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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: 1677 - 1948

Date: Thursday, August 2, 1984

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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 Generating Plant, Unit 1)	:	Docket No. 50-322-OL-4 (Low Power)

Court of Claims
State of New York
Courtroom No. 1
Veterans Memorial Highway
State Office Building
Hauppauge, New York 11787

Thursday, August 2, 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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APPEARANCES:

On Behalf of the Applicant:

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ANTHONY F. EARLEY, JR., ESQ.
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On Behalf of the Staff:

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Office of the Executive Legal Director
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

On Behalf of the Intervenor, Suffolk County:

KARLA J. LETSCHE, ESQ.
JOHN BIRKENHEIER, ESQ.
Kirkpatrick, Lockhart, Hill, Christopher and Phillips
1900 K Street, N. W.
Washington, D. C. 20555

On Behalf of the Intervenor, State of New York:

FABIAN PALOMINO, ESQ.
Governor's Office
No. 2 World Trade Center
New York, New York 10047

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C-O-N-T-E-N-T-S

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P R O C E E D I N G S

JUDGE MILLER: Very well. Are we ready to proceed?

MR. EARLEY: Judge Miller, we finished the cross-examination of Mr. McCaffrey and therefore LILCO moves into evidence the testimony of Brian McCaffrey and we also moveinto evidence his professional qualifications which are designated as Attachment 1 and Attachments 2, 3 and 4 of his testimony which were designated LILCO Exhibits LP-6, 7 and 8.

JUDGE MILLER: Okay. Were there any other exhibits which you hadn't profferred?

MR. EARLEY: Judge. I believe LILCO Exhibits 9 and 10 were admitted in the course of the cross-examination along with some of the County exhibits.

JUDGE MILLER: I think that is true.

Very well, any objections?

MS. LETSCHE: Yes, Judge Miller. At this time I would like to restate my motion to strike pages 17 to 33 of Mr. McCaffrey's testimony beginning on page 17 with the heading "Cost of the Shoreham Licensing Proceeding."

The County also objects to the admission of what were Attachments 2, 3 and 4 to Mr. McCaffrey's testimony which have now been designated LILCO Exhibits LP-6, 7 and 8 for identification.

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The basis for the County's motion is that this portion of Mr. McCaffrey's testimony, as well as the three exhibits being offered by LILCO, are not relevant, material, probative or reliable evidence and, therefore, pursuant to Section 2.743(c) of the regulations it should not be admitted in this proceeding.

This portion of Mr. McCaffrey's testimony consists of a recitation of events which are already reflected in the record of this proceeding, combined with Mr. McCaffrey's perception or chacterizations as to the reasons various things in this licensing proceeding have occurred.

It also includes his or LILCO's disagreement with many of those occurrences, as well as a discussion of perceptions about whether or not the Shoreham proceeding is ever going to end.

In particular, Mr. McCaffrey discusses certain staff actions that have taken place during the course of the staff's review of the Shoreham licensing application, certain ASLB actions that have taken place during the course of the proceeding, as well as the actions of others involved in the proceeding.

Mr. McCaffrey's testimony is not relevant, first of all, because this portion of his testimony has nothing to do with LILCO's compliance with GDC 17 or the requested

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exemption. The items he addresses do not address the matters set forth in the Commission's May 16th order.

The issue here in this proceeding is whether or not LILCO has met the Commission's standards for obtaining an exemption from GDC 17.

This portion of Mr. McCaffrey's testimony on its face has nothing to do with onsite power sources. It has nothing to do with the relative safety of the plant's operation at five percent power with the proposed alternate AC power source as compared with a qualified onsite power source.

Those are the matters that are at issue in this proceeding whether or not an exemption should be granted.

Although Mr. McCaffrey does state on page 32 of his testimony that this portion of his testimony relates to the equities which are referenced in Footnote 3 of the Commission's May 16th order, in fact Mr. McCaffrey's testimony does not demonstrate the existence of exigent circumstances relating to this exemption application that would constitute any exceptional circumstance or an equitable reason to justify granting the exemption.

It appears that all the items mentioned in Footnote 3 of the Commission's order where the exceptional circumstances relating to the exemption application are discussed in the context of the exigent circumstance

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demonstration that an applicant must make in order to obtain an exemption all relate directly to the exemption that is being requested and the regulation that is involved in that exemption.

The order does not say that the equities should include any inequities that a party considers might have existed during the course of the entire licensing proceeding or at any other time.

It is not an open door to discuss anything that LILCO might have been dissatisfied about at any time involved in the licensing proceeding, and that is exactly what Mr. McCaffrey's testimony does. It does not discuss anything pertinent to this exemption.

It states that LILCO is unhappy because this has been a contested proceeding. That is a fact. It has been that fact for a long time. That fact didn't happen in connection with this exemption application, and the fact that LILCO doesn't like it is simply not relevant.

Mr. McCaffrey also states that LILCO disagrees with the staff's review of its license. That staff review has been taking place over a long period of time. LILCO has, according to Mr. McCaffrey, exercised its rights under the NRC regulations to object to the staff's review and to object to what the staff has required of LILCO, and to object to whether or not those requirements were technically

Sim 1-5

justified and to object as to how long that staff has taken.

The fact, however, that the review has taken a long time or that LILCO has disagreed with what the staff has done, or that LILCO believes that what the staff did was without technical justification is not relevant to the regulation at issue here or to the exemption application that is at issue here.

Finally, Mr. McCaffrey states that LILCO disagrees with a lot of the ASLB rulings that have permitted the intervenors to participate in this licensing process.

The fact is, as Mr. McCaffrey admitted and as the entire record of this proceeding will show, all of those Licensing Board rulings were based upon the Commission's regulations. The participation by the intervenors in this proceeding has been consistent with those regulations. The fact that LILCO doesn't like that is not relevant to the question of whether or not this exemption application is proper or should be granted.

In essence, Mr. McCaffrey's testimony constitutes a challenge to the NRC staff's actions wth respect to LILCO, to the conduct of these proceedings by the ASLBs that have conducted them and in effect a challenge to the NRC's regulations.

Mr. McCaffrey thinks that if you have a

Sim 1-6

contested proceeding, which is conducted according to the NRC's regulations, it takes too long and it is unduly burdensome.

That may be Mr. McCaffrey's opinion and it may be LILCO's opinion, but it is not relevant to the issues that are before this Board.

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In addition, Mr. McCaffrey's testimony is not probative or reliable evidence. A couple of reasons for that which I think are plain on the face of the testimony itself and also were demonstrated during the cross-examination I was permitted to conduct yesterday. First of all, Mr. McCaffrey's testimony -- I'm talking about Pages 17 to 33 -- consists solely of conclusory, unsubstantiated personal opinions or perceptions by Mr. McCaffrey or LILCO as a company. There is not a stated basis contained in his testimony for, for example, his assertions that Staff review was without technical justification, or that the Staff SER was late in coming out, or that certain challenges posed by Intervenors were frivolous, or that discovery proceedings were burdensome or massive or in any way improper.

In fact, when questioned Mr. McCaffrey was not able to provide any specifics with respect to any of those matters. In particular, with respect to the assertion that the Staff, without technical justification, consistently held LILCO to a different standard than other plants because of the existence of Intervenor contentions, which Mr. McCaffrey states on Pages 18 and 19.

When asked, Mr. McCaffrey was able to give only two examples, a steam by-pass issue and an RCIC issue. He stated, however, that neither one of those related to

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Intervenor contentions. Clearly, he has no specific basis for the conclusion that he states at that portion of his testimony.

Furthermore, he said that his testimony was not based on any statements from the NRC Staff, that their positions were taken because of Intervenor contention. And, in fact, as Mr. McCaffrey stated, the Staff disagreed during the course of this licensing proceeding with LILCO's objections with respect to those two issues and LILCO's appeals with respect to those -- with respect to those issues.

The assertion by Mr. McCaffrey that the Staff's actions were without technical justification, number one, and number two, were taken because, in Mr. McCaffrey's view, there was a contested proceeding, is clearly without any stated basis in this record and, therefore, is not probative or reliable evidence.

The same is true with respect to his assertion that the SER was delayed because of the existence of intervention. Mr. McCaffrey was not able to state any basis for that statement other than his personal perception.

He did mention seeing some kind of a draft SER; however, he didn't see that until after this testimony was prepared. Therefore, that clearly did not provide a basis for his testimony.

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With respect to the discovery which he discusses at length in his testimony, the discovery that has taken place in several different aspects of this proceeding, the fact is that that discovery took place. The only point Mr. McCaffrey seems to make is that it happened and there was a lot of it. As Mr. McCaffrey said, though, that was all conducted pursuant to the NRC regulations. LILCO conducted that discovery, as did the other participants in the proceeding.

The fact that that happened, however, does not constitute or does not contribute to the ability of this Board to determine whether or not the requested exemption at issue here should be granted. That testimony concerning the fact that a lot of discovery was conducted in this proceeding is not probative of the issue that this Board must decide here. And, therefore, the testimony is not probative and should be striken.

Finally, Mr. McCaffrey's assertion that certain actions taken by the Intervenors, according to Mr. McCaffrey, were frivolous also must be striken. That statement, as evidenced through the cross-examination I was permitted to conduct yesterday, indicated that Mr. McCaffrey has no specific information upon which to base his allegation that in his view actions, which he characterized as challenges, were frivolous. He could not describe what the challenges

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were that he was referencing. He didn't know the dates of those challenges. He didn't know the bases for those challenges. I was not permitted to refresh his recollection or to establish that his assertion concerning the frivolous nature of those so-called challenges was incorrect.

The bottom line was, it was clear that he had no basis in his testimony nor was he able, upon cross-examination, to state any basis for his conclusions that those challenges were frivolous.

In addition, clearly Mr. McCaffrey is not competent to provide expert testimony as to the legal adequacy or the "frivolous" nature of any legal challenges that may have been posed during the course of the licensing proceeding. The main point is that whatever those challenges are, they are all in the record of this proceeding, as is the way those challenges were dealt with by the then sitting licensing board.

The fact that all of that history happened does not contribute one iota to the decision by this Board as to whether or not the now pending exemption request with respect to GDC-17 should or should not have been granted.

In addition, Mr. McCaffrey states that in his view the hearing, apparently in his view because they have been contested vigorously by the Intervenors, have extended the fuel load date of the Shoreham plant. And he refers to

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that on Page 32 of his testimony. In fact, as Mr. McCaffrey stated on cross-examination, the LILCO plant was not ready for fuel load until April or May of 1984. His own testimony admits that the hearings had nothing to do with that. The plant hasn't been ready.

Furthermore, as Mr. McCaffrey stated, LILCO cannot load fuel into that plant until the Commission issues a license. The reason that hasn't happened is because the TDIs failed and those problems have still not been resolved, and because LILCO needs an exemption from the regulations because they do not have a qualified onsite source of AC power. Those are the reasons that LILCO has not been able to load fuel.

The fact that this is a contested proceeding and that there has been vigorously contested hearings over the course of that proceeding has no relationship to the fuel load date for this plant. Mr. McCaffrey's testimony doesn't state any such relationship. He merely makes a conclusory assertion, which is belied by his own testimony and by the facts.

His conclusory assertions are not probative or material evidence and, therefore, it should be striken.

Finally, Mr. McCaffrey states that, in his opinion, the reason this testimony is relevant is because it demonstrates that LILCO has borne a "unusual burden" in

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this proceeding. That line of testimony, which I believe is on Page 32 of his testimony, is also not probative. It does not contribute at all to this Board's ability to decide the issues that it is faced with. He does not include in his testimony any comparison, any statements about any other licensees or any burdens faced by any other licensees in contested proceedings.

And apparently the only basis for his statement is the mere fact that this has been a contested proceeding. It has been conducted in accordance with the NRC regulations. That fact is not relevant to anything that needs to be decided here.

The bottom line is what is factual in Mr. McCaffrey's testimony is already contained in the record of this proceeding. What is not factual in Mr. McCaffrey's testimony; that is, his conclusory assertions and innuendoes, he has no basis for and is unable to specify in any way. His purely conclusory perceptions are not reliable or probative evidence.

The testimony as a whole is not probative or relevant to anything that needs to be decided by this Board.

Finally, the three exhibits that have been proffered by LILCO, LILCO Low Power Exhibits 6, 7 and 8, which are referred to in this portion of Mr. McCaffrey's testimony,

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Pages 17 to 33, should not be admitted for the same reasons I've just stated.

The first exhibit, LP-6, is a portion of the partial initial decision. That's already in the record. There is no reason to attach it here. It's simply not relevant. It's past history. It doesn't have anything to do with this exemption request.

The second exhibit, LP-7, is a LILCO submittal, a pleading that was submitted in this proceeding. A portion of its proposed findings of fact and conclusions of law. Again, it's already in the record. There is no reason to attach it to this testimony. It contributes nothing. And it's simply not relevant.

Finally, LP-8, LILCO LP-8, is an Order issued in the Grand Gulf case. It has no relevance to the exemption application by LILCO, which is what is being addressed by this Board. It is irrelevant and should not be admitted.

JUDGE MILLER: Mr. Palomino.

MR. PALOMINO: The State joins in the motion for the reasons set forth by the County.

JUDGE MILLER: Staff.

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MR. PERLIS: Mr. Chairman, I spent a long time looking into the Commission's Order last night trying to see whether there was any relevance in the testimony.

Frankly, I am not sure I understand all of what the Commission wants in its Order, but I don't see the relevance of this testimony to any of the issues before the Board.

I believe the Board should be considering issues which are relevant to the exemption request, and I would agree with the County that the past history of this proceeding is not relevant to whether an exemption should be granted.

The exemption request should be viewed on its own merits. I don't believe this testimony, the portions that the County seeks to have striken, addressed the merits of the exemption request before the Board.

JUDGE MILLER: LILCO?

MR. EARLEY: Judge Miller, the County has given a very nice closing argument on what weight this Board should ascribe to Mr. McCaffrey's testimony rather than addressing whether Mr. McCaffrey's testimony is relevant to the matters being considered by this Board.

Mr. McCaffrey's testimony addresses what is included in footnote 3 of the Commission's May 16th Order. In that footnote, the Commission stated that a reasoned

exercise of such discretion should take into account the equities of each situation.

Now, remember in considering the equities of the situation, and considering the exigent circumstances required by the Commission, the Commission required that the Applicant demonstrate that there were no health and safety problems. So to get this far, the Board will have to find that there are no health and safety problems associated with LILCO's application for an exemption.

When we have gotten that far, and taking into account the equities of the situation, the application for exemption can't be viewed in a vacuum. You have to look at precisely what the Commission says, the equities of each situation.

I think the situation would be far different if LILCO were applying for an exemption after a licensing process that had not run the tortuous course that this licensing process has run. The situation is that this licensing proceeding has lasted over eight years. It has cost millions of dollars. It has placed a substantial drain on LILCO's resources.

Mr. McCaffrey's testimony merely says that given those realities, and given that there are no health and safety problems associated with LILCO's application for an exemption, a fact that the Board will have to find,

that then the equities of the situation favor permitting LILCO, finally after all this time, to go forward with testing and go forward with a program that does not present any risk to the public health and safety.

In addition, I believe that his testimony does address additional matters in that footnote. The Commission goes on to specify some of what the equities include, and they mention financial and economic hardships.

Certainly Mr. McCaffrey's testimony mentions the economic hardships and the hardships placed on the Company because of this long and drawn out licensing process. Mr. McCaffrey's testimony is not a challenge to these proceedings. It is not a challenge to the regulations. He is not trying to relitigate all the things that have happened over the years.

What he is doing, though, is placing in context and providing testimony concerning the situation in which this exemption application is proffered in front of the Board.

Mr. McCaffrey's testimony, therefore, is relevant to a matter that must be decided by this licensing Board. Counsel for County makes a number of arguments about specifics included in Mr. McCaffrey's testimony. I believe there the County's complaints go to what weight should be ascribed to Mr. McCaffrey's testimony. The County, in its

cross examination, tried to focus on narrow portions of not only Mr. McCaffrey's testimony, but other documents, and the fact that that particular cross examination did or did not reveal specifics, I don't think is a matter that goes to the relevance, but rather the weight of the particular testimony.

The County keeps arguing that Mr. McCaffrey had no basis for statements about the frivolous nature of certain challenges that were brought forward in this proceeding, and one in particular we spent time with, the shipment of fuel onsite, and the construction permit extension request. If the County had read further in the testimony on page 25, the witness in his prefiled testimony had stated that construction permit extensions and receipt of new fuel onsite are routine matters that any knowledgeable person recognizes having no safety impacts on the public.

But the County chose not to go into that. They chose to focus on selected portions, and I think that is true for a number of the areas in which Mr. McCaffrey was examined. The County kept trying to focus their questions to limit his answers. Mr. McCaffrey indicated in his qualifications that he is well qualified to testify on nuclear licensing matters. He has been involved in the licensing of the Shoreham proceeding for

years.

He discussed his involvement in dealing with the NRC Staff and, therefore, is qualified to discuss those matters on the record.

In short, Mr. McCaffrey's testimony is relevant because it addresses what the Commission wanted this Board to hear about, and that is the equities of the situation which surround LILCO's application for an exemption, and that situation includes the history of this licensing proceeding and LILCO submits that it is relevant to the consideration of this Board whether LILCO had merely submitted its application and shortly thereafter filed an application for exemption, or whether it is filing this application for exemption after many years of attempting to get a license, now showing that there are no health and safety problems associated with its proposal, it is relevant that LILCO has had the extensive output of manpower resources and money in order to try and get this plant licensed.

JUDGE MILLER: Does that conclude your response?

MR. EARLEY: Yes, Judge.

MS. LETSCHE: If I might respond to Mr. Earley's argument.

JUDGE MILLER: No. I think we have heard

enough. We have heard this on and on. This is not the first time, and this isn't the closing argument. This is simply hearing from you on the Motion to Strike. We have been fully informed. You had plenty of time. Much of it was argued yesterday.

(Board confers.)

JUDGE MILLER: The Motion to Strike the testimony will be overruled. It will be admitted into evidence and become part of this transcript, subject to whatever rulings have been made.

(Testimony of Mr. McCaffrey follows)

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NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

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LONG ISLAND LIGHTING COMPANY	)	Docket No. 50-322-OL-4
	)	(Low Power)
(Shoreham Nuclear Power Station, Unit 1)	)	
	)	

TESTIMONY OF BRIAN R. McCAFFREY
ON BEHALF OF LONG ISLAND LIGHTING COMPANY

Q.1. Please state your name and business address.

A. My name is Brian R. McCaffrey. My business address is Long Island Lighting Co., Shoreham Nuclear Power Station, Wading River, New York 11792

Q.2. What is your occupation?

A. I am employed by LILCO as the Manager, Nuclear Licensing and Regulatory Affairs in the Nuclear Operations Support Department

Q.3. What are your responsibilities as Manager, Nuclear Licensing and Regulatory Affairs?

A. As Manager, Nuclear Licensing and Regulatory Affairs, I am responsible for the overall management of the company's licensing activities of the Shoreham station. My

organization is the primary contact with the Nuclear Regulatory Commission and Institute of Nuclear Power Operation (INPO) and is responsible for receiving and determining the corporate position and response to any regulatory issue affecting the station. As part of my duties, I am required to be familiar with the substance of regulatory issues and LILCO's activities that deal with those issues. I am responsible for all licensing activities leading to an Operating License as well as the conduct of the various ASLB proceedings underway. In this capacity, I coordinate LILCO's efforts to respond to discovery, LILCO's technical review of contentions submitted by intervenors, the preparation of testimony by LILCO witnesses and support activities during the hearing process. I also play an active role in the procurement of expert assistance for dealing with licensing issues and testifying in hearings. My organization is also responsible for maintenance of Policies, Programs and Directives for the Office of Nuclear and for the assessment of emerging licensing issues.

Q.4. Please summarize your previous employment and educational experience.

A. A copy of my resume (Attachment 1) was previously submitted in the Shoreham operating license proceeding as

LILCO Exhibit 35, item 4. Let me summarize and update that information. I joined LILCO in January 1973, as an associate engineer in the Mechanical and Civil Engineering Department. In 1975, I was named a senior engineer in the department and appointed as Project Coordinator-Gas Turbine Installations. As a senior engineer, I was also assigned as the Lead Mechanical Engineer for Nuclear Projects. In October 1977, I was transferred to LILCO's nuclear organization. Since that time I have held various positions relating to the Shoreham Nuclear Power Station. These positions include Senior Licensing Engineer; Project Engineer; Assistant Project Manager-Engineering & Licensing; Manager, Project Engineering; and Manager, Nuclear Compliance and Safety. In May 1984, I was named Manager, Nuclear Licensing and Regulatory Affairs. In many of these positions, I was involved in and familiar with LILCO's efforts to license Shoreham. Prior to joining LILCO, I was employed by the Grumman Aerospace Engineering Corporation involved with aerodynamic design and flight test stability and control testing of the F-14A aircraft.

Q.5. Mr. McCaffrey, please describe your educational background.

A. I hold a Bachelor of Science degree in Aerospace Engineering from the University of Notre Dame, a Master of Science degree in Aerospace Engineering from Pennsylvania State University and a Master of Science degree in Nuclear Engineering from the Polytechnic Institute of New York.

Q.6. Are you a member of any professional societies?

A. I am a member of the American Society of Mechanical Engineers, the Long Island Section of the American Nuclear Society and am a Registered Professional Engineer in New York.

Q.7. What is the purpose of your testimony?

A. The purpose of this testimony is to address several aspects of the circumstances surrounding LILCO's application for an exemption from GDC 17 which justify granting LILCO's request. I will describe LILCO's extensive efforts to meet GDC 17's requirements for an onsite power source, the resources LILCO has been required to devote to the Shoreham licensing proceedings, and the effect of this proceeding on the perception of the likelihood that Shoreham can ever be licensed.

LILCO's Good Faith Efforts

Q.8. Why are LILCO's efforts to comply with GDC 17 pertinent to LILCO's application for an exemption from GDC 17?

A. The Commission's May 16, 1984 Order indicated that LILCO had to submit a request for an exemption under 10 CFR § 50.12(a) in order to obtain further consideration of its low power license application. The Commission noted that LILCO's application should discuss the "exigent circumstances" that favor granting the request. One of the considerations the Commission explicitly mentioned was LILCO's good faith in attempting to comply with GDC 17. This testimony demonstrates that LILCO has made a good faith effort to meet GDC 17.

Q.9. How has LILCO made such a good faith effort?

A. There are a number of indications of LILCO's good faith efforts:

(1) The original design of the Shoreham plant included an onsite power source that was intended to meet the requirements of GDC 17.

(2) When problems with the TDI diesel generators were discovered, LILCO undertook extensive efforts to ensure that these diesels would reliably perform the functions required of them by GDC 17.

(3) As a contingency, LILCO is installing three additional diesel generators manufactured by Colt Industries to ensure that there will be a qualified onsite source of emergency power for Shoreham as required by GDC 17.

(4) As demonstrated in LILCO's other low power testimony, LILCO has provided significant enhancements of the offsite system to assure that AC power will be available in the event offsite power is lost during low power testing.

Q.10. Is it significant that Shoreham's original design included qualified diesel generators?

A. Yes. LILCO's request for an exemption is not the result of an attempt to avoid GDC 17's requirements for qualified diesel generators at Shoreham. LILCO's original intent, as reflected in Section 8.2 of the Shoreham FSAR, was to provide fully qualified diesel generators to comply with GDC 17. Importantly, LILCO still intends to provide fully qualified diesel generators for Shoreham. LILCO is only requesting an exemption from these requirements as an interim measure to allow fuel load and low power testing of the plant prior to completion of litigation concerning the reliability of the TDI diesels. In fact, two TDI

diesels have completed preoperational testing and a modified integrated electrical test (i.e., demonstrated plant response to a loss of offsite power coincident with LOCA), and are available to perform their intended function.

Q.11. Will you please explain LILCO's efforts to ensure that the TDI diesel generators will operate reliably and, thereby, meet GDC 17.

A. LILCO's efforts to ensure that the TDI diesel generators operate reliably can be divided into two phases -- (1) efforts prior to the failure of the crankshaft on diesel generator 102 in August 1983, and (2) efforts following that failure.

Prior to the crankshaft failure, LILCO included in Shoreham's design three emergency diesel generators intended to meet all applicable regulatory requirements for onsite power sources. With these requirements in mind, specifications for these machines were developed by Stone & Webster and LILCO. LILCO purchased three diesel generators from Transamerica Delaval, Inc, requiring that these machines be manufactured in accordance with the approved specifications.

Once the diesels arrived on site and were installed in the plant, LILCO subjected them to a preoperational test program which used a building block approach. This program had been completed except for an integrated electrical test when the crankshaft failed on diesel generator 102.

Q.12. Could you please explain LILCO's building block approach to testing?

A. The TDI diesel generator preoperational test program started with checkout and initial operation (C&IO) tests of individual components such as pumps, air compressors, pressure switches and the like. After these tests, components were tested again as part of a system or subsystem. Through system flushes and specific C&IO testing, there was functional demonstration of support systems such as lube oil, fuel oil starting air, and others.

The C&IO testing was followed by mechanical, electrical and qualification preoperational tests. The mechanical preoperational test verified the operability of each diesel and its supporting auxiliary systems. Similarly, the electrical preoperational test demonstrated the capabilities of the diesel generator electric system and included a 24 hour full load run (22 hours at

full load, 2 hours at overload) and a 72 hour run. The qualification preoperational test demonstrated the ability of each diesel to perform 23 consecutive starts. All of these tests had been completed at the time the diesel generator 102 crankshaft failed. In addition, LILCO had planned to perform an integrated electrical test which would have tested the plant's entire electrical power supply system and the loads it supplies under simulated loss of coolant accident and loss of offsite power conditions. I should add that pre-crankshaft failure testing included enhancements LILCO imposed to provide additional measures of their reliability above and beyond regulatory norms.

Q.13. Did this test program identify any problems with the diesels?

A. Yes. As expected, the Shoreham test program identified problem areas that needed correction.

Q.14. And what was LILCO's response to these problems?

A. In addition to correcting each individual problem that was identified, LILCO performed a review of the operability of the TDI diesels. This Diesel Generator Operational Review Program initiated in March 1983 involved a complete review of each problem encountered

with the Shoreham diesels and resulted in recommendations for improved reliability. LILCO reviewed this program with the NRC Staff on June 30, 1983 and subsequently submitted a report on it.

Q.15. Following the failure of the crankshaft of diesel generator 102 in August 1983, what steps did LILCO take to ensure that the TDI diesels could be relied upon to meet the requirements of GDC 17?

A. LILCO engaged the services of a nationally known engineering firm, Failure Analysis Associates (FaAA), within two days of the failure to conduct a comprehensive investigation into the cause of the failure. FaAA was physically on the job less than four days after the failure. The effort involved:

(1) inspection of the crankshaft on DG 101 and 103 for indications of similar problems;

(2) complete metallurgical analysis of the failed crankshaft;

(3) strain gauge and torsiograph testing of one of the remaining original crankshafts to determine actual stresses on the shaft;

(4) complete disassembly and inspection of all three diesel engines to replace the original crankshafts with crankshaft of an improved design, and to

assess any damage to the engines as a result of the crankshaft problems; and

(5) design analysis using finite element modeling/modal superposition analysis to ascertain dynamic torsional response of the original crankshafts.

Q.16. What resulted from disassembly of the diesels?

A. As a result of problems discovered during disassembly, LILCO established a team of specialists to review engine components. Initially, LILCO and its consultants investigated each problem identified to determine its cause and the appropriate corrective action. After identifying problems with a number of components, however, LILCO concluded that a comprehensive review of the design and quality of the TDI engines was necessary. Thus, at a November 3, 1983 meeting with the NRC Staff, LILCO announced that it would undertake a comprehensive diesel generator recovery program. This program has four phases:

A. disassembly, inspection, repair and reassembly of each diesel,

B. failure analysis of defective components,

C. design review and quality revalidation (DRQR) program, and

D. expanded qualification testing.

The expanded testing included a 100-consecutive-start test on one engine, a seven-day run on all three diesels that conservatively simulated the load on the diesels following a LOCA, and the accumulation of at least 100 full power hours on each diesel. These expanded tests are in excess of the pre-crankshaft failure test program which itself had elements above and beyond minimal regulatory requirements.

Q.17. What is the DRQR program?

A. The DRQR program is a detailed review of the design and quality of the TDI diesel engines. The program, involving over 120 people from LILCO, Stone & Webster, FaAA, Impell and other consultants, resulted in an assessment of the design of important components in the diesels. It also verified important quality attributes for the requisite engine components.

