try and get it restarted, you are dealing with
12 times that would probably take longer than the ten minutes
13 we are talking about.

14 Q So, you are talking about the ten minute unwritten
15 rule here rather than some ultimate time that --

16 A No, I didn't --

17 Q -- would be required to --

18 A Sorry, Judge Bright. I didn't mean to make a
19 transition to a ten minute rule there. The ten minutes I
20 am referring to is the ten minute goal that is in the
21 test procedure when they go through the testing of these
22 units.

23 For instance, the one-time test procedure that we
24 were talking about that the NRC observed, they wanted to
25 make sure that this unit got on line within, I believe the
time, ten minutes and if you did not then you were supposed

#17-9-SueT1

2 to go to the EMDs and get the EMDs on and you are supposed
3 to get them on line within thirty minutes.

4 So, if you did not have the gas turbine on line
5 within a few minutes you would start probably on the process
6 for the EMDs. You wouldn't send somebody out to fix the
7 gas turbine, and if you did it would probably be beyond
8 the ten minute time you are shooting for and there wouldn't
9 be assurance you could get it on line anyway, because it's
10 supposed to have started automatically.

11 Q So there would be nothing in the procedure about
12 an operator being sent to the turbine to go kick it and see
13 if that would start it or not, regardless of what you did
14 with the EMDs?

15 I may be straining your knowledge of the pro-
16 cedure, or it may just not be there.

17 A (Witness Bridenbaugh) Judge Bright, may I
18 comment?

19 Q Certainly.

20 A If you look at the restoration of AC power pro-
21 cedure with onsite mobile generators, which is TP29.015.03,
22 it discusses in the first section of that the symptoms during
23 which you would look for in making the decision to go with
24 the EMDs. And basically there are four symptoms that are
25 delineated there.

One is loss of power and failure of the TDIs to

#17-10-SueT

2 start up, which we have assumed anyway in this exercise. And
3 then failure of the onsite 20 megawatt gas turbine to start.

4 I think if you reach the situation that you are
5 postulating where you've had the blackout and the gas turbine
6 has not started, it's my reading of this procedure, that
7 you don't take the time to go to the gas turbine but you
8 move ahead to the EMD restoration procedure. And if you do
9 that, one of the first things that you do is to isolate the
10 rest of the system so that the gas turbine won't come up
11 and automatically close in on the backside of the EMDs and
12 disable the system, as we've mentioned here.

13 Q So, this is -- it's not part of the procedure to
14 go find out what has happened to the gas turbine, I presume?

15 A As far as I have been able to determine, it --

16 Q I mean, as an individual isolated act, not a
17 matter of it's going to be used or anything like that, but
18 just to go to it?

19 A I would assume that that would be done when the
20 operator -- if the operators had time to do that. But I
21 think their first duty would be to get some source of AC
22 power on, and if they didn't have the automatic start of
23 the gas turbine, I would assume they would go to the EMD
24 system.

25 Q Are you aware of what they mean when they say
"operator" in these procedures?

#17-11-SueT

1 A In some of these procedures, I just happen to
2 be looking at the one that I was talking about, in some
3 cases they identify operator. If they are talking about
4 system operator, they I believe say system operator. At
5 other times, they just say operator and it says that an
6 operator will be dispatched. Other times, they say field
7 operator.

8 Q You are not -- they are not talking about the
9 reactor operator specifically, are they?

10 A Well, certainly I would think they would not
11 talk about a reactor operator if they are talking about
12 dispatch an operator to some location away from the control
13 room.

14 Q Well, I guess what I wanted to find out, and
15 this is probably the wrong place and I may have to do it
16 on redirect, is to find out where people are around the
17 plant. So, if you will keep that in mind, Mr. Rolfe.

18 Down in the last part of Page 45, you say the
19 gas turbine is not designed such and thus. When you say
20 gas turbine, do you mean the gas turbine or do you mean
21 the whole system?

22 A (Witness Minor) I believe the basis for this
23 was established in the earlier part of the hearing, April
24 I believe when we asked questions of LILCO regarding the
25 design of this system to withstand an earthquake, meaning the

#17-12-SueT

2 gas turbine system. And it also relates to our own analyses
3 and considerations of some of the other components related
4 to the gas turbine that are necessary for it to supply
5 power to the RSST and on in to the plant.

6 Q Well, my question was somewhat simpler than that.
7 Do you mean the gas turbine itself, or do you mean the
8 gas turbine generator and its enclosures and the various
9 nuts and bolts and screws that make up the assembly?

10 A No, it's just related to the system aspect. I'm
11 not trying to pick out any individual component and say the
12 gas turbine and say that it wouldn't withstand the seismic
13 vibration, restricting myself now to the turbine as contrasted
14 with the system that makes up the gas turbine supply.

15 JUDGE BRIGHT: Fine. Thank you.

16 MR. BIRKENHEIER: I have one follow-up question,
17 Judge Miller.

18 JUDGE MILLER: I haven't given Judge Johnson
19 a chance.

20 Now, you are following up what, now?

21 MR. BIRKENHEIER: I just want to make a clarifica-
22 tion.

23 JUDGE MILLER: You aren't following up Judge
24 Bright now, are you?

25 MR. BIRKENHEIER: I just want to clarify some-
thing, an answer that was given in response --

#17-13-Sue 1

JUDGE MILLER: You have an irresistable urge
to ask one more question, is that it? Okay, one question.

REDIRECT EXAMINATION

BY MR. BIRKENHEIER:

INDEXXX

Q I want to make sure the record is not confused
on this point. Mr. Minor, in response to a question by Judge
Bright, you discussed the sentence that begins at the bottom
of Page 44 of your testimony and runs over to the top of
Page 45.

Do the statements you make there about remote
control deal with the starting of the gas turbine or the
operating of the gas turbine?

end #1713

Joe flw 14

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1 A It is dealing with the black start capability
2 of that unit. The control of the unit is relatively minimal.
3 You don't do very much to control the unit, but you do have
4 to initiate certain actions to have it start, or have it
5 start automatically on black start.

6 MR. BIRKENHEIER: I have no further questions.

7 JUDGE MILLER: All right. Now, you have made
8 a Motion to admit the testimony and the exhibits.

9 MR. BIRKENHEIER: If I may, I would like to
10 add to that motion five of the exhibits, which I had marked
11 for identification during my cross examination of Messrs.
12 Iannuzzi and Lewis. Those are exhibits 4, 5, 6, 9, and 11.
13 4, 5, 6, and 11 are pages which were removed from the
14 maintenance manuals -- I am sorry, for the manuals. For the
15 repairs of these machines, and Suffolk County Exhibit LP-9
16 is the July 6, 1984 letter from A. Kornichuk of EMD to a
17 Mr. Iannuzzi.

18 JUDGE MILLER: Any objections?

19 MR. ROLFE: Yes, Your Honor. LILCO has several
20 objections, both to the exhibits and to the testimony as a
21 whole.

22 JUDGE MILLER: Well, let's take the testimony
23 first, and then the exhibits.

24 MR. ROLFE: Okay. LILCO has filed a Motion to
25 Strike this testimony on several grounds, and I will just

1 briefly go into them.

2 First of all, LILCO does not believe that any
3 of these witnesses are qualified to express opinions about
4 the EMD diesels at Shoreham, or the 20 megawatt gas turbine
5 at Shoreham. Messrs. Eley and Smith have marine diesel
6 experience. Neither of them had ever previously operated,
7 maintained, or had any experience with EMD diesels.

8 They were not familiar with the industry
9 experience concerning EMD diesels, and furthermore, they
10 have had no experience with respect to nuclear plants, so
11 that they can't relate the EMDs to a qualified nuclear
12 diesel.

13 Similarly, Messrs. Minor and Bridenbaugh have
14 had no experience with diesel generators at all. Neither
15 have ever operated or maintained or been responsible for
16 operating or maintaining any type of diesel generator,
17 EMD or otherwise.

18 Additionally, none of these witnesses are
19 qualified to express the opinions in their testimony about
20 gas turbines. I think the gas turbine portion of the testimony
21 is limited to being sponsored by Messrs. Minor and Bridenbaugh,
22 but just in case I am wrong, I will point out that both
23 Messrs. Smith and Eley stated that they had no gas turbine
24 experience at all.

25 Messrs. Minor and Bridenbaugh testified that they

18-3-Wal

1 have not had any experience in operating or maintaining gas
2 turbines. Mr. Bridenbaugh stated that he had some limited
3 tangential experience in being involved with the installation
4 of the gas turbine in Arizona and back in 1966, I believe it
5 was, when he was with General Electric, but that was only
6 by way of reviewing some reports, and he didn't have any
7 day-to-day decision making responsibility with respect to it.

8 So, first of all, we don't have qualified witnesses
9 to express the opinions. Secondly, the testimony purports
10 to express conclusions about whether the operation of the
11 plant with these AC power systems would be as safe as operation
12 of the plant with the proposed onsite AC power system proposed
13 in the FSAR, the TDI diesels.

14 In fact, that analysis has not been made by the
15 witnesses own admission. What they done, they haven't looked
16 at the safety of the system, the AC power system at all. And
17 to the extent they express opinions about safety, and whether
18 the plant is as safe as it would have been, their testimony
19 is immaterial to that, because they don't try to do that.

20 What they have done, is first of all they have
21 individually compared the EMD diesels with the TDIs, and
22 then they have closed their eyes, forgotten EMDs exist, and
23 then they look at the 20 megawatt gas turbine and compare it
24 with the TDIs, when they don't compare the system -- by
25 Mr. Smith's own admission. What they are doing is postulating

1 double failures. They are not looking at the NRCs required
2 single failure rule, so in that vein their proposed safety
3 analysis is not material to any determination this Board
4 has to make.

5 And more importantly, they are not qualified
6 to compare the safety of the systems even if they wanted
7 to.

8 None of these gentlemen has had any experience
9 in operating nuclear power plants. None of these gentlemen
10 has had any experience in operating, installing, or maintaining
11 backup AC power sources at nuclear power plants, and so even
12 if they had tried to make the proper comparison, which they
13 didn't, they wouldn't have any expertise by which to do that,
14 because they wouldn't have any expertise by which to evaluate
15 the ability of LILCO to provide AC power within the time
16 parameters which have been described in this proceeding as
17 compared with the ability of LILCO to do that in the event that
18 it had had onsite AC power sources.

19 So, not only are the witnesses unqualified, but
20 they haven't attempted to study the safety of the plant. As
21 Mr. Minor said, they have looked at the reliability of the
22 EMDs versus the TDIs. They have looked at the reliability
23 of the gas turbine versus the TDIs, but the Commission's Order
24 doesn't talk about looking at reliability of isolated power
25 sources, and these gentlemen haven't even looked at the other

1 power sources that are available. They have ignored all the
2 gas turbines that are offsite.

3 What the Commission says we ought to look at
4 is whether operation of the plant is as safe as it would
5 have been with qualified onsite diesels. These witnesses
6 have not made any attempt to do that.

7 So, even if the Board were to find them qualified
8 to express certain knowledge about the characteristics of
9 those machines in isolation, all of the conclusions they
10 draw from those characteristics ought to be stricken, because
11 they are not qualified to draw any conclusions, and the ones
12 they try to draw aren't relevant to this proceeding.

13 For those two reasons, Your Honor, we believe
14 that the testimony in whole ought to be struck, or at a minimum
15 all of the conclusions with respect to the comparisons. And
16 I could go through and give Your Honors specific page and
17 line numbers that ought to be struck.

18 MR. BIRKENHEIR: Judge Miller, may I ask first if
19 the witnesses may be excused.

20 JUDGE MILLER: Yes, they may be excused. Thank
21 you, gentlemen.

22 (Panel stands aside.)

23 JUDGE MILLER: Staff?

24 MR. PERLIS: I think Mr. Rolfe has just provided
25 the Board with an excellent reason to give little or no weight

1 to the testimony provided by these witnesses, but I think
2 the objection does go to the weight and not admissibility,
3 and therefore, the Staff would not support a Motion to
4 Strike.

5 (Board Confers.)

6 JUDGE MILLER: The Board will overrule the
7 Motion. There may be in there some conclusory matters of
8 invading the provinces of the trier of facts, as we have
9 discussed. If there are, those would be disregarded by
10 the Board. But rather than take the time to go through,
11 in that respect, we think the witnesses have demonstrated
12 sufficient qualifications for the introduction of this
13 type of testimony, and so the Motion will be overruled.

14 Now, what about exhibits?

15 MR. ROLFE: Your Honor, with respect to the
16 exhibits --

17 JUDGE MILLER: By the way, are these photographs
18 supposed to be returned now? Is that the arrangement?

19 MR. BIRKENHEIER: Yes.

20 JUDGE MILLER: Pick them up. I don't want --

21 MR. BIRKENHEIER: All except one copy, which

22 --

23 JUDGE MILLER: That goes to the Reporter according
24 to you. Yes, go ahead, you may continue. LILCO?

25 MR. ROLFE: Judge Miller, LILCO just has an

1 objection to one exhibit, and it is Exhibit 9, proffered by
2 Suffolk County. That is the letter to Mr. Iannuzzi from Mr.
3 Kornichuk of General Motors.

4 That was a letter about which Mr. Iannuzi was
5 cross examined. He did not rely on it in his testimony in
6 any way.

7 JUDGE MILLER: Who produced it?

8 MR. ROLFE: LILCO produced it during discovery.

9 JUDGE MILLER: After the close of discovery,
10 but pursuant to informal discovery. Was that the one?

11 MR. ROLFE: No, Your Honor. I don't think that
12 was the one, and I can't represent to Your Honor exactly when
13 we did produce it. It was pursuant to a request from the
14 County for all documents in the possession of any of the
15 consultants that might bear on EMDs?

16 JUDGE MILLER: Cross examination of your
17 witness? What is your objection to it?

18 MR. ROLFE: It is hearsay.

19 JUDGE MILLER: Most documents are, --

20 MR. ROLFE: Well, if it is coming in for
21 impeachment purposes, that is one thing. If it is coming
22 in for substantive purposes, now I think it is hearsay, and
23 it is unreliable, and we don't have a witness here we can
24 cross examine about the letter.