Q.18. How does LILCO's DRQR program relate to the Diesel Generator Owners' Group effort?

A. As LILCO discovered and reported problems with its TDI diesel generators, other utilities also experienced and reported problems with TDI machines at their own nuclear power plants. In response to these problems, the

NRC Staff indicated that each utility would be required to demonstrate the reliability of its TDI diesels. The utilities that owned TDI diesels for nuclear service formed the TDI Diesel Generator Owners Group to address these concerns about the reliability of the TDI engines. Because LILCO had already instituted its comprehensive DRQR program, the utilities looked to LILCO for leadership in the Owners Group effort. Accordingly, the Owners Group developed a DRQR program modeled on LILCO's program and appointed LILCO personnel and LILCO contractors and consultants to significant leadership roles in the Owners Group effort. For example, LILCO's then Director of the Office of Nuclear, William Museler, was appointed Technical Director of the Owners Group and Michael Milligan, then LILCO's Shoreham Project Engineer, was the Assistant Technical Director. Craig Seaman of LILCO was assigned as DRQR Program Manager. To give some idea of the magnitude of Owners Group undertaking, LILCO's share of the DRQR and Shoreham-specific activities outside of the original crankshaft failure has totaled approximately $4 million.

Q.19. You stated that another indication of LILCO's good faith in attempting to comply with GDC 17 was the installation of three additional diesel generators manufactured by Colt Industries. Please explain.

A. As already noted, LILCO initiated an extensive review of the design and quality of the TDI diesel generators as a result of the failure of the crankshaft on DG 102 and subsequent problems identified during the disassembly and inspection of all three TDI diesels. When these investigations were initiated, LILCO had no guarantee that it could successfully demonstrate the reliability of the TDI diesels. Thus, as a precaution, LILCO undertook to procure and install three diesel generators manufactured by Colt Industries. These machines are of the type in use at other nuclear power plants and are designed to satisfy the requirements of GDC 17.

Q.20. Please describe how much effort is involved in the installation of the Colt diesel generators.

A. LILCO has devoted substantial resouces to the Colt effort to ensure that Shoreham would have an alternate means of meeting GDC 17. When questions about the reliability of the TDI diesels arose, LILCO organized a task force to research the availability of nuclear qualified diesels that would meet Shoreham's requirements. Once potential candidates were identified, LILCO expedited the procurement process. LILCO decided to purchase the Colt engines within two months of the

DG 102 crankshaft failure. At about the same time, Stone & Webster started a substantial engineering effort to design a new building for the Colt diesels, to design support systems, and to analyze how to integrate this new system into the existing plant. The Stone & Webster engineering effort alone had consumed 216,000 manhours as of the end of May, 1984.

Q.21. Has LILCO aggressively pursued installation of the Colts?

A. Yes. As discussed above, LILCO created a task force that was dedicated to the Colt diesel project. This task force was charged with moving the project forward briskly. Thus, the procurement and engineering activities just described were all conducted on an expedited basis. Construction of site facilities for the machines started almost immediately in November, 1983. All three machines have now been manufactured and delivered to the Shoreham site. Engineering work for the installation of the Colts is essentially complete and construction work is well underway. Underground cable and piping runs are in progress. The main duct bank between the new EDG building and the main plant is essentially complete. Work on the new diesel building is in progress. The engines are scheduled to be moved

into the building by the end of July. In addition, work on auxiliary structures such as the oil storage tank building is in progress. Construction and testing is now scheduled to be complete in May 1985.

LILCO currently believes the TDI diesels will be qualified for nuclear service. Thus, it will not be necessary to connect the Colts to the plant immediately. The Company plans to connect the machines at the first refueling outage. LILCO, however, is committed to completing the Colts as soon as possible to ensure that a qualified onsite power source is available in the event the TDI licensing process is delayed or the TDIs are found not to be reliable.

Q.22. How much will the Colt diesel generators cost LILCO?

A. Over 260 LILCO and Stone & Webster personnel were working full-time on the Colt project at its peak. The total cost for these machines is now estimated at approximately $93 million.

Q.23. Have there been other efforts by LILCO to provide AC power in compliance with GDC 17?

A. Yes. LILCO's proposal for low power operation did not ignore the need to provide a reliable means of emergency power. LILCO's low power testimony demonstrates the

significant effort undertaken to provide such power. This testimony describes, among other things, the GM EMD diesels, the 20 MW gas turbine, LILCO's testing commitments and LILCO's commitments to suspend low power testing, all of which are intended to ensure that the plant can be operated safely.

Cost of the Shoreham Licensing Proceeding

Q.24. Mr. McCaffrey, how long has the Shoreham licensing proceeding been going on?

A. LILCO filed its application for an operating license when the Final Safety Analysis Report was submitted in August 1975. The FSAR was officially submitted for docketing in January, 1976 and the application was publically noticed on March 18, 1976. Thus, this licensing proceeding has been underway for over eight years.

In February 1977, the New York State Energy Office and OHILI/North Shore Committee were granted intervenor status. Suffolk County filed its petition to intervene on March 17, 1977, with Shoreham Opponents Coalition filing in January 1980. Over the years, the major intervention was conducted by Suffolk County. Recently, the State of New York has been in active opposition to the plant before the various licensing boards.

Q.25. Would you please describe generally the licensing activities relating to the hearing process for Shoreham during the last eight years?

A. A detailed review of the Shoreham licensing process is contained in Appendix A to the Shoreham Licensing Board's Partial Initial Decision of September 21, 1983 (Attachment 2) and in LILCO's Proposed Opinion, Findings of Fact and Conclusions of Law in the Form of a Partial Initial Decision, Vol. 3, Appendix A (Jan. 17, 1983) (Attachment 3). I will only provide a summary of hearing related activities here.

During the 1976 to 1979 time period, LILCO was heavily involved in the prehearing process at the same time we were attempting to complete the NRC Staff review and issue the Safety Evaluation Report. It was clear that the heavy intervention affected the Staff review. Often the Staff review would include issues raised in intervenor contentions because the Staff knew it would have to prepare testimony on these issues. LILCO, without technical justification, was consistently held by the Staff to a different standard than other plants. This does not mean that the Staff's review at other plants was deficient. To the contrary, the Staff conducts detailed reviews of all plants. Rather, in an

effort to eliminate issues or reduce the burdens of dealing with them in hearings, the Staff would require more of LILCO than had been judged acceptable for other plants. All of this ultimately contributed to delay in issuance of the SER.

The most recent example of this different standard is the NRC's May 22 order issued to Mississippi Power and Light Company (Attachment 4). This order relates to the low power license for the Grand Gulf Nuclear Station. Section III of the order notes:

> As a result of the above [i.e., operational problems], there is a question concerning the reliability of the TDI diesel generators installed at the Grand Gulf facility. Staff analysis (Attachment 1) indicates that the total loss of diesels at 5% power would not significantly increase the risk of low-power operation. Nevertheless, one of the contributors to that risk is some very low probability environmental events.

LILCO, of course, has addressed these environmental events by committing to shut down the plant for certain events as noted in testimony of William J. Museler. The point here is that Grand Gulf was permitted to retain their low power license without fully qualified TDI diesels in accordance with GDC 17 and with fewer enhancements and commitments than LILCO.

Suffolk County and the other intervenors filed contentions on hundreds of issues. LILCO and its consultants were required to respond to numerous document requests and interrogatories concerning these issues. LILCO prepared responses to the hundreds of contentions to be ready to go forward as soon as possible with what we knew from experience would be protracted hearings. LILCO personnel devoted substantial time to developing affidavits and other supporting materials for motions for summary disposition.

The period from 1979 to 1981 was marked by intense efforts to settle or narrow issues. The process included extensive informal and formal discovery. Five stipulations which settled or narrowed many issues in the case were consummated. Each of these agreements resulted from multiple meetings among the parties and extensive research on the part of LILCO and its consultants to provide information responsive to the intervenors' "concerns." This period also saw the development of new contentions filed by SOC and SC on matters related to Three Mile Island.

Commencing in the spring of 1981, negotiations with Suffolk County intensified in an effort to reach a comprehensive settlement of the large number of issues

still outstanding. This settlement, termed the Sixth Stipulation of Settlement, was negotiated throughout the summer of 1981 with representatives of the Executive and Legislative Branches of the County, along with their lawyers and consultants. After intense effort by the parties, Mr. Charles R. Pierce, LILCO's Chairman and Chief Executive Officer, approved the Stipulation and forwarded it to Mr. Cohalan, Suffolk County Executive with the understanding that the LILCO Board of Directors would formally approve the settlement once Mr. Cohalan did. This settlement would have resolved all but a few issues and significantly shortened the pending hearings. Significantly, the terms of the settlement had been approved by Suffolk County's lawyers and consultants, Mr. Cohalan and representatives of the Suffolk County legislature participating in the negotiations. The Suffolk County Legislature, however, rejected the settlement on December 8, 1981. This action led to the lengthy licensing hearings that are still underway.

Prehearing Conferences were held on November 10, 1976, October 11, 1977, March 9-10, 1982, and April 14, 1982. During the first half of 1982, massive formal discovery efforts were resumed. Despite the almost five years of informal and formal discovery, Suffolk County once

again served extensive interrogatories and document requests on LILCO. Also, a number of LILCO witnesses were deposed. Indeed, formal discovery has been almost continuous since early 1982. The County has routinely used LILCO's filing of testimony as a pretext for additional document requests. Particularly notable was an extensive request for quality assurance documents following already massive discovery on the issue. The Board and parties spent a large part of one hearing day (Tr. 9334-9447) dealing with this one request.

Emergency planning discovery started in 1982 and still continues. Untold numbers of document requests and interrogatories have been answered in the Phase I (on-site) and Phase II (off-site) emergency planning proceedings. (Phase II alone included over 300 document requests and interrogatories, not counting subparts.) These proceedings have involved over 65 depositions.

Diesel generator discovery commenced in June 1983. The proceeding was originally quite limited in scope. But on the one issue to be litigated prior to fuel load, the County deposed eight individuals from LILCO and its contractors. The initial diesel discovery effort also involved the production of documents. Following the

crankshaft failure, the scope of diesel discovery was greatly expanded. Throughout the second half of 1983, LILCO provided SC with information concerning the diesel effort. After a conference of the parties in February 1984, diesel discovery intensified. To date, LILCO and TDI have produced more than 50,000 documents in response to County requests. Depositions of 28 LILCO personnel, LILCO consultants and TDI personnel have been conducted.

Finally, LILCO has had to deal with discovery on its low power application. LILCO has produced over eleven boxes of documents (on the order of 30,000 pages). LILCO has had to depose 10 County consultants in an effort to determine what opinions they intend to express because the County had no documents which would give LILCO information on the opinions of its consultants. The County has deposed eight individuals from LILCO and its contractors and consultants.

Q.26. When did the Shoreham licensing hearings begin?

A. Formal ASLB hearings commenced on May 4, 1982. Thirty seven issues (combining identical County and SOC contentions), many with subparts, were set for litigation. Out of the original 37 issues to be litigated, 26 were settled and the rest litigated. It is worthy of note

that the 11 health and safety contentions decided by the ASLB consumed approximately 29 weeks of evidentiary hearings, over 110 days of hearings with over 21,000 pages of transcript. Over 100 witnesses testified in the proceedings that led to the Licensing Board's September 21, 1983, Partial Initial Decision.

Q.27. Would you please describe the resources that LILCO devoted to those efforts?

A. The OL hearing process of dealing with contentions, answering discovery requests, negotiating settlements, filing testimony and testifying placed a considerable drain on LILCO and its consultants' resources at a time the Company was attemping to complete the plant and the NRC Staff review process. In most cases, to deal with a single contention issue, LILCO used technical expertise in the areas of design, construction, startup and operations. Personnel with first hand knowledge of the systems or components at issue and associated documents were involved in developing a response to contentions. Many times these were the same people responsible for designing and completing the systems, testing them and making them ready for operations. In addition, the settlement process involved numerous meetings and site tours to discuss technical aspects of

contentions with the intervenors, their consultants and attorneys. Thus, LILCO Project, Startup, Operations, Quality Assurance, Nuclear Engineering and Engineering personnel, and General Electric and Stone & Webster personnel had to devote extensive efforts to the ASLB process preceding and following the start of hearings. In addition, the licensing staffs of Stone & Webster, General Electric and LILCO were heavily involved in attempting to expedite the process and to coordinate the overall program with LILCO's attorneys.

Q.28. In addition to the efforts in the hearings on health and safety issues, on what other licensing issues has LILCO had to expend resources?

A. The County, and to a lesser extent other intervenors, have seized on every possible opportunity to delay the licensing of Shoreham. Other efforts have included challenges to construction permit extension requests, shipment of new fuel to the site, emergency planning and diesel generators. The first two items just mentioned are particularly representative of the frivolous nature of many of these challenges. Both construction permit extensions and receipt of new fuel on site are routine matters that any knowledgeable person recognizes as having no safety impacts on the public.

In addition, the County has attempted to litigate the safety of Shoreham in other arenas. For example, in hearings held by the so-called "Marburger Commission" appointed by Governor Cuomo, the County raised many of the same health and safety issues already litigated in front of the ASLB. Once again, LILCO had to devote significant resources to answering the County's baseless claims.

Q.29. Please describe LILCO's efforts in emergency planning.

A. The emergency planning issues in the hearings were divided into two phases. Phase I essentially covered on-site emergency planning and Phase II covered off-site emergency planning.

As already described, Phase I emergency planning involved extensive discovery. LILCO prepared and filed thousands of pages of written testimony to respond to the County's contentions. The Licensing Board, which had already experienced the County's proclivity for dragging out the hearing process, attempted to make the process more efficient by requiring pre-hearing evidentiary depositions so as to focus the issues that would have to be heard before the ASLB. The County, after forcing LILCO to expend significant resources on pre-hearing activities, refused to obey the Board's

order and declined to participate in these depositions. Consequently, the Board dismissed all of the Phase I emergency planning contentions.

Phase II emergency planning also has been a tremendous drain on the Company's resources. Again, the County filed hundreds of contentions (counting parts and subparts). Following another massive discovery effort, Phase II emergency planning hearings started in December 1983. These hearings have, to date, consumed 55 hearing days and generated over 12,000 transcript pages. Over 7,000 pages of prefiled testimony have been submitted.

Q.30. Is there anything particularly burdensome about the Phase II emergency planning effort?

A. Yes. In 1981, LILCO and the County signed a contract in which the County agreed to prepare an offsite emergency plan. LILCO agreed to pay the County $245,000 to cover the cost of developing the plan. After extensive cooperation between SC and LILCO personnel which resulted in the preparation of a draft plan, the County reneged on its contractual obligations. As a result of the County's refusal to produce an off-site emergency plan and its position that the County will not cooperate in any way with LILCO on emergency planning

matters, LILCO has had to undertake extensive efforts to develop its own offsite emergency planning organization. This effort has been both expensive and time consuming. New York State, as well, has done nothing to assist in developing an emergency plan for Shoreham.

Q.31. With respect to the licensing hearings, will you please summarize the extent of LILCO's efforts?

A. As of June 1984, there have been a total of almost 15,000 pages of written testimony and almost 400 exhibits in these proceedings. There have been over 180 days of prehearing conferences and hearings with more than 310 witnesses taking the stand. There have been over 34,000 pages of transcript. The rulings of various Licensing and Appeal Boards and the Commission have exceeded 2,900 pages. In addition over 160 people have been deposed. The drain on LILCO and its consultants has been severe. In excess of 50 LILCO, 20 General Electric, 25 Stone & Webster and 25 consultant personnel have testified or directly supported the ASLB proceedings. Thus, at a time when LILCO was attemping to finish the plant, critical personnel were being diverted to the ligitation arenas.

Q.32. Do you know how much this effort has cost LILCO?

A. In May, 1983, LILCO estimated that the cost of the ASLB process would end up in excess of $22 million. This projection was made at a time when the hearings were expected to be "winding down." Subsequent to this, there has been TDI licensing, low power licensing and a tremendously expanded emergency planning proceeding. We have not made a new overall projection, but I would judge that the total cost of the Shoreham licensing proceeding to date is more than $33 million.

The cost to LILCO and its consultants, of course, cannot be limited strictly to financial accounting. Long days, extended trips away from home, diversion of key people from performing their normal duties and a general disruption of family life has been the norm.

Q.33. What have been the results of all of these hearings?

A. Unfortunately, these proceedings are continuing on emergency planning, diesel generators and, most recently, the low power proceedings. The Partial Initial Decision issued in September 1983, however, demonstrated that there was essentially no merit to the intervenors' contentions. Prior to the health and safety hearings, all environmental issues had been resolved by summary disposition.

The quality assurance issue provides a good example of why the Shoreham litigation has placed an unjustified and unfair burden on LILCO. This issue alone consumed 52 days of hearings and involved 24 witnesses. After this searching inquiry, the Board concluded that the intervenors had not supported any of their claims. Long Island Lighting Co. (Shoreham Nuclear Power Station, Unit 1), LBP-83-57, 18 NRC 445, 580-81 (1983). In fact, the Board was very critical of the County and its use of the record:

> Once again, the Board, in reaching its conclusions on these contentions, is faced with a massive record, based on 55 days of hearing, extensive written testimony and exhibits, and voluminous proposed findings of fact and opinions by the parties that are disparate, at least. The difficulty of our task, trying to be objective in consideration of each of the parties' submissions, is further compounded by the County's misrepresentation of the complete record -- by omission, selective citations and distortion of recorded testimony.*
>
> ---
>
> * Our view of the County's performance is strictly our own. Our conclusion, however, is not without independent, if biased, corroboration. LILCO, on its own initiative, took the trouble of analyzing all 732 proposed findings of the County. It found 365 (50%) of them inaccurate, for 439 reasons (157 out of context, 110 with no citation, 105 with unjustified inference and 67 refuted on the record).

Id. at 579. The Board made similar comments on

Suffolk County's use of the record in Contention SC/SOC 7B. Id. at 545. In summary, the Company has had to spend an inordinate amount of money and resources defending the plant against allegations which consistently have been demonstrated to be baseless.

Q.34. In addition to the human and financial costs, has the protracted nature of the Shoreham licensing process had any other adverse impacts on LILCO?

A. Yes. The protracted licensing process has created the perception that the Shoreham licensing proceeding may never end. It is possible to reach this conclusion based upon the length and scope of the proceeding. Through my dealings with other utilities on generic licensing issues, I know that the Shoreham licensing proceeding is one of a handful of exceptionally protracted licensing proceedings. Licensing proceedings for plants similar to Shoreham have been far less extensive than Shoreham's. After eight years, the proceeding continues unabated on at least three fronts (low power, emergency planning, diesel generators). The stark contrast between Shoreham and other NRC proceedings has led to the perception that the Shoreham proceeding may continue indefinitely.

Q.35. Why are the costs of the Shoreham litigation pertinent to LILCO's application for an exemption?

A. The NRC's May 16 Order indicated that if LILCO's low power proposal did not present a risk to the public health and safety, it was appropriate to weigh the equities involved in determining whether to grant an exemption. The length and cost of Shoreham's licensing proceeding are pertinent because they demonstrate the unusual burdens placed upon LILCO over the years by intervenors' use of the NRC licensing process. LILCO has had to spend an inordinate amount of money and resources defending the plant against allegations which have consistently been demonstrated to be baseless. In addition to the direct costs of litigation previously addressed, the extended hearings have and will continue to delay the plant's fuel load date. The testimony of Anthony Nozzolillo demonstrates that delay in the operation of the plant increases the cost to the ratepayers.

With rare exception, when the substantive merits of the issues raised in litigation have been engaged, Shoreham has been found to be safe. More frequently, the County has fought to avoid engaging the merits by seeking delay, raising legal challenges, ignoring the absence

of any demonstrable safety concerns, and, in one instance, flatly refusing to participate in hearings. Given this protracted licensing history, fairness dictates that if LILCO can demonstrate the safety of its proposal, it should be granted an exemption from the regulations.

Item 4

PROFESSIONAL QUALIFICATIONS

Brian R. McCaffrey
Manager, Nuclear Compliance
Nuclear Operations Support Department
Long Island Lighting Company

My name is Brian R. McCaffrey. My business address is Long Island Lighting Company, 175 East Old Country Road, Hicksville, New York. I have been employed by Long Island Lighting Company (LILCO) since 1973, and have been Manager, Nuclear Compliance and Safety for LILCO since November 1981, responsible for managing the Nuclear Compliance and Safety Division of the Nuclear Operations Support Department. In addition, I am responsible for managing and coordinating the Company's efforts in the ASLB Licensing Proceedings. The Nuclear Compliance and Safety Division will support the operation of the Shoreham Station in coordination of all NRC licensing activities, the Nuclear Review Board and the management of the Independent Safety Engineering Group.

I graduated from the University of Notre Dame in 1967 with a Bachelor of Science Degree in Aerospace Engineering. I received a Master of Science Degree in Aerospace Engineering in 1972 from the Pennsylvania State University and a Master of Science Degree in Nuclear Engineering in 1978 from the

Polytechnic Institute of New York. I completed a General Electric BWR Design Orientation Course in 1978.

My professional experience began with my employment with Grumman Aerospace Corporation in 1968. My primary responsibilities were in the areas of aircraft aerodynamics and flight test stability and control.

I joined LILCO in 1973. I have held the positions of Associate Engineer and Engineer in the Power Engineering Department (1973-1975), where I was involved with plant engineering for both fossil and nuclear power stations. I then became Senior Engineer in the Power Engineering Department (1975-1977), with responsibilities as Project Coordinator for gas turbine installations and Lead Mechanical Engineer for nuclear projects; Senior Licensing Engineer for Shoreham Nuclear Project (1977-1978), with responsibility for the licensing activities leading to an Operating License; and Project Engineer for Shoreham (1979-1980), with responsibilities that included directing Project Engineering and the Architect Engineer in engineering and procurement for Shoreham.

I was assigned in 1980 as Assistant Project Manager for Engineering and Licensing (in July 1981, retitled Manager--Project Engineering) for Shoreham. In that capacity I

was responsible for the overall engineering and licensing of the Shoreham Station. My organization directed and approved the engineering efforts of the Architect Engineer and Nuclear Steam Supplier, and was responsible for directing the activities leading to an Operating License from the NRC. I became Regulatory Supervisor in November, 1981 (retitled Manager, Nuclear Compliance and Safety in October 1982).

I am a Registered Professional Engineer in the State of New York. In addition, I am a member of the American Society of Mechanical Engineers and the Long Island Section of the American Nuclear Society.

Now, we do want to consider, however, the offer of the exhibits separately.

What do you have to say to the objections to Exhibits 6, 7, and 8?

MR. EARLEY: Judge Miller, with respect to Exhibits 6 and 7 --

JUDGE MILLER: What is 6, for the record.

MR. EARLEY: Six is a portion of the partial initial decision in this case, and 7 is a portion of LILCO's proposed findings of fact.

JUDGE MILLER: Let's take them one at a time. Let's take LILCO's LP-6, partial initial decision, unpublished appendices A through F.

What is the relevance of those in this proceeding?

MR. EARLEY: Judge Miller, that was provided to accompany Mr. McCaffrey's testimony as a convenience to the Board. The County has indicated they believe the matters are included in the record. LILCO agrees, and this does not need to be added to the record here. It was added for the convenience of the parties.

JUDGE MILLER: So you are therefore withdrawing your proffer marked by identification LILCO Exhibit 6?

MR. EARLY: Yes, Judge, as long as it is understood that --

JUDGE MILLER: You either submit it or withdraw it. Let's not quibble about it.

You are either offering it, or you are not.

MR. EARLEY: Judge Miller, LILCO would like to refer to this as a matter of record --

JUDGE MILLER: Are you offering it, or are you not offering it. Let's stop this argument on every point that comes along. We will never finish this.

MR. EARLEY: Yes, we are offering it.

JUDGE MILLER: You are offering it. It will be denied. What is 7?

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(Exhibit previously marked for identification as LILCO Exhibit LP-7 is denied.)

MR. EARLEY: 7 is a section of LILCO's proposed opinion findings of fact and conclusions of law. We understood the County to say that they are also --

JUDGE MILLER: In what proceeding?

MR. EARLEY: In the Shoreham licensing proceeding.

JUDGE MILLER: Which one?

MR. EARLEY: The operating license.

JUDGE MILLER: Which Board?

MR. EARLEY: The Brenner Board.

JUDGE MILLER: Okay. What is its materiality

or relevance here?

MR. EARLEY: Again, it is provided as additional information that Mr. McCaffrey references in his testimony. In his testimony, he summarizes the licensing proceedings. He believed that this attachment, coupled with the prior attachment, added more detail.

End 3.
Mary fols.

Sim 4-1

JUDGE MILLER: Well, if his testimony summarized it, it summarized it. Insofar as there are matters of record, which you tell us both Exhibits 6 and 7 are matters of record in this proceeding, why wouldn't it be redundant?

MR. EARLEY: Judge, LILCO withdraws the offer of this particular exhibit.

JUDGE MILLER: All right. Seven has been with drawn.

(LILCO Exhibit LP-7, previously marked for identification, was WITHDRAWN.)

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JUDGE MILLER: By the way, when you say in the record, I take it you mean in the overall record and not the record of this particular low-power proceeding, is that correct?

MR. EARLEY: Yes, Judge, the overall record in the larger Shoreham proceeding.

JUDGE MILLER: But you ask us to take official notice of insofar as it would be material to any matters that any of the parties might have?

MR. EARLEY: Yes, Judge.

JUDGE MILLER: Okay. Now what about 8? What is it and why?

MR. EARLEY: Item 8 is an official order of the Nuclear Regulatory Commission concerning matters at the

Sim 4-2

Grand Gulf Nuclear Station. Mr. McCaffrey used that as an example in his testimony concernig the issue of whether LILCO had been held to a different standard.

Again, this was attached to the testimony for the convenience of the Board and parties. It is an official document that the Board can take notice of. Therefore, LILCO will withdraw the proffer into evidence because we think official notice can be taken of official orders of the Commission.

JUDGE MILLER: Very well. Then 8 also is with drawn.

(LILCO Exhibit LP-8, previously marked for identification, was WITHDRAWN.)

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The effect, therefore, of the ruling and of the two withdrawals is to deny on one ground or other the profferred exhibits marked for identification as LILCO's Exhibits 6, 7 and 8.

Okay, what next?

MS. LETSCHE: Judge Miller ---

MR. EARLEY: Judge Miller, LILCO ---

MS. LETSCHE: There were four exhibits that the County marked for identification during the cross-examination of Mr. McCaffrey. If the Board wishes, I will wait to formerly offer them into evidence at the time of our

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case in chief.

JUDGE MILLER: Yes, you may be permitted to do so.

Anything further now at this stage?

MR. EARLEY: Judge Miller, LILCO rests its case.

JUDGE MILLER: All right.

I believe the staff was prepared to go next?

MR. PERLIS: That is correct.

JUDGE MILLER: You may proceed.

MR. PERLIS: The staff calls Mr. Wayne Hodges and Mr. Ted Quay to the stand.

Whereupon,

WAYNE HODGES

-- and --

THEODORE R. QUAY

were called as witnesses on behalf of the NRC Staff and, having been first duly sworn by Judge Miller, were examined and testified as follows:

JUDGE MILLER: You may be seated.

MR. PERLIS: Just to introduce the two gentlemen, Mr. Quay is to the Board's left and Mr. Hodges would be to the Board's right.

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DIRECT EXAMINATION

BY MR. PERLIS:

Q Mr. Hodges, could you please state your name and position with the NRC for the record?

A (Witness Hodges) My name is Wayne Hodges. I am a Section Leader in the Reactor Systems Branch in the Division of Systems Integration with the NRC.

Q I have before me a document of 14 pages entitled "Testimony of Wayne Hodges." Is this the testimony you prepared for this portion of the proceeding?

A Yes, it is.

Q Are there any changes you would like to make in your testimony?

A There are a few minor typos I would like to correct.

Q Would you please do that.

A On page 6, the sixth line down from the top where the latter part of the sentence reads "The hydrogen generation as well as temperature limit." Insert an "a" between "as" and "temperature," so that it now reads "The hydrogen generation as well as a temperature limit."

Then in the fourth line from the bottom of the same page, the sentence starts out "This means that there should no large release." Insert a "be" so that it now reads "This means that there should be no large release."

Sim 4-5

Then on page 11, the third line from the bottom, after the third word insert "of". So that it now reads "Accident would be of concern."

Q Is that all?

A That is all.

Q With those changes, is the testimony true and correct to the best of your knowledge and belief?

A Yes, it is.

Q Mr. Quay, could you please state your name and position with the NRC for the record?

A (Witness Quay) My name is Theordore R. Quay. I am a Section Leader in the Accident Evaluation Branch of the Division of Systems Integration, NRR of the Nuclear Regulatory Commission.

Q I have before me a document three pages long with an attachment entitled testimony of Theodore R. Quay, and the attachment is entitled "Theodore R. Quay - Professional Qualifiactions, Office of Nuclear Reactor Regulation, U. S. Nuclear Regulatory Commission."

Is the three pages of testimony the testimony that you prepared for this proceeding?

A Yes, it is.

Q Do you have any changes which you would like to make?

A Yes, I do. There is one minor change on the

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second page. "Mitigative" in the very top line, about the sixth word, is misspelled.

Q With that change is your testimony true and correct to the best of your knowledge and belief?

A Yes, it is.

Q Gentlemen, would you identify for the Board and the parties the portions of Supplement 6 to the Staff's SER that you people are responsible for?

(Pause.)

The identification of the section number would suffice.

A (Witness Quay) Chapter 15.

A (Witness Hodges) Yes, we were responsible for Chapter 15. I was trying to see if we could identify the particular paragraphs. I believe that is what you wanted.

Q No, that is fine. Thank you.

Mr. Hodges, could you briefly summarize your professional qualifications?

A (Witness Hodges) I have received a bachelor's degree and a master's degree in mechanical engineering from Auburn University. I hold a professional engineer's license in the State of Maryland. I have served at the NRC as a Section Leader in the Reactor Systems Branch since July of 1981.

In that responsibility I have the responsibility

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for reviewing all of the operating license applications and all of the construction permit applications for boiling water reactors in the area of reactor systems.

I also have the responsibility for reviewing the modifications to the operating plants and requests for changes in technical specifications for the operating plants in the area of boiling water reactors.

Immediately following the Three Mile Island accident, I was a member of the Bulletins and Orders Task Force where I was responsible for the review of loss of feedwater tansients and small-break loss-of-coolant accidents for all of the boiling water reactors.

I have served as a consultant to the Office of Research in areas relating to heat transfer and two-phase flow, and in particular for the experiemental program, the TLTA, which is now called FIST for a full integral systems test which is the electrically simulated boiling water reactor small-scale simulation.

I serve as a consultant to the Office of Research in the planning and operation of that facility, which is a cooperative facility with industry.

I worked for approximately seven years for the DuPont Company where I did both experimental hydraulics and experimental heat transfer.

Q Thank you.

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Mr. Quay, is there a statement of professional qualifiactions attached to your testimony?

A (Witness Quay) Yes, there is.

Q Is that a correct statement of your professional qualifications?

A Yes, it is.

Q Could you please briefly summarize those qualifications for the Board?

A Certainly. I have a bachelor of science degree from New York State Maritime College, and I have a master's of science degree in nuclear engineering from North Carolina State University.

After completing my school work I worked for well over three years with an architect/engineer. My responsibilities were as a nuclear subgroup leader as well as a licensing engineer.

In the nuclear subgroup leader activities I was involved in the design of the nuclear systems. As a licensing engineer I handled the licensing activities associated with the submission of the FSAR and responses to FSAR questions.

I was also during this time a member of a test working group which was a group that met monthly at the site, the construction site of a nuclear power plant to discuss design and operational questions associated with

Sim 7-10

the plant.

Following that I spent five years at a Commission level office as a policy analyst in the Office of Policy Evaluation. In that office we reviewed Commission papers and policy papers. We responded to Congressional inquiries, prepared Congressional testimony and reviewed certain aspects of the Commission's budget.

Following that assignment I took a job in Nuclear Reactor Regulation in the Division of Licensing in the Systematic Evaluation Program. That responsibility, I had to review site hazards and mitigative features of the systematic evalution plants, a group of older plants that were under review.

For the last four years I have spent as Section Leader in the Accident Evaluation Branch, and the function of my section is to review the plant mitigative features of plants currently under license review.

MR. PERLIS: Thank you.

Mr. Chairman, Mr. Hodges and Mr. Quay are available for voir dire.

JUDGE MILLER: Very well.

Voir dire examination?

MS. LETSCHE: I don't have any voir dire.

MR. PALOMINO: No vire dire, Judge.

MR. EARLEY: No vire dire, Your Honor.

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JUDGE MILLER: You may proceed.

DIRECT EXAMINATION (Resumed)

BY MR. PERLIS:

Q Mr. Hodges, could you please provide the Board with a brief summary of your testimony?

A (Witness Hodges) Basically my testimony discusses the need for AC power for the four phases of low-power operation that have been proposed by LILCO, and it concludes that there are no AC power requirements needed for Phase I because there are no fission products. For Phase II there is no likely need, but definitely no need for 30 days based upon an adiobatic heat up of the fuel. For Phases III and IV, I lumped those together and considered the five percent as the bounding case, the worst case there being the LOCA where a very conservative analysis using conservative peaking factors and an evaluation model shows that there are at least 55 minutes available to restore power.

A more realistic analysis would show greater than three hours. For the non-LOCA either HPSI or RCIC is adequate to provide the makeup that is required. So there would be no need for AC power to protect the fuel.

The gist of my testimony is that if there is reasonable assurance that AC power can be restored in the times mentioned, then Shorehan is as safe at five percent power with the enhanced offsite power as with qualified

Sim 4-11

onsite AC power.

MR. PERLIS: Thank you.

Just for the convenience of the Board, would you please identify HPCI and RCIC?

WITNESS HODGES: Sure HPCI stands for high-pressure coolant injection. RCIC stands for reactor core isolation cooling. Both of those systems are steam driven. DC power is required to operate valves initially to start the systems up and control the turbines during operation, but the mode of power is steam.

MR. PERLIS: Thank you.

BY MR. PERLIS:

Q Mr. Quay, could you please provide a brief summary of your testimony?

A (Witness Quay) My purpose of the testimony is to discuss the loss of the standby gas treatment system. The staff assumed that the standby gas treatment system mitigated the consequences of two accidents, the fuel-handling accident and the loss-of-coolant accident.

As Mr. Hodges just discussed, there are no fuel failures predicted for at least 55 minutes under the most pessimistic circumstances for the loss-of-coolant accident. Therefore, without fuel damage, the radiological consequences of the accident would be negligible.

The only other accident that we need to discuss

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is the fuel handling accident.

First of all, I want to state that it is highly unlikely that LILCO will be moving fuel during the low-power license. However, even if you assume a fuel assembly was moved and damaged, the staff would postulate a gap release.

The gap inventory already at five percent power is 1/20th of what you would assume at full power.

In addition, due to the extremely low burnup of this particular fuel, the gap inventory is orders of magnitude less than what Regulatory Guide 125 would postulate for this accident.

So in essence the consequences of a fuel handling accident would be negligible.

MR. PERLIS: Thank you.

Mr. Chairman, these witnesses are available for cross-examination.

JUDGE MILLER: Very well.

Cross-examination.

CROSS-EXAMINATION

BY MS. LETSCHE:

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Q Good morning, gentlemen.

Mr. Hodges, have you been to the Shoreham plant since the propsed alternate AC power configuration has been at the plant?

A (Witness Hodges) No.

Q Have you, Mr. Quay?

A (Witness Quay) No, I have not.

Q Have either one of you reviewed any of the revised or new procedures that LILCO has generated subsequent to their proposal of this new configuration?

MR. PERLIS: Your Honor, I object to that question. These witnesses were profferred to discuss the potential for accidents at the site and for the need to restore power in a certain period of time.

The staff will be presenting witnesses who will discuss whether power can be restored within that period of time. I believe that is what that question gets to and these witnesses are not being profferred in that area.

JUDGE MILLER: It does sound as though other witnesses will cover, counsel, the area that you are going into, but it seems also to be beyond the scope, the reasonable scope of direct examination.

MS. LETSCHE: I am just inquiring as to what data base these gentlemen have for their testimony. I don't intend to go into details on the procedures. I am just curious if they have reviewed them and if they are in any way a basis for their testimony.

JUDGE MILLER: I am not sure. Do you understand the question?

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WITNESS HODGES: I think I understand the question. I have not reviewed the procedures personally. I have discussed some of the procedures with the people who have reviewed them, but I personally have not reviewed them.

MS. LETSCHE: Okay. Thanks.

WITNESS QUAY: My response is the same.

JUDGE MILLER: All right.

BY MS. LETSCHE:

Q You both stated that you were responsible for or had worked on Chapter 15 of Revision 6 to the SER. Were you collectively responsible for that entire portion?

(Pause while the witnesses review the document.)

A (Witness Hodges) I was just trying to verify. My recollection is there was some discussion of the AC power sources and the enhanced power sources in this area, and I was just trying to verify if there is something like that. I did not write that portion.

Mr. Quay and I wrote the remaining portions, where he wrote the section at the bottom of 15-5 ---

A (Witness Quay) And the top of 15-6.

A (Witness Hodges) --- and the top of 15-6, yes. The brief discussions that are there on the AC power supplies are really there to provide some continuity and basis and were paragraphs provided by members of the Power Systems Branch. But with the exception of those few paragraphs,

Sim 4-15

I either authored or supervised the writing of the remaining parts of that Chapter 15.

Q Now in connection with the preparation of your testimony, gentlemen did either one of you review any of the Shoreham tech specs?

A (Witness Hodges) I have not.

A (Witness Quay) I did not.

Q Mr. Hodges, I would like to direct your attention to page 7 of your testimony, please.

Now the first question on that page, "If Shoreham were operating at five percent of rated power with qualified TDI diesels and there was a LOCA, what would the peak cladding temperature and oxidation be?"

Does your answer to that question also assume that there has been a loss of offsite power?

A (Witness Hodges) Yes.

Q Okay. Now in the answer to that question and in the answer to the subsequent question, which refers to a LOCA with no qualified diesels and a loss of normal offsite power you state the peak cladding temperatures under each of those two conditions.

A (Witness Hodges) That is correct.

Q And with the qualified diesels it is 550 degrees Fahrenheit and with the proposed alternate configuration it is 1086 Fahrenheit, correct?

A That is correct.

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#5-1-SueT

Q And the assumption in getting to the 1086 degree Fahrenheit temperature with the proposed alternate system is that that's going to take thirty minutes; is that right?

A (Witness Hodges) The assumption was that AC power would not be restored for thirty minutes.

Q Now, would you agree with me, Mr. Hodges, that operating a plant at five percent power with a cladding temperature of 1086 degrees Fahrenheit would be operation with a smaller margin of safety than would operation at five percent power with a cladding temperature of 550 degrees Fahrenheit?

MR. PERLIS: Your Honor, if I could object here. I don't believe he is talking about operation with a cladding temperature of 1086 degrees. I don't believe that's what the testimony says.

MS. LETSCHE: Let me amend my question to take care of Mr. Perlis' objection.

BY MS. LETSCHE: (Continuing)

Q Would you agree, Mr. Hodges, that having a plant condition following operation at five percent power with a cladding temperature of 1086 degrees Fahrenheit would provide a lower margin of safety with respect to that plant than would a condition following five percent operation with a cladding temperature of 550 degrees Fahrenheit?

#5-2-SueT 1

A The answer I would give to that depends very much on how you would define margin. So, I could probably give you two answers.

Q Why don't --

A How would you care to define margin?

Q Well, how do you understand margin of safety, Mr. Hodges?

A If -- I will give you both of the answers. If you are just talking about the difference in temperature between the limit as defined by the regulations and the maximum that would be achieved during the transient, then in that sense there is less margin.

But if you are saying is there less margin if your temperature goes a little bit higher but nothing happens, then it would be difficult to say there is less margin.

It's kind of like driving on a four-lane bridge, being in the outside lane near the edge as opposed to the inside lane. Is there less margin of safety?

Q I understand. And in the answer to the second question on Page 7 where you are discussing the situation with the alternate AC power configuration, am I correct that your conclusion that operation is as safe as the case with qualified diesels is premised on the assumption that AC power is restored within 55 minutes?

#5-3-SueT

A That's what I say.

Q Now, on the top of Page 8, Mr. Hodges, you refer to Reg Guide 1.70. The Reg Guide 1.70 guidance on accident analysis relates to full power operation, doesn't it?

A It -- we normally interpret it that way.

Q Yes. You also talk on Page 8 about LILCO's Chapter 15 accident analysis. The analysis contained in Chapter 15 of the FSAR also relates to full power operation, doesn't it?

A Generally they relate to full power. There are some transients which if started at less than full power conditions can be more limiting. And so they are addressed as well. Generally it's for full power.

Q Okay. And it's also true, isn't it, that LILCO's Chapter 15, FSAR analysis, assumes the operation of the TDI diesels?

A That's correct.

Well, let me state that a little different. It's correct in the sense that it assumes that AC power would be available. There is no mention of what kind of diesels are supplying that power.

Q Well, let me rephrase that. I understand your clarification, and it was a good one.

The analysis contained in the FSAR, as it is now written, assumes that part of the plant configuration is

#5-4-SueT

a set of qualified onsite emergency diesel generators, right?

A The analyses normally take credit for electrical power being restored in some minimal amount of time for the full power cases that are being analyzed. There is no specific discussion in Chapter 15 of the qualification of that power supply.

Q What is the time within which AC power is assumed to be restored in the Chapter 15 FSAR analysis?

A For the most limiting cases, which is like a loss of coolant accident, which is really I think in Chapter 6.3 rather than 15, but we can use 15 as a broad umbrella here if you like, I think -- it assumes that the systems are operating on the order of 27 seconds. And in order to do that, the power has to be restored in about 15 seconds.

Q Now, Mr. Hodges, in the discussion which begins at the bottom of Page 8 where you say, "For all of the events, operation of the plant up to five percent rated power will be bounded by the Chapter 15 analysis," and continuing over to the top of Page 11, the first two lines on Page 11, all one discussion I believe --

A Right.

Q Am I correct that what you are doing there is comparing the situation, fission product inventory and

#5-5-SueT

other things you are discussing, under low power testing up to five percent power and under one hundred percent low power operation?

A Not quite.

Q Okay. Let's see if we can do it bit by bit here. The paragraph that begins at the bottom of Page 8, you do mention there that the FSAR notes that turbine trips at power levels less than thirty percent of rated power are bounded by the limiting analysis, right?

A That's correct.

Q Okay. So in that paragraph you do discuss operation at thirty percent power, right?

A I mention the power levels less than thirty percent, yes.

Q Excuse me. Up to thirty percent, right?

A Yes.

Q The analysis that you are talking about in that paragraph, however, the limiting analysis is an analysis assuming one hundred percent power operation, isn't it?

A That's correct.

Q Would you agree that the discussion in that paragraph about that limiting analysis and your conclusion that for operation at power levels less than five percent the impact of loss of feedwater heating is minimal because

#5-6-SueT

of the low feedwater flow, is a comparison of the analysis for one hundred percent power to the conditions under five percent power?

A I am using the hundred percent power case there because it's convenient, it's available, but also there is no fuel damage. And so when I say that it is bounded by those limits, then I'm saying for the five percent power case you also have no fuel damage.

Q Now, in the next paragraph on Page 9 which begins, for low power testing up to five percent power, do you have that paragraph?

A Yes.

Q About halfway through there, after the reference to a LILCO SNRC letter, you say, "This low fuel burnup enhances safety in three ways..." and then you list them.

The low fuel burnup you are talking about there is the low fuel burnup that would occur during low power testing up to five percent power; is that right?

A That's right.

Q Now, when you say that that low fuel burnup enhances safety, enhances safety as compared to what? Enhances safety over what?

Isn't it over one hundred percent power?

A It enhances the safety over the case where you didn't have the low fuel burnup. If you operated for a

#5-7-SueT 1 significant amount of time at five percent you could get
2 a high fuel burnup there as well. But you would have to
3 operate a long time to do that. I don't think LILCO is
4 proposing that.
5 But you could also say in comparison to the
6 hundred percent power case.
7 Q When you say in Part (b), the second of your
8 three ways, that the low fuel burnup enhances safety, you
9 say: The amount of radioactivity that could be released
10 upon fuel failure is substantially reduced, more than a
11 factor of 20?
12 A Yes.
13 Q That reduction is a reduction from the amount of
14 radioactivity that could be released upon fuel failure at
15 a hundred percent power; isn't that right?
16 A It's a combination of the reduction from a hundred
17 percent to five percent, and the total amount of fuel
18 burnup. So it's a combination of the two.
19 Q And in your third reason, Part (c): If
20 additional failures were postulated to occur, you say, the
21 operation will have longer time to take corrective actions.
22 Now, am I correct that what you had in mind
23 there was that at five percent power with LILCO's configuration
24 or any other configuration an operator would have more time
25 to deal with additional failures than that operator would

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have if the plant were operating at full power?

A Whether it's additional failures or just a simple transient, the transient will progress more slowly.

Q It would progress more slowly than it would at full power operation?

A That's correct.

Q And I think I skipped Part (a) accidently here. Your first reason that the amount of decay heat present in the core following shutdown is substantially reduced resulting in reduced cooling system requirements, in that statement you intended, did you not, to say that the amount of decay heat is substantially reduced from that that would be present following shutdown after full power operation?

A That's substantially what that means. There is again a small burnup contribution. It's basically from a hundred percent to five percent.

Q Right. Now, in the next paragraph that begins, another factor contributing to enhance safety, you mention the increased time available for preventive or mitigating action should the action be deemed desirable.

I take it that again there, judging from your example which follows, you are talking about the fact that there would be more time available with five percent operation than would be available if there -- under full power operation; isn't that right?

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A Yes.

Q And in the paragraph which begins about two-thirds of the way down on the page on Page 10 which also begins, another factor contributing to the enhanced safety, you discuss the reduction and the required capacity for mitigating systems.

And I gather, based on the last line of that paragraph where you say that the requirements are substantially reduced for five percent power operation as compared to one hundred percent power operation, that the comparison you are making in this paragraph is five percent to one hundred percent power; is that right?

A Basically, yes.

MS. LETSCHE: Judge Miller, I move to strike the portion of Mr. Hodges testimony beginning at the bottom of Page 8, the last three lines, through Pages 9 and 10, and continuing to the top two lines of Page 11, on the grounds that it discusses a comparison of operation at five percent power to operation at full or one hundred percent power, which is not the issue that is before this Board.

The issue before the Board, as set forth in the Commission's May 16th Order, is a comparison of operation at five percent power with LILCO's proposed alternate system to operation at five percent power with a qualified onsite

#5-10-SueT

AC power source.

And in light of that identified scope of this proceeding, this testimony by Mr. Hodges is not relevant.

JUDGE MILLER: It will be denied. We might suggest that you hold all of your motions. Instead of doing it piecemeal, you will be given an opportunity when the witness' testimony has been concluded on cross and re-direct, if any, to make an appropriate motion. It might save time and avoid repetitiousness.

We would also have a fuller picture of what is before us.

MS. LETSCHE: I had completed my cross-examination on this portion, and I felt it would make sense to make the motion when that cross-examination was fresh in the Board's mind.

But I understand you have denied the motion.

JUDGE MILLER: That's what I ruled.

BY MS. LETSCHE: (Continuing)

Q Mr. Hodges, at the bottom of Page 13 of your testimony, there is a question which says, "In your answers, do you assume that a LOCA and a seismic event occur simultaneously?"

I want to ask you a few questions about your answer to that one.

A Okay.

#5-11-SueT

Q Now, you say -- the beginning of your answer is, "Although the equipment which is used to mitigate a loss of coolant accident is normally required to satisfy seismic criteria..." the seismic criteria that you are referring to there, I take it, are the seismic qualification regulations?

A That's correct.

Q Okay. And it's true, isn't it, that the equipment that is used to mitigate a loss of coolant accident includes the onsite source of AC power?

A That's correct normally.

Q Now, although normally the onsite AC power source satisfies the seismic qualification requirements of the Commission, the configuration proposed by LILCO has not satisfied those requirements; isn't that right?

MR. PERLIS: Objection. Mr. Hodges is not being proffered as a witness on the configuration being used by LILCO at low power, the proposed configuration.

JUDGE MILLER: Is not what?

MR. PERLIS: He is not being proffered as a witness on the proposed configuration of LILCO's power system. He is merely being offered as a witness on the state of the core and the need to restore power in certain periods of time.

Therefore, I would object that this is beyond the scope of his direct.

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JUDGE MILLER: The objection will be sustained.

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BY MS. LETSCHE: (Continuing)

Q Mr. Hodges, the statement that equipment which is used to mitigate a loss of coolant accident is normally required to satisfy seismic criteria -- strike that.

Am I correct that the reason you put the word, 'normally' in that sentence is because this particular situation, exemption application, is not the norm?

A (Witness Hodges) I think it is there primarily because that is the way I talk.

Q And to your knowledge, Mr. Hodges, the onsite AC power equipment which would be used to mitigate a loss of coolant accident at the Shoreham plant, if this exemption is granted, does not satisfy the Commission's seismic qualifications, does it?

A It is my understanding that the enhanced AC power supply does not satisfy all the seismic criteria.

Q Now, you go on in that sentence to say the Staff does not assume the simultaneous occurrence of a loss of coolant accident a seismic event.

Now, I take it that you are referring there to what the Staff does in its normal review process, is that right?

A That is correct.

Q And am I right that in the normal Staff review process, one of the reasons that the probability of the

combined event is very low is because the equipment, by definition, is designed to withstand a safe shutdown earthquake?

A Well, when I would say the equipment -- I would really say the piping is designed to withstand the earthquake, and in fact is designed for a combination of blowdown loads and seismic loads so that you would not expect only the seismic loads to cause a failure of the piping. Consequently, the only combination you would get for the seismic event and the LOCA would be the independent combination of both being low probability events, the combination is an extremely low probability event.

Q Mr. Hodges, I would like to address your attention to page 15-5 of Supplement 6 of the SER. In the third full paragraph of that page, the one beginning, 'in a conference call.'

Do you have that?

A Yes.

Q You discuss there the operation of the RCIC system to control reactor pressure.

A Yes.

Q You are discussing there the possibility of there being a stuck open relief valve, right?

A That is correct.

Q Now, if that happened, if there was a stuck

open relief valve, for how long would there be enough steam available to run the RCIC?

A If there were a stuck open relief valve, I don't have an exact time, but on the order of twenty or thirty minutes, I would think, at the most. Definitely a short period of time.

Q You state in the beginning of that paragraph, Mr. Hodges, that no single act of failure can cause a safety relief valve to stick open while operating in the safety mode.

A Yes.

Q Is the same true for a relief valve -- or a safety relief valve -- operating in the relief mode?

A No.

Q And am I right that a stuck open relief valve would create a condition comparable to a LOCA.

A If it never reclosed, yes.

Q Could you turn to page 15-6, please, and in particular the paragraph under the heading, Containment Isolation.

You reference in the second sentence of that paragraph two three-quarter inch diameter valves. Am I correct that the closure of those valves is dependent upon the available of AC power?

A Let me amend something I said earlier when

I was looking through.

This part was provided by the containment systems branch. I did not write this portion either. I apologize for overlooking that part earlier.

Q Well, I understand that you didn't write it. Are you able to answer my question?

A Possibly. Try again.

Q Do the two three-quarter inch diameter valves that are discussed in this section, are they dependent upon AC power for closure?

A It is my understanding they can be closed manually.

Q But they normally are hooked up to an AC power source?

A That would be the normal mode.

Q In the last sentence of that paragraph, it states, To ensure containment integrity in a timely manner for this limited condition, LILCO has committed to assign an equipment operator to the reactor building whenever the reactor vessel is pressurized during phases 3 and 4.

Am I correct that if there were a qualified source of AC power available, that it wouldn't be necessary to have an equipment operator performing that function.

A That is correct.

Q To your knowledge, is this something that is

going to be required in a tech spec?

A Or a licensed condition.

Q Could you turn to page 15-7, please?

A Yes.

Q I am going to ask you some questions about the carry over paragraph from page 15-6, which is under the heading, LOCA Analysis, and I assume that this is your section, right?

A That is my section, yes.

Q You state in the second line on page 15-7 that modifications to the HPCI System, which should make HPCI capable of withstanding a seismic event, are in progress?

A Yes.

Q Can you tell me what those modifications are that you are referring to?

A I do not know the details of the modifications.

Q Isn't the HPCI System identified in the FSAR as seismic Category 1?

A Yes, it is.

Q But it is your understanding that as now installed in the Shoreham plant, at least portions of that system don't meet that requirement?

A It was my understanding it was intended to be a seismic system that upon testing of a similar turbine

at another plant. There were some problems that were found, and LILCO decided to make some modifications. And those modifications are now in progress.

Q But to your knowledge they have not been completed?

A They had not been at the time of the writing of this SER. I don't know whether they have yet or not.

Q In the next paragraph, you discuss a large break LOCA, and you describe that as a situation where the vessel -- or the worse situation -- where the vessel pressure decreases rapidly.

What did you have in mind time wise in terms of a rapid decrease in vessel pressure?

A For the design basis loss of coolant accident, you could expect the pressure to drop down within the hundred pound-range within approximately thirty to forty seconds, I would think. Very quickly.

Q Mr. Quay, am I correct that the standby gas treatment system is dependent upon the availability of AC power?

A (Witness Quay) Yes, it is.

Q So that if there is a loss of offsite power, and there is not -- strike that. With respect to a fuel handling accident, I believe you stated in the summary of your testimony that you gave in response to Mr. Perlis'

question earlier, that it was highly unlikely that LILCO would be moving fuel during low power testing.

That statement or opinion isn't contained in your prefiled testimony, is it?

A That is correct.

Q Am I correct that if near the end of a low power test program, changes to the core or checking of the core support structures were required, that the fuel may have to be removed to perform those?

A If that were the requirement, then they would have to move fuel.

Q Now, in the second sentence of the second paragraph to Answer 6, the one that is headed with respect -- or starts off, with respect to the fuel handling accident...; you compare the total fuel inventory at five percent power to that at full power, correct?

A You are talking about where?

Q In the second paragraph to Answer 6.

A Okay. That is correct. It says right there, five percent versus a hundred percent.

Q And in the last sentence of your testimony on page 3, you say the decay allowed for by a forty day period would also produce more than a factor of twenty reduction in radioactive iodine released during a postulated accident.

What is that factor of twenty reduction from?

A From the decay of the radioactive iodine.

Q Now, I take it it is true that if there were no standby gas treatment system available, the mitigative effects of that system would not be available to deal with a release from a fuel handling accident?

A That is partially correct. You have isolation capability that you may use, but that is not assumed typically in a Staff analysis.

Q I see. Now, you mention on page 3 -- in the last couple of sentences in your testimony -- restricting the movement of eradiated fuel for a period of 40 days.

Is that something that the Staff is going to require of LILCO?

A It says earlier, if you look at the second complete sentence on that page, it says the Staff does not believe additional measures are necessary and, therefore, no, we are not requiring that.

Q Well, why did you put this in this testimony?

A Because, if in the determination of the Board that additional measures are required, that is one available to them.

But the Staff does not believe that it is necessary.

Q And, in fact, LILCO has not stated that they

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will do that, have they?

A That is correct.

MS. LETSCHE: I have no further questions of this panel.

JUDGE MILLER: Very well. We will take a fifteen minute recess.

End 6.
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(Short recess taken.)

Sim 7-1

JUDGE MILLER: Mr. Palomino?

MR. PALOMINO: The State of New York has no cross-examination, Your Honor.

JUDGE MILLER: LILCO.

MR. EARLEY: LILCO has just a few questions, Judge.

CROSS-EXAMINATION

BY MR. EARLY:

Q Mr. Hodges and Mr. Quay, in the preparation of your testimony was there anything that necessitated or made it necessary for you to visit the site?

A (Witness Hodges) No.

A (Witness Quay) No.

Q Was there anything in your testimony that made it necessary or would have made it necessary to review procedures?

A (Witness Hodges) No.

A (Witness Quay) No.

Q And was there anything in your testimony that would have required you to review technical specifications?

A (Witness Hodges) May I qualify my last statement. Nothing would require that I review the procedures for the power systems. I have some familiarity with the emergency procedure guidelines and procedures developed from those, and some of that information was used in the

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development of my testimony. So there is some of my testimony based upon procedures, but not procedures written for the emergency power.

Q Thank you.

And, Mr. Hodges, the procedures you discussed that you said do come into play in your testimony, you have reviewed those procedures?

A Yes, I have.

Q And, gentlemen, ir the preparatin of your testimony was there anything in there that would have made it necessary to review the technical specifications for Shoreham?

A (Witness Hodges) No.

A (Witness Quay) The same, no.

Q Mr. Quay, why is it unlikely that LILCO would be moving fuel during the low-power test program?

A (Witness Quay) I would assume that the flow tests and everything, if you had a problem with structures, it would occur prior to that. I have very limited knowledge in the area, and therefore that was basis of my statement.