25 JUDGE MILLER: But you produced the document, as

1 I understand you, which means you can get at the underlying
2 sources if you have any questions or it is prejudicial in
3 any way, can't you?

4 We wouldn't let them offer them, because we
5 wouldn't let any counsel offer in the other person's case.

6 MR. ROLFE: I understand that, Judge Miller.

7 JUDGE MILLER: It appears to us that it has
8 some tangential and certainly would explicate some of the
9 cross examination, is my recollection, so unless you have
10 some additional weighty reason, we are inclined to overrule
11 your objection.

12 MR. ROLFE: I have none weightier than that
13 I have already stated, Your Honor.

14 Judge Miller, at this time I would
15 like to proffer into the record, because I don't know if
16 LILCO will have a rebuttal case other than offering a witness
17 for --

18 JUDGE MILLER: Wait. Let us conclude first of
19 all with these exhibits.

20 MR. ROLFE: I am sorry. I don't have any other
21 objections?

22 JUDGE MILLER: Anybody have any other objections?

23 MR. PERLIS: Yes, Your Honor. As to -- it is
24 Attachment 16, which I believe was Exhibit 49.

25 JUDGE MILLER: 49. Okay.

1 MR. PERLIS: The only problem I have with this
2 document is both copies I have, the one with the prefiled
3 testimony and the one handed out this morning, are practically
4 illegible.

5 JUDGE MILLER: Well, we will ask that a more
6 legible copy --

7 MR. PERLIS: Unless a more legible copy can be
8 found.

9 JUDGE MILLER: Both for the record and the
10 parties.

11 MR. PERLIS: Yes. I just don't think the record
12 should be --

13 MR. BIRKENHEIER: Judge Miller, if I may comment
14 on that. The copies that we produced are the best that we
15 can make based on the copies that we were given from LILCO.

16 JUDGE MILLER: Just type it, attach it to it,
17 and then we can read it. And that, upon the furnishing
18 of a legible typescript, which counsel will represent it
19 as a copy of this data, then we will then overrule the
20 objection.

21 MR. PERLIS: Well, I don't mean to be difficult.
22 I am just not sure that anyone would be able to read this
23 to type a copy from it, and I don't know how accurate a copy
24 they could make.

25 JUDGE MILLER: Well, I don't either. But somewhere

1 in the future we are going to find out, because something will
2 be forthcoming.

3 If you think it is wrong, you can make an
4 appropriate one.

5 MR. PERLIS: I am not sure I will know either.

6 JUDGE MILLER: That way, nobody can get hurt,
7 can they. Okay, next? Is that all the exhibits?

8 MR. PERLIS: Yes, Your Honor. I have no objections
9 to any of the other exhibits.

10 JUDGE MILLER: Fine. I assume, Mr. Palomino,
11 that you have no objection?

12 MR. PALOMINO: No.

13 JUDGE MILLER: And the orders have been entered
14 and they will stand as to the testimony, which will become
15 part of the transcript, together with the qualifications,
16 with the qualifications included therein, and the exhibits
17 will be admitted, but will not become part of the transcript.

18 (Testimony and qualifications follows)

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of)

LONG ISLAND LIGHTING COMPANY)

(Shoreham Nuclear Power Station,)
Unit 1))

Docket No. 50-322-OL-4
(Low Power)

TESTIMONY OF G. DENNIS ELEY, C. JOHN SMITH, GREGORY C.
MINOR AND DALE G. BRIDENBAUGH ON BEHALF OF SUFFOLK COUNTY
REGARDING EMD DIESEL GENERATORS AND 20 MW GAS TURBINE

Introduction and Qualifications

Q. Please state your names and positions and describe your professional qualifications.

A. My name is G. Dennis Eley. My business address is 1301 Metropolitan Avenue, Thorofare, New Jersey 08086. I am a Technical Manager with Ocean Fleets Consultancy Service, Ltd. I have a combined First Class Department of Trade and Industry Certificate of Competency (Steam and Diesel), and a Higher National Certificate in Mechanical Engineering. I also am an Associate Member of the Institute of Marine Engineers, and a Member of the Institute of Port Engineers. Since 1959 I have held various engineering and consulting positions with concerns engaged in the design, manufacture and operation of ships and related machinery, including diesel engines and generators. In

these positions I have been responsible for the efficient operation of various diesel engines, boilers, air compressors and refrigeration systems. My qualifications are set forth more fully in my resume which is Attachment 1 hereto.

My name is C. John Smith, and I am an Assistant Technical Manager with Ocean Fleets Consultancy Service, Ltd. My business address is 1301 Metropolitan Avenue, Thorofare, New Jersey 08086. I have worked as a Marine Engineer with Ocean Fleets for the past 22 years, after joining them as an Engineer Cadet in 1962. I hold a Department of Trade and Industry First Class Certificate of Competency (Diesel). During my employment with Ocean Fleets I have had experience in the operation, maintenance and repair of a wide variety of makes of diesels, including Allen, Burmeister & Wain, Deutz, Diahatsu, Doxford, General Motors, Mak, Mitsubishi, Paxman, Petters, Rustonk, Sulzer, and Volvo, in applications both as generators and prime movers onboard ships. As part of my employment I have been required to attend two fire fighting and prevention courses given by the fire departments of the cities of Liverpool and Leith, ^{United Kingdom} ~~England~~. In recent years I have been actively involved in the design and implementation of fire and safety procedures onboard ships. I also have attended the building commissionings and delivery of four new ships, requiring the

inspection of machinery and systems for correct operation and compliance with statutory regulations. My resume is Attachment 2 hereto.

My name is Gregory C. Minor. I am a founder of and currently am a Vice President of MHB Technical Associates. My business address is 1723 Hamilton Avenue, San Jose, California 95125. I have 24 years of experience in the nuclear industry including design and testing of systems for use in nuclear power plants. For 16 years I was employed by General Electric Company as a design engineer and manager of engineering design organizations. My responsibilities have included the design and qualification testing and preoperational testing of safety systems to meet safety criteria applicable to nuclear power plants. I have also worked 8 years as a consultant with MHB Technical Associates. These consulting activities have included work on nuclear plant safety features and designs for governmental and private organizations as well as public interest groups. My education is in electrical engineering (with a power systems option) resulting in a B.S. degree from the University of California at Berkeley and an M.S. degree from Stanford. My qualifications are set forth more fully in my resume which has been submitted with the Testimony of Dr. Christian Meyer, Dr. Jose Roesset, and Gregory C. Minor on Behalf of Suffolk County.

My name is Dale G. Bridenbaugh. I am President of MHB Technical Associates, and I serve as a Principal Consultant in the performance of my firm's consulting activities. My business address is 1723 Hamilton Avenue, San Jose, California 95125. I am a Mechanical Engineer by education, having received a BSME in 1953. I am also a registered professional Nuclear Engineer in the State of California. I have more than 30 years experience in the engineering field, primarily in the areas of power plant analysis, construction, maintenance, and operations. A substantial portion of my experience was as a field engineer supervising the installation, operation, and maintenance of central station power plant equipment, including steam turbines, gas turbines, and emergency power generators. Further details of my experience and training are contained in my resume which is Attachment 3 hereto.^{1/}

Purposes and Conclusions

Q. What is the purpose of this testimony?

A. The Long Island Lighting Company ("LILCO") has requested an exemption from the requirements of 10 CFR Part 50,

^{1/} Unless otherwise indicated, all answers in this testimony are sponsored by all witnesses.

Appendix A, GDC 17. LILCO proposes that it be allowed to operate the Shoreham Nuclear Power Station ("Shoreham"), at up to five percent of rated power, without a fully qualified emergency, onsite AC power source, that has been designed, procured, manufactured, installed, and tested in compliance with all applicable NRC licensing regulations, and that has been adjudged to meet these requirements ("qualified onsite emergency AC power system").

Instead, LILCO proposes to operate Shoreham using a configuration which enhances LILCO's offsite AC power system, consisting of a set of four mobile diesel generators manufactured by the Electro-Motive Division of General Motors Corporation (the "EMDs") and a 20 MW Pratt and Whitney gas turbine.

This testimony addresses the question whether operating Shoreham at up to five percent of rated power relying on LILCO's proposed, alternate sources of emergency AC power would be as safe as operation at up to five percent power relying on a qualified onsite emergency AC power system. In particular, this testimony addresses the reliability of the EMDs and gas turbine starting and running, and their overall availability, compared with a fully qualified onsite emergency

AC power system. For purposes of this evaluation this testimony compares the EMDs and 20 MW gas turbine to LILCO's originally proposed onsite AC power system (the three diesels procured from Transamerica Delaval, Inc. ("TDI"), as it was envisioned by the FSAR.

Q. Describe briefly the onsite emergency AC power sources described in the Shoreham FSAR.

A. The originally proposed onsite AC power sources consist of three TDI diesel-generator sets ("EDG's") rated at 3500 KW each. Each of these units is housed in a separate reinforced concrete compartment which is designed to withstand the Shoreham safe shutdown earthquake. Each unit is designed to start automatically and to supply power sequentially to necessary engineered safeguards systems that are needed to assure safe shutdown and maintenance of reactor cooling and containment integrity in the event of a loss of coolant accident coincident with a loss of offsite power (a "LOOP-LOCA"). All appropriate design criteria, such as protection from fire and missiles, separation and single-failure, and other criteria necessary to assure on-site power reliability are committed to be followed in the design, procurement, installation, and operation of these units. This includes a commitment to a

Quality Assurance program in compliance with the requirements of 10 CFR 50, Appendix B.

Q. What is your conclusion?

A. Our conclusion is that low power operation of the Shoreham plant at up to five percent power relying on LILCO's proposed alternate AC power system would not be as safe as such operation with onsite emergency AC power sources that were fully qualified and satisfied all applicable regulatory requirements.

Low power operation in reliance on the proposed, alternate AC power system would not be as safe as such operation in reliance on a fully qualified set of onsite AC power sources, because the EMDs are not as reliable as the latter. First, unlike fully qualified generators, the EMDs have a number of common features that make them vulnerable to single failures. Second, the EMDs have no fire detection or fixed fire suppression systems, and therefore fire in one of the EMDs would be much more likely to incapacitate it and make operation of the other EMDs difficult if not impossible, than a fire in a qualified diesel generator. And, because the starter battery is inadequately ventilated and isolated from potential ignition sources, the threat of explosion or fire in EMD 402, where the

battery is housed, is greater than would be true of a qualified diesel generator.

Third, the alarms and monitors of the EMDs are not indicated in the control room, and all but one of them are annunciated only when the diesel shuts down. Consequently, unlike the case with qualified diesels, the EMD alarms are unlikely to lead to human intervention to remedy a developing problem before it causes the unit to stop or otherwise become inoperable. Even at the local control panel the EMD alarms are not specific enough to facilitate timely diagnosis and repair of failures with the machines.

Fourth, LILCO's proposed procedure for testing the EMDs does not provide adequate assurance that the EMDs will function as expected in an emergency. The proposed procedure does not test the automatic elements of the EMDs, and the procedure, as designed, is not likely to reveal significant, developing mechanical problems. Fifth, unlike a fully qualified AC power source, the processes for starting the EMDs and connecting them to the safety loads in the plant are not fully automatic. Consequently, the EMDs are more vulnerable to failure due to human error, and are less reliable than a completely automatic, qualified generator set. Sixth, the maintenance and

repair histories of the EMDs indicate that the EMDs have experienced both component failures and the need for overhaul much too frequently. Mechanical failures of the sorts experienced by these machines cast doubt on their reliability.

(Minor and Bridenbaugh) Low power operation in reliance on the proposed, alternate AC power system also would be less safe than such operation would be in reliance on a fully qualified set of onsite AC power sources, because the gas turbine is not as reliable as the latter. First, LILCO has not developed an effective surveillance testing program that provides adequate verification of the reliability of the gas turbine. Second, the alarm and control systems of the gas turbine are insufficient. Third, the gas turbine and its fuel system are susceptible to seismic and missile damage, and the gas turbine is vulnerable to single failures. Finally, the gas turbine is essentially a new installation due to modifications in its control and starting systems. None of these vulnerabilities or inadequacies is a characteristic of the originally proposed onsite AC power system, and consequently the gas turbine is less reliable than that system.

(Minor) In addition, the proposed alternate emergency onsite AC power system is less reliable than the originally

proposed AC power system, because it is more complex and therefore more susceptible to equipment failure and human error.

The EMD Diesel Generators

Q. What are the common features shared by the EMDs that render them susceptible to single failures?

A. (All Witnesses) The EMDs share (1) a single electrical output circuit from the EMD control cubicle^{2/} to ~~Emergency~~ Bus 11 in the plant; (2) a single starter system consisting of one battery array, one battery charger, and one starter control mechanism; and (3) a single fuel supply system. In addition, all the breakers connecting the individual EMD generators to their common bus are located in the EMD control cubicle.

Q. Describe the single electrical output line from the EMD control cubicle to ~~Emergency~~ Bus 11.

A. The electrical output of each EMD is carried by buried cable to the EMD control cubicle, where it is connected through an electrical breaker to a single three phase bus.^{3/} The

^{2/} The EMD "control cubicle" is a small, enclosed structure located next to EMD 401. The control cubicle houses the electrical and mechanical control equipment for the EMDs.

^{3/} An electrical bus typically is a copper or aluminum bar or plate housed in an electrical cabinet or enclosure. Be-

(Footnote cont'd next page)

output of all four EMDs is then carried by two three-conductor cables in a single raceway, which runs approximately 100 yards from the control cubicle to the switchgear room, and a quarter of the length of which is ^{proposed to be} covered by sand and stucco.

2. How does this single output line compare with LILCO's originally proposed onsite AC power source?

A. The power output of the three qualified diesel generators intended to be provided at Shoreham are completely separate and independent. Not only are the diesel generators themselves housed in separate compartments designed to withstand all design basis loads and phenomena, but each unit also is provided with all necessary auxiliaries and controls for independent operation. The power generated by each of the units is distributed by electrical systems provided with "physical and electrical separation of bus sections, switchgear, interconnections, feeders, load centers, motor control centers, and other system components." (FSAR 8.3.1.1.1).