Q Do you know whether licensees conducting low power testing typically move fuel during that low-power test program?

A To the best of my knowledge, they do not.

Q Mr. Hodges, in discussing the stuck open relief

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you were asked a question concerning whether if the stuck open relief valve remained opened and never reclosed, whether that would be a condition comparable to a LOCA, and I believe you indicated that if it didn't reclose, it would be comparable.

Would that LOCA be less severe than the LOCA that is predicated to arrive at the times referred to in your testimony?

A (Witness Hodges) The transient nature would be considerably different because the HPCI or RCIC could be avaiable to provide makeup during the first part of the blowdown. Consequently, by the time you would start to uncover fuel the decay heat would have dropped off and the amount of time avaiable before you would start reaching the 2200 limit would be considerably longer. I think the estimates are on the order of 10 hours.

Q And wouldn't it also be true that that LOCA would involve the blowdown of just steam through the safety relief valve?

A That is correct.

Q And the postulated design basis LOCA, that postulates a large guillotine break in the pipe, whereas this is a limited size opening?

A That is correct. The double-ended break that we consider the more limiting break is a large rupture and

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full separation of a recirculation pipe. This would be equivalent to a steamline break of a .1 square foot area for the stuck open relief valve, which is much smaller than the break for the recirculation line and would be blowing steam as opposed to water.

This would cause the depressurization to go more rapidly for the same break size, but it would still be a lower depressurization than for the full break.

MR. EARLEY: I have no further questions of this panel.

JUDGE MILLER: The staff. Anything on redirect?

MR. PERLIS: Very brief redirect.

REDIRECT EXAMINATION

IND EXXXXXX

BY MR. PERLIS:

Q Mr. Hodges, you were cross-examined from page 7 of your testimony on a 550 degree figure for peak cladding temperature and a 1086 degree figure, one being peak cladding temperature reached with TDIs and the other being the peak cladding temperature that would be reached with no qualified diesels and loss of normal offsite power.

My question is what temperature must be reached before a peak cladding temperature would be of concern?

A (Witness Hodges) Well, the limit specified in 10 CFR 50.46 is 2200 degrees Fahrenheit as being the

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licensing limit.

MR. PERLIS: Thank you.

I have no further redirect.

JUDGE MILLER: Anything further?

MS. LETSCHE: Yes. I have just one line of questions.

RECROSS-EXAMINATION

INDEX

BY MS. LETSCHE:

Q Mr. Quay, how many reviews have you conducted of the results of low-power test programs at nuclear power plants?

A (Witness Quay) Two.

Q And when was it that you did that?

A I am sorry. None of the results of low-power licensing applications.

Q You have conducted two reviews of low-power license applications?

A None of the results.

MS. LETSCHE: I see.

I have no further questions.

JUDGE MILLER: Anything further?

MR. PERLIS: Mr. Chairman, at this point I would move that their testimony be admitted into evidence.

JUDGE MILLER: The testimony consisting of the prefiled written direct testimony?

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MR. PERLIS: The prefiled written direct, and I believe attached to Mr. Quay's testimony is a two-page statement of his professional qualifications.

JUDGE MILLER: All right.

Any objection?

MS. LETSCHE: Well, I will renew my motion to strike.

JUDGE MILLER: Oh, yes. You may be heard on your motion. I suggest at this time if you have anything at this time that you haven't covered, you may do so.

MS. LETSCHE: I previously moved to strike, and I won't repeat my arguments because I made them before, the following portion of Mr. Hodges' testimony, beginning on page 8 the last three lines, all of page 9, all of page 10 and the first lines on page 11.

The basis briefly is because that discusses a comparison between five percent power and 100 percent power conditions which is not a comparison within the scope of this proceeding as defined by the Commission's May 16 order.

In addition, I move to strike in Mr. Quay's testimony on page 2 the portion of line 17 beginning "At five percent power not only is" and continuing throughout the remainder of his testimony to the bottom of page 3.

The basis is the same as my basis for moving to

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strike the identified portions of Mr. Hodges' testimony, that this discussion is of a comparison between five percent power conditions and 100 percent power conditions which is not within the scope of the proceeding and therefore is irrelevant, as is the last two sentences of the testimony, the last two sentences on page 3 which discuss restricting movement of irradiated fuel.

Mr. Quay testified that this is not something the staff has required and is not something the staff believes is necessary and is not something that LILCO has said they are going to do.

Therefore, a discussion of that information is simply not relevant to anything in this proceeding.

JUDGE MILLER: Mr. Palomino?

MR. PALOMINO: I join in the motion, Your Honor.

JUDGE MILLER: LILCO?

MR. EARLEY: Judge Miller, LILCO opposes the motion. The county seems to mistake the comparison that the Commission has mandated for the ultimate determination of this Board and the testimony of these witnesses that is profferred to understand some of their conclusions.

It is necessary to understand what happens at five percent power in the reactor to understand the significance of their statements that in essence it doesn't matter whether you get power back in a matter of seconds

Sim 7-8

or a matter of minutes because there is a significant difference between operation of a plant normally and operation at five percent power.

So that this information that is presented that the county has moved to strike does not form the sole basis for their conclusions, but is part of that basis that is necessary to understand how they reach their conclusions.

With respect to the last three sentences of Mr. Quay's testimony, I think that that is relevant to the material that he is discussing. He is discussing his conclusions of why the standby gas treatment system, that the loss of power doesn't provide any problem, and this is additional information on why he doesn't think it would provide a problem.

He indicated that the staff doesn't think it is necessary to do these things and he is providing the information for the Board just so that they understand that if the Board desires that more be done to add to the safety, that there are things that are reasonably available and I think that that is nice for the Board to know.

JUDGE MILLER: The staff.

MR. PERLIS: Yes. I would like to make it clear that the staff's ultimate conclusion is a comparison at five percent with both a qualified system and the non-qualified system, or the power configuration that is being

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proposed by LILCO.

We are not making the ultimate comparison between five percent power and 100 percent power. I do believe that it is relevant for the Board to have everything placed in context, and that includes the state of the core and the potential for core damage at five percent.

It is for that purpose that information concerning 100 percent power levels was put in.

As to striking the last three lines in Mr. Quay's testimony, the staff again does not believe that an additional measure is necessary, such as restricting the movement of fuel for 40 days.

That statement was put in there solely to inform the Board that there was an additional measure which, if the Board deemed it necessary, the Board could order it, and again, the staff does not deem that that measure is necessary.

In that sense, we are not relying on his testimony, but we would like to leave it in there for the Board's consideration if the Board determines that more is necessary.

MS. LETSCHE: Judge Miller, may I respond?

JUDGE MILLER: Yes.

MS. LETSCHE: Just a couple of brief points.

With respect to Mr. Earley's argument that the

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information that I sought to strike is necessary to understand what happens at five percent power, what I am seeking to strike here is not information concerning the comparison between five percent power operation with the proposed alternate system compared to five percent power without it which, as Mr. Perlis states, is covered in the staff's testimony.

I am also not seeking to strike any description of what it is that would happen during Phases I or II or III or IV for that matter of LILCO's low-power test program. That is contained in Mr. Hodges' testimony and is necessary to understand his conclusions.

What I am seeking to strike is nothing but a comparison of five percent power and 100 percent power. It is that comparison which is not relevant here and that is all that I am seeking to strike.

Furthermore, the standard for the admissibility of evidence, and this goes to the portion of Mr. Quay's testimony that I have moved to strike for the additional reason that it is not relevant here because no one is talking about it being necessary or in fact doing this 40-day restriction requirement, the standard is not what it would be nice for the Board to know, which is what Mr. Earley argued. The standard is that set forth in the regulations and whether or not the evidence is relative, probative

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and material to this issues here.

In the view of the County for the reasons I have stated, the portions of this testimony that I have sought to strike do not meet that standard and should be stricken.

JUDGE MILLER: The motion to strike will be overruled.

The testimony, including the qualifications, will be admitted and made part of the transcript.

(The testimony of Messrs. Hodges and Quay and the questions follow:)

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-OL-4 (Low Power)
(Shoreham Nuclear Power Station, Unit 1)	)	

TESTIMONY OF WAYNE HODGES

Q. What is your name?

A. My name is Marvin Wayne Hodges.

Q. What is your position at the NRC?

A. I am employed as a Section Leader in Section B of the Reactor Systems Branch in the Division of Systems Integration.

Q. What are your technical qualifications?

A. I graduated from Auburn University with a Mechanical Engineering Degree in 1965. I received a Master of Science Degree in Mechanical Engineering from Auburn University in 1967. I am a registered professional engineer in the State of Maryland (No. 13446).

In my present work assignment at the NRC, I supervise the work of six graduate engineers. My section is responsible for the review of primary and safety systems for boiling water reactors. I have served as principal reviewer in the area of boiling water reactor systems. I have also participated in the review of analytical models used in the licensing evaluations of boiling water reactors and I have the technical review responsibility for many of the modifications and analyses being implemented on boiling water reactors post Three Mile Island Unit 2 accident.

As a member of the Bulletins and Orders Task Force, which was formed after the TMI-2 accident, I was responsible for the review of the capability of BWR systems to cope with loss of feedwater transients and small-break-loss of coolant accidents.

I have also served at the NRC as a reviewer in the Analysis Branch of the NRC in the area of thermal hydraulic performance of the reactor core. I served as a consultant to the RES representative to the Program Management Group for the BWR blowdown emergency core cooling program.

Prior to joining the NRC staff in March 1974, I was employed by E. I. DuPont at the Savannah River Laboratory as a research engineer. At SRL I conducted hydraulic and heat transfer testing to support operation of the reactors at the Savannah River Plant. I also performed safety limit calculations and participated in the development of analytical models for use in transient analyses at Savannah River. My tenure at SRL was from June 1967 to March 1974.

From September 1965 to June '967, while in graduate school, I taught courses in thermodynamics, statics, mechanical engineering measurements, computer programming, and assisted in a course in the history of engineering. During the summer of 1966, I worked at the Savannah River Laboratory doing hydraulic testing.

Q. Do NRC regulations limit peak cladding temperatures in case of accidents?

A. For loss of coolant accidents, Title 10, Paragraph 50.46 of the Code of Federal Regulations gives five limits to be satisfied. First, the calculated maximum fuel element cladding temperature shall not exceed 2200°F. Second, maximum cladding oxidation shall nowhere exceed 17% of the total cladding thickness before oxidation. Third, the calculated total amount of hydrogen generated from chemical reaction of the cladding with water or steam shall not exceed 1% of the hypothetical amount that would be generated if all the metal in the cladding cylinder surrounding the fuel, excluding the cladding surrounding the plenum volume, were to react. Fourth, calculated changes from core geometry shall be such that the core remains amenable to cooling. Fifth, after any calculated successful initial operation of the ECCS, the calculated core temperature shall be maintained at an acceptably low value and decay heat shall be removed for the extended period of time required by the long-lived radioactivity remaining in the core.

Q. If all alternating current electric power were lost when the reactor was at 5% rated power, how long would it take before a maximum fuel element cladding temperature of 2200°F would be reached in the case of an accident that caused a loss of coolant and one that did not?

A. A loss of coolant accident is the most serious accident or transient that could occur without the availability of AC power because it could lead to lack of power to drive pumps necessary to maintain water in the reactor vessel to cool the core. For a non-loss-of-coolant accident, there would be a very slow boil off of the water in the vessel. The level would drop from the normal range down to the top of the fuel over an extended period of time. Starting from the normal water level, there are 158,000 pounds of water above the top of the fuel. That is equivalent to approximately 18,930 gallons. At five minutes after a reactor trip, if all the decay heat goes to boil the water, then the required makeup to replace the water boiled away would be about 42 gallons per minute. After eight hours that value has dropped to 12 gallons per minute. However, not all of the decay heat goes to boil the water away. Some is transferred to the containment and surroundings. If either the Reactor Core Isolation Cooling system or the High Pressure Coolant Injection system acts to restore the water level to the normal range, at least once during the first four days, then heat losses to the ambient through the reactor vessel wall to the containment and out through the environment will equal the decay heat being generated before the fuel would ever uncover. For that condition, the boiloff would cease, the transfer of the heat through the reactor vessel walls would tend to depressurize the reactor vessel slowly, and a peak cladding temperature of 2200°F would never be reached. In fact, the temperature of both the fuel and the cladding would remain near the saturation temperature of the water.

For the loss of coolant accident, LILCO has performed several calculations. They did a calculation using very limiting assumptions on the power and operating history. Using an approved evaluation model for a loss of coolant accident with no makeup at all, there are approximately 55 minutes before the peak cladding temperature would exceed the 2200°F limit. For a more realistic analysis which uses more realistic peaking factors and to some extent considers the limited operating lifetime at 5%, but still using the approved evaluation model, LILCO calculates that it would take 110 minutes for the peak cladding temperature to reach the 2200°F limit. Using best estimate models, which have been reviewed and approved by the NRC, it would take more than three hours for the peak cladding temperature to exceed 2200°F (at the end of three hours the temperature would still be less than 1900°F). For all three cases analyzed, no fuel failures were predicted up to the times the cladding was calculated to reach 2200°F. These calculations were done for LILCO by the General Electric Company and have been done with an NRC approved model. Although I did not review all of the details of the specific calculations, I have reviewed the evaluation models that have been used to perform the calculations and I have reviewed major assumptions used in the calculations. I am satisfied that these are bounding calculations.

Q. What would happen if the 2200°F temperature limit were exceeded at 5% rated power?

A. That depends on the extent to which that limit is exceeded. Nothing drastic happens at 2200°F. In fact there are some data that indicate that you could go as high as 2700°F, not melt the fuel, and

still retain some ductility to the cladding. The 2200°F limit was chosen as a conservative value to assure that the ductility of the cladding still exists so that following reflooding of the fuel with cold water you won't shatter the fuel and you can maintain a coolable geometry. 10 C.F.R. 50.46 also has limits on the cladding oxidation and the hydrogen generation as well as temperature limit. For the type of event we're discussing, which would be a loss of coolant accident from 5% power, there would be a very slow heatup of the fuel rods. The oxidation that can occur is a function of the time at which you're at high temperatures; also the rate of the oxidation increases as the temperature increases. Therefore, if you exceeded the 2200°F limit, you might also exceed the oxidation limit and cladding brittlement would become a concern.

Q. For the loss of coolant accident at 5% power, what is the rod internal pressure prior to reaching 2200°F and what is the significance of that value?

A. LILCO calculated a rod internal pressure of 97.7 psia at 2200°F. This is the highest value of internal pressure reached during the 55 minute heatup. For an internal pressure of 98 psia, a temperature of 2800°F would be needed to cause the cladding to rupture. At 2200°F, the rupture pressure is 117 psia. Therefore, even using the very conservative bounding analysis, no fuel rod rupture is expected. This means that there should no large release of activity because the cladding retains the fission products.

Q. What local oxidation resulted from the rod heatup in that analysis and what is its significance?

A. The maximum local oxidation was calculated to be 6½%. Using the Baker-Just equation, for values less than 17%, the cladding remains ductile and should not fracture due to thermal stresses when the fuel is quenched by cold water. Therefore, the core remains coolable. Because there is no cladding rupture, the fission products are retained in the fuel.

Q. If Shoreham were operating at 5% of rated power with qualified TDI diesels and there was a LOCA, what would the peak cladding temperature and oxidation be?

A. The peak cladding temperature has been calculated by GE to be 550°F. The local oxidation would be .033% and the core wide oxidation would be .033%.

Q. How does this compare with the LOCA with no qualified diesels and loss of normal offsite power?

A. If it is assumed that the 20 MW gas turbine fails and the GM EMDs are started in 30 minutes, the peak cladding temperature is calculated to be 1086°F, local oxidation would be .05% and core wide oxidation would be .034%. Even using a very conservative peaking factor, there are at least 55 minutes available to restore offsite power. If AC power is restored within 55 minutes for the case with no qualified diesels, then it is as safe as the case with qualified diesels because the cladding integrity is maintained and all fission products are retained in the fuel.

Q. Is there NRC staff guidance setting out the transients and accidents to be analyzed in an FSAR Chapter 15?

A. Yes. Reg. Guide 1.70 on the standard format and content for FSARs lists the transients and accidents to be analyzed. The Standard Review Plan (SRP, NUREG-0800) provides detail on how the Staff reviews the accidents and transients listed in Reg. Guide 1.70. LILCO used the transients and accidents listed in Reg. Guide 1.70 in its analysis of possible low-power transients and accidents in its submittal.

Q. We have previously talked of an accident involving the loss of all electric power with the Shoreham reactor operating at 5% of rated power. How does this compare with the spectrum of transients and accidents set out in Chapter 15 of the FSAR?

A. Except for the loss of coolant accident, all of the transients and accidents analyzed in the FSAR, even with no alternating current power available for the 5% power case, are less restrictive than for the design basis cases analyzed in Chapter 15 of the FSAR. The loss of coolant analysis has been discussed previously. The review of the FSAR Chapter 15 analysis shows that of the 38 accident or transient events addressed in Chapter 15, 5 events cannot occur during this phase. Generator load rejection and turbine trip with failure of generator breakers to open events are not possible because the generator will not be connected to the grid. Control rod removal errors during refueling are precluded by definition. A cask drop accident is precluded by design, hence it is not postulated in the analysis. The remaining 33 events are considered.

For all of the events, operation of the plant up to 5% rated power will be bounded by the Chapter 15 analysis. For example, the turbine trip event is analyzed with the assumption that the limiting

event occurs with the reactor operating at 105% of rated steam flow coupled with failure of the turbine bypass valves to open. Even this limiting event does not result in any fuel failures. The FSAR specifically notes that turbine trips at power levels less than 30% of rated power are bounded by the limiting analysis. Another example is the loss of feedwater heating event. This event is analyzed with the assumption of continuous operation of the feedwater system and the most severe possible loss of feedwater heating, resulting in the injection of colder feedwater. For operation at power levels less than 5% , the impact of lost feedwater heating is minimal because of the low feedwater flow.

For low power testing up to 5% power, the fission product inventory in the core will not exceed 5% of the values assumed in the FSAR. In addition, because of the small temperature differential across the pellets, almost all of the fission products will be retained in the pellets. LILCO estimates that the fuel burnup during low power testing will be less than 200 MWD/MTU (REF: LILCO letter SNRC-1036 dated April 11, 1984). This low fuel burnup enhances safety in three ways: (a) the amount of decay heat present in the core following shutdown is substantially reduced resulting in reduced cooling system requirements, (b) the amount of radioactivity that could be released upon fuel failure is substantially (more than a factor of 20) reduced, (c) and if additional failures were postulated to occur, the operator will have longer time to take corrective actions.

Another factor contributing to enhanced safety during low power operation is the increased time available for preventive or mitigating action should such action be deemed desirable by the

operator. Longer time is available because the limited power levels mean that it takes longer for the plant to reach setpoints and limits. For example, on loss of feedwater, the water level in the reactor will decrease at a slower rate than if the event occurred at 100% power. If HPCI or RCIC operate at least once during the first four days to restore normal water level, then no additional make up will be required to prevent core uncovery due to boil-off. Similarly, in the loss of condenser vacuum event, the operator will have more time to identify the decreasing vacuum and to take steps to remedy the situation before automatic actions such as turbine trip, feed pump trip or main steam isolation occur. Another example is the main steam isolation valve closure event. At five percent power, the amount of heat produced upon isolation of the reactor vessel (which is followed by a reactor trip) results in a much slower pressure and temperature increase than would be experienced at 100% power. This gives the operator more time to manually initiate reactor cooling rather than relying on automatic action. In effect, the operator may end the transient before there is any substantial impact on the plant.

Another factor contributing to the enhanced safety during lower power testing is the reduction in the required capacity for mitigating systems. Because of the lower levels of decay heat present following operation at 5% power, the demand for core cooling and auxiliary systems is substantially reduced, permitting the operation of fewer systems and components to mitigate any event. It follows that the AC power requirements for event mitigation are substantially reduced for 5% power operation as compared to 100% power operation. (Five minutes

after shutdown, about 42 GPM makeup is required to compensate for boil-off; after 8 hours, 12 GPM are required).

Q. If fuel were loaded in the reactor, the reactor had not reached criticality, and all electric power were lost, how long a period of time would there be before any fuel rod reached 2200°F?

A. Because there would be no nuclear heat generation, there would be no heatup of the fuel so that even if all the water were lost from the vessel and there were no water makeup, the fuel would sit in the vessel and the temperature would remain near ambient. You would not reach 2200°F.

Q. Is the availability of AC power a concern if criticality had not been reached?

A. Availability of AC power is not a safety concern because many of the transients cannot occur and for those that can occur, there can be no radiological consequences regardless of whether or not AC power is available. Therefore, there is no risk to the public health and safety.

Q. If the reactor were operating at .001% power as described in Phase II of the LILCO low power submission, and all alternating current power were lost, could a LOCA occur?

A. For conditions described in Phase II where the reactor is operating at essentially ambient temperature and pressure, there are not stresses in the piping system great enough that a loss of coolant accident would be concern, so it is extremely unlikely that a LOCA would occur under these conditions. However, if a loss of coolant accident should occur during Phase II testing, LILCO has calculated that there

would be time on the order of months available to restore makeup water for core cooling. At the decay heat levels which would exist under these conditions, heat transfer to the environment would remove a significant fraction of the decay heat and it is likely that the fuel would never heat up to 2200°F. However, even if no heat transfer from the fuel rod is assumed, so that you have an adiabatic heatup of the fuel rod, and equilibrium fission products are assumed for infinite operation at .001% power, I calculate that more than 30 days are available to restore cooling prior to exceeding a fuel rod temperature of 2200°F.

Q. How do the accidents and transients possible during Phase II compare to those set out in Chapter 15 of the Shoreham FSAR?

A. The review of anticipated operational occurrences and postulated accidents set out in Chapter 15 of the Shoreham FSAR, when compared to Chapter 15 Phase II operation indicates that most of the transients are not possible for the same reasons described in the Phase I evaluation. Because the fission products inventories in the core will be significantly less during Phase II operation than for conditions analyzed in the FSAR, the radiological impact for transients involving continuous control rod withdrawal during startup event, fuel handling accident, liquid radwaste tank rupture are significantly less severe than those that have already been analyzed and found acceptable in the FSAR.

Q. Is the availability of the AC power a concern during LILCO's projected Phase II operation?

A. Availability of AC power is not a safety concern during Phase II, because many of the transients cannot occur and for those that can

occur, it very unlikely that fuel failure could occur. Even if it did, there can be no significant radiological consequences due to very low fission product inventory. Therefore, there is no significant risk to the public health and safety.

Q. What plant systems need power to keep the hottest fuel rod from going over 2200°F in the event of an accident?

A. For transients which do not depressurize the vessel, either the reactor core isolation cooling system, the high pressure coolant injection system, both of which are steam driven, or the control rod drive system would be sufficient to maintain water inventory. The fuel would remain covered with water and would not heat up. For a design basis accident where all of the water inventory would be initially removed from the vessel and there would be no steam available to drive the RCIC or the HPCI and supply water to cool the core, you would need a core spray system or a low pressure coolant injection system to provide water to flood the core up to the 2/3 core height. However, even for the LOCA case there are on the order of 55 minutes available before the maximum fuel element cladding temperature exceeded 2200°F and power had to be restored.

Q. In your answers, do you assume that a LOCA and a seismic event occur simultaneously?

A. Although the equipment which is used to mitigate a loss of coolant accident is normally required to satisfy seismic criteria, the Staff does not assume the simultaneous occurrence of a loss of coolant accident and a seismic event. This is because of the very low probability of the combined event.

Q. We have previously talked about fuel rod temperatures. Is this the bounding source of any of the concerns for an accident starting from 5% at Shoreham?

A. For the cases that we have discussed, the peak cladding temperature would be reached prior to any of the other limits that are described in 10 C.F.R. 50.46. For a lower power condition such as operation at 1 or 2%, it is possible that an oxidation limit could be reached prior to reaching the fuel temperature limit. However, in either case, the 55 minutes that's been described for the 5% case would bound the time available to restore power to prevent reaching any of these limits.

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-OL-4 (Low Power)
	)	
Shoreham Nuclear Power Station	)	

TESTIMONY OF THEODORE R. QUAY

Q1. Mr. Quay, please state your name, address and position with the Nuclear Regulatory Commission.

A1. My name is Theodore R. Quay. My business address is U. S. Nuclear Regulatory Commission, Washington, D. C., 20555. I am a Section Leader in the Accident Evaluation Branch, Division of Systems Integration within the Office of Nuclear Reactor Regulation of the Nuclear Regulatory Commission.

Q2. Have you prepared a statement of your professional qualifications?

A2. Yes, I have prepared the statement of my professional qualifications. It is appended to this testimony.

Q3. Please state the purpose of your testimony and identify your responsibilities therein.

A3. The purpose of my testimony is to discuss the effect of the loss of the Standby Gas Treatment System (SGTS) on the radiological conseqeunces of certain accidents.

Q4. Please state the purpose of the SGTS.

A4. The SGTS is a post accident mitative system designed to reduce the quantity of radioactive iodine released to the environment following certain postulated accidents.

Q5. What accidents is the SGTS used to mitigate?

A5. The SGTS is used to mitigate the consequences of the Loss-of-Coolant Accident and the fuel handling accident.

Q6. What is the effect of the loss of the SGTS on these two accidents?

A6. As discussed in the staff's Shoreham SSER 5, the most limiting case predicts that power could be lost for 55 minutes without fuel failures occurring. As indicated in this SSER no more than 30 minutes will be needed to restore power to the ECCS pumps from alternate ac sources. As a result, without fuel failures, there is no need for the SGTS.

With respect to the fuel handling accident, those fission products which are in the fuel-cladding gap are subject to release from fuel assemblies damaged during handling, but not the fission products which remain in the fuel itself. At 5% power, not only is the total fuel inventory 20 times smaller than at full power (5% versus 100%), but also the fraction of that inventory that has left the fuel and entered the gap is at least 20 times smaller as well. This reduction of fission products in the fuel-clad gap alone compensates for a loss of the SGTS due to unavailability of the onsite diesels (This system was assumed in the SER to reduce the post-accident release of iodine fission products by a factor of

20). Although the loss of the SGTS is more than compensated for by the reduced fuel-cladding fission product gap inventory and the Staff does not believe additional measures are necessary, the consequences of postulated fuel-handling accidents could further be mitigated by imposing a technical specification restriction on movement of irradiated fuel. Restricting the movement of irradiated fuel for a period of 40 days would more than compensate for the iodine removal capability of the SGTS. The decay allowed for by the forty day period would also produce more than a factor of 20 reduction in radioactive iodine released during a postulated accident.

THEODORE R. QUAY

PROFESSIONAL QUALIFICATIONS

OFFICE OF NUCLEAR REACTOR REGULATION

U. S. NUCLEAR REGULATORY COMMISSION

I am a Section Leader in the Accident Evaluation Branch, Division of Systems Integration, U.S. Nuclear Regulatory Commission, Washington, D.C. My duties are to provide technical supervision and review the work of personnel assigned to my section. My responsibilities include planning, coordinating, and reviewing the fission product attenuation of accident mitigative features of plants under review for construction permits and operating licenses, and modifications to operating facilities. I am also responsible for the development of technical positions for reactor standards, codes, and criteria associated with programs assigned to the section.

I received a BS degree in Nuclear Science from the Maritime College of the State University of New York in 1966. I received a MS degree in Nuclear Engineering from North Carolina State University in 1972 and also completed all the requirements for a PhD in Nuclear Engineering at that same University with the exception of the dissertation.

My professional experience in the nuclear power industry includes over three years of work with an architect-engineering firm where I was the nuclear group leader on a power plant under construction. My

responsibilities included supervision of the nuclear design group, a group of nuclear engineers responsible for the design of all the reactor nuclear systems, and review and coordination of all the inputs to the Safety Analysis Report. I was also a member of the Test Working Group, a group which dealt with problems associated with design and construction of the facility.

I joined the Nuclear Regulatory Commission as a Policy Analyst in the Office of Policy Evaluation late in 1975. My responsibilities included the review and analysis of existing and proposed Commission policy statements, review and analysis of portions of the Commission's budget, preparation of the technical aspects of Congressional testimony or speeches for the Commissioners, and the review of proposed projects and programs from a policy standpoint.

Prior to assignment to my present position, I was the Senior Reviewer for Site Hazards for the Systematic Evaluation Program (SEP), a program which reviewed safety aspects of a number of older operating reactors. My responsibilities included review and coordination of the inputs for topics dealing with meteorology, hydrology, external hazards and accident consequences for the SEP Plants.