(Footnote cont'd from previous page)

cause it is enclosed, it normally is not insulated. It is used to facilitate the interconnection of power supplies and associated branch circuits.

Q. How does the single output circuit affect the reliability of the EMDs when compared with a fully qualified emergency onsite AC power source?

A. If the single output circuit became inoperable due, for example, to any electrical malfunction or mechanical failure in the control cubicle, it would be impossible to transmit power from any of the EMDs to the plant. By contrast, because the power produced by each of the three qualified diesels is transmitted independently, the failure of one output line would affect only one generator. The other two would remain capable of generating and transmitting power. Consequently, the EMDs are less reliable, because a single failure in the output line would make all four EMDs unable to supply emergency AC power.

Q. Describe the common starting system for the EMDs.

A. The common starting system for the EMDs is comprised of a number of components. Included is a battery array housed in EMD 402. This array consists of a number of individual lead acid batteries connected in series, which provide a total available voltage of 125v. The battery array is connected to a stepping switch located in the EMD control cubicle. The stepping switch is necessary, because the battery array is capable of starting only one EMD at a time. When a start signal

is given, the stepping switch directs the battery power to one machine at a time, moving to the next machine when the first machine starts or fails to start after 15 seconds. Also included in the starting system is a battery charger located in EMD 402. It is connected to the battery array, and is intended to maintain it in a fully charged state.

2. Describe the starter system for a set of qualified onsite AC power sources.

A. The starting systems described in the FSAR that were to be provided for the fully qualified EDGs were substantially more reliable than the system provided for the EMDs. The FSAR states:

Each diesel generator set has a separate air starting system designed to be capable of starting the diesel engine without external power and also to meet the single failure criterion. The air storage tanks and piping between tanks and the air start distributors are designed to ASME Boiler and Pressure Vessel Code Section III, Class 3. All other portions of this system are designed to manufacturer's standards and Seismic Category I requirements."

(FSAR 9.5.6.1) Further:

Each [qualified] diesel generator is provided with two independent, redundant starting systems. Each independent starting system includes the following:

1. One ac motor-driven air compressor with intake filter

2. One air compressor after cooler
3. One refrigerant air drier with moisture trap
4. Two check valves
5. Two air storage tanks with relief valves and drain valves
6. One manual shutoff valve
7. One strainer
8. Instrumentation and control systems
9. Air starter distributor system

Each independent redundant air starting system is of sufficient volume to be capable of cranking the engine for a minimum of five starts, without recharging the tanks.

Each motor-driven air compressor has the capacity to recharge the air storage system in 30 min to provide for a minimum of five starts. Its motor is furnished with automatic start and stop control on pressure signals from the air storage tanks.

(FSAR 9.5.6.2).

Q. How does the common starter system affect the reliability of the EMDs relative to a qualified set of onsite power sources?

A. The EMDs are less reliable than qualified onsite generators, because, unlike the latter, the failure of the single starter system could make it impossible to start any of the

EMDs. The failure of the battery array and/or charger could render the starting system inoperable. Similarly, if the starter control mechanism in the EMD control cubicle failed, although electricity would be available to power the EMD starter motors, that electricity would not be transmitted to them, and none of the EMDs would be started. Therefore, the set of three qualified onsite generators described in the FSAR would be more reliable than the EMDs. As noted above, each TDI diesel generator is provided with two independent, redundant starting systems. (FSAR §9.5.6 2.) Thus, the failure of one starting system would not incapacitate even one qualified generator, and failure of two systems could only prevent the starting of one generator. The other generators still would be able to supply emergency power to the plant. By contrast, the failure of one starter component could prevent the entire EMD set from starting and from transmitting any power at all to the plant.

2. Describe the EMD fuel supply system.

A. The EMD fuel supply system also consists of several components. They include individual 130 gallon "day" tanks in each individual unit, which are joined together by an equalizing pipe. Fuel from all four day tanks flows through

the equalizing pipe in a manner which keeps the fuel in all four day tanks at the same level. Fuel is supplied to the day tanks by two transfer pumps located in EMD 402. Normally, only one of these two pumps operates; the second pump will run if the fuel level in the day tanks drops to an abnormally low level. These pumps draw the fuel through a single above ground pipe line.^{4/} This pipe runs next to the EMDs at the foot of a steep embankment. It passes under a temporary ramp constructed to allow vehicles to drive up the embankment, and ends at a fueling station. At that point, the pipeline is connected to a flexible hose which in turn is connected to a 9,000 gallon tank truck. Fuel from the truck is drawn by the pumps through the hose and supply pipe line, into the day tank in EMD 402. From there it flows to the other day tanks through the equalizing pipe. The EMD fuel supply system is illustrated in Attachments 4, 5 and 6.

2. Describe the fuel supply system for a set of qualified onsite diesel generators.

^{4/} We understand that LILCO has now committed to put this pipe underground. When data are available regarding the new pipe design, it may be necessary to amend this testimony.

A. Each of the three TDI diesel generators described in the FSAR has its own fuel system, which is physically isolated from the fuel systems for the other two generators. Each system consists of a completely buried tank and two fuel supply pumps housed in their own concrete block house. All components are designed to withstand the credible seismic events that may occur. Each system also has its own fuel supply line, which is buried. Thus the tanks, pumps and supply lines are protected from common fires and missile events. In addition, each generator also has its own "day" tank, which is isolated from the other generators' day tanks.

Q. How does the design of the EMD fuel supply system affect the reliability of the EMDs relative to a set of qualified onsite AC power sources?

A. The fuel system for the EMDs presents another single failure vulnerability that is absent from the qualified emergency AC power source described in the FSAR, and as a result, the EMDs are less reliable than qualified AC power sources. In the case of qualified generators, if a failure rendered a fuel supply system inoperable, because each qualified generator has an independent fuel supply system, only one of the three generators would be affected; the other two generators could

continue to produce power. By contrast, if the EMD fuel supply system failed, all four EMDs would be affected, because they all receive their fuel through that single system.

For example, because all the fuel for all the EMDs flows through the pumps and day tank in EMD 402, an interruption of the fuel supply in that unit would interrupt the flow of fuel to all four EMDs. Thus, if a fire occurred in EMD 402, or if the pumps or float switches in EMD 402 failed, fuel would not be transferred from the single supply pipe to the day tanks of any of the EMDs. Similarly, because all the day tanks are interconnected by the equalizing line, any single failure, such as a rupture due to a seismic event, could adversely affect all four EMDs.

The single failure vulnerability created by the EMD fuel supply system is heightened by two features that are particularly susceptible to the kind of failure that could affect all the EMDs.

First, fuel for the EMDs is transferred from the tank truck into the supply line through a hose running from the truck. This hose apparently just lies on the ground as it runs from the tank truck to the connection with the supply line. (See Attachment 7.) The area in which the tank truck and hose

are located is an area with significant construction activity,^{5/} and consequently it is quite possible that the hose could be damaged by construction activities or equipment. Because the fuel for all four EMDs flows through this one piece of equipment, damage to it could terminate the flow of fuel from the tank truck to all four EMDs.

Second, the single supply line that carries fuel from the hose to EMD 402 is susceptible to failure due to both ground motion and missile impact. As other witnesses for Suffolk County have testified, a seismic event with ground acceleration of 0.2g's could cause the pipeline to rupture. (See Testimony of Dr. Christian Meyer, Dr. Jose Roesset and Gregory C. Minor on Behalf of Suffolk County.) The supply line is also susceptible to damage from missile impact. For example, at the point at which the pipe issues from under the south side of the ramp (See Attachment 4) there is no protection from the possibility of a vehicle, such as an articulated truck, striking and rupturing the pipe. Again because fuel for all four EMDs flows through this pipeline, damage to it would interrupt the flow of fuel from the tank truck to all the EMDs.

^{5/} Completion of the Colt diesel addition program (through preoperational testing) is not expected until mid-1985, well after LILCO's proposed low power test program would likely be completed.

Q. How is the reliability of the EMDs affected by the location of the breakers for all four EMDs in the EMD control cubicle?

A. The reliability of the EMDs is reduced, because a single event, such as an electrical fire in the control cubicle, or missile damage, could disable all four breakers and make it impossible to transmit emergency power from the EMDs to ~~Emergency~~ Bus 11.

Q. What fire protection systems were included in the onsite AC power system originally proposed for Shoreham?

A. The onsite emergency generator system originally proposed for Shoreham contained both fixed fire detection and fixed fire extinguishing systems. These fire protection systems, as described in the FSAR (Section 9.5), contain permanent and automated detectors and fire suppression devices in each EDG compartment. These systems are designed to automatically activate CO₂ fire suppression systems which flood the compartments with CO₂ gas. The fire protection systems also provide immediate alarms in the main control room to assure that followup operator action is initiated. Because each of the three TDI EDGs is in its own separate compartment, these systems operate independently to enhance the reliability of each unit.

Q. What fire protection systems exist for the EMDs?

A. The EMDs contain no fire detection equipment and no fixed, remotely operated fire extinguishing system. The only fire extinguishing equipment associated with the EMDs is a small number of hand-held fire extinguishers stored inside the EMD units and two fire hydrants located in their vicinity.

Q. How does this lack of fixed fire detection and suppression systems affect the reliability of the EMDs relative to a set of fully qualified onsite AC power sources?

A. It makes the EMDs less reliable than the qualified sources. First, it is unlikely that a fire in one of the EMDs would be discovered until it was too late to extinguish it exp^editiously. Because the EMDs are not fitted with a fire detection system, the first indication of a fire would be smoke or flames escaping from the housing of an EMD. Even then detection would only occur when someone happened to see the smoke or flames.

By the time a fire in an EMD is sufficiently well established to cause smoke or flames to issue from the housing, it may be so well established that it will be impossible to enter the EMD housing and apply an extinguishing medium to the

seat of the fire. Without the ability to direct hoses and extinguishers at the seat of the fire, it is very unlikely that the fire could be extinguished before the EMD was rendered inoperable. Consequently, personnel responding to the fire would have to be content with containing it.

In addition, the vulnerability of the EMDs is increased by the fact that it is unlikely the other three EMDs could be kept running if one EMD were burning. Fire fighters responding to such a fire would almost certainly want to isolate sources of fuel from the fire. This would mean stopping the flow of fuel from the tank truck as well as isolating the day tank of the burning unit. Consequently, the other three EMDs would have only the fuel that was in their day tanks when the burning unit was isolated. Also, operating EMDs draw large amounts of air. Therefore running them while a neighboring unit is burning creates the risk of drawing flames into the non-burning machine through the air intakes. Similarly, because the fire fighters almost certainly would spray large amounts of water on the non-burning EMDs to cool them, there is a risk that water could be drawn into the running EMD through its air intakes. Finally, a fire in EMDs 401 or 402 could result in water being sprayed on the nearby EMD control cubicle. To eliminate the risk of electrical injury to the fire

fighters, the flow of electricity through the switchgear in the control cubicle probably would have to be stopped, thereby preventing the operation of any of the EMDs.

This situation makes the EMDs less reliable than qualified, onsite generators, because they are more vulnerable to fires. By way of example, with LILCO's originally proposed diesel generators, any fire would be detected quickly; indeed the precursors to the fire, such as hot gases, might even be detected before the fire actually began. And once a fire was detected, the fixed mitigation system could quickly attempt to extinguish it. A fire in an EMD almost certainly would incapacitate the EMD, whereas one of the originally proposed diesel generators would have a much better chance of surviving a fire; and while a fire in one qualified diesel would not affect the others, a fire in one EMD would make it very difficult to continue to run the others.

Q. Is the EMD arrangement more vulnerable to fire hazards in any other ways?

A. Yes. The absence of fire detection and fixed fire suppression equipment is a serious shortcoming in any diesel configuration, because operating diesel engines always present a potential for fire. But this shortcoming is especially

serious with respect to the EMDs, because they are more vulnerable to common fire damage than the diesel configuration originally proposed by LILCO. Unlike a set of qualified diesel generators, the EMDs are not separated by approved, fire barrier walls. The EMDs are simply sitting in a row, with each unit approximately 8 to 12 feet from the next one. (See Attachment 4.) Consequently, there is a greater potential that a fire in one EMD could spread to the other EMDs and prevent the entire set from supplying emergency power to the plant.

Moreover, the EMD starting battery array poses a threat of explosion and fire. When the EMDs are started, the starter battery is partially depleted, and it must be replenished by the battery charger. While they are being charged, batteries generate both oxygen and hydrogen gases. The hydrogen gas is a potential source of explosion. Safe operating practice dictates that batteries should be housed in a compartment with no potential sources of ignition, and which is ventilated to outside air either naturally or mechanically in a manner which prevents the accumulation of explosive gases.

Neither of these practices is followed with the EMDs. The starter battery array for all four EMDs is stored beneath the floor of the engine compartment of EMD 402. Instead of

ventilation that carries potentially explosive gases to the outside air, gases generated by this starter battery are vented into the enclosed engine compartment of EMD 402. There those gases are exposed to electrical devices, such as lights, light switches and relays, all of which could create sparks and ignite an explosion and possibly a fire. (See Attachments 8 and 9).

An explosion or fire could incapacitate EMD 402. But it also could disable the common starting system for all four EMDs by destroying the battery. It also could incapacitate the fuel supply system for all four EMDs, which runs through EMD 402. Consequently, the threat of explosion or fire resulting from the improper ventilation of the starting battery array is a potential single failure that could prevent the operation of the entire EMD set.

There is no comparable threat of explosion associated with the originally proposed diesel generators, because their starting systems utilize no batteries and therefore there is no source of hydrogen. (FSAR 9.5.6.2,

Q. What are LILCO's proposals for testing the EMDs?

A. LILCO proposes to conduct bi-weekly surveillance testing of the EMDs. The details of this plan are described in ~~Temporary Procedure~~ TP 24.307.04. Rev. 0, June 7, 1984. By this procedure, LILCO will manually start the EMDs one at a time to be sure that three of the four mobile diesels "can be manually started and operated at rated speed." This process is deficient in that it does not provide for regular testing of the automatic starting, synchronizing, and load sharing mechanisms as these devices would be required to operate during the LOOP-LOCA scenario. Consequently, LILCO's proposed testing would not identify potential problems with key automatic elements of the EMD configuration, and as a result that testing does not provide an accurate indication of the reliability of the EMD system. The need for regular testing of these systems is demonstrated by the fact that during an electrical function test performed on July 2, 1984, one EMD failed to synchronize; and during attempts to restart this machine, two of the other EMDs tripped off.

In addition, there are specific deficiencies in the proposed test procedure aside from the failure to test the entire EMD system. (See Attachment 10, which is an appendix to

Procedure TP 24.307.04 that sets forth the steps to be followed in the manual starting and loading of the EMDs). First, the procedure does not provide for a visual inspection of each EMD prior to starting the engine. Such an inspection is good operating practice. It permits the operators to ensure that the required amount of vital fluids is present, and that equipment failures or human errors have not left the engine mechanically unsound. Starting the engine without a visual inspection increases the risk that the machine will be damaged and rendered inoperable.

Second, although the General Motors manual for the EMDs states that prelubrication of the EMD engine is a "necessary and important practice for any engine which has been inoperative for more than 48 hours" (See Operating Manual, MU-20E Power Plants for Peaking, Reserve, and Base Load Operation (the "EMD Operating Manual"), at 9-17), the LILCO test procedure does not require the "necessary and important" prelubrication.

Third, the LILCO test procedure does not indicate how long an EMD should be run once it has been started and connected to electrical loads. Consequently, it is possible that the EMDs will not be run long enough at their normal

operating temperature to allow temperatures to stabilize in individual components. Stopping an engine before this occurs reduces component life and operating reliability.

Fourth, the LILCO test procedure does not call for a visual inspection of the machines while they are running. Such an inspection is important, because many developing mechanical problems can only be detected while the engine is running. If no one inspects the machine while it is operating, such problems could go undetected. As a result, the operators would not have the opportunity to repair the problem before it became serious enough to make the machine inoperable.

Finally, the LILCO test procedure does not call for a visual inspection after completion of the test. Thus, LILCO passes up another opportunity to discover developing problems with the machines. Moreover, a post-test visual inspection serves to verify that the soak back lube oil pump for the turbocharger is operating properly. Failing to verify that the soak back pump is functioning increases the risk of damage to the turbocharger.

2. How do the deficiencies you have identified in LILCO's test procedure relate to the reliability of the EMDs?

A. Each of these deficiencies results in a missed opportunity to discover developing problems with the units, increased risk of damage to components, or reduced operating life of components. Consequently, all of these deficiencies reduce the reliability of the EMDs.

2. How does the alarm monitoring present in the EMD configuration affect its reliability when compared with qualified diesel generators?

A. Inadequacies in the EMDs' alarm system make it less likely that they will operate reliably than would a set of qualified diesel generators. When qualified onsite diesels are operating, personnel in the control room are informed of deviation of the diesel systems from design parameters (e.g., cooling, fuel, lubrication) by alarm systems that are displayed in the control room. Early detection of an abnormal condition gives the control room personnel the ability to take corrective action before the condition deteriorates to the point at which the diesel(s) automatically stops. Thus, the operating reliability of the diesels is enhanced by adequate alarms.

The EMDs do have alarm systems, but all the alarm signals except one ("Abnormal Fuel Tank Level") are given only when a problem becomes serious enough to initiate an engine

shutdown. That is, all but one of the alarms go off only when it is too late for human intervention to correct an abnormal condition prior to shutdown. In addition, the EMD alarm system is not sufficiently precise to facilitate the prompt diagnostic and repair actions that would be needed to restore to service a failed EMD. Indeed, four of the alarm lights on the EMD annunciator panel cover 17 separate shutdown causes. For example, if the "Engine Stop" light and the "Generator Breaker" light come on simultaneously, the problem could be low engine lubricating oil pressure, low engine cooling water level, excessive crankcase pressure, engine overspeed, or an open breaker. Consequently, when faced with those two alarms, the operators would have to check a long list of potential problems in order quickly to repair the EMD.

By contrast, the description of the alarm system contained in the Shoreham FSAR sets forth the comprehensive instrumentation provided for operation and monitoring of a typical qualified onsite AC power system.

Surveillance instrumentation is provided to monitor the status of the diesel generator. Provisions for surveillance are an essential requirement in the design, manufacture, installation, testing, operation, and maintenance of the diesel generators. Such surveillance not only provides continuous monitoring of the status of the emergency generators so as to indicate their readiness to perform their intended function, but also serves to facilitate

testing and maintenance of the equipment. Conditions which can adversely affect performance of the emergency diesel generators are annunciated locally and in the main control room. The following list shows the important functions that are annunciated:

<u>Function</u>	<u>Alarm</u>	
	<u>Local</u>	<u>Control Room</u>
1. Low Pressure Lube Oil	x	x
2. High Temperature Lube Oil	x	
3. Low Pressure Turbo Oil	x	
4. High & Low Temperature Jacket Water	x	
5. Low Pressure Jacket Water	x	
6. Low Level Jacket Water	x	
7. Low Level Fuel Day Tank	x	
8. Low Level Lube Oil	x	
9. Low Pressure Starting Air	x	
10. Aux. Pump Switches Off	x	
11. Low Pressure Lube Oil Shutdown	x	
12. High Temperature Lube Oil Shutdown	x	
13. Low Pressure Turbo Oil Shutdown	x	
14. High Temperature Jacket Water Shutdown	x	
15. High Pressure Crankcase Shutdown	x	
16. Overspeed Shutdown	x	x
17. Low Pressure Fuel Oil	x	
18. High Level Fuel Day Tank	x	
19. Low Flow Service Water	x	
20. Fail to Start	x	
21. Unit Unavailable	x	
22. Diesel System Degraded		x
23. Diesel System Inoperative		x
24. Diesel Engine Trouble		x
25. Emergency Bus Supply or Feeder Breaker Auto Trip		x
26. Generator Neutral Ground Overcurrent		x
27. Low Level Fuel Storage Tank	x	
28. Generator Field Manual Shutdown	x	
29. Generator PT Blown Fuse		x
30. Generator Voltage Regulator Power Failure		x
31. Main Board Control Disabled	x	x
32. Generator Heater Loss of Control	x	
33. F.O. Suction Strainer High Differential Pressure	x	
34. Jacket Water Conductivity High	x	
35. Motor Driven Fuel Pump Running	x	
36. Field Flash Inoperative	x	
37. Fuel Oil Transfer Pump Locked Out	x	
38. Fuel Oil Booster Pump Strainer High Differential Pressure	x	

NOTE: Alarm No. 24 includes Local Alarm Nos. 2 through 10, 17, 18, 19, 20, 27, 28 and 34. Alarm No. 23 includes Local Alarm No. 21 and 36. Alarm No. 22 includes Local Alarm No. 32.

(FSAR 8.3.1.1.5)

Moreover, the EMD alarm indications are only given on an annunciator panel in each EMD unit. This means that during operation the EMD alarms cannot be read from the control room, but instead can only be read if operating personnel actually monitor the individual annunciator panels in each EMD unit. LILCO's procedures do not provide for operators to be in the EMD units during their operation. The only indication in the control room of the status of the EMDs is an indication of whether any voltage is being supplied by the EMDs. There is no indication in the control room of how many EMD units are operating, how they are sharing the load, or if one or more are in difficulty and/or about to shut down. Consequently, it is possible, for example, for only one EMD to be operating, without control room personnel knowing that the other three have shut down. In contrast to the situation with the originally proposed diesel generators, in such circumstances the operators of the EMDs would not know how close they were to losing all their EMD-supplied power. Thus, the operators would be unable to attempt to head off developing operating problems before

those problems forced the EMDs to cease operation. Consequently, the reliability of the EMDs is less than that of a set of qualified diesels that can be monitored in the control room.

2. Are the EMDs started and loaded in the same manner as qualified, onsite AC power sources?

A. No. The normal design of safety-related onsite emergency AC generators is to have power available within 10 seconds of a loss of offsite power. (FSAR 8.3.1.1.8) All the starting and loading functions are performed automatically without operator assistance. LILCO's originally proposed onsite AC power systems were designed to meet this standard.

By contrast, starting and loading of the EMDs is a multiple step process. The starting sequence is automatic, but a total of at least 18 manual operations, performed by operators under the potential stress of an emergency situation, are required to connect the necessary electrical loads for the engineered safeguard systems to the EMDs. (See procedure TP 85.84042.3, Rev. 1, pages 6, 7.) A start signal is given simultaneously to all the EMDs by the EMD autostart system upon loss of voltage on the EMD bus. However, because only one cranking battery is provided for all four units, electricity is

provided to each unit's starter motors serially. The starter control mechanism in the EMD control cubicle supplies starting power to each EMD, one at a time, for cranking. After the first unit has started, or has cranked for a timed period, the control mechanism switches power to the next EMD. After a 90 second warmup period at idle speed, each engine goes to full speed as soon as engine oil pressure is satisfactory. The first engine to reach full speed has its speed adjusted to give the correct frequency and is then connected to the EMD bus. As the other machines come up to speed, they are synchronized with the first machine and then connected to the EMD bus. When all the running EMDs are synchronized and connected to the EMD bus, they can be manually connected to ~~Emergency~~ Bus 11.

The EMD Operating Manual estimates that for deadline start it will take approximately 2 minutes for one unit to start, idle, accelerate and be ready to receive load. However, loading is not done until the last unit is synchronized with the other units and all units are ready to be loaded. This means that for four units it will take between 2 minutes 20 seconds and 2 minutes 50 seconds to have them synchronized and ready to accept load, in contrast to the 10 seconds required by the FSAR.

In addition, in contrast to the fully automated operation of qualified onsite AC power sources, operation of the EMDs depends on the actions of human operators. Consequently, the risk of human error is greater with the EMDs, and this additional risk reduces their reliability. Before the breaker from the EMD bus to ~~Emergency~~ Bus 11 can be closed, supplying power to the emergency loads, field operators must manually (1) remove three undervoltage program fuses in the service water pump cubicle; (2) open the gas turbine feeder breaker, the feedwater pump feeder breaker, and the 480V substation feeder breaker, in the normal switchgear room; and (3) go outside to the Normal Station Service Transformer ("NSST") and open three disconnect switches on the low side of the NSST. Those disconnect switches and the NSST are depicted in Attachment 11. LILCO's procedures call for an operator to be dispatched to perform these actions. (See Procedure TP 85.84042.3, Rev. 1, Step 8.5.1) In order for an operator to leave the control room and complete those necessary tasks, he must travel nine flights of stairs, pass through approximately 15 doors (6 of which are locked, security doors, and require a credit card-like key to open), and he must pass one security station. The large number of stairways and doors involved in this process increases the chances that the operator will be unable to complete his assigned tasks in a timely manner.

In addition, step (3) above requires the operator to leave the building, climb over the EMD cable raceway, and open three switches on the NSST. In order to open the switches, the operator has to use an approximately twenty foot long fiberglass pole, with a hook at the end. The difficulty involved in performing this task increases the risk of delay. Moreover, the difficulty of opening these switches under adverse weather or lighting conditions is significantly increased, especially because there is no emergency lighting in the vicinity of the NSST.

In addition, the impact of human error potential in the operation of the EMDs is further increased, because it is necessary for operators manually to manage the load of the EMDs from the EMD control cubicles.

(Smith) LILCO personnel have acknowledged during a recent demonstration that manual control of the loads placed on the EMDs could be necessary to ensure that the engines do not run at loads low enough to be detrimental to the machines.

(All witnesses) This necessary local management increases the risk of human error, especially because the EMD control cubicle contains only one set of current and power meters; monitoring the load on each EMD is consequently a

cumbersome process. Because this management increases the risk of human failure, the reliability of the EMDs relative to that of fully automated power sources is decreased.

Q. What information relating to the reliability of the EMDs is contained in the records of their maintenance and repair histories?

A. (Eley and Smith) The maintenance records for the EMDs for the period 1974 through 1983 show that exclusive of replacement of parts at scheduled maintenance periods the following components have had to be replaced:

- 17 cylinder heads
- 21 power assemblies (a power assembly consists of complete cylinder, piston and cylinder head)
- 3 turbochargers
- 13 starter motors

The failure of this number of major components over an average of 2,255 hours per machine is greater than expected for reliable diesels.^{6/}

Furthermore, although the EMD Operating Manual states that repowering^{7/} should take place at 12,000 hours and Power

^{6/} Salient events from the maintenance and repair histories of the EMDs are set forth in Attachments 12 through 15.

^{7/} In a "repowering" the cylinder assemblies (piston, piston rod, cylinder and cylinder head), and the fuel injectors

(Footnote cont'd next page)

Systems (LILCO's agent for maintaining the EMDs) states in its maintenance agreement with LILCO that repowering should take place after 16,000 hours, the maintenance records show that EMDs 401 and 403 only ran 6,900 hours before requiring repowering. EMDs 402 and 404 have only 6,300 and 5,000 hours, respectively, since they were fitted with Utex Engines.^{8/} Nonetheless, after their installation inspection at Shoreham, Power Systems had concerns about the mechanical condition of EMDs 402 and 404 and stated in its installation inspection report that the "[e]ngine components are used and approaching overhaul." Copies of the relevant pages of the installation inspection report are attached to this testimony as Attachment 16.

(Footnote cont'd from previous page)

are replaced, and the following parts are checked and changed or adjusted as needed:

connecting rod bearings
 piston cooling tubes
 rocker arms, rocker arm bushings
 and cam followers
 lash adjusters
 exhaust valve timing
 water pumps

^{8/} A Utex Engine is a factory rebuilt engine brought up to as new standards.

Some additional, specific incidents documented in the maintenance histories of the EMDs which give rise to our concern about their reliability are described below.