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JUDGE MILLER: Now were there any other documents or attachments, whatever they were called, attachments or what-not?

MR. PERLIS: The staff offered no attachments and I don't believe there were any exhibits offered by any other party.

JUDGE MILLER: That concludes then the testimony of this panel; is that correct?

MR. PERLIS: That is correct, Your Honor.

JUDGE MILLER: Thank you, gentlemen, you may step down.

(Panel excused.)

JUDGE MILLER: Next?

MR. PERLIS: Your Honor, if I may first raise one preliminary matter. I believe in the first phase of this hearing the SER was formally moved into evidence as an exhibit. We did move it into evidence earlier in this hearing, but I don't believe we offered it as an exhibit.

JUDGE MILLER: All right. Which SSER are you talking about?

MR. PERLIS: SSER Supplement 6.

JUDGE MILLER: No. 6. What exhibit number do you wish to give it?

MR. PERLIS: Supplement 5 I believe was Staff

Sim 7-13

Exhibit LP-1. So Supplement 6 would be Staff Exhibit LP-2.

MR. ROLFE: Judge Miller?

JUDGE MILLER: Yes.

MR. ROLFE: I believe that that was offered Monday morning at the beginning of this hearing, and I also believe, although I am not certain, that it has already been bound into the transcript of Monday's proceedings.

MR. PERLIS: That is correct. It has already been offered. The only point I am raising is that we didn't give it an exhibit number at that time.

JUDGE MILLER: It was admitted into evidence.

MR. PERLIS: Right, and we did attach an exhibit number to SSER 5. I just wanted to give this one a number.

JUDGE MILLER: All right then, for clarity in the record, SSER No. 6, which was profferred and admitted into evidence on Monday of this week and has been made, as I understand it, part of the transcript, will be assigned Staff Exhibit what?

MR. PERLIS: LP-2.

JUDGE MILLER: LP-2. All right.

MR. PERLIS: Thank you.

JUDGE MILLER: There is nothing further that is necessary and the record should be clear.

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(Staff Exhibit LP-2, which was made a part of the record at transcript page 721, was marked for identification and admitted into evidence.)

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MR. PERLIS: The staff calls Jim Clifford to the stand.

Whereupon,

JAMES P. CLIFFORD

was called as a witness on behalf of the staff and, having been first duly sworn by Judge Miller, was examined and testified as follows:

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JUDGE MILLER: Please be seated.

DIRECT EXAMINATION

BY MR. PERLIS:

Q Mr. Clifford, would you please state your full name and position with the NRC?

A My name is James William Clifford. I am an operational safety engineer in the Procedures Section of the Procedures and Systems Review Branch, the Division of Human Factors Safety, Office of Nuclear Reactor Regulation in the Nuclear Regulatory Commission.

Q Thank you.

I have in front of me a document entitled "Testimony of James W. Clifford." The document is four pages long and attached to it is a one-page document entitled

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"Professional Qualifications of James William Clifford." Is the four-page document the testimony you have provided in this proceeding?

A Yes, it is.

Q Do you have any changes you would like to make to that testimony?

A Yes, there are some changes I would like to make.

On page 2 in the answer to Question 4, the third paragraph, in the last sentence that starts "This would involve," it should read "This would involve verification of the availability of either the 20 megawatt gas turbine or an alternate offsite power source local operation," and the change is rather than "a breaker," it should be "three breakers."

On page 3, the fourth line down, the sentence should read "To close a breaker," and insert "and a control room operator is expected to close a total of four breakers."

MS. LETSCHE: Would you repeat that, please?

THE WITNESS: Yes, I will. In the fourth line down on page 3, it should read "To close a breaker" and insert "and a control room operate is expected to close a total of four breakers."

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Q Are those the only changes you have to make?

A No, I have some more. The answer to Question 7, I would like to insert the revisions of those procedures that I reviewed for clarity.

The revision of SP 29.015.02, loss of all AC power emergency procedure that I reviewed was Revision 5. And the procedure of TP 29.015.03, restoration of AC power with onsite mobile generators, interim emergency procedure, was Revision 1.

In that same sentence, there is a set of parentheses with five percent power, and in front of the five there should be a less than sign.

And those are all the changes.

Q Thank you. With those changes, is your testimony true and correct to the best of your knowledge and belief?

A Yes, it is.

Q Could you identify for the Board which portions of Supplement 6 to the SER you were responsible for?

A I was responsible for Section 13.5.1.

Q Could you please provide the Board with a brief summary of your professional qualifications?

A Yes. As I stated, I am currently employed as an Operational Safety Engineer. The duties that are assigned include the evaluation of emergency operating procedures at nuclear power plants, the development and review of guidelines

#8-2-SueT

for the evaluation of emergency and other procedures. And I've also been involved in evaluating the operational and human factors aspects of various generic issues.

I've been in this capacity since 1980. There was one six month period when I was an Acting Section Leader for the Procedures Section. And in addition to the duties of review, the Section Leader is responsible for supervision of four technical and three human factors professionals.

Prior to my tenure with the Nuclear Regulatory Commission, I was an officer in the United States Navy, assigned to a nuclear power prototype in Windsor, Connecticut, where I was qualified the equivalent of a shift supervisor.

Prior to that tour, I was assigned to a nuclear powered ship where my duties included the operation of the ship's nuclear propulsion plant.

I earned a Bachelor of Science in Systems Engineering from the United States Naval Academy. And other formal training I have received include courses from one week to six months in the technical, theoretical and operational aspects of nuclear power plants.

During my time in the Navy, I qualified as Chief Engineer of Naval Nuclear Propulsion Plants.

MR. PERLIS: Thank you. Your Honor, Mr. Clifford is available for voir dire.

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JUDGE MILLER: Any voir dire examination?

MS. LETSCHE: I have none.

MR. PALOMINO: None, Your Honor.

MR. EARLEY: LILCO has no questions.

JUDGE MILLER: You may proceed.

BY MR. PERLIS: (Continuing)

Q Mr. Clifford, could you please provide the Board with a brief summary of your testimony?

A Yes. My testimony starts with a summary of the actions that are necessary for restoration of AC power, using the alternate, proposed alternate AC power sources by the Applicant. I then discuss the procedures that were proffered by the Applicant for implementing those actions, and I go on to discuss a site visit that we made which observed the operators' capability of taking the necessary actions to restore AC power using these alternate power sources.

My overall conclusion is that the operators are capable of taking the necessary actions within the specified time frame.

MR. PERLIS: Thank you. Your Honor, Mr. Clifford is available for cross-examination.

JUDGE MILLER: Very well. County.

MS. LETSCHE: Yes. Before I begin my cross, I would like to move to strike two portions of Mr. Clifford's

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testimony. They are the -- on Page 2 of his testimony, the second paragraph of Answer 4, which begins, "The operators are expected..." and the first clause in the first sentence of the following paragraph, that is, "If the TDI generators could not be started..."

In addition, I move to strike the -- on Page 3, the last sentence of the first paragraph of Answer 7, which states, "In addition, this procedure provides actions to start the TDI diesels."

The basis for this motion to strike is that this testimony deals with the expected operation of the TDI diesel generators in the event of a loss of offsite power. The premise of this proceeding, as stated by LILCO in its exemption application, is the unavailability of the TDI generators. And the issues being discussed by the witnesses and to be evaluated and ruled upon by the Board involve the operation of the alternate sources of AC power, not the TDI diesels.

Accordingly, this discussion by Mr. Clifford of the operation, automatic start, et cetera, of the TDI diesel generators is not relevant and should be striken.

JUDGE MILLER: Staff.

MR. PERLIS: Mr. Chairman, the reason that's in Mr. Clifford's testimony, he is factually describing the procedures that will be used. Those procedures include

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attempts to start up the TDI diesel generators. The Staff, in its ultimate conclusion, is not relying on those TDIs to start.

And his evaluation of the procedures does not rely on those to start. But in evaluating the procedures, he looked at the procedures that will be used. Those procedures involve attempts to start up the TDIs as well as the gas turbines as well as the four EMDs.

For the sake of completeness, his testimony should accurately reflect the procedures he reviewed and the procedures that will be attempted. But, again I want to emphasize the conclusion is not based on an assumption that the TDIs will start.

JUDGE MILLER: Are they based on the assumption that they won't start or at least will not be used --

MR. PERLIS: I believe it's based on the assumption that operator actions necessary to start the gas turbines or the EMDs will be accomplished in a specified period of time.

JUDGE MILLER: I think we will overrule the motion to strike. And you may proceed with your cross-examination.

CROSS EXAMINATION

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BY MS. LETSCHE:

Q Mr. Clifford, I would like to direct your attention

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please to Page 2 of your testimony.

Is it your understanding that during the low power testing, Phases I through IV, that are being proposed by LILCO in its exemption application, that if a loss of offsite power occurred LILCO would attempt to operate the TDI diesels?

A That is my understanding, yes.

Q And what is your basis for that understanding?

A The procedures that are specified include attempts to verify operation of the TDIs and attempts to restart TDIs if they fail to start.

Q Is it your understanding, Mr. Clifford, that such use and reliance upon the TDI diesel generators would be permissible prior to the resolution of the TDI litigation before the Brenner licensing board?

MR. PERLIS: Objection. Your Honor, this witness is being proffered to describe the procedures that they are using. He is not an expert on TDI diesels, and he is not up here to testify as to whether they will or will not be used.

JUDGE MILLER: I think that's correct. Your questions go beyond the scope of the direct examination proffered of this witness.

So, the objection will be sustained.

MS. LETSCHE: Judge Miller, I think it's important

#8-7-SueT

to understand Mr. Clifford's understanding of what would happen under the operation of this plant, and I'm attempting to identify what that understanding is.

JUDGE MILLER: Well, you are going beyond the scope of direct is the objection. So, limit yourself to the reasonable scope and then there probably will be other opportunities for you. But, at this time it's not.

BY MS. LETSCHE: (Continuing)

Q I take it, Mr. Clifford, that it's your understanding that during the low power testing being proposed by LILCO in its exemption application that the use of the EMD diesels or the 20 megawatt gas turbine, assuming there is a loss of offsite power, would only happen if the TDI diesels were tried and didn't work?

A That's correct.

Q So, your conclusions concerning the ultimate availability of onsite AC power during the low power operation of the Shoreham plant include the assumption that the TDI diesel generators would be one source of such power, correct?

A That's correct.

MS. LETSCHE: Judge Miller, I move to strike Mr. Clifford's testimony in its entirety. In light of the testimony we have just heard, his testimony is premised on the availability of the TDI diesel generators which is --

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JUDGE MILLER: Can't you wait until it's concluded? Because you are going to be repeating your objection, your motion. You are doing it piecemeal, we are doing it two or three times.

Why don't you wait until we get the whole picture, and you will be given time to make your argument.

MS. LETSCHE: Very well, Your Honor.

BY MS. LETSCHE: (Continuing)

Q Mr. Clifford, you state in the third paragraph of Answer 4 of your testimony which discusses what would happen if the TDI diesel generators couldn't be started, that the lining up or the availability of the 20 megawatt gas turbine would involve several actions.

And the first one you mention is the verification of the availability of that turbine. How does that verification occur?

A Are you speaking of the 20 mega -- the onsite 20 megawatt gas turbine?

Q Yes, I am. That's what you were speaking of here, isn't it?

A That's correct.

Q Okay. That's what I'm talking about, too.

A There is an indication in the control room of power available from that turbine.

Q What is that indication?

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A It's a white indicating light.

Q And what does it indicate? That there is voltage on the line?

A It indicates that -- I believe that there is a voltage output from the turbine itself, or from the generator. I'm sorry.

Q I'm sorry. You are saying that the indicator has a voltage reading on it in the control room?

A No. It has -- it is just a white indicating light that power is available.

Q What is your understanding of the conditions that cause that white light to come on?

A There would have to be some amount of voltage available.

Q Where would the voltage have to be?

A At the output of the generator of the 20 megawatt gas turbine.

Q Is it your understanding that the voltage would have to be on the 69 KV line?

A I'm not sure whether it's actually on the 69 KV line after the output breaker is shut.

Q Is this indication only present after the output breaker is shut?

A I do not know.

Q I take it that this indication in the control

#8-10-SueT

room does not provide the operator with the amount of voltage that is coming off of that turbine; is that right?

A This particular light does not, no.

Q Now, the verification of the availability of the turbine that you refer to in this sentence of your testimony is limited to the review by the control room operator of that indicating light we have been discussing; is that right?

A I'm sorry. Could you repeat the question?

Q It wasn't a very good question. Let me try it again.

Am I correct that by, to quote your testimony, verification of the availability, of the 20 megawatt gas turbine consists solely of the control room operator looking at this indicator we have been discussing in the control room?

A There are other means available for determining availability.

Q I'm just trying to understand what you meant when you wrote in your testimony, verification of the availability of the 20 megawatt gas turbine.

What did you have in mind when you wrote that?

A The particular indication that was used was a white indicating light, as I previously described. There

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are other means available which provide an indication of whether power is available at the reserve service station transformer.

Q What other means are those?

A Those are also indicating lights.

Q Those are lights in the control room also?

A Yes, they are.

Q And what conditions are present, or need to be present, for those indicators to operate?

A There must be some amount of voltage present.

Q At the -- where does that voltage have to be present?

A At the normal and reserve service station transformer.

Q Both?

A Transformers.

Q Is there a separate indicator for each transformer?

A There are separate indicators for both, yes.

Q Do those indicators provide the amount of voltage or just the presence or absence of voltage?

A They indicate just the presence or absence of voltage.

Q Do those indicators provide an identification of where the voltage is from?

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A You mean the particular source that it's from?

Q Yes.

A No, it does not.

Q Now, in this sentence that we have been discussing, verification of the availability, you mention either the 20 megawatt gas turbine or an alternate offsite power source.

What did you have in mind by alternate offsite power source?

A The -- there are Holtsville gas turbine generators that are offsite that are also available for providing power to the site.

Q Now, if the Holtsville gas turbine was providing power, that would mean that the power had been restored to the grid; isn't that right?

A It would have been restored to a particular portion, yes.

Q Now, is there an indication in the control room that power has been supplied by the Holtsville gas turbine?

A Not specifically, no.

Q Am I correct that the indication in the control room that would relate to the Holtsville gas turbine would be an indication that offsite power had been restored?

A In my understanding, yes.

Q Now, continuing in this same sentence, you refer to local operation of -- and you changed it to three breakers

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to line up these power sources.

What did you mean by local operation?

A An operator would have to be dispatched to go down to the emergency switchgear room and operate or close three breakers in that room.

Q This is, what, a control room operator would be dispatched to the emergency switchgear room?

A It would normally be an equipment operator.

Q An equipment operator?

A Yes.

Q How does that dispatching take place? Who tells them to do that?

A The control room supervisor.

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Q Now, when the equipment operator gets to the emergency switchgear room, he deals with three breakers. What does he do with those breakers?

A On the front of the cabinet containing the breakers he would operate a control switch.

Q And the control switch would result in the change of alignment of the three breakers?

A No. There are three different switches he would have to turn.

Q I see. Can you identify for me what the three breakers are?

A They are supply breakers from the reserve service station transformer, to the 4 KV emergency buses.

Q And am I correct that the operator would be expected to close those breakers?

A The supply breakers to the 4 KV emergency buses, yes.

Q Now, you go on to say that manual resetting of the emergency bus program lockout devices would also be required. Where are those devices located?

A The controls for operating those are in the control room.

Q So, the manual resetting would be done by a control room operator?

A That is correct.

Q Can you explain to me what the emergency bus program lockout devices are, what they do?

A They have a number of functions. There are a number of functions that come off the lockout device. I am sorry -- the bus program lockout devices themselves would -- it controls the automatic transfer from normal service station transformer to reserve service station transformer on loss of power to the normal service station transformer, and upon subsequent loss, or a concurrent loss of power to the reserve service station transformer, would prevent reclosure of the breakers from either the normal or reserve service station transformer to allow the TDI diesel generators to provide power to the 4 KV emergency buses.

Q Well, I am now a little confused. I thought we were talking here about the procedures that would be used to get the 20 megawatt gas turbine on line? Isn't that what you are discussing here in your testimony?

A That is correct.

Q Well, why did you just mention bringing on line the TDI diesels?

A You asked what the purpose of a particular device was.

Q In the context of the use of the 20 megawatt gas turbine, and your testimony which refers to the manual

resetting of the emergency bus program lockout devices, what is the function of those emergency bus program lockout devices?

MR. PERLIS: Your Honor, excuse me. I object. He has already answered what the function of the devices is. If counsel wishes to ask him why they have to be manually reset, she would rephrase the question that way.

JUDGE MILLER: I don't know what who is asking whom at this point. The witness seems to be having trouble focusing on the question. I don't know whether it is a lack of communication between them or not.

I will sustain the objection simply on the grounds of lack of clarity, and ask counsel if she can rephrase now so that maybe we can all get on the same wave length, if that be the problem.

BY MS. LETSCHE: (Continuing)

Q Mr. Clifford, what is the function of the manual resetting of these devices which you describe in your testimony?

A I believe that in addition to what I stated, there is an additional function of automatic sequencing, or resetting the automatic sequencer for loads off the 4 KV buses.

Q Why is it necessary to perform this manual resetting function if one is attempting to get power from

the 20 megawatt gas turbine?

A You need to get power from the bus to the loads themselves.

Q Am I correct that until that manual resetting takes place, the closing of the breakers that we discussed a few minutes ago would not result in power going to the emergency buses?

A Power would go to the emergency buses themselves, yes.

Q Mr. Clifford, in the next paragraph you discuss, I believe, the procedures to line up the EMD diesel generators to emergency buses.

A I discuss the actions, yes.

Q Right. Now, the first thing you mention is isolating the 4 KV buses from the RSST and the NSST. How is that done?

A There are a number of breakers that are operated in the control room; the control switches are placed in the Pull to Lock position.

Q You also reference shedding the loads from the 4 KV emergency buses. Is that a separate operation, or is that part of the working of the breakers that you just mentioned?

A It is a separate step in the procedure, but it is a similar operation.

Q It also takes place in the control room?

A Yes, it does.

Q Did you -- if you told me, I apologize -- did you say how many breakers were involved in this isolation?

A No, I did not.

Q How many?

A I am not sure of the exact number.

Q Is it just one operation to take care of all those breakers, or is there a separate operation for each one?

A There is a separate operation for each breaker.

Q And is that also true for the shedding of loads from the 4 KV emergency buses?

A That is correct.

Q Now, you go on to say that an operator is expected to remove undervoltage bus program fuses locally. Where is it that that action takes place?

A That action takes place in the emergency switchgear rooms, and there are three emergency switchgear rooms.

Q Right. Does an operator have to go to all three of those rooms?

A Yes, he does.

Q And what does he do in each one of those emergency switchgear rooms?

A He would open the front panel of the control cabinet, and remove a fuse block inside that control cabinet.

Q I am not a mechanic. What do you have to do to remove a fuse block?

A There is an assembly that contains the fuses, and you would grab hold of that assembly and pull it out.

Q Okay. You don't have to have any tools and unwire things. You just pull something out of the cabinet, is that right?

A That's correct.

Q And who is it who is expected to perform this operation in those three rooms?

A Normally, an equipment operator would do that.

Q When you say, 'normally,' do you mean according to LILCO's procedure an equipment operator would do it?

A I would have to look at the procedure to make sure, but I believe so.

Q To the best of your recollection?

A Yes.

Q What happens, or what would happen, Mr. Clifford, if these program fuses weren't pulled?

(Pause)

A If they were not pulled, and power restored to the 4 KV emergency buses, one of the things that would

occur would be that all the 4 KV loads would automatically sequence onto the emergency buses.

Q Why is it important to keep that from happening?

MR. PERLIS: Objection. Your Honor, this is a witness on procedures to be taken. He is not being supplied as a witness for power systems.

JUDGE MILLER: Well, what is he testifying about in this respect?

MR. PERLIS: He was offered, proffered to testify as to whether procedures could be implemented. She is asking whether certain items done in the procedures are necessary from a power systems point of view, and what will happen if certain things aren't performed.

We will have witnesses who can answer those questions later.

JUDGE MILLER: What about his testimony at the bottom of page 2, where he tells what is to be done and so forth. And he doesn't know what happens.

MR. PERLIS: He is describing the operator actions that are necessary to be taken.

JUDGE MILLER: Is that for some purpose in this proceeding, for us to understand what the operator does?

MR. PERLIS: Yes, I believe the purpose of his testimony is to indicate the operator actions that LILCO

has stated will be taken, and to state whether those actions can be taken in the specified period of time the operators have before power needs to be restored.

JUDGE MILLER: I understand that period of time and all the rest; why wouldn't it be significant to know what happens if one of these steps isn't taken, which is at least part of this interrogation?

MR. PERLIS: It may well be significant. What I am suggesting is that that doesn't come within his area of expertise.

JUDGE MILLER: I know, but you can't shield him from everything. Now, he is there and he is telling us what is supposed to be done. Certainly it is fair to inquire what happens if you stop at Step 3 instead of 4.

MR. PERLIS: I am merely suggesting that it might go a lot easier and quicker if those questions were asked to witnesses we will have coming up next who are qualified in this area.

JUDGE MILLER: What I am suggesting is whoever prepared this testimony might have had that same criterion in mind. Have the testimony proffered by those who can get into the reasons behind it. Do you have such testimony available, and are you proffering it by other witnesses, if this witness is not capable of answering it, or it is beyond his area of expertise?

MR. PERLIS: We are proffering power systems testimony.

JUDGE MILLER: What does that mean?

MR. PERLIS: That testimony would deal with the generators that are to be used, and the necessary means of supplying power from them to the core.

JUDGE MILLER: In other words, those witnesses would be better able to answer the questions that are involved here on this testimony at the bottom of page 2, commencing: If these electrical power sources cannot be used, et cetera?

MR. PERLIS: No, no, no. They would be better able to answer questions such as -- I believe these questions are getting to the design.

JUDGE MILLER: I don't know what they are getting to. It is the answer that is troubling me.

(Pause)

JUDGE MILLER: Who objected?

MR. PERLIS: I did, Your Honor, and the basis of the objection was that these questions are getting to the design of the system, and this witness is proffered not as an expert on the design of the system, but as an expert on operator actions that LILCO has stated will be taken.

JUDGE MILLER: All right. The witness is

directed to answer questions insofar as he can, and when he can't do so, to tell us right out and let's not spend a lot of time if he can't.

We are having long pauses, and I am trying to find out why. I want to be fair to everybody here, both the witness and Staff, and also to counsel cross examining.

So, let's go ahead. I take it it is being offered for a more limited purpose than I realize.

In any event, proceed. But the witness is directed now, when you don't know, just say you don't know, and if we have to get somebody else later, don't you worry about it, okay?

WITNESS CLIFFORD: Yes, Your Honor.

JUDGE MILLER: Fire away.

BY MS. LETSCHE: (Continuing)

Q I think the last question, Mr. Clifford, was why is it important to remove the undervoltage bus program fuses?

A My understanding is that the EMD diesel generators are not designed to take the automatic load sequencing.

Q Is it your understanding that the TDI diesel generators are?

A Yes.

Q So, you understand that if the TDIs were operating, that this step wouldn't have to be taken?

A This step, yes.

Q Now, you also say that an operator is expected to verify locally operated breakers are lined up in preparation for power restoration. Who is it who is expected to do that operation?

A The equipment operator that removed the under-voltage bus program fuse.

Q And does he also do this in the three emergency switchgear rooms?

A No. This is done primarily in the normal switch-gear room.

JUDGE MILLER: The normal switchgear room?

WITNESS CLIFFORD: The normal switchgear room?

WITNESS CLIFFORD: The normal switchgear room.

JUDGE MILLER: What is that, as distinguished from abnormal, or whatever else you are distinguishing it from.

WITNESS CLIFFORD: Well, it is distinguished from the emergency switchgear room basically in location, and the type of equipment that is powered from the two rooms -- the four rooms.

BY MS. LETSCHE: (Continuing)

Q There is only one normal switchgear room, isn't that right, Mr. Clifford?

A That is correct.

Q Now, how many breakers need to be -- breaker line ups need to be verified in this step?

A I am not sure of the exact number.

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Q Is this just a verification step, or are breakers supposed to be moved or operated at some point?

A There are some verification steps and some breakers that need to be operated.

Q I see. So this verifying, your word here to verify locally operated breakers really includes verifying and lining them up; is that correct?

A That is correct.

Q Now next you say that the NSST may be locally isolated from the emergency buses if a fault exists in the NSST. How does that happen? How does the NSST become locally isolated from the emergency buses?

A At the NSST itself there are some disconnect switches which again the equipment operator would have to go to these disconnect switches. They are, I would estimate, 20 to 30 feet in the air and he would have to use an extension pole to pull these disconnect switches.

Q And this is outside the containment building; isn't that right? Or between the containment building and the plant building?

A I believe it is outside the auxiliary building.

JUDGE JOHNSON: Mr. Clifford, I am having trouble hearing some of your answers.

THE WITNESS: I am sorry, ma'am. It is outside of the auxiliary building.

Sim 10-2

JUDGE MILLER: You will have to get closer to the microphone and remember to look at least sometimes at the Board.

THE WITNESS: Yes, Your Honor.

BY MS. LETSCHE:

Q When would the equipment operator be instructed to operate these disconnect switches you just described?

A If the control room supervisor instructs him to do so, then he would do so upon indication in the control that a fault exists in the NSST.

Q And what is that control room indication?

A I believe there are indicating lights or enunciators.

Q Okay. You then say that the LILCO operator is instructed to close a breaker to connect the EMD diesel generators to the four KV buses. Is this the same equipment operator?

A Normally it would be, yes.

Q Okay. And just to make sure I understand, are all these EMD diesel operations that we have been discussing outside of the control room intended to be performed by the same equipment operator?

A My understanding is yes, they can be.

Q Well, are they intended to be under LILCO's procedures?

Sim 10-3

A I do not know what LILCO's intent is.

Q What do the procedures provide?

A It believe it provides for an operator to be dispatched.

Q One operator to do all of these things?

A I believe so, yes.

Q So I take it that you don't know whether or not it would be the same operator who would be dispatched to perform all of those things?

A I don't know in any individual circumstance how many operators would be dispatched to peform these operations.

Q Now, Mr. Clifford, wouldn't it make a difference in the amount of time it would take to complete all these operations whether one or more than one individual was performing them?

A I would expect so, yes.

Q Now going back to where I was, you mentioned that the LILCO operator is instructed to close a breaker and to connect the EMD diesel generators to the four KV buses.

Where is that breaker that he has to close?

A That is in the normal switchgear room.

Q And you added to this testimony, and I think it was in this sentence, that a control room operator is expected to close a total of four breakers, right?

Sim 10-4

A That is correct.

Q Once the control room operators manually load equipment onto the emergency buses, are there any additional actions that the equipment operator needs to take?

A Depending on plant conditions, there may be, yes.

Q What sorts of things could there be? I am referring to things relating to the EMD diesels.

A I can't recall if there are any additional actions.

Q Mr. Clifford, to your knowledge, have the procedures that you reviewed, Revision 5 of the Loss of All AC Power Emergency Procedure, and Revision 1 of the procedure Restoration of AC Power With Onsite Mobile Generators been revised?

A I believe that Revision 5 to Loss of All AC Power Emergency Procedures has been revised.

Q To your knowledge, the other one has not?

A Not to my knowledge.

JUDGE MILLER: I think we will break for lunch at this point, counselor.

We will resume at 1:30, please.

(Whereupon, at 11:50 a.m., the hearing recessed, to reconvene at 1:30 p.m., the same day.)

Sim 10-5

AFTERNOON SESSION

(1:30 p.m.)

Whereupon,

JAMES W. CLIFFORD

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

JUDGE MILLER: All right, who is interrogating?

MS. LETSCHE: I am, Judge Miller.

CROSS-EXAMINATION (Continued)

BY MS. LETSCHE:

Q Mr. Clifford, you mentioned in your testimony that you observed a demonstration of the operation of the 20 megawatt gas turbine and the EMD diesel generators on July 2nd, 1984 at the Shoreham site.

A That is correct.

Q Am I correct that the field operators who were sent to perform the various functions required under the procedures during that demonstration were in the control room at the time they were dispatched?

A Yes, they were.

Q Now I believe you said before you were responsible for Section 13.5.1 of Supplement 6 of the SER; is that right?

A It is 13.5.1, yes.

Q On page 13-2 you list a number of items, five

Sim 10-6

items to be precise, which you state "The following changes will be necessary for the staff to find the procedural and operational aspects of the augmented electrical power system at Shoreham acceptable."

Now I take it from that that based on your review of the procedures that you have seen, that at this time those are not acceptable, correct?