At 12,932 hours (i.e., only 6,900 hours after having been fitted with a Utex engine), the engine in EMD 401 was repowered. Eighty-seven hours later power units^{9/} 4, 6, 10, 11, 13 and 18 had to be changed again because of damage to the cylinders and pistons that had occurred in the short time after the repowering. After a further 15 minutes of running, Power Unit No. 11 was again changed because of cylinder/piston damage. For this number of components to be changed so soon after overhaul (when they would be expected to last approximately 12,000 hours) indicates that either the maintenance or components were of poor quality.

The turbocharger on EMD 404 failed at 10,992 hours. The normal expected life of a turbocharger is 32,000 hours. A mere 704 hours later the new turbocharger failed in such a fashion that pieces of the broken turbocharger pierced the aftercoolers, requiring them to be changed also. These two

^{9/} A "Power Unit" consists of the cylinder head assembly, cylinder liner, piston assembly, carrier assembly, connecting rod assembly, and all related gaskets and seals.

failures, coupled with the fact that EMD turbochargers have had a history of problems (see Refinement of the Electro-Motive Turbocharger GM Aug. 1982) indicate that this component has low reliability.

In light of the facts that the EMDs have required the replacement of parts due to failures as well as repowering much more frequently than one would expect, it seems likely that there is some serious deficiency either in some of the machines or in the manner in which they have been maintained. In either event, the risk of mechanical failure seems higher than it should be. This increased risk is made worse by the fact that LILCO's test procedure is not adequate to discover developing mechanical problems. The end result is another factor that reduces the reliability of the EMDs.

The 20 MW Gas Turbine

Q. Has LILCO developed an effective surveillance test program for the gas turbine to assure it will be available when needed?

A. (Minor and Bridenbaugh) We have been provided with only two gas turbine test procedures, SP 24.307.07 (Draft) and TP 24.307.08, Rev 1, July 2, 1984.^{10/} Our review of these two

^{10/} TP 24.307.08 also makes reference to an unidentified "biweekly 13 MWE load test" but we have been unable to determine if such a test procedure in fact exists, or what its purpose may be.

procedures leads us to conclude that they are not an effective surveillance program for the new service assigned to the gas turbine.

Procedure TP 24.307.08 is entitled "Six Month Surveillance on 20 MW Gas Turbine Generator No. 2". The apparent purpose of this procedure is to demonstrate the ability of the unit to start and carry some safety related load in the event of a loss of off-site power. During this test the gas turbine is required to carry the load of only one or two operating RHR pumps from the 103 emergency bus. These two pumps have a total power rating of 1998 KW, so if both are run simultaneously, this would load the gas turbine to approximately only 10% of its rating. The procedure is silent as to how long the load should be carried.

Procedure SP 24.307.07 is entitled "Monthly Black Start Test of the 20 MW Gas Turbine." It calls for the gas turbine to be started, loaded and operated for at least one hour every two weeks, and to be black started monthly. ("Black start" is the term used to define a component which has the ability to start and operate with no external power being supplied to it.) The specific test included as an appendix to this procedure is identified as a "Monthly Test" but describes

in step 23 the performance of a "13 MWe biweekly load test." It is, accordingly, not clear what test requirement is being fulfilled by this procedure, and we conclude that the final details have not yet been developed.

Q. Do you conclude that the surveillance test program for the gas turbine is ineffective?

A. (Minor and Bridenbaugh) Yes. The six month testing of the gas turbine at only 5 to 10 percent of its rated capacity for a non-defined period of time does not sufficiently tax the unit to verify its reliability. The test is too easy. The one month (or perhaps bi-weekly) load test is obviously not yet developed. A test in such a preliminary stage of development does not have well enough defined goals, procedures, or acceptance criteria to provide adequate verification of the reliability of the gas turbine for the service for which it has been proposed. Our position that the proposed test is not sufficient to verify the ability of this unit to supply the necessary loads is supported by the NRC Staff's review of this issue reported in the Safety Evaluation Report (NUREG-0420, Supplement 5, April 1984). In this report, the Staff expressed concern regarding the possible imposition of non-safety loads on the gas turbine that could result in a total of 17 MW on the

unit. The Staff has recommended more frequent full load testing and monthly testing to verify that the normal 69 KV and 4.16 KV loads will automatically disconnect. (NUREG-0420, Supplement 5, page 8-2 and 8-3).

Q. Does the Shoreham control room have adequate controls and alarms for monitoring the operation of the 20 MW gas turbine?

A. (Minor and Bridenbaugh) The only indication available in the Shoreham control room from which operation of the gas turbine can be inferred is the indication of voltage on the 69KV line and a light which indicates whether the 20 MW gas turbine breaker is open or closed. Thus, as is the case with the EMDs, the operators in the control room cannot monitor the operation of the gas turbine in the manner made possible by the comprehensive alarm monitoring system associated with the originally proposed onsite AC power system. Consequently, with the gas turbine, the operators do not have the same ability to intervene and rectify developing problems with the unit's operation that they have with respect to the originally proposed onsite AC power system.

Moreover, under most conditions, the gas turbine can only be operated at the local control panel at the gas turbine

or by the LILCO system operator in Hicksville, if the control is set up for remote control. If the controls are set for black start operation, then the unit is supposed to start automatically if voltage is lost on the 69KV line. Thus, there is no way to start the 20 MW gas turbine manually from the Shoreham control room, short of artificially creating a loss of power event by isolating the 69 KV line. The control room operator cannot directly start or initiate a restart attempt of the gas turbine as a precautionary or supplemental measure. Consequently, the only way that the gas turbine can serve the needs of Shoreham in a timely manner is if its controls are left in the proper auto start position, and it performs correctly during a loss of offsite power event. If it failed to start properly, the only way to determine the status of the machine and attempt a restart would be to dispatch an operator to the gas turbine, and that would take too long.

Q. Is the gas turbine protected against phenomena such as seismic events, external missiles and other potentially destructive events?

A. (Minor and Bridenbaugh) The gas turbine is not designed to be able to withstand the Shoreham safe shutdown earthquake, nor is its fuel supply tank. The turbine is not

enclosed by anything other than a weatherproof enclosure, and therefore, its operation is vulnerable to missiles such as those that could be generated by falling aircraft.

Q. Is the gas turbine designed to satisfy the single failure criterion?

A. (Minor and Bridenbaugh) No, it is not. Because the gas turbine is a single unit, the failure of any one of many critical components could prevent or interrupt its operation. Of particular importance is its reliance on a single starting system and a single fuel supply line routed to it from the fuel tank approximately 40 yards away. This fuel line could be severed by missile impact, such as falling transmission towers or lines, or out-of-control motor vehicles. (See Attachment 17.)

Q. Does the past performance of the gas turbine provide assurance that it will perform reliably in the future?

A. (Minor and Bridenbaugh) No, it does not. Although this unit had several thousand hours of operation in the past, it was moved to Shoreham only in the Spring of 1984. Coincident with this move, the control and starting equipment necessary to provide black start capability was added to this unit. Thus, it is essentially a new installation with the inherent startup "bugs" still to be worked out.

Q. What is your conclusion as to the reliability of the 20 MW gas turbine as a source of emergency onsite AC power, relative to the originally proposed onsite AC power system?

A. (Minor and Bridenbaugh) The 20 MW gas turbine is not as reliable as the originally proposed onsite AC power system. It does not meet the single failure criterion, it is not qualified to withstand any of the necessary design basis phenomena, and it is not even under the control of the Shoreham control room operators. Moreover, LILCO's proposed test procedures do not adequately assure the reliable operation of the unit, and its alarm monitoring is inadequate. None of these vulnerabilities or inadequacies present in the 20 MW gas turbine configuration are present in the originally proposed onsite AC power system. As a result, the gas turbine is not as reliable as the latter.

Complexity of the Proposed Alternate
AC Power System

Q. In what ways is the proposed, alternate AC power system more complex than the originally proposed AC power system?

A. (Minor) The electrical connections associated with the alternate AC power system proposed by LILCO are more complex than those associated with the originally proposed onsite

AC power source. The EMDs are not connected directly to the emergency load centers (Buses 101, 102 and 103). To reach those centers, AC power from any EMD must pass through 3 circuit breakers and 2 buses. Output from the 20 MW gas turbine must take an even longer and less certain route in order to reach the safety loads connected to the emergency 4 KV buses. Power from the gas turbine must pass through 3 circuit breakers, 3 switches and 2 transformers. By contrast, AC power produced by one of the originally proposed onsite generators must pass through only 1 intervening device, a single circuit breaker, in order to reach safety loads connected to an emergency 4 KV bus.

Q. How does this increased complexity affect the reliability of the proposed alternate AC power system relative to the originally proposed system?

A. (Minor) The increased complexity of the proposed alternate AC power system reduces its reliability relative to the originally proposed onsite AC power system. In general, the less complex a system is, the more likely it is to be able to perform its assigned task. A less complex system involves lower potential for failure of intervening hardware and less need for coordination of automatic and manual actions; as a

result, a less complex system is more reliable. Moreover, because of both the greater number of devices and the increased complexity of necessary procedures involved in the proposed alternate AC power system, it is subject to a greater potential for human error in its design, implementation and operation, than is the originally proposed AC power system.

Q. Does that conclude your testimony?

A. (All witnesses) Yes.

CONFIDENTIAL

RESUME

Name: George Dennis Eley
Address: 117 Bortons Road
Marlton, New Jersey 08053
Home Phone: (609) 768-6699
Business Phone: (609) 848-2913

Licenses and
Certificates: Combined First Class Certificate of Competency
Steamship & Motorship. Higher National
Certificate in Mechanical Engineering.

Society
Memberships: Associate Member of The Institute of Marine
Engineers. Member of the Institute of Port
Engineers. Member of the ASTM Task Group on
Pollution Abatement Equipment (F25.11).

Employment History

1981 - 1983 Marine Consultant with:-
Head Office:- Ocean Transport and Trading PLC.
India Buildings
Water Street
Liverpool, England L20RB
Telephone No. 011-44-51-236-9292
Address of U.S.A. Office:-
Ocean Fleets Consultancy Service
1501 Grandview Avenue
Midatlantic Corporate Center
Thorofare, New Jersey 08086
Telephone Nos. (609) 435-6457 & (609) 848-2913

1969 - 1981: - Third Assistant, 2nd And Chief
Marine Engineer with above Company.

1966 - 1969: - Estimator and Contracts Engineer for British
Shipbuilders at:-

Austin & Pickersgill Limited
Shipbuilders and Installation
Engineers
P.O. Box 38
Southwick
Sunderland
Tyne & Wear, England

Telephone Nos. 011-44-783-57684

1959 - 1966: - Apprentice Pitter & Turner, then Contracts
Engineer with:-

George Clark & N.E.M., LTD.
P.O. Box 8
Northumberland Engine Works
Wallsend, Northumberland, England

Telephone No. 011-44-966-623141

Summary of Work Experience & Accomplishments

As a Marine Consultant with Ocean Transport & Trading, my duties
have included:-

Negotiation and formation of a joint venture with the American
Bureau of Shipping to provide fuel services to the marine
industry.

My responsibilities have been to negotiate with Senior Officers of
ABS and to formulate operational policy. My duties also include
coordination of the various departments and efficient operation of
the business. I have implemented the Data Bank System for the
above business and control the staff so doing. I also act as an
independent consultant on machinery damage investigations and run
seminars for the following establishments on fuel technology.

1.) "Kings Point Merchant Marine Academy" on Professor
Christenson's "Continuing Education on Diesel Technology" given to
chief engineers studying for advanced certification.

2.) Maritime Safety International lecturing to chief and port
engineers on poor quality fuel oil.

3.) Marine Engineers Benefit Association to chief and port
engineers on poor quality fuel oils.

In addition I advise on system design for ships engine rooms and upgrade existing vessel so that they have full operational capability on lower quality fuel. I have worked in this capacity with major American shipping companies and normally negotiate the contracts for so doing with the vice presidents of those respective companies.

Prior to my employment as a Consultant, I was employed by the same company for 12 years as a Marine Engineer in all capacities up to the rank of Chief Engineer. In this capacity my responsibilities were for the efficient operation and maintenance of various diesel engines, boilers, air compressors, refrigeration systems which encompassed a high degree of automation. Coordination with different marine and hull classification societies was also a requirement as was the effective implementation of planned maintenance scheduling.

Before continuing my career at sea, I was employed by British Shipbuilders as a Contracts Engineer. During this period, my responsibilities were to produce ships specifications for newbuildings to a potential owners requirements, and also to handle all ships contract correspondence. It was also my responsibility to estimate the costs of various building projects and submit these costs for negotiation with the owners representatives.

Prior to my employment with British Shipbuilders, I served an Engineering Apprenticeship with George Clark & N.E.M. LTD., a Marine Enginebuilder. On completion of my apprenticeship I continued as a Draughtsman with this same company in the Engine Design Department until I was promoted to Contracts Engineer with duties similar to those held at British Shipbuilders.

RESUME

NAME: Christopher John Smith

ADDRESS: 33173 Gillette Street
Lake Elsinore, CA 92330

HOME PHONE: 714-678-4278

BUS. PHONE: 609-848-2913

QUALIFICATIONS

FIRST CLASS CERTIFICATE OF COMPETENCY "MOTOR"

PERSONAL

Age: 38 years Height: 5'11" Weight: 160 lbs.

EMPLOYMENT

1983 Marine Consultant with:
Ocean Fleets Services
1301 Metropolitan Avenue
Thorofare, New Jersey 08086

1970-1983 Served as Second Engineer on company vessels.
Responsible for the efficient operation of all
main and auxiliary machinery.

Resume
Christopher John Smith

- 1967-1970 Served as Fourth and Third Engineer on company vessels.
- 1962-1967 Joined Ocean Fleets and trained as an Engineer Cadet.

WORK EXPERIENCE

During final year of apprenticeship spent several months in the company's engineering department designing engine room modifications for unmanned operation of machinery spaces of two classes of company ships.

Have stood by the building of four of the company's ships in Japanese shipyards. This involved the checking and testing of most systems and machines in the machinery spaces and making modification recommendations where applicable.

Recently as a consultant, I have been advising a major American shipping company on the improved design and operation of their machinery on lower grade fuel.

INTERESTS

Aircraft maintenance, flying, and sky-diving.

PROFESSIONAL QUALIFICATIONS OF DALE G. BRIDENBAUGH

DALE G. BRIDENBAUGH
1723 Hamilton Avenue
Suite K
San Jose, CA 95125
(408) 266-2716

EXPERIENCE:

1976 - PRESENT

President - MHB Technical Associates, San Jose, California

Co-founder and partner of technical consulting firm. Specialists in energy consulting to governmental and other groups interested in evaluation of nuclear plant safety and licensing. Consultant in this capacity to state agencies in California, New York, Illinois, New Jersey, Pennsylvania, Oklahoma and Minnesota and to the Norwegian Nuclear Power Committee, Swedish Nuclear Inspectorate, and various other organizations and environmental groups. Performed extensive safety analysis for Swedish Energy Commission and contributed to the Union of Concerned Scientist's Review of WASH-1400. Consultant to the U.S. NRC - LWR Safety Improvement Program, performed Cost Analysis of Spent Fuel Disposal for the Natural Resources Defense Council, and contributed to the Department of Energy LWR Safety Improvement Program for Sandia Laboratories. Served as expert witness in NRC and state utility commission hearings.

1976 - (FEBRUARY - AUGUST)

Consultant, Project Survival, Palo Alto, California

Volunteer work on Nuclear Safeguards Initiative campaigns in California, Oregon, Washington, Arizona, and Colorado. Numerous presentations on nuclear power and alternative energy options to civic, government, and college groups. Also resource person for public service presentations on radio and television.

1973 - 1976

Manager, Performance Evaluation and Improvement, General Electric Company - Nuclear Energy Division, San Jose, California

Managed seventeen technical and seven clerical personnel with responsibility for establishment and management of systems to monitor and

measure Boiling Water Reactor equipment and system operational performance. Integrated General Electric resources in customer plant modifications, coordinated correction of causes of forced outages and of efforts to improve reliability and performance of BWR systems. Also responsible for development of Division Master Performance Improvement Plan as well as for numerous Staff special assignments on long-range studies. Was on special assignment for the management of two different ad hoc projects formed to resolve unique technical problems.

1972 - 1973

Manager, Product Service, General Electric Company - Nuclear Energy Division, San Jose, California

Managed group of twenty-one technical and four clerical personnel. Prime responsibility was to direct interface and liaison personnel involved in corrective actions required under contract warranties. Also in charge of refueling and service planning, performance analysis, and service communication functions supporting all completed commercial nuclear power reactors supplied by General Electric, both domestic and overseas (Spain, Germany, Italy, Japan, India, and Switzerland).

1968 - 1972

Manager, Product Service, General Electric Company - Nuclear Energy Division, San Jose, California

Managed sixteen technical and six clerical personnel with the responsibility for all customer contact, planning and execution of work required after the customer acceptance of department-supplied plants and/or equipment. This included quotation, sale and delivery of spare and renewal parts. Sales volume of parts increased from \$1,000,000 in 1968 to over \$3,000,000 in 1972.

1966 - 1968

Manager, Complaint and Warranty Service, General Electric Company - Nuclear Energy Division, San Jose, California

Managed group of six persons with the responsibility for customer contacts, planning and execution of work required after customer acceptance of department-supplied plants and/or equipment--both domestic and overseas.

1963 - 1966

Field Engineering Supervisor, General Electric Company, Installation and Service Engineering Department, Los Angeles, California

Supervised approximately eight field representatives with responsibility for General Electric steam and gas turbine installation and maintenance

work in Southern California, Arizona, and Southern Nevada. During this period was responsible for the installation of eight different central station steam turbine-generator units, plus much maintenance activity. Work included customer contact, preparation of quotations, and contract negotiations.

1956 - 1963

Field Engineer, General Electric Company, Installation and Service Engineering Department, Chicago, Illinois

Supervised installation and maintenance of steam turbines of all sizes. Supervised crews of from ten to more than one hundred men, depending on the job. Worked primarily with large utilities but had significant work with steel, petroleum and other process industries. Had four years of experience at construction, startup, trouble-shooting and refueling of the first large-scale commercial nuclear power unit.

1955 - 1956

Engineering Training Program, General Electric Company, Erie, Pennsylvania, and Schenectady, New York

Training assignments in plant facilities design and in steam turbine testing at two General Electric factory locations.

1953 - 1955

United States Army - Ordnance School, Aberdeen, Maryland

Instructor - Heavy Artillery Repair. Taught classroom and shop disassembly of artillery pieces.

1953

Engineering Training Program, General Electric Company, Evendale, Ohio

Training assignment with Aircraft Gas Turbine Department.

EDUCATION & AFFILIATIONS:

BSME - 1953, South Dakota School of Mines and Technology, Rapid City, South Dakota, Upper 1/4 of class.

Professional Nuclear Engineer - California. Certificate No. 0973.

Member - American Nuclear Society

Various Company Training Courses during career including Professional Business Management, Kepner Tregoe Decision Making, Effective Presentation, and numerous technical seminars.

HONORS & AWARDS:

Sigma Tau - Honorary Engineering Fraternity.

General Managers Award, General Electric Company.

PERSONAL DATA:

Born November 20, 1931, Miller, South Dakota.

Married, three children

6'2", 190 lbs., health - excellent

Honorable discharge from United States Army

Hobbies: Skiing, hiking, work with Boy Scout Groups

PUBLICATIONS & TESTIMONY:

1. Operating and Maintenance Experience, presented at Twelfth Annual Seminar for Electric Utility Executives, Pebble Beach, California, October 1972, published in General Electric NEDC-10697, December 1972.
2. Maintenance and In-Service Inspection, presented at IAEA Symposium on Experience From Operating and Fueling of Nuclear Power Plants, Bridenbaugh, Lloyd & Turner, Vienna, Austria, October, 1973.
3. Operating and Maintenance Experience, presented at Thirteenth Annual Seminar for Electric Utility Executives, Pebble Beach, California, November 1973, published in General Electric NEDO-20222, January, 1974.
4. Improving Plant Availability, presented at Thirteenth Annual Seminar for Electric Utility Executives, Pebble Beach, California, November 1973, published in General Electric NEDO-20222, January, 1974.
5. Application of Plant Outage Experience to Improve Plant Performance, Bridenbaugh and Burdsall, American Power Conference, Chicago, Illinois, April 14, 1974.
6. Nuclear Valve Testing Cuts Cost, Time, Electrical World, October 15, 1974.

7. Testimony of D. G. Bridenbaugh, R. B. Hubbard, and G. C. Minor before the United States Congress, Joint Committee on Atomic Energy, February 18, 1976, Washington, D.C. (Published by the Union of Concerned Scientists, Cambridge, Massachusetts.)
8. Testimony of D. G. Bridenbaugh, R. B. Hubbard, G. C. Minor to the California State Assembly Committee on Resources, Land Use, and Energy, March 8, 1976.
9. Testimony by D. G. Bridenbaugh before the California Energy Commission, entitled, Initiation of Catastrophic Accidents at Diablo Canyon, Hearings on Emergency Planning, Avila Beach, California, November 4, 1976.
10. Testimony by D. G. Bridenbaugh before the U. S. Nuclear Regulatory Commission, subject: Diablo Canyon Nuclear Plant Performance, Atomic Safety and Licensing Board Hearings, December, 1976.
11. Testimony by D. G. Bridenbaugh before the California Energy Commission, subject: Interim Spent Fuel Storage Considerations, March 10, 1977.
12. Testimony of D. G. Bridenbaugh before the New York State Public Service Commission Siting Board Hearings concerning the Jamesport Nuclear Power Station, subject: Effect of Technical and Safety Deficiencies on Nuclear Plant Cost and Reliability, April, 1977.
13. Testimony by D. G. Bridenbaugh before the California State Energy Commission, subject: Decommissioning of Pressurized Water Reactors, Sundesert Nuclear Plant Hearings, June 9, 1977.
14. Testimony by D. G. Bridenbaugh before the California State Energy Commission, subject: Economic Relationships of Decommissioning, Sundesert Nuclear Plant, for the Natural Resources Defense Council, July 15, 1977.
15. The Risks of Nuclear Power Reactors: A Review of the NRC Reactor Safety Study WASH-1400, Kendall, Hubbard, Minor & Bridenbaugh, et al, for the Union of Concerned Scientists, August, 1977.
16. Testimony by D. G. Bridenbaugh before the Vermont State Board of Health, subject: Operation of Vermont Yankee Nuclear Plant and Its Impact on Public Health and Safety, October 6, 1977.
17. Testimony by D. G. Bridenbaugh before the U.S. Nuclear Regulatory Commission, Atomic Safety and Licensing Board, subject: Deficiencies in Safety Evaluation of Non-Seismic Issues, Lack of a Definitive Finding of Safety, Diablo Canyon Nuclear Units, October 18, 1977, Avila Beach, California.

18. Testimony by D. G. Bridenbaugh before the Norwegian Commission on Nuclear Power, subject: Reactor Safety/Risk, October 26, 1977.
19. Swedish Reactor Safety Study: Barseback Risk Assessment, MHB Technical Associates, January, 1978. (Published by the Swedish Department of Industry as Document DsI 1978:1)
20. Testimony by D. G. Bridenbaugh before the Louisiana State Legislature Committee on Natural Resources, subject: Nuclear Power Plant Deficiencies Impacting on Safety & Reliability, Baton Rouge, Louisiana, February 13, 1978.
21. Spent Fuel Disposal Costs, report prepared by D. G. Bridenbaugh for the Natural Resources Defense Council (NRDC), August 31, 1978.
22. Testimony of D. G. Bridenbaugh, G. C. Minor, and R. B. Hubbard before the Atomic Safety and Licensing Board, in the matter of the Black Fox Nuclear Power Station Construction Permit Hearings, September 25, 1978, Tulsa, Oklahoma.
23. Testimony of D. G. Bridenbaugh and R. B. Hubbard before the Louisiana Public Service Commission, Nuclear Plant and Power Generation Costs, November 19, 1978, Baton Rouge, Louisiana.
24. Testimony by D. G. Bridenbaugh before the City Council and Electric Utility Commission of Austin, Texas, Design, Construction, and Operating Experience of Nuclear Generating Facilities, December 5, 1978, Austin, Texas.
25. Testimony by D. G. Bridenbaugh for the Commonwealth of Massachusetts, Department of Public Utilities, Impact of Unresolved Safety Issues, Generic Deficiencies, and Three Mile Island-Initiated Modifications on Power Generation Cost at the Proposed Pilgrim-2 Nuclear Plant, June 8, 1979.
26. Improving the Safety of LWR Power Plants, MHB Technical Associates, prepared for U.S. Dept. of Energy, Sandia Laboratories, September 28, 1979.
27. BWR Pipe and Nozzle Cracks, MHB Technical Associates, for the Swedish Nuclear Power Inspectorate (SKI), October, 1979.
28. Uncertainty in Nuclear Risk Assessment Methodology. MHB Technical Associates, for the Swedish Nuclear Power Inspectorate (SKI), January 1980.

29. Testimony of D. G. Bridenbaugh and G. C. Minor before the Atomic Safety and Licensing Board, in the matter of Sacramento Municipal Utility District, Rancho Seco Nuclear Generating Station following TMI-2 accident, subject: Operator Training and Human Factors Engineering, for the California Energy Commission, February 11, 1980.
30. Italian Reactor Safety Study: Caorso Risk Assessment, MHB Technical Associates, for Friends of the Earth, Italy, March, 1980.
31. Decontamination of Krypton-85 from Three Mile Island Nuclear Plant, H. Kendall, R. Pollard, & D. G. Bridenbaugh, et al, The Union of Concerned Scientists, delivered to the Governor of Pennsylvania, May 15, 1980.
32. Testimony by D. G. Bridenbaugh before the New Jersey Board of Public Utilities, on behalf of New Jersey Public Advocate's Office, Division of Rate Counsel, Analysis of 1979 Salem-1 Refueling Outage, August, 1980.
33. Minnesota Nuclear Plants Gaseous Emissions Study, MHB Technical Associates, for Minnesota Pollution Control Agency, September, 1980.
34. Position Statement, Proposed Rulemaking on the Storage and Disposal of Nuclear Waste, Joint Cross-Statement of Position of the New England Coalition on Nuclear Pollution and the Natural Resources Defense Council, September, 1980.
35. Testimony by D. G. Bridenbaugh and G. C. Minor, before the New York State Public Service Commission, In the Matter of Long Island Lighting Company Temporary Rate Case, prepared for the Shoreham Opponents Coalition, September 22, 1980, Shoreham Nuclear Plant Construction Schedule.
36. Supplemental Testimony by D. G. Bridenbaugh before the New Jersey Board of Public Utilities, on behalf of New Jersey Department of the Public Advocate, Division of Rate Counsel, Analysis of 1979 Salem-1 Refueling Outage, December, 1980.
37. Testimony by D. G. Bridenbaugh and G. C. Minor, before the New Jersey Board of Public Utilities, on behalf of New Jersey Department of the Public Advocate, Division of Rate Counsel, Oyster Creek 1980 Refueling Outage Investigation, February 1981.
38. Economic Assessment: Ownership Interest in Palo Verde Nuclear Station, MHB Technical Associates, for the City of Riverside, September 11, 1981.