A That is true.

Q And am I also correct that the five conditions, or five items that are listed here on page 13-2 and continue over to page 13-3 would be required to be licensed conditions if a low-power license were to be issued?

A That is correct.

MS. LETSCHE: I have no further questions.

JUDGE MILLER: Thank you.

I see Mr. Palomino isn't here. We will give him an opportunity if he comes.

LILCO.

XXXXXXX

CROSS-EXAMINATION

BY MR. EARLEY:

Q Mr. Clifford, in your testimony on page 2 you list a sequence of events that starts with TDIs and goes to the 20 megawatt gas turbine followed by the EMD diesels.

In a loss of offsite power event, would the 20 megawatt gas turbine EMDs start automatically in

Sim 10-7

essentially the same time frame but not in this sequence?

A Although that wasn't in my particular area of review, that is my understanding, yes.

Q Now in your testimony on cross-examination you were asked about a number of breaker manipulations to be peformed by control room operators.

Would it be fair to say that a qualified control room operator can perform a breaker operation in the control room in a matter of seconds?

A Yes, he could.

Q You were also asked about the power available indication. I believe it was for the gas turbine and a number of other power available indications, and you mentioned that that indication was given by lights.

Are power available lights an appropriate and accepted means of indicating power available?

A Generally, yes, it has been.

Q In discussing the bus program fuses I believe you indicated that they were pulled because the EMD diesels were not designed to take automatic load sequencing.

If the 20 megawatt gas turbine was available to supply power, it wouldn't matter whether the bus program fuses were pulled or not, would it?

A That didn't come under my particular area of review. However, my understanding is that the undervoltage

Sim 10-8

bus program fuses do not need to be pulled for the 20 megawatt.

Q On page 3 of your testimony you mentioned isolating the NSST if a fault existed in the NSST. If there were not fault on the NSST, you wouldn't have to perform that step in the procedure, correct?

A The current wording of the procedure is somewhat confusing on that. My understanding is that that operation would not need to be performed. Part of my review of the revision to the procedure will cover that fact.

Q Now the demonstration that is discussed on page 4 of your testimony, in that demonstration did the LILCO equipment operator isolate the NSST?

A For the EMD demonstration, yes, he did.

Q And if then there had been no fault on the NSST and it had not been isolated, the times that you discuss in your testimony would have been reduced further?

A I would expect so, yes.

Q Now it is true that in that demonstration LILCO only used a single equipment operator to perform the manual actions outside of the control room, correct?

A That is correct.

Q So if there were more operators performing some of those actions simultaneously, again the time that you mentioned in your testimony, would you expect that to

Sim 10-9

reduced also?

A Yes, I would.

Q Now that operator that performed the manual actions was in the control room in that instance. If he had not been in the control room could the control room have given the instructions to the operator to commence taking those actions?

A Yes. There are means available for getting in touch with equipment operators while they are in the plant.

Q You were also asked about pages 13-2 and 13-3 in Supplement 6 to the SER, five items that you indicated would be licensed conditions.

I take it that if those licensed conditions are implemented, you would find LILCO's procedures for the alternative power sources acceptable?

A If they were adequately addressed, yes.

Q And the NRC would review implementation of conditions imposed in a license; is that correct?

A By "review implementation" do you mean would verify that the applicant has complied with the conditions?

Q Yes.

A Yes, we would.

Q Do you know if any of those five items that are listed there on pages 13-2 and 13-3 have been implemented yet?

Sim 10-10

A I will not say specifically. There has been, as I stated earlier, a modification to one of the procedures, and based on a cursory review, it appears to address some of the items, yes.

Q Can you identify which items it would address?

A It would be Item 5B, sub Item 1 and the portion that says "including a direct reference to the onsite 20 megawatt gas turbine.

MR. PERLIS: Just if I may just have one minute.

(Pause.)

(At this point in the proceedings Mr. Palomino joined the other parties at counsel tables.)

JUDGE MILLER: Do you want to go next? We started and you weren't quite here, but we thought you would be coming along.)

MR. PARLOMINO: Thank you, Judge. I apologize.

BY MR. EARLY:

Q Mr. Clifford, on page 2 of your testimony and beginning in the answer to Question 4 you mention actions that the operator might take with respect to the TDI diesels. Does that mention of the TDI diesels or consideration of the TDI diesels there in any way affect your conclusions about the ability of LILCO to implement restoring power from the supplemental power sources within

Sim 10-11

the time frames indicated in your testimony?

A Could you rephrase your question, please?

Q Yes. Let me start with a different question.

The fact that you mention the TDI diesel generators, I take it that doesn't impact in any way on your conclusions that LILCO can successfully implement or use the supplemental power sources within the periods of time indicated in your testimony, and I believe it is approximately 4 and 9 minutes?

A My conclusion is based on the operator's ability to perform a specified set of actions and a necessary set of actions and did not relate to any particular piece of equipment being relied upon but merely being available.

end Sim
Sue fols

#11-1-SueT

Q In reaching your conclusion then on the adequacy of these procedures, you assumed that the operators would try and start the TDIs and go through that series of steps in the procedure.

You further assumed that that operation was unsuccessful and then had to go on further to do these other things; is that correct?

A That's correct.

MR. EARLEY: I have no further questions.

JUDGE MILLER: New York.

CROSS EXAMINATION

BY MR. PALOMINO:

Q Mr. Clifford, in your testimony on Page 4, you say that you observed the demonstration on July 2nd, 1984.

I assume that was pursuant to a prior arrangement as to date and time?

A Are you asking whether or not --

Q Yes. Was there a previous arrangement for you to be there at that date and that time to make this observation?

A It was a planned trip, yes.

Q And do you know how many people were involved in that demonstration?

A Total number of people or people involved in the NRC?

#11-2-Sue1

Q No. People who were performing the demonstration, the LILCO people.

A Actually performing the demonstration, there were three control room operators and the equipment operator.

Q And did you witness more than one demonstration?

A Yes, I did.

Q How many?

A Two.

Q And they were with the same set of people?

A I believe they were the same set of people.

Q You don't know?

A I did not take their names or recognize -- memorize faces, no.

Q All right. You said there were means of getting in touch with people inside the plant.

What are those means?

A There are what I would call walkie-talkies available for contacting the equipment operators.

Q How about getting in touch with people offsite if necessary?

A There are telephone lines for getting in touch with the system operator.

MR. PALOMINO: I have no further questions.

JUDGE MILLER: Staff.

MR. PERLIS: Thank you.

&11-3-SueT

REDIRECT EXAMINATION

BY MR. PERLIS:

Q Mr. Clifford, just so we are absolutely clear, could you please describe the expected sequence of operator actions in the event of loss of offsite power?

A Well, in general I would expect the operator to first recognize that there is a loss of offsite power and then to verify whether or not the TDIs have started and go through a sequence of contingency actions based on the actual operation of the equipment.

Such as if the TDIs failed, I would expect the operator to -- the conglomerate of operators -- attempt to restart the TDIs while they were trying to provide power with the 20 megawatt gas turbine. And if the 20 megawatt gas turbine was not providing power, or was not capable of providing power, I would expect the operators to then go on to try to provide power with the EMD diesels.

Q In concluding that operator actions -- let me rephrase that.

Have you concluded that the operator actions are adequate to restore power from the 20 megawatt gas turbine?

A I have concluded that the operators are capable of taking the necessary actions.

Q And in reaching that conclusion then, does one

#11-4-SueT1

assume that the TDIs will not operate to have gotten to that sequence?

MS. LETSCHE: I object to that question. If he is asking what Mr. Clifford assumed, that would be a proper question.

He is asking does one assume. I don't know what that means.

MR. PERLIS: That's fine.

BY MR. PERLIS: (Continuing)

Q Mr. Clifford, did you assume in reaching that conclusion that they have reached a stage in the sequence where the TDIs have failed to operate?

A Yes.

Q Would you have reached -- would you have made the same assumption in determining whether the operator actions -- operators are capable of performing operator actions to restore power from the EMDs?

A Yes, I would.

Q The assumption that the TDIs would not operate?

A Yes.

Q If you could, turn to Page 2 of your testimony.

A (The witness is complying.)

Q You were asked a question about the verification of the availability of either the 20 megawatt gas turbine or an alternate offsite power source which I believe you

#11-5-SueT

identified as the Holtsville turbines.

A Yes.

Q For purposes of operation actions, does it matter whether power will be coming from the gas turbine or from Holtsville?

A No, it would not.

Q If you could, turn to Page 3 of your testimony, please.

A (The witness is complying.)

Q You were asked about the number of locally operated breakers for which operator action would be required.

Would the procedures have to identify each breaker that has to be operated?

A Yes, they will.

Q Also on Page 3, you were asked about certain operator actions and how many operators would do those actions.

Could you tell us whether the actions could be performed by a single operator?

A Yes, they could be performed by a single operator.

MR. PERLIS: Thank you. I have no further redirect.

JUDGE MILLER: Anything further?

#11-6-SueT

MS. LETSCHE: I have just two questions here, I think.

RECROSS EXAMINATION

BY MS. LETSCHE:

INDEXXXXX

Q Mr. Clifford, in response to I believe a question from Mr. Earley, you mentioned a cursory review of a revision to one of the procedures that you relied upon in preparing your testimony.

When did you perform this cursory review?

A I don't believe that I said I relied upon it --

Q No. I'm sorry.

A -- for my testimony.

Q I'm sorry. I didn't mean to indicate that. I meant, it's a revision to the one you relied upon in your testimony.

A That's correct.

Q Okay. My question is, when did you perform the cursory review of the revision?

A I believe it was Monday evening.

Q This past Monday of this week?

A This week, yes.

Q Now, you also mentioned that in the July 2nd demonstration that you witnessed that there were two tests performed.

I take it you meant there was one test of the EMD

#11-7-SueT

and one test of the gas turbine; is that right?

A Those were the two tests that I witnessed, yes.

Q All right. There weren't two tests of each procedure?

A That's correct.

MS. LETSCHE: Okay. That's all I have.

JUDGE MILLER: Anything further?

MR. PALOMINO: Yes.

RECROSS EXAMINATION

BY MR. PALOMINO:

Q If there was one test of the EMD and one test of the turbine, there was no test of the Holtsville?

A That was not a part of the test, no.

MR. PALOMINO: Thank you.

JUDGE MILLER: Anything further?

MR. EARLEY: No.

JUDGE MILLER: Very well.

MR. PERLIS: Your Honor, at this time I would move that Mr. Clifford's testimony be received into evidence.

JUDGE MILLER: Is it accompanied by --

MR. PERLIS: It's accompanied by a one-page attachment which details his technical qualifications -- professional qualifications.

JUDGE MILLER: Any objections?

#11-8-SueT

MS. LETSCHE: No. I believe the Board already ruled on my motion to strike.

JUDGE MILLER: I did promise that you could renew it, or if you had anything additional after it had all been covered by cross that you would have the opportunity to --

MS. LETSCHE: No, I --

JUDGE MILLER: Feel free, if you want.

MS. LETSCHE: I don't have anything additional.

JUDGE MILLER: Mr. Palomino?

MR. PALOMINO: Nothing.

MR. EARLEY: No objection.

JUDGE MILLER: Very well. The testimony will be admitted into evidence subject to the rulings that were made as we went along, together with the description of qualifications of the witness and will become part of the transcript.

(The testimony follows.)

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 JAMES W. CLIFFORD

Q.1. By whom are you employed, and what is the nature of the work you perform?

A.1. I am employed as an Operational Safety Engineer in the Procedures Section of the Procedures and Systems Review Branch, Office of Nuclear Reactor Regulation, U. S. Nuclear Regulatory Commission. A Statement of Professional Qualifications, which includes the nature of the work that I perform, is attached.

Q.2. What is the subject matter of your testimony?

A.2. I will address the implementation of the procedures for restoring AC power using the augmented electric power system in the event of a station blackout at the Shoreham Nuclear Power Station.

Q.3. Are operator actions necessary to restore emergency AC power to the Shoreham site?

A.3. Operator actions may be necessary to restore emergency AC power to the Shoreham site, depending on the operation of the installed equipment.

Q.4. Describe the conditions under which operator action is necessary to restore emergency AC power, and briefly describe these actions.

A.4. The postulated scenario for my evaluation was a loss of off-site power with a subsequent postulated failure of various backup power sources to provide power.

The operators are expected to observe operation of automatic equipment, which in the case of loss of off-site power would be the automatic start of the TDI diesel generators and the automatic start of any necessary loads on the emergency buses. If the TDI diesel generators fail to start, or if any necessary loads fail to sequence onto the emergency buses, the operators would be expected to manually start these components.

If the TDI diesel generators could not be started, the operators would be expected to line up the on-site 20 MW gas turbine, or, in conjunction with the system operator, line up an alternate off-site power source, to provide power to the emergency buses. This would involve verification of the availability of either the 20 MW gas turbine or an alternate off-site power source, local operation of a breaker to line up either of these power sources to the 4 KV buses, and manual resetting of the emergency bus program lockout devices.

If these electrical power sources cannot be used, the operators would be expected to line up the temporary EMD diesel generators to the emergency buses. This would involve isolating the 4 KV buses from the Reserve Station Service Transformer (RSST) and the Normal Station Service Transformer (NSST) and shedding the loads from the 4 KV emergency buses. An operator is expected to remove undervoltage bus program fuses locally,

and to verify locally operated breakers are lined up in preparation for power restoration. The NSST may be locally isolated from the emergency buses if a fault exists in the NSST. The local operator is then instructed to close a breaker to connect the EMD diesel generators to the 4 KV buses. The control room operators are then expected to manually load any necessary equipment onto the emergency buses, according to existing plant conditions.

Q.5. Has LILCo developed procedures that provide instructions for the operators to implement these actions?

A.5. Yes.

Q.6. Have you reviewed these procedures?

A.6. Yes.

Q.7. Could you briefly describe the procedures?

A.7. The procedures that I reviewed are SP 29.015.02, "Loss of All AC Power Emergency Procedure" and TP 29.015.03, "Restoration of AC Power With Onsite Mobile Generators Interim Emergency Procedure (5% Power)." SP 29.015.02 provides the actions to take for a station blackout condition, which is the loss of all AC power on the site. It covers the maintenance of plant safety functions and the control of DC powered equipment to prolong battery life. In addition, this procedure provides actions to start the TDI diesels.

TP 29.015.03 contains the actions to be taken in the event of failure of the TDI diesel generators, all alternate off-site power sources, and the on-site 20 MW gas turbine generator. The procedure specifies action steps to accomplish the operations that were outlined in the response to Question 4.

Q.8. Have the operations that are necessary to restore power with the on-site 20 MW gas turbine and the temporary EMD diesel generators been performed to demonstrate that the operators are capable of taking the necessary actions?

A.8. Yes. I observed a demonstration of the operation of both the 20 MW gas turbine and the temporary EMD diesel generators on July 2, 1984, at the Shoreham site. The demonstration included the operator actions that are necessary to restore electrical power and subsequently restore necessary equipment using the 20 MW gas turbine and the temporary EMD diesel generators as electrical power sources.

Q.9. Are the operators capable of implementing the necessary procedures in a timely fashion?

A.9. The operators that conducted the demonstration completed the necessary actions to restore AC power to the emergency buses with the 20 MW gas turbine in approximately 4 minutes. AC power was restored to the emergency buses using the temporary EMD diesel generators in approximately 9 minutes. Upon completion of training of all shift operators on the necessary actions, which we are requiring to include actual performance of the necessary actions to restore power to the emergency buses, there is reasonable assurance that the operators at Shoreham will be capable of implementing the necessary actions well within the minimum required time of 55 minutes as shown in the accident analysis.

PROFESSIONAL QUALIFICATIONS

JAMES WILLIAM CLIFFORD

My name is James William Clifford. I am employed as an Operational Safety Engineer in the Procedures and Systems Review Branch, Division of Human Factors Safety, Office of Nuclear Reactor Regulation, U. S. Nuclear Regulatory Commission, Washington, D. C. I have held this position since October 1980. I have also been assigned as Acting Section Leader, Section A (Procedures) of the Procedures and Systems Review Branch for the period of March 28, 1983 to September 11, 1983. The Procedures and Systems Review Branch reviews and evaluates licensee programs for the technical, human factors, and operational aspects of nuclear power plant operating and maintenance procedures. I was involved in the pre-licensing audit of emergency operating procedures at five (5) applicants' sites, and have review the emergency operating procedure development programs for eight (8) applicants and operating reactors. These reviews included the evaluation of technical guidelines, operational concerns, and the human factors guidelines to be used in the development and implementation of the emergency operating procedures. I was involved as one of the principal staff reviewers for the human factors aspects of emergency operating procedure generic technical guidelines for B&W and Combustion Engineering Owners Group guidelines, and, through the reviews of procedures for three (3) BWR applicants, assisted in the evaluation of the adequacy of the BWR Owners Group guidelines. I was the principal reviewer for the operational and human factors concerns for the Pressurized Thermal Shock generic issue, including audits of emergency operating procedures for six plants.

From July 1978 to October 1980, I was a naval officer qualified to the equivalent of a shift supervisor at the naval nuclear power prototype at Windsor, CT, where my responsibilities included supervision of plant operations, training of new personnel, and ensuring the continued expertise of experienced personnel. From March 1976 to July 1978 I was a naval officer assigned to a nuclear powered ship, where my responsibilities included safe operation of the ship's nuclear power plant.

I earned a BS degree in Systems Engineering from the U. S. Naval Academy in 1974. During my naval service and my employment with the NRC, I have attended several courses, varying from one week to six months in duration, on plant engineering, human factors, and plant operations. I am previously qualified as Chief Engineer Officer for Naval Nuclear Propulsion Plants.

#11-9-SueT

JUDGE MILLER: You may step down. Thank you, sir.

(The witness, Mr. Clifford, stood aside.)

MR. PERLIS: Your Honor, at this time the Staff would call to the stand, John Knox and Ed Tomlinson.

(Mr. Knox and Mr. Tomlinson are sworn by Judge Miller.)

MR. PERLIS: For the Board's convenience, Mr. Knox is situated to the Board's left and Mr. Tomlinson is to the Board's right, to the right of Mr. Knox, I should say.

Whereupon,

JOHN L. KNOX

-and-

EDWARD B. TOMLINSON

were called as witnesses by and on behalf of the Nuclear Regulatory Commission and, having first been duly sworn by Judge Miller, were examined and testified as follows:

DIRECT EXAMINATION

INDEXXXXXX

BY MR. PERLIS:

Q Mr. Knox, would you please state your name and position with the NRC?

A (Witness Knox) My name is John L. Knox. I am a Senior Electrical Engineer in the Power Systems Branch of the Nuclear Regulatory Commission.

#11-10-SueT

Q Mr. Tomlinson, could you please state your name and position with the NRC?

A (Witness Tomlinson) My name is Edward B. Tomlinson. I am a Mechanical Engineer in the Power Systems Branch, Division of Systems Integration, NRC.

Q Do you gentlemen have before you a 21 page document entitled "Testimony of John L. Knox and Edward B. Tomlinson?"

A (Witness Knox) Yes.

(Witness Tomlinson) Yes.

Q Is this the testimony that the two of you have prepared for this proceeding?

A (Witness Knox) Yes, it is.

(Witness Tomlinson) Yes, it is.

Q Do either of you have any changes you would like to make in the testimony?

A (Witness Knox) No.

(Witness Tomlinson) I have a few minor changes. On Page 4, in the last paragraph, the second sentence of the last paragraph, National Ocean Spray should read National Ocean Survey.

On Page 10, the first sentence of the first paragraph, reads, "...is started using a staring motor..." strike the word "staring."

Q Excuse me. That would now read, "The turbine is

#11-11-SueT started using a motor...?"

A That is correct.

Q Thank you.

A And the final correction is on Page 13. It's in the first paragraph, the third line from the bottom, should read, load will be equal to or less than one half the diesel generators..."

Q Are those all the changes you have?

A Yes, they are.

Q Gentlemen, with those changes, is the testimony true and correct to the best of your knowledge and belief?

A (Witness Knox) Yes, it is.

(Witness Tomlinson) Yes, it is.

Q Could you identify to the Board which section of the SER Supplement 6 you gentlemen were responsible for?

A (Witness Knox) Section 8.

Q Is that the same for you, Mr. Tomlinson?

A (Witness Tomlinson) That's correct.

Q Mr. Knox, could you please briefly summarize your professional qualifications?

A (Witness Knox) I have an Associate of Arts degree from Montgomery College. I have a B.S. degree in electrical engineering from the University of Maryland.

For the past ten years, I've worked at the

#11-12-Su4T

Nuclear Regulatory Commission reviewing electric power systems, both onsite and offsite in regard to compliance to NRC regulations.

Prior to my employment at NRC, I worked for the Potomac Electric Power Company for three years in their electrical transmission and distribution system for the offsite power systems.

Q Thank you. Mr. Tomlinson, could you please summarize briefly your professional qualifications?

A (Witness Tomlinson) Yes, sir. I received a Bachelor of Science Degree from the U.S. Merchant Marine Academy in 1960. My major field of study was marine engineering.

And since the graduation from the Academy, I have had twenty-four years of diversified experience in the operation, maintenance and/or application of diesel engines for use as main propulsion engine, as prime movers for ship service and stationary generators.

A more detailed outline of my qualifications are included as part of the submitted testimony.

MR. PERLIS: Thank you. Mr. Chairman, these gentlemen are available for voir dire.

JUDGE MILLER: Voir dire examination.

#11-13-SueT

VOIR DIRE EXAMINATION

BY MS. LETSCHE:

INDEXXXX

Q Gentlemen, I will address this to both of you. Am I correct that neither one of you have worked in the equipment qualification branch of the NRC?

A (Witness Knox) As part of my responsibilities for approximately the first four years I worked with the NRC, the Power Systems Branch was part of the Instrumentation Control Systems Branch and the Qualifications Branch was all part of the same group, and I reviewed equipment qualification for approximately four years.

Q I see. How about you, Mr. Tomlinson?

A (Witness Tomlinson) No, I have not worked in equipment qualification.

Q Have either one of you ever performed any seismic qualification of equipment for use in nuclear power plants?

A (Witness Knox) Could you restate that for me, please?

Q Have you performed any seismic qualification of equipment for use in nuclear power plants?

A No.

(Witness Tomlinson) No.

Q And I take it it is not part of the responsibilities of either of you to review equipment for seismic qualification?

#11-14-Sue T

A (Witness Knox) That's correct.

(Witness Tomlinson) That's correct.

MS. LETSCHE: That's all I have.

MR. PALOMINO: No questions.

JUDGE MILLER: LILCO.

MR. EARLEY: No questions.

JUDGE MILLER: There doesn't seem to be much in the way of redirect then, I suppose.

MR. PERLIS: Not on voir dire, no.

JUDGE MILLER: Go ahead, then, with your substantive testimony.

DIRECT EXAMINATION

NDEXXX

BY MR. PERLIS:

Q Mr. Knox, could you please provide a brief summary of your testimony?

A (Witness Knox) We have evaluted the alternate AC power system proposed by the Applicant to the requirements of the general design criteria. We have concluded that this alternate AC power system has sufficient capacity and capability to supply power to the systems needed to safely shut down the Shoreham plant from five percent power.

The design has sufficient redundancy, independence and testability so that it can perform its safety function, given a single failure. We have concluded that a fully qualified onsite AC power system would not provide a degree

#11-15-SueT of safety greater than that which would be provided by a proposed alternate AC power system.

Q Thank you. Mr. Tomlinson, do you have anything to add to that summary?

A (Witness Tomlinson) No.

MR. PERLIS: Your Honor, before tendering these gentlemen for cross-examination, I believe the Board indicated that we would have an opportunity to ask limited supplemental direct.

I do have a few questions I would like to ask these gentlemen.

JUDGE MILLER: Yes. I think we need to know what it is, and we need to be sure that the opposing counsel aren't taken by surprise.

MR. PERLIS: This is just to get Mr. Tomlinson's reaction to testimony given Tuesday by Messrs. Iannuzzi and Lewis.

JUDGE MILLER: Any objection?

MS. LETSCHE: Yes. I do object. I don't think that's proper direct testimony, since the direct testimony in this proceeding had been prefiled.

My objection is also that if there is a reason or a need for the Staff to submit supplemental or rebuttal testimony, they should file an appropriate motion showing good cause for the need to do so.

#11-16-SueT

JUDGE MILLER: Well, oral motions can be made in the course of the trial by any of you.

You would have to make an appropriate motion. You may make it orally.

MR. PERLIS: I will represent that this testimony is not significantly different than testimony that is already contained in their direct testimony. In case there was some confusion caused by the testimony of Mr. Iannuzzi and Lewis, I thought it might be helpful for the Board if Mr. Tomlinson could describe his reaction to that testimony.

JUDGE MILLER: It's kind of unusual to have the witness describe his reaction to another witness' testimony.

Tell me a little bit what you have in mind. We don't want to be technical about this thing.

MR. PERLIS: Well, there was some confusion about the starting figures for the EMDs at Shoreham, whether it was 275 or 279 out of 279 attempts.

MS. LETSCHE: Excuse me. As I recall that testimony was -- I may be wrong, but wasn't that portion of the testimony striken?

At any rate, it is the County's position that the Board is correct. One witness' reaction to the testimony of another is not appropriate for supplemental or rebuttal

#11-17-SueT testimony, at least not without some showing that that matter could not have been addressed at the time the original testimony was filed.

JUDGE MILLER: Let me inquire whether the witness has knowledge of the matters that you are seeking to address and can independently testify.

Is that the situation?

MR. PERLIS: Mr. Chairman, I believe this testimony, or portions of it, are already in the direct testimony. I just wanted to clear up some confusion that may have been caused Tuesday.

JUDGE MILLER: Well, let's don't worry about Tuesday. Let's look at the portion of his direct testimony that may need some supplementation that would be consistent with the nature of the prefiled testimony.

If you can satisfy that, why we can get on with it.

MR. PERLIS: The portion of Mr. Tomlinson's direct testimony to which I am referring is on Page 12.

JUDGE MILLER: Page 12. Go ahead.

BY MR. PERLIS: (Continuing)

Q Mr. Tomlinson, there was some confusion about the figures --

JUDGE MILLER: No, no. Don't go into confusion. Let's just go real clearly with what we have and what he

#11-18-SueT

knows.

BY MR. PERLIS: (Continuing)

Q Mr. Tomlinson, in your testimony, do you rely on 275 out of 279 starts being successful or on all 279 starts being successful?

A (Witness Tomlinson) The testimony allows a conservatism, and we use 275 out of 279 for a reliability of ninety-eight point six percent for each individual unit.

However, the basis for the conclusion is that we look at the four units as a block, and when looked at as a block the reliability approaches a hundred percent.

end #11
Joe flws

Q To your knowledge, in the four attempts on which you are not relying as a successful start attempt, did the engines fail to start?

A (Witness Thomlinson) We are not certain that they failed to start. There is indication that the engines did, in fact, start; they did, in fact, synchronize and load onto the grid, and were subsequently shut down by operator action for some reason. That reason is not clear.

Q But to make it absolutely clear, for the purposes of your testimony you assume that those four starts were unsuccessful?

A That is correct.

MR. PERLIS: That is the only supplemental direct I have.

JUDGE MILLER: Anything further?

MR. PERLIS: No. These gentlemen are available for cross examination.

JUDGE MILLER: Cross examination, Suffolk County?

XXX INDEX

CROSS EXAMINATION

BY MS. LETSCHE:

Q Gentlemen, I would like to address your attention to the bottom of page 6, continuing over to page 7 of your testimony.

In particular, the question which is the next

to the last one on page 6, which asks: Is it the Staff's opinion that these alternate sources would be available after a seismic event ... continuing over to the responses to why; now, am I correct that neither one of you gentlemen has performed any analysis or review of the seismic capabilities or survivabilities of the alternate AC power configuration being proposed by LILCO?

A (Witness Thomlinson) That is correct.

Q For both of you?

A (Witness Knox) Yes.

Q That is fine. I don't need for both of you to answer it if it is true for both of you.

And you also state that in paragraph D on page 7, that the Staff has not conducted any review of the seismic analysis provided by LILCO concerning the diesel generators and their associated switchgear, right?

A (Witness Thomlinson) That is correct.

Q And I take it that the Staff has not performed any review of any seismic analysis of the survivability of the gas turbine or its associated switchgear?

A That is correct.

MS. LETSCHE: Judge Miller, in light of these witnesses responses to these questions I have just posed, I move to strike the Question and Answer -- the next to the last question at the bottom of page 6, the question following

that, and the answer which is the top half of page 7, on the ground that although this contains a conclusion and an opinion concerning the availability of alternate sources after a seismic event, it is based on no review performed by the Staff of either the seismic capability of that equipment itself, or even a review of any other analysis of that seismic capability, and accordingly there is no basis for this testimony, and these witnesses have stated on voir dire that they, in fact, do not have the expertise or the qualifications to render opinions concerning seismic matters.