39. Testimony of D. G. Bridenbaugh before the Public Utilities Commission of Ohio, in the Matter of the Regulation of the Electric Fuel Component Contained Within the Rate Schedules of the Toledo Edison Company and Related Matters, subject: Davis-Besse Nuclear Power Station 1980-81 Outage Review, November, 1981.
40. Supplemental Testimony of D. G. Bridenbaugh before the Public Utilities Commission of Ohio, in the matter of the Regulation of the Electric Fuel Component Contained within the Rate Schedules of the Toledo Edison Company and Related Matters, subject: Davis-Besse Nuclear Power Station 1980-81 Outage Review, November 1981.
41. Systems Interaction and Single Failure Criterion, Phase 2 Report, MHB Technical Associates for the Swedish Nuclear Power Inspectorate (SKI), January, 1982.
42. Testimony of D. G. Bridenbaugh and G. C. Minor on behalf of Governor Edmund G. Brown Jr., before the Atomic Safety and Licensing Board, regarding Contention 10, Pressurizer Heaters, January 11, 1982.
43. Testimony of D. G. Bridenbaugh and G. C. Minor on behalf of Governor Edmund G. Brown Jr., before the Atomic Safety and Licensing Board, regarding Contention 12, Block and Pilot Operated Relief Valves, January 11, 1982.
44. Testimony of D. G. Bridenbaugh before the Commonwealth of Massachusetts, Department of Public Utilities, on behalf of the Massachusetts Attorney General, Pilgrim Nuclear Power Station, 1981-82 Outage Investigation, March 11, 1982.
45. Testimony of D. G. Bridenbaugh before the Pennsylvania Public Utility Commission, on behalf of the Pennsylvania Office of Consumer Advocate, Beaver Valley Outage, March, 1982.
46. Interim testimony of D. G. Bridenbaugh before the Illinois Commerce Commission, on behalf of the Illinois Attorney General's Office, Expected Lifetimes and Performance of Nuclear Power Plants, March, 1982.
47. Testimony of D. G. Bridenbaugh and G. C. Minor before the Atomic Safety and Licensing Board, on behalf of Suffolk County, in the matter of Long Island Lighting Company, Shoreham Nuclear Power Station, Unit 1, regarding Suffolk County Contention 11, Passive Mechanical Valve Failures, April 13, 1982.
48. Testimony of D. G. Bridenbaugh and R. B. Hubbard, in the Matter of Jersey Central Power and Light Company For an Increase in Rates for Electrical Service, on behalf of New Jersey Department of the Public Advocate, Division of Rate Counsel, Three Mile Island Units 1 & 2, Cleanup and Modification Programs, May, 1982.

49. Testimony of D. G. Bridenbaugh and G. C. Minor on behalf of Suffolk County, before the Atomic Safety and Licensing Board, in the matter of Long Island Lighting Company, Shoreham Nuclear Power Station, Unit 1, regarding Suffolk County Contention 22, SRV Test Program, May 25, 1982.
50. Testimony of D. G. Bridenbaugh and G. C. Minor on behalf of Suffolk County, before the Atomic Safety and Licensing Board, in the matter of Long Island Lighting Company, Shoreham Nuclear Power Station, Unit 1, regarding Suffolk County Contention 28(a)(vi) and SOC Contention 7A(6), Reduction of SRV Challenges, June 14, 1982.
51. Testimony of D. G. Bridenbaugh before the Illinois Commerce Commission, on behalf of the Illinois Attorney General's Office, Expected Lifetimes and Performance of Nuclear Power Plants, June 18, 1982.
52. Testimony of D. G. Bridenbaugh and R. B. Hubbard on behalf of the Ohio Consumers Counsel, before the Public Utilities Commission of Ohio, regarding Construction of Perry Nuclear Generating Unit No. 1, October 7, 1982.
53. Issues Affecting the Viabiling and Acceptability of Nuclear Power Usage in the United States, prepared by MHB Technical Associates for Congress of the United States, Office of Technology Assessment for use in conjunction with Workshop on Technological and Regulatory Changes in Nuclear Power, December 8 & 9, 1982.
54. Testimony of D. G. Bridenbaugh on behalf of Rockford League of Women Voters, before the Atomic Safety and Licensing Board, in the matter of Commonwealth Edison Company, Byron Station, Units 1 and 2, regarding Contention 22, Steam Generators, March 1, 1983.
55. Testimony of G. C. Minor and D. G. Bridenbaugh before the Pennsylvania Public Utility Commission, on behalf of the Office of Consumer Advocate, Regarding the Cost of Constructing the Susquehanna Steam Electric Station, Unit I, Re: Pennsylvania Power and Light, March 18, 1983.
56. Surrebuttal Testimony of D. G. Bridenbaugh before the Pennsylvania Public Utility Commission, on behalf of the Office of Consumer Advocate, Regarding the Cost of Constructing the Susquehanna Steam Electric Station, Unit I, Re: Pennsylvania Power and Light, April 20, 1983.
57. Testimony of D. G. Bridenbaugh In the Matter of Public Service Gas & Electric, Base Rate Case, Nuclear Construction Expenditures, on behalf of New Jersey Department of the Public Advocate, Division of Rate Counsel, October 13, 1983

58. Affidavit of D. G. Bridenbaugh, in the Matter of Jersey Central Power and Light, on behalf of New Jersey Department of the Public Advocate, Division of Rate Counsel, TMI Fault Investigation, November 23, 1983.
59. Testimony of D. G. Bridenbaugh, in the Matter of Public Service Electric & Gas, on behalf of New Jersey Department of the Public Advocate, Division of Rate Counsel, LEAC Investigation, Salem-1 Outages, December 1, 1983.
60. Rebuttal Testimony of D. G. Bridenbaugh, in the Matter of public Service Electric & Gas, on behalf of New Jersey Department of the Public Advocate, Division of Rate Counsel, LEAC Investigation, Salem-1 Outages, January 18, 1984.
61. Testimony of D. G. Bridenbaugh, L. M. Danielson, R. B. Hubbard and G. C. Minor before the State of New York Public Service Commission, PSC Case No. 27563, in the matter of Long Island Lighting Company Proceeding to Investigate the Cost of the Shoreham Nuclear Generating Facility -- Phase II, on behalf of County of Suffolk, February 10, 1984.
62. Status Report, WJ Zimmer Plant, Assessment of Options, MHB Technical Associates, prepared for The Ohio Office of the Consumer's Counsel, February 23, 1984.

XX INDEX 1

2 (Documents previously identified as
3 as Suffolk County Exhibits LP-4, 5, 6,
4 9, & 11; and Suffolk County Exhibits
5 LP-36 through 50, are admitted into
6 evidence.)

7 JUDGE MILLER: Now, what is next?

8 MR. ROLFE : Two minor things, Judge Miller.

9 First of all, LILCO would proffer its Exhibit marked LILCO-lr,
10 about which these witnesses were cross examined, into
11 evidence.

12 JUDGE MILLER: Let me see. Is there any objection
13 to that? For the sake of completeness of record, we will
14 probably allow it --

15 MR. BIRKENHEIER: Judge Miller, I don't believe
16 that a foundation has been laid for this document.

17 JUDGE MILLER: I think for the completeness of
18 the record -- we are trying to get a complete record here.
19 I think probably we would allow it. You may be technically
20 correct, I am not quarreling about that. But since the witnesses
21 have gone into -- I think they have all explained pretty much
22 what the two documents were. I think the record would be
23 more intelligible, more complete, so unless there is again
24 some weighty objection, I think we will -- all right,
25 we will admit it.

1 JUDGE MILLER: LILCO for identification, LP-14
2 is admitted.

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3 (LILCO Exhibit LP-14, previously
4 marked for identification, is
5 admitted into evidence.)

6 JUDGE MILLER: Anything further?

7 MR. ROLFE: The last thing is just a question,
8 Judge Miller. LILCO is prepared and will be prepared at
9 the end of the case to proffer a witness to answer Judge
10 Bright's questions, and I can proffer him any time the
11 Board so desires.

12 JUDGE MILLER: All right. We will take it up
13 at some convenient point. Does anybody have any estimates
14 of the time required to complete this evidentiary hearing?

15 MS. LETSCHE: Judge Miller, the County has two
16 more witness panels to present. I don't know how much cross
17 examination -- I mean I have gotten some rough estimates of
18 cross examination with respect to those panels. And following
19 that, the State, I believe has a witness to put on.

20 JUDGE MILLER: Is there going to be a request
21 for rebuttal of any of the parties?

22 MR. ROLFE: Judge Miller, the only request LILCO
23 would make for rebuttal is leave to put probably Mr. Gunther
24 back on the stand to answer Judge Bright's questions, but
25 nothing else.

1 JUDGE MILLER: Staff?

2 MR. PERLIS: The Staff has no plans for rebuttal
3 testimony.

4 JUDGE MILLER: All right. I think that gives us
5 a reasonable estimate at any rate. That is all we can
6 expect.

7 Very well, we will stand in recess until nine
8 o'clock tomorrow.

9 MS. LETSCHE: Excuse me, Judge Miller. I have
10 another matter which is a separate one, but which I would
11 like to bring to the Board's attention to get some guidance
12 on, and that is with respect to the security issues that
13 were covered in the Board's Order -- I don't have the date
14 in front of me -- but a week and a half or two weeks ago
15 that set a schedule for the litigation of security issues
16 in this case.

17 A problem has arisen concerning the access to
18 safeguarded information by Suffolk County representatives,
19 and we were under the impression that we understood that
20 the Board intended that the safeguard procedures that had
21 been set up by the previous Board who had ruled on security
22 matters would still be in effect, and following those procedures,
23 we had identified for LILCO the individuals whom we intended
24 to use in connection with the security litigation, and had
25 those individuals execute the appropriate affidavits of

1 non-disclosure, pursuant to the Order that Judge Brenner had
2 issued setting forth those procedures back in 1982.

3 Subsequent to all of that happening, a -- LILCO
4 has indicated to us that they no longer agree to the number
5 of individuals that the County has indicated it needs.

6 We have identified the specific individuals,
7 precisely who they are. The vast majority, with the exception
8 of two, other than a secretary -- there is one lawyer, one
9 secretary and two technical people. The rest of them were
10 all previously cleared and approved by the Brenner Board
11 during the prior proceeding.

12 The ones who are being added are, in fact,
13 substitutes, or most of them are, for people who had been
14 deleted from the earlier list. So the bottom line number
15 is the same. The number of people who we request clearance
16 for, and a large number of them are Suffolk County police
17 officials who were, as I stated, cleared in the past.

18 We do have a problem because at this point
19 LILCO has stated, for instance, that they will not agree
20 to my personally having access to this material, and since
21 I am the lead attorney on the low power case, I clearly need
22 such access, and they have stated that they would not agree
23 to the access by any of the other individuals who previously
24 were authorized for that access by the other Board.

25 And we just -- we need some ruling by the Board,

1 apparently, since the parties have been unable to agree as
2 to the County's permission to have the continued access to
3 this information so we can pursue the security issues.

4 JUDGE MILLER: Well, let me say first the Board
5 had no intention of either adopting or rejecting any other
6 Board's procedure. We just did not consider it one way
7 or the other. This isn't to say that we wouldn't, but we
8 will probably take it up as a new matter, but it may well be
9 that those and similar procedures commend themselves by their
10 good sense, and that is all we are looking at.

11 Now, there are several things. First of all,
12 the schedule we announced for the security issues or
13 contentions has been the subject, I think, of a Motion
14 for Reconsideration by LILCO. At the time that that schedule
15 was adopted, now, we didn't know how long we would be taking
16 on this procedure and so forth.

17 So, there is some latitude in there for reconsider-
18 ation if we know the whole picture. In fact, we had intended
19 to take that up, perhaps, maybe perhaps after the closing
20 argument in this evidentiary hearing.

21 Well, what we want to do is get some kind of
22 procedure that would be sensible and controllable and efficient,
23 so we will in that regard, we will hear from the representations
24 of counsel running into certain problems, from both LILCO
25 and the Staff.

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Now --

MR. EARLEY: Judge, do you want to hear now?

JUDGE MILLER: As they say in Tennessee, 'rite

now.'

End 18.
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Sim 19-1

1 MR. EARLEY: Judge Miller, the dispute that
2 has arisen exists because the County has proposed that
3 up to 17 people have access to LILCO's security plan, and
4 security safeguards information. We just think that that
5 is an excessive number of people given the traditional
6 and regulatory requirement that security matters be held
7 in close confidence and that only personnel with need to
8 know have access.

9 We have suggested to the County several things.
10 First, the county for a number of months has claimed they
11 have security issues that they want to raise. Before we
12 can tell what portions of a plan might be relevant and who
13 needs to have access to that plan, you need to know what
14 issues are involved. And, therefore, it would be appropriate
15 to look at the issue of access after the Board decides
16 whether in fact they are going to admit security issues,
17 because it would not make sense from a security standpoint
18 to allow people access if there are going to be no security
19 contentions.

20 In the interim we have agreed I believe to
21 five people having access to security information.

22 JUDGE MILLER: Does that include counsel?

23 MR. EARLEY: It includes three lawyers from
24 the firm that represents the County. They had all had
25 previously had access to security matters ---

Sim 19-2

1 JUDGE MILLER: Well, what about counsel who
2 are going to handle this aspect of security in low-power
3 licensing who says that she is being excluded? Do you
4 exclude her or not?

5 MR. EARLEY: Ms. Letsche was not on the
6 original list of lawyers handling this. I believe there
7 are ---

8 JUDGE MILLER: That is true, but the question
9 is (a) has she been excluded from a transcript, yes, and
10 (b) why, other than history?

11 MR. EARLEY: The answer is because three
12 other lawyers already have access. If the County just wants
13 to have Ms. Letsche have access, LILCO will agree to that
14 and withdraw having other members of their firm.

15 JUDGE MILLER: Well, who are the other three
16 lawyers?

17 MR. EARLEY: I believe it is Mr. Brown,
18 Mr. Lanpher and Mr. Miller of Kirkpartrict, Lochhart.

19 JUDGE MILLER: What other lawyers?

20 MR. EARLEY: Those are the three lawyers and
21 I believe ---

22 JUDGE MILLER: How about the State of New York?

23 MR. EARLEY: The State of New York has not
24 had access to the security plan in the past. They were
25 a party ---

Sim 19-31

1 JUDGE MILLER: Is it requested in there? Have
2 you talked to them about it?

3 MR. PALOMINO: I signed the affidavit today,
4 Your Honor.

5 MR. EARLEY: We have never had any request
6 from the State.

7 JUDGE MILLER: We have an interest in keeping
8 the number as small as possible, or as small as is
9 reasonable for security reasons. However, if you are
10 through on that, let me see what the staff's suggestions
11 are.

12 MR. PERLIS: First of all, the staff does not
13 have any objection to counsel for Suffolk County, particularly
14 Ms. Letsche, gaining access to the plan.