Accordingly, the testimony is not probative or reliable, and these gentlemen are not qualified to submit it.

JUDGE MILLER: We will defer a ruling until the conclusion of the interrogation of the witnesses.

You may proceed.

BY MS. LETSCHE: (Continuing)

Q Now, gentlemen, in the answer to the question -- the first question actually on page 7, the one that is about two-thirds of the way down, you state that if a seismic event were to occur simultaneous with the loss of offsite power, there would be at least thirty days before the power would be needed.

Now, the simultaneous occurrence of a seismic event with a loss of offsite power is not an unlikely event,

is it?

A (Witness Knox) For the purposes of our review, we assume that they happen at the same time, so we don't consider it an unlikely occurrence.

Q Now, you mention at the bottom of that answer in the event that they fail to survive such an event, repairs could be made or additional sources of AC power could be made available to the site .

What did you have in mind there by, 'additional sources of AC power?'

A (Witness Thomlinson) One of the sources that we know would be available would be from the Army Corps of Engineers, the non-tactical generator program.

Q What is it that you had in mind? That the Army was going to truck in some kind of generators or something to the plant?

A Yes.

Q I see. And what is your understanding that the Arny would do that based upon?

A It is based upon an interpretation of the Atomic Energy Act, and also based upon discussions that I, and others, have had with the Corps of Engineers and with FEMA.

Q Now, on the top of page 8, you say that the supplemental power sources are independent of the normal

offsite power system at Shoreham. Now, what do you mean by, ' the normal offsite power system' in that answer? What did you understand to be meant in that question?

A (Witness Knox) Well, the offsite power system that is supplied from the Shoreham grid system.

Q Did you mean the 69 KV line, and the 138 KV line?

A Yes.

Q And is it your testimony that the EMD diesels, and the gas turbine, are both independent of the 69 KV line and the 138 KV line?

A Yes.

Q Isn't it true, Mr. Knox, that the energy supplied by the twenty megawatt gas turbine, is supplied on the 69 KV line?

A Yes.

Q And so the power from that power source shares a common line with one of the -- what you refer to as normal offsite power systems -- at least for a portion of that system, isn't that right?

A Yes.

Q Now, in the next question you talk about whether the independence that you discussed earlier, meets what would be required for the normal onsite safety related diesel generators. Are you familiar with the set up at

Shoreham, including the TDI diesels; I mean the onsite and offsite power configuration, including the TDI diesel generators?

A Generally familiar with it. However, that was not specifically part of my review.

Q Would you agree with me, though, that given the TDI diesel configuration, looking at that one for now, that there are three independent onsite sources of power under that configuration?

A Yes.

Q And it is true is it not that under the proposed alternate configuration involving the gas turbine and the emergency diesel -- the EMDs, that there is only one independent onsite source?

A No, I wouldn't agree with that.

Q How many independent onsite sources do you believe there are in the alternate power configuration?

A Two.

Q And what are they?

A That would be the 20 megawatt gas turbine, and the 4 mobile diesel generators.

Q But the 20 megawatt gas turbine is not totally independent from the offsite power system, is it?

A It is as independent as the TDIs would be independent from the offsite power system.

Q I see. So, it is your understanding that the TDI diesel generators share a portion of the offsite power system relied upon at Shoreham?

A They connect into the offsite power system at a separate point. However, they are both independent, in that they both are sitting there at standby, with open breakers, so, therefore, they are independent.

Q Am I correct, then, that your definition of, 'independence' relates to whether or not a piece of equipment is in a standby position, not whether or not that equipment shares any equipment with another piece?

A In my definition of independence, is that electrically the circuit for the 20 megawatt gas turbine would be normally disconnected electrically from the offsite power system. It would not normally be connected until there was a loss of offsite power.

Q So, I take it, using your definitions, you would consider two systems independent, even if they shared common equipment?

A Yes.

Q Okay. Gentlemen, I would like to direct your attention to page 10 of your testimony, please. The first question on that page, what has been the reliability of the gas turbine LILCO intends to use?

Does your answer refer to starting reliability?

A (Witness Thomlinson) Yes.

Q Now, what is the -- what was the source of the data that you have here in this answer?

A That was provided to the Staff by LILCO.

Q And what did you do to verify the accuracy of that data?

A I am not certain that we did anything special to verify the accuracy of that data. We assumed it to be correct when it was given to us.

Q I see. You didn't do any independent analysis or go and try to find any additional information on the subject?

A I am not certain where we would have gone to find additional information on LILCO equipment.

Q Do you know how the data that LILCO provided to the Staff was obtained?

A I must assume that it was obtained from their records. I reviewed their actual records.

Q Do you know the criteria used by LILCO in generating this data to define a successful start attempt?

A To the best of my knowledge, a successful start attempt is that the unit started, came up to rated speed and voltage, synchronized with the grid, loaded onto the grid, and provide power when called upon.

Q Is that what you would mean by a successful

start, or do you know that that is what LILCO meant by a successful start?

A To the best of my knowledge, our definition is the same.

Q What is your knowledge of that based on?

A It is based on the review of the data provided by LILCO, and discussions with LILCO.

Q You mention that the gas turbine has been refurbished since being relocated to Shoreham. What are you referring to there?

A Most of the major mechanical parts on the engine have been renewed.

Q Have been -- I am sorry, I didn't hear the last word.

A Most of the major mechanical parts on the unit have been renewed.

Q Renewed?

A Replaced.

Q And it is your understanding that that has been done since when? Do you know when that replacement has taken place?

A I am not exactly sure when it was done. Whether it was done before the unit was brought to the Shoreham site, or after it was brought to the Shoreham site, but it has been done since it has been at Shoreham.

Q So, I take it you think it has been done since it was moved to the Shoreham site, is that right.

A That is my understanding. That it was done after it was moved to the site.

Q And is it your -- I take it from this answer that it is your opinion that replacing parts automatically means that the reliability of a machine has been enhanced, is that correct?

A When you rebuild or refurbish a unit, and install new parts, yes, it does enhance the reliability of the unit.

Q Mr. Thomlinson, I would like to direct your attention to page 11 of your testimony. You mention there in the second answer, actually the first full answer on that page, the technical specification requirement.

That technical specification requirement isn't in the supplemental SER, is it?

A Excuse me. What is your reference, please?

Q Page 11. The first full answer on that page, the second sentence, which begins: A technical specification requirement.

Do you see that?

A I didn't see the reference. Will you please repeat your question?

Q Yes. Is that technical specification set forth

in the SER Supplement No. 6?

A No.

Q Why not?

A Technical specifications are not normally a part of an SER.

Q Well, there are a lot of them in this one, aren't there?

A I beg your pardon?

Q There are a lot of technical specification requirements in this supplement of the SER, aren't there?

A There is a lot of reference to technical specifications that will be imposed, yes.

Q Why wasn't this technical specification which will be imposed not included in the SER?

A I am not sure I understand your question. I think I just stated that technical specifications are not normally a part of an SER, and I am not aware that technical specifications are in the SER.

Q Let me see if I can clear this up. I think we are not communicating with each other.

This piece of your testimony states that a technical specification requirement will be imposed by the Staff on LILCO, isn't that right?

A That is the way it is worded, yes.

Q Right. And you would agree with me, wouldn't

you, that in Supplement 6 of the SER, there are several statements that particular technical specification requirements will be imposed by the Staff upon LILCO.

A Would you give me the reference, please?

Q Well, I will give you a lot. Turn to Section 8, I think that is your section. Let me direct your attention to the middle of page 8-2, particularly the technical specification that a 4 megawatt non-emergency load be included in the test load, so that the gas turbine will be loaded to 20 megawatts as part of an operational test prior to plant operation beyond criticality testing, and 2 thirteen megawatts every two weeks.

JUDGE MILLER: Were you able to get that, Mr. Reporter?

REPORTER: (Nods affirmatively.)

BY MS. LETSCHE: (Continuing)

Q Let me also direct you to page 8-3.

A Wait a minute, please.

Q Yes, I am sorry.

MR. PERLIS: Excuse me, Your Honor. Would it be possible to ask for a proffer from counsel as to what the relevance of this line is? I believe Mr. Thomlinson has already indicated that there is no need to put a technical specification in the SER. The fact that there may be other technical specifications in the SER, and this

specification was not in the SER, frankly, I just can't see any relevance to this line of questioning.

JUDGE MILLER: Well, why did he testify that a technical spec of this kind will be imposed?

MR. PERLIS: But it need not be put in the SER to be imposed. That's the --

JUDGE MILLER: He didn't say that.

MR. PERLIS: I believe the witness did say that it does --

JUDGE MILLER: But he didn't say it in his testimony. Now, if you wanted to make the point, you should have made it in the written direct. Not being there, it's subject to cross-examination. That's what cross is all about.

MR. PERLIS: I understand that. I'm just wondering what relevance counsel is seeking to establish from the fact that a technical specification is not in the SER, because frankly, I can't see any.

JUDGE MILLER: Well, why is it that you frame an objection in the form that might be given guidance to the witness, which you probably don't intend, but in any rate, what is the basis for your supposing that counsel on cross examination has to draw a road map?

End 12.

Sim 13-1

JUDGE MILLER: That is contrary to the function of cross-examination. Now let's just recognize what trial practice is.

Overruled.

Proceed.

BY MS. LETSCHE:

Q If you have had a chance to look at page 8-2, you might also look, Mr. Thomlinson, at page 8-3, which I believe has three technical specifications described that the staff will impose, and page 8-4 which has three more technical specifications that the staff might impose ---

JUDGE MILLER: Might or will?

MS. LETSCHE: Will. I am sorry, will. Thank you, Judge Miller.

--- and page 8-5 which has three more technical specifications the staff will impose, plus a licensed condition, and page 8-6 which has -- well, those are two licensed conditions. Page 8-7 has three technical specifications that the staff will impose, and page 8-8 has one technical specification that the staff might impose.

Now you were responsible for Section 8 of the SER, weren't you?

A (Witness Knox) I co-authored the SER with Ed and I am responsible for most of the technical specifications that you referred to.

Sim 13-2

As a general rule, if we have standard technical specifications, and if you take the 20 megawatt gas turbine or the mobile diesel generators and you refer to it that it has to be operable, as part of those technical specifications, it will include the fuel capacity to operate those diesel generators. A specific reference in our SER is not needed in that particular case.

Now there are other cases where we have specific design requirements that we are trying to impose to assure that during the technical specifications those get flagged in the SER.

Q Well, let me ask it this way. Is the technical specification requirement that you state will be imposed by the staff in your testimony at page 11 a condition of the staff's approval of the alternate AC power system?

A Yes, it will be. Yes.

Q Is it your understanding that saying it here in your prefiled testimony carries the same weight as saying it in the supplemental SER; is that right?

A I am saying that it is in the supplemental SER by the fact that we are requiring the mobile diesel generators to the gas tubine to be operable and therefore we have to have a fuel supply in order for those systems to be operable, and as a standard practice or procedure, NRC procedure, we will have technical specifications in

Sim 13-3

the tech specs.

Q Well, are you saying to me that because your only requirement is that the gas turbine and the diesel generator be operable, that in fact there could be a lot more additional technical specification requirements that are not in either the SER or in your testimony, but that still might be imposed by the staff?

A That may be the case, yes.

Q So, in other words, the conclusions in Supplement 6 of the SER and in your testimony concerning the staff's approval of the alternate system proposed by LILCO is subject to your determination as to whether or not there may be some additional conditions that the staff might have to impose?

A Our SER should have referenced all technical specification requirements that we will impose. We don't go in our SER into the details of what these technical specifications will contain. However, they should all be referenced in the SER and I don't expect to see any additional technical specifications over what is in the Supplement 6.

Q And what is in your testimony?

A And in the testimony.

Q And in whatever else you might decide upon in the future, right?

Sim 13-4

A I don't foresee any others in the future, however. If a situation arose where we needed additional technical specifications, that is a possibility.

Q Am I correct, gentlemen, that Section 14 of the SER is the section that discusses technical specifications?

JUDGE MILLER: Do you have that document before you?

WITNESS KNOX: No, we don't.

JUDGE MILLER: Well, let's have that produced.

(Pause.)

JUDGE MILLER: Does staff have a copy?

MR. PERLIS: I do not have a copy of the full Shoreham SER, no. I believe she is not talking about Supplement 6, but is rather talking about the original SER.

MS. LETSCHE: That is correct, I was.

MR. PERLIS: I do not have a copy of that.

JUDGE MILLER: Well, the witnesses will have to be shown a copy if you are going to interrogate them on it. I don't know where the copy will come from.

MS. LETSCHE: Let me just ask a question and we may not need to do that.

BY MS. LETSCHE:

Q Are you generally aware, gentlemen, without looking at a table of contents of the SER as to whether or

Sim 13-5

not Chapter 14 is the section that deals with technical specifications?

A (Witness Knox) I know that the technical specifications are in the FSAR. I could not say whether or not they are in Chapter 14 or not.

Q Okay. Well I am not sure that really even matters.

Is the staff going to issue a supplement to the SER dealing with technical specifications?

A No. We will issue technical specifications. I believe they will be part of the SER. It will be separate.

Q When is it that the staff intends to do that?

A Very shortly.

Q What does that mean?

A They are being finalized this week and they should be out probably next week.

Q Next week?

A Within the next -- well, the next step in the preparation of the tech specs will be to send them to the applicant. I would expect that to happen in the next two to three weeks.

Q Gentlemen, I would like to direct your attention to page 12 of your testimony. And I think this one goes to you, Mr. Tomlinson.

The first question on that page is does the

Sim 13-6

operation of one of these diesels depend on the operation of any others, and the reference is to the EMDs.

Your answer is "No, the diesel generators are capable of operating totally independent of each other."

Isn't it true, Mr. Tomlinson, that those four diesel generators share one control cubicle?

A (Witness Tomlinson) That is correct.

Q And isn't it also true that they share one fuel line and one equalizing line?

A Yes.

Q And isn't it also true that they share one set of batteries?

A Yes.

Q And that they also share one power cable coming out to the four KV?

A Yes.

Q Now you discuss in the answer to the next question some information on start attempts of the EMDs. Am I correct that this is also data that the staff received from LILCO?

A Yes,

Q And am I also correct that the staff did not perform any independent research or analysis of the data provided by LILCO?

A I am not sure I understand what you mean by

Sim 13-7

independent research or analysis.

Q All right. Let me ask a different question.

Did you verify the data that was provided to you by LILCO?

A I am not sure how I could verify it.

Q Well, the question is did you?

A I am not sure I understand what you mean by verify the data.

Q What did you do after receiving LILCO's data before you transferred that data into your testimony to satisfy yourself that it was accurate and something you wanted to rely upon?

A I didn't do anything specific.

Q This data that LILCO gave you that you mention here in the testimony deals only with the starting reliability of those diesels; isn't that right?

A Are we defining start in this case as we have previously discussed, or just what is it that you are defining as a start?

Q I don't know what you are talking about about previously discussing it. Is it your understanding that this data deals with the starting reliability of those engines?

A In the context of what I discussed before, that is a start is for the engine to start, come up to rated

Sim 13-8

speed and voltage, synchronize with the grid and go on line and carry load, yes.

Q It is your understanding that LILCO's data shows that out of 279 attempts, 275 of them resulted in a successful start, synchronization and loading of those engines; is that correct?

A That is correct.

Q Now on page 13 of your testimony, and this is both of you gentlemen sponsored this answer, in the fourth line you state that four hours is adequate time to remove, refill and reposition a 9,000 gallon fuel tanker. What is the basis for that number. The four number is the number I am interested in.

A The basis of the number is that the fuel tanker has to move about a hundred yards.

Q Just so that I understand, is it your testimony that it would take four hours to move the tanker as far as it would have to get moved, and then to refill it and then move it back; is that right?

A That is not correct.

Q Okay. Why don't you explain to me what this four hours relates to.

A What we are saying is that four hours is more than adequate time to move the tanker from its position to the refill position and then back again.

Sim 13-9

Q Oh, but not to refill it?

A And to refill it.

Q Mr. Knox, you discuss in the answer to the next question on page 13 the routing of power from the gas turbine and you reference bus 12. That bus is not Class 1-E electrical equipment, is it?

A (Witness Knox) No, it is not.

Q On page 14 where you are talking about the routing of power from the EMD diesels you reference that that goes to switchgear bus 11. That is also not Class 1-E electrical equipment, is it?

A That is correct.

Q In the beginning of that answer you say that power from the diesels is routed through cables and you go on to describe where it goes. In fact, the power comes from the diesels but then into the control building for the diesels before it gets into the cables that you reference here, doesn't it?

A That is correct.

Q Now in the second question on page 14, the one that says "Does this independence meet the single failure criteria," is it your understanding, gentlemen, and I guess this is you, Mr. Knox, that independence is the same as meeting the single failure criteria?

Sim 13-10

A If you separate two components by a sufficient distance, the failure of one will not cause the failure of the other. That would meet the single failure criteria.

Q But it is true, is it not, that two components could be physically separated and still be subject to a single failure?

A Yes.

Q And in fact with respect to this equipment, isn't it true that the cables carrying power from both the gas turbine and the EMD diesels both go through the block walls in the non-emergency switchgear room. So that a failure of those block walls would be one single failure that would affect both of those lines?

A At the point you are talking about where they go through the concrete block wall, I think there is about 40 foot of separation. Yes, if that block wall collapsed, it would cause both lines to fail.

Q And it is also true, isn't it, that if there were a fire in the non-emergency switchgear room that that could be a single failure that could disable both of those systems, the gas turbine and the EMDs?

A I don't consider that a single failure. I consider that an event that would cause the loss of both.

Q Gentlemen, would you turn to page 18 of your testimony, please.

Sim 13-11

In the answer to the second question on that page you list a number of conditions. Am I correct that these are conditions that would be imposed as licensed conditions by the staff?

A That is correct.

Q And that without the imposition of these conditions and the implementation of whatever these conditions set forth in the opinion of the staff the alternate AC power system is not acceptable?

A That is correct.

Q Are all of these licensed conditions set forth in the Supplement 6 of the SER?

A Yes, they are.

Q Are there additional ones set forth in the SER?

A In my section, Section 8, no.

Q Gentlemen, on page 21 of your testimony in the last answer, and I guess this is you, Mr. Knox.

A What page?

Q Page 21, the last page and the last answer.

Your answer begins "Because there are three independent sources of AC power." What are the three independent sources you were referring to in that answer?

A One would be the 20 megawatt gas turbine. The second one would be the four mobile diesel generators. And the third one would be the normal offsite power circuits into

Sim 13-12

the plant.

MS. LETSCHE: I don't have any further questions.

JUDGE MILLER: Mr. Palomino?

MR. PALOMINO: No questions.

JUDGE MILLER: LILCO?

MR. EARLEY: One moment, Judge.

(Pause.)

CROSS-EXAMINATION

BY MR. EARLEY:

Q Gentlemen, you were asked some questions concerning page 7 of your testimony. I believe you were asked whether you consider the simultaneous occurrence of a seismic event and loss of offsite power, whether that was not an unlikely event, and I believe you said no, you didn't believe it was an unlikely event.

Did you mean that the occurrence of the two together, if the seismic event occurs it might not be unlikely that the loss of offsite power would occur?

A (Witness Knox) As part of our review process we just postulate the loss of both of them at the same time. If you are asking for my opinion if it is likely or not, I don't think it is likely that you would lose offsite power during a seismic event.

end Sim
sue fols

#14-1-SueT 1 Q There was a discussion about the technical
2 specifications, in particular the reference to the technical
3 specifications for the requirement of having seven days of
4 fuel.
5 Isn't it true that even prior to LILCO's applica-
6 tion for this exemption there was a requirement in the
7 technical specification to have seven days' worth of fuel
8 for a power source on site?
9 A That's correct.
10 Q And, Mr. Knox, I believe when you said that if
11 the need arose you might impose additional technical specifi-
12 cation, that would be true for any aspect of the plant if
13 you saw a need arise. You might impose responsive technical
14 specifications or other requirements, correct?
15 A (Witness Knox) That's correct.
16 Q You were asked about the conditions on Page 18
17 of your testimony, and I believe it goes over to Page 19,
18 if those conditions are implemented, then in your opinion
19 is LILCO's proposal for the conduct of low power testing
20 acceptable?
21 A Yes.
22 Q And it is true the NRC will review implementation
23 of license conditions?
24 A Yes, that's true.
25 Q You were asked whether a failure of the block

#14-2-SueT

wall through which the cables from the EMD diesels and the gas turbine go through, whether that failure could cause a failure, a disruption of power from both of those sources.

Do you know whether LILCO has taken any steps or made any commitments with respect to that possible accident sequence?

A As part of one of our conditions to the license, we are requiring the capability of routing cables around that particular room or that location so that power could be brought back from at least one source to the emergency switchgear room.

Q And do you know whether LILCO has taken any steps to implement that license condition?

A Yes.

Q What are those steps?

A They have proposed to install raceways. They are seismic qualified and have procedures to full -- or actually have cable installed in these raceways so that by procedure they could get reconnected power from the mobile diesel generator to the emergency switchgear.

Q And is that proposal responsive to the concerns addressed by that particular license condition?

A It's more than responsive to that concern.

MR. EARLEY: We have no further questions.

#14-3-SueT

JUDGE MILLER: Staff?

MR. PERLIS: The Staff has brief redirect.

REDIRECT EXAMINATION

BY MR. PERLIS:

INDEXXXX

Q Gentlemen, does the NRC Staff normally rely upon data supplied to it by an applicant in the course of its license review?

A (Witness Knox) Yes, it does.

Q Do you gentlemen plan at this time to recommend the imposition of any additional requirements or technical specifications that you have not previously identified?

A No.

Q Do you gentlemen know whether technical specifications are normally included as a part of a license?

A They are included as part of the license, yes.

Q Mr. Tomlinson, could you turn to Page 12 of the testimony, please?

A (Witness complying.)

Q I believe you were asked by counsel for Suffolk County if you had attempted to verify the successful start figures that are listed there.

A (Witness Tomlinson) Yes.

Q Is that data consistent with your knowledge of the general reliability of EMDs?

A Yes, it is.

#14-4-SueT

Q If you could turn to Page 7 of your testimony, please?

A Page 7?

Q Yes.

A (Witness complying.)

Q In reaching your conclusion that the alternate power sources are acceptable, do you gentlemen rely on those sources being seismically qualified?

A No.

Q Turning to the four portions of your response to the question that begins at the bottom of Page 6 -- I would ask you to look at the portion on Page 7, since I'm interested in your response now, could you describe your knowledge of diesel generators similar to those being used at Shoreham that are used in marine and locomotive applications?

MS. LETSCHE: Excuse me. I object. That is beyond the scope of my cross.

MR. PERLIS: I believe your cross asked them the basis of their knowledge -- the basis of their beliefs that these generators could survive a seismic event.

Did it not?

(No reply.)

Well, it's my belief that the cross-examination did delve into the area of whether these generators could

#14-5-SueT

survive a seismic event.

JUDGE MILLER: Yes, I believe that there was something in that area. I don't know how specific. Go ahead and ask your question.

What's your question?

MR. PERLIS: My question?

JUDGE MILLER: Yes.

BY MR. PERLIS: (Continuing)

Q My question is, listed on Page 7 you include a reference to the fact that diesel generators similar to those being used at Shoreham have been used in marine and locomotive applications.

Could you describe those applications?

MS. LETSCHE: Let me state for the record my objection. That goes beyond the scope of my cross-examination. I did not ask any questions concerning the items (a), (b) or (c) in this answer on Question 7.

JUDGE MILLER: Did you inquire as to (d)?

MS. LETSCHE: Only to establish that in fact (d) said that no Staff review of any seismic analysis performed. That was my only question.

JUDGE MILLER: I recall that. I don't recall if there was any further -- well, what was the purpose of your question?

MR. PERLIS: Based on counsel's representation,

#14-6-SueT

I will withdraw the question.

JUDGE MILLER: All right.

MR. PERLIS: I have no further redirect.

JUDGE MILLER: Any further cross?

MS. LETSCHE: Yes. I just have a couple of questions.

RECROSS EXAMINATION

BY MS. LETSCHE:

INDEXXXXX

Q Am I correct, Mr. Knox, that you stated in response to a question by Mr. Earley that you do not think it is likely that you would lose offsite power if there were a seismic event?

A (Witness Knox) Yes.

Q That was your statement?

A Yes.

Q And what is the basis for that belief?

A Just basic general knowledge of the offsite power systems and their susceptibility to seismic event and probability of a seismic event happening in sufficient severity to cause loss of offsite power. It's questionable whether you are going to lose offsite power in a seismic event.

The conservatism as far as NRC review is concerned, we assume the loss of offsite power, given a seismic event.

Q But your personal belief just based on your

#14-7-SueT

general knowledge is that you don't really think you would lose offsite power if you have a seismic event, right?

A Correct.

Q You haven't had any training in seismic analysis, have you?

A My basic experience would be with the general review of seismic events that have happened throughout the country in regard to generic studies that have been going on in the NRC which lead me to believe that the loss of offsite power is not all that likely to happen, given a seismic event.

Q Now, you also responded to a question from Mr. Earley about a seven day requirement in the existing tech specs for Shoreham, a seven day fuel requirement for power sources.

Do you recall that? One of you did. I think it might have been you, Mr. Tomlinson. I'm sorry.

A (Witness Tomlinson) Yes. I responded to that.

Q Right. Now, the existing tech specs for Shoreham and the seven day fuel requirement don't relate to the 20 megawatt gas turbine, do they?

A No, those do not.

Q Or the EMD diesel generators?

A That's correct.

Q Now, in response to another question from Mr.

#14-8-SueT

Earley, I believe it was you, Mr. Knox, talked about a proposal by LILCO to respond to one of the Staff requirements about an alternate routing.

Do you recall that line of questions?

A (Witness Knox) Yes.

Q Now, have you reviewed any engineering drawings concerning this proposed alternate routing?

A No, I haven't.

Q Have you reviewed any documentation submitted by LILCO concerning this proposed alternate routing?

A No.

Q I take it, to your knowledge, none of this alternate routing has actually been constructed or installed yet, right?

A I don't know.

MS. LETSCHE: I have nothing further.

JUDGE MILLER: Mr. Palomino.

MR. PALOMINO: Just a moment.

(Pause.)

RECROSS EXAMINATION

BY MR. PALOMINO:

Q Just one question. Mr. Tomlinson, you were asked whether or not the figures on Page 12, the reliability of starting of these EMD diesels, were consistent with your general experience with EMD diesels, and you answered

#14-9-SueT

yes. What experience did you have with EMD diesels?

A (Witness Tomlinson) I've had experience with EMD diesels starting from my initial training at the Merchant Marine Academy and on through my experience as a support service contractor to the Navy with NOAA and, of course, with --

Q Pardone me. What --

MR. PERLIS: Excuse me, Your Honor.

JUDGE MILLER: Hold it.

MR. PERLIS: Would he please let the witness respond to his question.

MR. PALOMINO: All right.

MR. PERLIS: The witness was not finished responding.

MR. PALOMINO: Let him finish his answer. I'm sorry.

WITNESS TOMLINSON: I was about to say that experience with NOAA and, of course, with the NRC in my present position.

I might add that in my four and a half years with NOAA, I was in -- had direct dealings with approximately eight seagoing vessels that used EMD engines. And in that time, these engines logged something in excess, conservatively, of a hundred thousand hours with no known failures.

#14-10-SueT

BY MR. PALOMINO: (Continuing)

Q Were they the same model diesels that we have at --

A Yes, they were.

Q What horsepower rating did they have?

A They have a horsepower rating per cylinder, sir. And they vary in the number of cylinders. They went from, in some cases, twelve cylinders, and other cases to twenty cylinders.

Q So that they weren't necessarily the same as Shoreham?

A That's not true, sir. They are the same engines at Shoreham except that there may be different number cylinders. It's the same boring stroke, the same design, all other features are the same.

Q They are the same type of in-line engine except for the number of cylinders?

A These are not in-line engines. These are V-engines.

Q And they are all the same design?

A Yes, sir.

Q And what vessels were they on?

A They were on NOAA vessels, National Oceanic and Atmospheric Administration vessels.

Q And in what capacity did you sail on those vessels?

#14-11-SueT

A I didn't sail on those vessels. I operated in the marine engineering division at Headquarters.

Q So you didn't know when they started them and when they stopped, did you?