15 JUDGE MILLER: You have seen the plan, haven't
16 you?

17 MR. PERLIS: I myself have not. Other counsel
18 for the staff I believe have.

19 JUDGE MILLER: So the staff of course is aware
20 of the plan.

21 MR. PERLIS: The staff is certainly aware of
22 the plan.

23 JUDGE MILLER: Okay.

24 MR. PERLIS: The one problem we do have with
25 access is not the individuals but those aspects of the plan

S 19-4
1 that the individuals are allowed to see. Generally in
2 a security proceeding concerns have to be identified before
3 access is granted to the plan so that the areas of the
4 plan which individuals want to look at are delineated.

5 As yet in this proceeding no security concerns
6 have been identified. Until such concerns are identified,
7 we would oppose granting access to anyone.

8 JUDGE MILLER: What do you suggest that the
9 potential contentions or security concerns, however you
10 wish to phrase it, should be identified?

11 MR. PERLIS: Well, Suffolk County has been
12 talking about security concerns for a number of months now.
13 I would think they should be able to identify the concerns
14 in a pretty short period of time.

15 JUDGE MILLER: Now you are going to make me ask
16 the obvious question, aren't you?

17 MR. PERLIS: I would think they could do it
18 today, but certainly by Monday.

19 JUDGE MILLER: They may be tired today.

20 MR. PERLIS: I believe the 13th was the day
21 that the Board had previously said, and certainly it should
22 be done no later than that time.

23 JUDGE MILLER: That is next Monday?

24 MR. PERLIS: Yes, I believe so.

25 JUDGE MILLER: Yes, okay. I don't have the

Sim 19-5

1 schedule before me, but I can reach it. I think the first
2 step was to identify the concerns, wasn't it?

3 MS. LETSCHE: Yes. And that was the 13th let
4 me just interject.

5 JUDGE MILLER: And that was set for the 13th
6 which is next Monday.

7 MS. LETSCHE: That is correct.

8 JUDGE MILLER: All right. That seems like
9 a reasonable time both ways. So we will adhere to that
10 date. We may consider shortening some of the other dates,
11 but we will go into that when we have all had a chance to
12 be heard.

13 So we think it should be by the 13th which we
14 think is reasonable. It will be the factors that are
15 pending.

16 MS. LETSCHE: Judge Miller, just let me get
17 a clarification. The County had fully intended to comply
18 with the Board's order with respect to identifying contentions.

19 Certainly, however, unless the counsel and the
20 experts who are going to be participating in this proceeding
21 have access to the appropriate safeguards information, those
22 contentions are not going to be able to be particularized
23 or specific at that time.

24 Now if the Board wishes to defer some kind of
25 ruling on who it is who is permitted to have access, then

Sim 19-6

1 we could on the 13th file a generalized statement of concerns
2 if is what it is the staff is looking for.

3 JUDGE MILLER: We don't want a generalized
4 statement. We want a reasonably specific one. You have
5 two things here. You have a previous plan. Now admittedly
6 you may not have gone into certain things, but nonetheless
7 there was a plan which was approved by a Board and by the
8 same Board held to be final, and I think it also set up
9 terms for revisions and so forth. Now maybe you have
10 complied with those. I don't know. I know nothing about it.

11 But I am asking you now to show good cause why
12 that original plan should be the subject of contentions, and
13 I assume this is what you will be doing when you identify
14 contentions.

15 MS. LETSCHE: That is correct.

16 JUDGE MILLER: But we don't expect them generally.
17 We expect to see if they are viable contentions in accordance
18 with our regulations so we can go ahead and make rulings
19 and set up whatever discovery may be required.

20 MS. LETSCHE: I don't think we are disagreeing
21 with you. I am not disagreeing with you, Judge Miller. If
22 I could just clarify. I think there has been a misunder-
23 standing. My point was that since I personally was not
24 involved in the earlier proceeding, I personally as the
25 attorney here have not ever seen the security plan.

Sim 19-7 1

JUDGE MILLER: But you have access to fellow
2 counsel, haven't you, from the same firm who were involved
3 in the former proceeding?

4 MS. LETSCHE: There were other counsel in
5 my firm who were.

6 JUDGE MILLER: From whom you can get information
7 presumably.

8 MS. LETSCHE: Well, if their memories from two
9 years are accurate enough to be able to correlate with
10 my understanding of the low-power concerns which is what
11 I am familiar with.

12 JUDGE MILLER: Well, we don't think we are
13 writing on a new slate, you see. Now low-power concerns,
14 okay, there could be adjustments.

15 First of all, we would like to know why you
16 don't go into the terms of that original agreement, if there
17 were terms, but we are not going to put a fine point on that.
18 But we want to know rather precisely why it is. You have
19 been talking about concerns for some time and you want
20 some mechanism and we are giving you a mechanism. But we
21 don't expect to be general and we don't expect you to conduct
22 long discovery before you decide what your concerns are.

23 MS. LETSCHE: I didn't intend to say that we did.

24 JUDGE MILLER: Well, I did misunderstand you.

25 MS. LETSCHE: Yes. The issue I am raising,

Sim 19=8

1 Judge Miller, is we have said all along that we will file
2 the contentions. We have never suggested that we would
3 not comply with your order to file contentions on the 13th.

4 The issue I am raising here, however, is
5 a separate one, and that is the question of access to the
6 certain safeguards information that would be pertinent
7 to those contentions and litigation of the issues that are
8 raised in those contentions.

9 The reason I raised that with the Board today
10 is that the longer the period of time that the experts and
11 the counsel who are going to be participating in particularizing
12 and specifying a contention and in putting together the
13 County's testimony on that contention, the longer those
14 people are prohibited from obtaining access to the safeguards
15 information, the longer the time is that they are going to
16 be unable to get into the nitty-gritty of doing the work.

17 That is the point that I am raising here with
18 the Board. And although in the past, based on the procedures
19 that Judge Brenner had set up, we had established a procedure
20 by which the parties could agree as to who would have
21 access and how that would proceed, that agreement now longer
22 seems to be in effect because LILCO has decided that they
23 don't want to agree any more and we need the Board's interven-
24 tion on that separate question, and that is the question of
25 access to the safeguards information, and that is separate

Sim : 19-9

1 and apart from filing a contention.

2 JUDGE MILLER: We are prepared to consider that
3 aspect but, as the staff correctly points out, the NRC
4 practice is to see some reasonably specific statement
5 of concerns or contentions or both in order to know what
6 areas are involved, and that precedes the determination.

7 Now we are prepared to hold that you as counsel
8 should be included on that list, and we can get over that
9 one pretty quickly. But next Monday is when the Board and
10 the parties are going to see what it is that the concerns
11 of the County are. This thing has been pending for some
12 time and it has been talked about frequently and you have
13 all gone through it, that is to say the County and its
14 representatives two years ago or whenever it was. This is
15 not a new or novel thing. So we expect a lot more precision
16 that we have now and then we will be in a better position
17 to discuss counsel. We will see that the County and the
18 State and everybody who is involved has fair representation.
19 We do think that 14 or 17 is entirely too many, but we will
20 reserve judgment on how many until we see next Monday what
21 you file.

22 MS. LETSCHE: Am I correct, Judge Miller, that
23 you don't have a problem with the people who were granted
24 access to the ---

25 JUDGE MILLER: I don't have what?

Sim 19-10

1 MS. LETSCHE: Don't have a problem with the
2 people who were granted ---

3 JUDGE MILLER: No, that isn't a problem. Nothing
4 follows. I told you this is ---

5 MS. LETSCHE: I am just asking the question, and
6 tell me if I am wrong.

7 JUDGE MILLER: I think you are wrong because
8 you see we haven't addressed it. So, therefore, we haven't
9 concurred with you.

10 MS. LETSCHE: Oh, but you had referenced that
11 I could talk to other counsel.

12 JUDGE MILLER: Yes. Well, other counsel, I
13 asked if this kind of information wasn't available without
14 violating any of your security agreements. And if it is,
15 you can tell us.

16 MS. LETSCHE: Let me just explain to you the
17 problem.

18 JUDGE MILLER: Okay.

19 MS. LETSCHE: We had an expert who is a nuclear
20 safety expert consulting with the County back in 1982 on the
21 security matters. That gentleman was Mr. Mark Goldsmith.
22 He was approved by the Board to have access to safeguards
23 information and he did and he discussed that information
24 with counsel for the County and with, for instance, the
25 police officers and other security experts, Mr. Brian

Sim 19-11

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Jenkins and Mr. Richard White, who were approved by
the Board and accepted by LILCO.

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2 Now, Mr. Goldsmith is no longer -- is not working
3 with us any more. He is not someone we are going to be
4 using in connection with the case because of his previous
5 commitments. We intend, however, to use Mr. Minor and Mr.
6 Bridenbaugh because they do have expertise in the nuclear
7 safety area.

8 Those gentlemen, while they do not --

9 JUDGE MILLER: You are going to use all purpose
10 witnesses? I don't know that I've seen any qualifications --
11 I listened to them twice -- that went into security at all.
12 Knowing someone has read a book, a Boy Scout manual on how
13 to be safe --

14 MS. LETSCHE: Let me just finish my statement,
15 Judge Miller.

16 JUDGE MILLER: Go right ahead.

17 MS. LETSCHE: Mr. Minor and Mr. Bridenbaugh do
18 not need to have access to the security plan and we are
19 not requesting that they have access to that plan. However,
20 in order to be able to address in testimony the effect of
21 a design basis threat upon the safety of the plant; that is,
22 what would happen if a design basis threat were present,
23 they need to be able to discuss the nuclear plant aspect
24 of the issue with the people who would have access to the
25 security plan; that is, the security experts, so that the
combination of -- the link between the design basis threat

#20-2-SueT 1

2 and safe operation of the plant can be addressed in the
3 testimony.

4 So, those gentlemen who would not have access
5 to the security plan itself would need to be able to discuss
6 with those individuals that would have access to the plan
7 and that have previously had access based on the Board's
8 Order, the security experts, matters that might be considered
9 safeguards information, although not the safeguard of docu-
10 ments themselves.

11 That's all that the County is requesting with
12 respect to a number of the individuals that we have identified.
13 We are not asking that they get access to the security plan
14 itself, merely that they be permitted to engage in conversa-
15 tions with the other experts who would be, and counsel, work-
16 ing on the issue.

17 They have executed the appropriate affidavits of
18 non-disclosure and will comply with all of those rules. But
19 without their being able to discuss those matters with the
20 other witnesses and with counsel, it would not be possible
21 for us to present testimony which would adequately address
22 the impact of the design basis threat upon the safety of
23 the operation of the plant.

24 So, that's -- I mean, that's the problem in a
25 nutshell that we have here. And it's for that reason that
we have identified -- and I can give the Board a copy -- for

#20-3-SueT1

2 LILCO all the individuals and exactly what it is that we
3 intend for each one of them to address and what kind of
4 clearance we request for them. And as the Board will see,
5 the only ones for whom we are requesting access to the plan
6 itself are either Suffolk County police officials or the
7 two qualified security experts who were -- who participated
8 in the proceeding in the past and were approved by the
9 Board and the counsel. Those are the only ones.

10 The other individuals we don't request access
11 to the safeguarded documents themselves, only that they
12 be permitted to discuss pursuant to the affidavit of
13 non-disclosure the matters relating to the security issues
14 with the other people participating.

15 And maybe it would just be easier for the Board's
16 information if I just gave you this letter which sets forth
17 the individuals and the basis for the County's request.

18 (Ms. Letsche hands up to Judge Miller a
19 document.)

20 JUDGE MILLER: Is there any objection?

21 MR. EARLEY: No, Judge, as long as we can provide
22 our response to that particular letter?

23 JUDGE MILLER: You may. Why don't you hand them
24 up?

25 (Mr. Earley hands up to Judge Miller a
document.)

#20-4-SueT 1

JUDGE MILLER: This is in response now to the
2 other letter that we received from counsel?

3 MR. EARLEY: August 3, yes, Judge.

4 JUDGE MILLER: All right. Judge Bright is in
5 charge now of safeguard matters.

6 I think perhaps that you had better talk among
7 yourselves. We do see some problems. I don't know if it
8 will do any good for us to go around the mulberry bush again.
9 I think perhaps you can sharpen agreements or disagreements
10 among yourselves.

11 But we will hear you in the morning if you can't
12 work something out. I wasn't aware there were two lists,
13 a list of those who can see the plan and a list of those
14 who can talk to those who have seen the plan. So, I
15 will have to read these letters.

16 But, in the meantime counsel all know, I think,
17 the mechanics of the situation better than the Board does
18 at the moment. So, we recommend that you get together and
19 discuss this at least and then be prepared to acquaint the
20 Board with the insoluble situation.

21 We've already told you now, we expect to see
22 the contentions or the concerns and with some degree of
23 particularity so that we can set up a schedule next Monday.
24 We might consider revising the schedule in the sense of
25 tightening up some of the time factors, because we were having

#20-5-SueT 1

2 to be a bit general at that time. We now know more of the
3 time factor, we also know something about your problems.
4 So, we will be prepared to hear from counsel on that.

5 Anything else?

6 (No reply.)

7 All right. We will leave it at that point and
8 hear from you tomorrow or whenever.

9 Stand in recess.

10 (Whereupon, at 5:26 p.m., the hearing is
11 adjourned, to reconvene at 9:00 a.m., Tuesday,
12 August 7, 1984.)

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CERTIFICATE OF PROCEEDINGS

This is to certify that the attached proceedings before the
NRC COMMISSION

In the matter of: LONG ISLAND LIGHTING COMPANY

Date of Proceeding: Monday, August 6, 1984

Place of Proceeding: Hauppauge, New York

were held as herein appears, and that this is the original
transcript for the file of the Commission.

GARRETT J. WALSH, JR.

Official Reporter - Typed

Garrett J. Walsh, Jr.
Official Reporter - Signature

MYRTLE H. TRAYLOR

Official Reporter - Typed

Myrtle H. Traylor
Official Reporter - Signature

MARY SIMONS

Official Reporter - Typed

Mary C. Simons
Official Reporter - Signature