A Sir, I knew when those engines failed. Yes, sir.

Q Well, you wouldn't know of a failure to start. That would be taken care of by --

A I beg your pardon. I would know if it failed to start, yes, sir.

Q Do you mean to tell me, you reviewed those log books, the engine logs, every time a ship came in?

A Sir, if there was a failure of an engine to start, the vessel could not make it to sea because of an engineering problem, I knew it.

Q Well, that's if it could not make it to sea. If it failed to start and the onboard crew repaired it, you wouldn't know it.

A If they had a failure to start, I would know it.

Q How did you know it?

A Because the reports came into the Headquarters office on all of that type of information.

Q That's if it was a failure that required repair on shore, wasn't it, by --

MR. PERLIS: Your Honor, I object. This question

#14=12-SueT has been asked and answered a number of times already.

JUDGE MILLER: It's kind of interesting. Let him try again.

(Laughter.)

Go ahead. Answer it if you can, if it's a different answer, that is.

MR. PALOMINO: No, that's all right. No further questions.

MR. EARLEY: LILCO has no further questions.

JUDGE MILLER: Anything further?

MR. PERLIS: The Staff at this time would move that the testimony of Mr. Knox and Mr. Tomlinson be admitted into the record.

JUDGE MILLER: Let me inquire, is there any so-called attachments or exhibits involved?

MR. PERLIS: There are none.

JUDGE MILLER: Any objections?

MS. LETSCHE: Yes, Judge Miller. As I mentioned before, the County moves to strike the portion of this testimony beginning at the bottom of Page 6 with the next to the last question on that page, "Is it the Staff's opinion that these alternative sources would be available after a seismic event" through the first -- a little beyond the half of Page 7 which contains the answer to that question and the follow-up question, on the grounds that

#14-13-SueT this statement of opinion as to whether the alternative power sources would be available after a seismic event is based on no review conducted by the Staff of the seismic capabilities or survivabilities of those -- of that equipment and not even any Staff review of any analysis conducted by any other person.

In addition, there is no evidence that either of these witnesses is qualified to give expert testimony concerning seismic capabilities of equipment. Therefore, the testimony is without basis. It's not probative and the witnesses are not competent to provide it.

In addition, related to that motion, I would also move to strike the third sentence in the following question on Page 7, that is the sentence which says, "As stated above, the Staff believes the alternate power sources at Shoreham would survive a seismi event" for the same reasons.

In addition, the County moves to strike on Page -- beginning on Page 8 and continuing on to Page 9 the question and answer. The question is, "Why not?" It's about halfway down on Page 8. And the answer follows that and continues to about one-third of Page 9.

The basis for moving to strike this portion of the testimony is that it contains a comparison of conditions at one percent power operation to conditions at five

#14-14-SueT

percent power operation and, therefore, is not a relevant item of testimony for this proceeding which is intended, according to the Commission's May 16 Order, to deal with a comparison of the relative safe operation at five percent power with the alternate AC power configuration proposed by LILCO compared to five percent operation with the qualified onsite AC power source.

JUDGE MILLER: Mr. Palomino.

MR. PALOMINO: We join in the motion.

MR. EARLEY: Judge Miller, LILCO opposes the motion. Let me take the first section of the testimony on Pages 6 and 7.

First of all, I believe when counsel for the Staff tried to cross-examine, or tried to do redirect on (a) through (d) of that particular question, counsel for the County represented it had been no questions asked on that. Then, coming back, the basis for the motion was stated that there were questions asked and that the witnesses didn't have any qualifications on seismic matters. So, you can't have it both ways.

Second, the witnesses have indicated that they are familiar with diesel generators. At least one of the witnesses indicated that he is familiar with NRC activities and studies with respect to the operation of power sources during seismic events. And also the witnesses testified

#14-15-SueT

that it is normal Staff practice to rely on information submitted to them by Applicants.

With respect to the second set of testimony, the portion of the testimony on Page 8 that the County has moved to strike, again that does not appear to be a comparison attempting to show an equivalence between five percent and one hundred percent power. It is a piece of testimony designed to show how the witnesses reached their conclusion that operations at five percent in this particular configuration is equivalent to five percent with qualified diesels.

To understand that, you have to know why at a hundred percent power qualified diesels with seismic qualifications and other qualifications including fast-start capability are required to understand how they reach their conclusions now. And that, I think, is in the same vein as the testimony that was previously admitted. I believe it was the first panel this morning.

There was some background testimony. I think it is important to understanding their conclusions.

JUDGE MILLER: Staff.

MR. PERLIS: I don't want to repeat too much what Mr. Earley just said. I would say though that for the second portion of the motion to strike, again the Staff is not comparing its -- is not making its ultimate conclusion

#14-16-SueT

based on a comparison of five percent with a comparison of one hundred percent.

We do believe it is helpful for the Board to enjoy a complete record to indicate what the needs are at five percent.

As to the seismic testimony, again the Staff is not relying on seismic qualification of these instruments, of these diesels. However, the Staff does have certain information which leads it to believe that these diesels will survive seismic event. As Mr. Earley pointed out, and as I tried to point out in my redirect, counsel for Suffolk County did not cross-examine these gentlemen on a number of the statements made therein.

There is no basis in this record to find that these gentlemen don't have the capability to make those statements and are qualified to make those statements.

JUDGE MILLER: We will take a fifteen minute recess.

Are these the last witnesses of the Staff?

MR. PERLIS: That's correct.

MS. LETSCHE: Judge Miller.

MR. SEDKY: Can we address a scheduling problem before you go on break please, Your Honor?

As I understand it, this is the last set of Staff witnesses, and Suffolk County will be presenting its

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case at that time or after that time. We have got a minor scheduling problem that I raised with counsel for both LILCO and the Staff.

We are proposing to put on Messrs. Madan and Dirmeier, who are economic and financial experts, to testify in this proceeding. They have a prior engagement tomorrow in Atlanta, or one of them has to be in Atlanta tomorrow.

It would be our preference to go ahead with them. Mr. Rolfe had told me that he expected an hour or two with them, and assuming that that would be the bulk of the cross-examination, I guess the only concern I have, Judge Miller, is that if the Board is going to retire for the day at exactly 5 it might be cutting it awfully close.

If that's the case, certainly we would put on another panel and go on Friday and bring back Messrs. Dirmeier and Madan on Monday.

I just thought that might be some information the Board would consider perhaps chewing on during the recess.

JUDGE MILLER: All right. Let me understand now. Your witnesses, Mr. Dirmeier and Mr. Madan, are testifying on economic matters and so forth?

MR. SEDKY: That's correct.

JUDGE MILLER: They would be available this

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afternoon, not tomorrow but Monday.

MR. SEDKY: That's correct.

JUDGE MILLER: Then, do you have, without interrupting your own chosen order unduly, could you put another panel on this afternoon to run over until tomorrow?

MR. SEDKY: Yes. We would rather not do that, I guess is all I'm saying.

JUDGE MILLER: Well, you would have broken --

MR. SEDKY: Sure. And I guess what I was asking the Board to consider was perhaps running until perhaps 5:30 today in which case we could get Madan and Dirmeier on and off.

JUDGE MILLER: I hate to do that, counsel, especially on the first panel. They go faster after everybody gets acquainted with everybody. We ran late last night in order to finish up a witness.

MR. SEDKY: I understand.

JUDGE MILLER: I'm inclined to think we had rather not run late. We might recess a little early, as a matter of fact.

MR. ROLFE: Judge Miller --

MR. SEDKY: That's fine.

MR. ROLFE: -- if it helps the Board at all, I have no problem whatever the Board wants to do. And I

#14-19-Sue

don't have any difficulty in accommodating the County. I might point out that LILCO had prefiled a motion to strike a substantial portion of that testimony that deals with financial qualifications and the uncertainties about decommissioning the plant or ultimately getting a license.

JUDGE MILLER: When did you prefile?

MR. ROLFE: We filed it Friday and then I gave it to the Board again Monday morning at the beginning of the hearings.

In any event --

JUDGE MILLER: We have had no opportunity to study it, so I think if you are going to take any comfort from handing it to us, it was in a nice package. We appreciate that.

(Laughter.)

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MR. ROLFE: My only point is that I think if the Board gives some indication at the beginning of that testimony that it intends to continue with its earlier rulings in this case concerning the immateriality of that kind of evidence, and I don't know any reason why it wouldn't, I suspect --

JUDGE MILLER: Let's not get into the merits --

MR. ROLFE : I was going to say I suspect that we would be able to conclude Mr. Dirmeier and Madan without any problem this afternoon, but I will do whatever is convenient for the Board.

JUDGE MILLER: I couldn't stand on the ability of any lawyer to conclude any witness, I will tell you that.

MR. SEDKY: I guess where we are coming out --

JUDGE MILLER: I think it would be too much of a gamble from your point of view. But we will try to accommodate the wishes of everybody. I suspect you would be better off not to have an interruption.

MR. SEDKY: That is my instinct, too, thank you, Judge Miller.

JUDGE MILLER: We will take a recess for about fifteen minutes.

(Short recess taken.)

JUDGE MILLER: All right.

MR. PERLIS: Excuse me, Mr. Chairman. The witnesses haven't been excused. Does the Board have any questions of them?

JUDGE MILLER: You say they have been excused?

MR. PERLIS: I don't believe the Board ever excused them. I thought we were finished with them.

JUDGE MILLER: They may be excused. Where are they. You may be excused. Thank you gentlemen.

(Panel stands aside.)

JUDGE MILLER: I think -- what do we have? The deferred Motion?

MR. SEDKY: Judge Miller, just so you will know where we stand on our schedule, the batting order. Messrs. Dirmeier and Madan have decided that they would rather take the abuse today rather than on Monday, so they are going to stay over, but any time Your Honor wants to break for the day, they will resume tomorrow morning, and will go in that order.

JUDGE MILLER: I think we will probably break about four-thirty today.

MR. SEDKY: Whatever is Your Honor's pleasure.

JUDGE MILLER: Where do we stand procedurally? I think you had a deferred Motion.

MS. LETSCHE: I made two Motions to strike, which I think --

JUDGE MILLER: I think everybody has responded to.

MR. PERLIS: That is correct.

JUDGE MILLER: The Board denies the two Motions to strike, and will allow the testimony to stand. And may I say that we will probably use a similar rule.

In the first place, we expect to hear from you in closing argument. Secondly, much, if not all of this, or at least signficant parts, go to weight, probative value, and so forth.

We can't decide these things on horseback in the middle of a trial. It wouldn't be fair to any of you here, in your own case or in the other person's case.

We believe, therefore, that there is enough here to render this testimony admissible. And the probative weight and the materiality and those matters will be considered by the Board.

All right. Now, that includes the testimony and the qualifications.

MR. PERLIS: Their qualifications were in their testimony.

JUDGE MILLER: Included in that?

MR. PERLIS: That's correct.

JUDGE MILLER: You have no outstanding exhibits, then?

MR. PERLIS: No attachments or exhibits.

JUDGE MILLER: And your case is concluded?

MR. PERLIS: That is correct.

JUDGE MILLER: If there is nothing further, then, we come to the case to be presented by the Interveners.

I think you said you are ready to proceed now with the testimony of --

MR. SEDKY: Yes, Your Honor. The County calls Messrs. Dirmeir and Madan to the stand.

Whereupon,

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MICHAEL D. DIRMEIER

- and -

JAMSHED K. MADAN,

were called as witnesses on behalf of Suffolk County and, having been first duly sworn, were examined and testified as follows:

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DIRECT EXAMINATION

BY MR. SEDKY:

Q Would each of you please identify yourselves for the record, so the Board would know who is who?

A My name is Jamshed K. Madan, and I am a principal with Georgetown Consulting Group.

A (Witness Dirmeier) My name is Michael D. Dirmeir, and I am a principal in Georgetown Consulting Group.

Q Messrs. Dirmeier and Madan, do you have before

you the testimony that has been prepared and prefiled in this proceeding?

A (Witness Madan) Yes.

Q And is that testimony true and complete to the best of your knowledge?

A Yes.

Q Are there any changes that you wish to make in the testimony at this time?

JUDGE MILLER: Excuse me a minute. I am going to have to get my copy.

Okay. You may proceed.

BY MR. SEDKY: (Continuing)

Q Mr. Dirmeier, your testimony was prepared, was it not, prior to certain adjustments I should say that Mr. Nozzolillo made in his testimony?

A (Witness Dirmeier) Yes, it was.

Q Do those adjustments that Mr. Nozzolillo testified to in the economic runs that he ran impact in any material way the testimony that you prepared?

A No, they do not.

Q The differences are not as -- basically, forty-five million dollar number as opposed to a forty-two million dollar number that have been referred to earlier?

A Yes, with numerous subsidiary changes and assumptions, and slight changes in numbers throughout

the document, but the conclusions are the same.

Q Fair enough. Subject to that, do you both adopt that testimony as your testimony in this proceeding?

A (Witness Madan) Yes, we do.

MR. SEDKY: Judge Miller, I have a number of exhibits that I would like to mark at this time. I gather that is your preference.

There are approximately five of them, I believe. I would like to have marked as -- if I may inquire as to the next exhibit number for Suffolk County --

MS. LETSCHE: I believe it is 23. I am not positive.

MR. PERLIS: I think it is 23, but I am also not certain.

MR. SEDKY: Let me have marked as Suffolk County LP Exhibit No. 23 for identification, what is -- as part of the filed testimony, Attachment No. 4, consisting of a series of computer runs prepared by the witnesses on the stand.

I would like to have marked as Suffolk County Exhibit LP No. 24, what is included as Attachment No. 5 to the prefiled testimony, and consisting of the Form 10-K for Fiscal Year ending December 31, 1983, as filed by Long Island Lighting Company with the Securities and Exchange Commission.

I would like to have marked as Suffolk County Exhibit LP-26, a document which is included as Attachment 6 to the prefiled testimony, and which is comprised of the Form A-K for February 21, 1984, of Long Island Lighting Company, as filed with the Securities and Exchange Commission.

JUDGE MILLER: You say 26? I thought we had just received both 23 and 24.

MR. SEDKY: I am sorry. If I said 26, I ask the reporter to correct it.

I would also like to have marked for identification as LP-26, what is included as Attachment 7 to the prefiled testimony, which is a report on Form 10-Q -- just one second. I want to make sure I am identifying this correctly.

Form 10-Q of Long Island Lighting Company for the period ended March 31, 1984, as filed with the Securities and Exchange Commission.

I would also like to have marked as Suffolk County Exhibit LP-27 for identification, what is included as Attachment 8 to the prefiled testimony, and which consists of the position paper concerning Shoreham Nuclear Power Station, prepared by Long Island Lighting Company, and submitted to the Governor of New York on or about May 30, 1984. That document has been referred to in prior

testimony as the White Paper, I believe.

Finally, as the last exhibit, I would like to have marked as Suffolk County Exhibit LP-28, what is included as Attachment No. 9 to the prefiled testimony, and which consists of a letter dated June 21, 1984, from Gerard A. Maher, to the Honorable Frank S. Robinson, Administrative Law Judge for the Public Service Commission of the State of New York.

Your Honor, I will now move those exhibits in at this time, of course, but I would like to just merely lay the foundation in terms of identification and so forth with the witnesses. Is that all right?

JUDGE MILLER: Yes, certainly.

MR. SEDKY: Thank you.

BY MR. SEDKY: (Continuing)

Q Mr. Dirmeier, if you would briefly -- if you are able to identify for the record Exhibit LP-23, which is Attachment 4 to your testimony?

A (Witness Dirmeier) Yes. LP-23 consists of several computer runs that I prepared that effectively emulate the computer runs received from the Company the day of the depositions of Mr. Nozzolillo. These computer runs were the runs used by the Company to establish its claimed economic benefit from the early operation or the early testing of the Shoreham Nuclear Plant.

Q The data underlying the computer runs that you ran, as identified in LP-23 for identification, is basically data furnished to you by the Company, isn't that correct?

A Yes, that is correct.

Q Would you also briefly just identify Suffolk County Exhibit LP-24 for identification?

Before you do that, Mr. Dirmeier, excuse me, in your prefiled testimony, do you, and does Mr. Madan, rely on LP-23 in support of information and conclusions contained in your prefiled testimony?

A (Witness Madan) Yes, we do.

Q With respect to LP-24, Mr. Dirmeier, is that a copy of the Form 10-K of Long Island Lighting Company for December 31, 1983, as filed with the Securities and Exchange Commission?

A (Witness Dirmeier) Yes, it is.

Q Similarly, do you rely on that document with respect to information you furnished and conclusions you arrived at in the prefiled testimony?

A Yes, we do.

Q Perhaps to cut this short, unless counsel wants further identific-tion, our Suffolk County Exhibits LP-25 through 28, documents which I previously identified for the record, Mr. Dirmeier?

A Yes, they are.

Q And similarly, are these documents on which you relied in the preparation of your testimony in this proceeding?

A Yes, they are.

Q Would each of you please summarize your professional qualifications?

A (Witness Madan) My undergraduate training was in the area of electrical engineering, and I received a Bachelor of Science Degree in Electrical Engineering from The Massachusetts Institute of Technology.

I continued my studies at MIT, and received a Master of Science Degree in Management from the Alfred P. Sloan School of Management.

While I was undertaking those studies, I held the position of both teaching assistant and research assistant. From the period 1968 through April of 1979, I was primarily employed by Touche Ross & Company, which is an international auditing and management consulting firm, and I held the position of principal, to which I was promoted in the year 1977.

While at Touche Ross, my experience was varied. I was involved in a number of engagements involving the areas of operations reviews, feasibility studies, preparation of prospectuses of cash flow studies, systems

plans, and eventually when promoted to principal, I also held the position of National Director of Regulation.

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Sim 16-1

As far as regulation within Touche Ross was concerned, I was involved in a number of rate proceedings. I was involved in a significant amount of fuel adjustment clause hearings in which the subject of fuel prices and the setting of fuel clauses and the policy for fuel clauses in a number of States, including New Jersey, Maryland and Delaware were conducted.

I have also testified in a number of proceedings which have involved the question of nuclear plants, the regulatory treatment, et cetera.

Since leaving Touche Ross, I was a principal in the firm of Georgetown Consulting Group, and I am continually in that position. In that position I am also primarily involved in the area of regulation and have testified in about 15 different jurisdictions in that regard.

I say primarily from the period 1968 through April '79, because for a period of approximately six months, that from October 1975 through April 1, 1976 I was employed as the General Manager of Corporate Development for Public Service Electric and Gas Company of New Jersey, which is I think the third or fourth largest combination utility in the country.

My duties at Public Service were in the planning area significantly. One of the significant

Sim 16-2

undertakings I took there was part of a group that negotiated the negotiations for nuclear fuel supply with Kerr McGee into which Public Service did enter.

Q Mr. Madan, just one other point. You made reference to rate proceedings in which you testified. Are the proceedings in which you testified identified in Attachment 1 to the prefiled testimony?

A Yes, I believe they are.

Q Thank you.

Mr. Dirmeier, how about you?

A (Witness Dirmeier) I received a bachelor's degree in physics from Texas A&M Univerisity in 1971 and a master's degree in financial from the University of Chicago in 1973.

Upon completing the MBA, I went to work for Bendix Corporation for two and half years before joining Touche Ross & Company in New York.

At Touche Ross I participated in operations analyses of non-regulated corporations and in utility rate-setting matters when I was at Touche Ross.

In 1979 I left Touch Ross to join the Georgetown Consulting Group with which I am presently employed.

My experience in regulation involves cases dealing with nuclear plants, nuclear economics, the potential abandonment of nuclear plants, accidents at

Sim 16-3

nuclear plants, I have dealt in fuel clauses, I have looked at issues, including the decomissioning of nuclear plants and the operation of a nuclear plant versus the non-operation of a plant, the economic tradeoffs of nuclear versus non-nuclear.

Q Mr. Dirmeier, are there any proceedings in which you have participated that are identified in Attachment 2 to the prefiled testimony?

A Yes, that is in Attachment 2.

MR. SEDKY: Your Honor, I offer the witnesses for voir dire.

VOIR DIRE

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BY MR. ROLFE:

Q Mr. Madan, have you ever worked for an electric utility?

A Yes.

Q What utility was that, sir.

A I mentioned Public Service Electric and Gas of New Jersey.

Q In that capacity were you responsible for operating any power generation equipment?

A You mean direct responsibility for a major piece of generating equipment?

Q Yes, sir.

A Well, I was General Manager of Corporate

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Development. I was certainly not in the production line, but my duties in that regard involved certain studies and overall reviews of the company's financial position and planning into the future, but not direct responsibility of operating a generating station.

Q I take it the same would be true that you didn't have any responsibility in that job for maintaining any electric generation equipment; is that correct?

A Physically maintaining? In that narrow sense, no.

Q Or supervising the maintenance.

A No.

Q Did you have any experience in that job or responsibility in that job for deciding when electric generation equipment would be brought on line or taken out of service?

A No.

Q Is that the only experience or responsibility you have had with respect to operating power generation equipment?

A Yes.

Q Mr. Dirmeier, have you ever had any experience in operating electric generation equipment?

A (Witness Dirmeier) No.

Q Have you ever worked for a utility?

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A No.

Q Mr. Madan, have you any experience in forecasting the availability of oil supplies?

A (Witness Madan) Yes, generally.

Q Can you explain what you mean by generally?

A Yes. I have for a number of years, beginning in the middle '70's continuing to the present day ongoing engagements in the area of fuel clause levels and fuel clause analaysis.

In this regard, what we do in the State of New Jersey, for example, is we set a fuel clause level for a particular year into the future. This requires a prediction of generating availability for equipment, fuel prices, the mix and all those conditions in terms of setting a rate level.

I have done this kind of analysis in New Jersey, I have done it in Maryland, I have done it in Delaware, I have done it in the U. S. Virgin Islands and in many of these States have been the policy witness for the generic setting of policy that would be implemented in those particular states for fuel clause analysis and the setting of these rate levels.

These, of course, require annual true-ups, a comparison of what was forecast with what was actual, and in the course of this engagement would have to take into

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account fuel availability, a discussion with company officials looking at spot prices, contract prices and availability of fuels and on a continuing basis, as I say, from the middle '70's a true-up as to what was predicted to what actually happened.

Q Yes, sir. Maybe I didn't make my question as clear as I ought to have.

Have you personally had any experience in forecasting the future availability of oil supplies as opposed to analyzing the present costs for fuel adjustment clauses?

A You mean on some worldwide basis?

Q Or any basis.

A Yes. In setting a fuel clause maybe I didn't make myself clear. The fundamental exercise that you go through in setting fuel clauses is predicting the availability to a particular utility. In many states the utility is the entire industry. For example, in Delaware there is one major utility.

You are predicting the supply and price of availability of fuel in that state for the entire 12-month period that is coming, and you do the same in New Jersey, you do the same in Maryland and you do the same in many different places.

So what these engagements entail in fact is

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a prediction of the availability of that fuel at the price you are predicting.

Q Now, Mr. Madan, when you participate in those fuel adjustment proceedings, do you personally forecast the availability of fuel, or do you rely on some other consultant to do that?

A No, I personally do it.

MR. ROLFE: Your Honor, I have no further voir dire.

JUDGE MILLER: Staff.

MR. PERLIS: Just a few questions.

XXXXXXXXXX

VOIR DIRE

BY MR. PERLIS:

Q Mr. Dirmeier, I think you indicated you had done some work relating to accidents at nuclear power plants, was that correct?

A (Witness Dirmeier) Yes.

Q Could you describe that work, please?

A Well, I have been involved in every base rate proceedings in the State of Pennsylvania subsequent to the accident at Three Mile Island No. 2 for the companies, Pennelec, Pennsylvania Electric Company and Metropolitan Edison Company. And in the course of those proceedings we have dealt with the cost of the accident and the rate treatment for various costs incurred as a

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result of the accident and the financial implications of the cost of that accident.

Q Would it be fair to say then that the work you have done with nuclear accidents is limited solely to the economic effects of those accidents?

A Well, we have also reviewed the costs of those accidents. If you are saying have we worked on determining how to clean up after the accident or something like that, the answer would be no, I haven't done that.

We have been primarily concerned with the procedures, the timing, the decision-making points as you go towards cleaning up after the accident and the costs of those various decisions and procedures.

Q Okay.

Do either of you gentlemen have any background in any technical area related to the safety of operation of a nuclear power plant?

A (Witness Madan) No, I don't.

A (Witness Dirmeier) No, sir.

MR. PERLIS: I have no further voir dire.

JUDGE MILLER: I take it no one else has voir dire.

MR. PALOMINO: No, Your Honor.

JUDGE MILLER: Very well, you may proceed.

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DIRECT EXAMINATION (Continued)

BY MR. SEDKY:

Q Mr. Madan, I wonder if you would briefly summarize for us the testimony that has been previously filed in this proceeding?

MR. ROLFE: Judge Miller, before we do that, I wonder, Mr. Sedky has not yet profferred the witnesses as experts to the Board. LILCO does have any objection to their qualifications as to one part of their testimony, and I can either raise that now or after they summarize their testimony.

JUDGE MILLER: Well, I think our normal practic has been to ask counsel, first of all, to describe the areas of expertise and the underlying issues in which the witnesses are tendered as experts.

MR. SEDKY: It is difficult to do that without having them explain their testimony, but I will do the best I can.

They are experts as financial analysts with respect to utility matters. They are also experts in nuclear plant economics. They have epxeriences, as they have described it, in the rate-making proceedings, they have experience in operations analysis for public companies and they have done a considerable amount of work in fuel area.

They are being tendered for those purposes and I guess their level of expertise will have to be decided by this Board.

JUDGE MILLER: Thank you.

Now what was your question?

MR. ROLFE: One of the questions and answers in the testimony I think deals with something beyond what Mr. Sedky has described, and that is it deals with the length of time Shoreham might be in operation and what the effect of that would be on any possible economic benefit from oil consumption.

LILCO contends that the witnesses are not qualified to express an opinion in that area and that neither of them have ever had any responsibility for operating or maintaining electric generation equipment.

Mr. Madan's limited experience in working for an electric utility did not involve any decisions as to when the electric generation equipment would be brought on line or would be taken out of service. Therefore, I don't think the witnesses are qualified as experts in that area and ought to be allowed to express any opinion.

Specifically the question and answer to which I am referring is at page 20 and continues over to page 21 of their testimony.

JUDGE MILLER: I don't quite see how we can

anticipate a rule in a vacuum. We don't know what they are going to say in that sense. We have the prefiled testimony to be sure, but it is not our practice to go through and pick out pages here and there. In other words, we tend to let the development of the evidence unfold and then we then try to rule. I don't see how we could really handle your kind of a motion.

MR. ROLFE: Your Honor, I understand the Board's practice has been to defer motions to strike, and I will do that. I have not made any motion to strike, but I did not want the record to indicate LILCO's acquiescence to these witness' professional qualifications in that particular area by virtue of not having raised the matter after voir dire, which is the usual trial practice.

JUDGE MILLER: Oh, I see what you mean. Having completed voir dire, you are not concurring in possible areas of expertise which have been outlined by counsel preliminarily, is that it?

MR. ROLFE: Yes.

JUDGE MILLER: Well, you are not bound by anything. When it becomes an issue of some kind, procedural or otherwise, when of course you will be free to make your record, at any rate, and then Board will then rule in light of the situation as it sees it.

MR. ROLFE: Thank you, Judge Miller.

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JUDGE MILLER: You may proceed.

BY MR. SEDKY:

Q I believe, Mr. Madan, the question to you was whether you would please summarize the testimony you have presented or that has been filed in this proceeding.

A (Witness Madan) Yes. I will attempt to provide a brief summary of our testimony.

Our testimony is basically divided into three major areas.

The first one deals with the computations as provided by LILCO showing the impact a three-month delay. The range of possible benefits that LILCO attributes an acceleration of the in-service debt by three months is in the range of $8 million to about $45 million.

First, we believe that a substantial portion of this benefit relates to the issue of having Shoreham placed in service for tax purposes or synchronized by the end of 1984.

We believe that that assumption is an unreasonable assumption. Based on the assumptions that are presently before us, we believe that that assumption is inherently unreasonable.

Therefore, the benefit, not taking into account the in-service date in 1984, but a synchronization beyond December 31, 1984, or in the calendar year 1985

Sim 16-13

produces a benefit in the order of some $8 million. So that is what we are dealing with first.

Now beginning with the premise of using the company's own figures for this analysis, we believe that the presentation provided by LILCO is also erroneous. This benefit of $8 million does not occur at the time the acceleration of the in-service date is achieved three months early.

In Mr. Nozzolillo's example, he has a hypothetical in-service date of July 1, 1985. Now if in fact there is any impression that on July 1, 1985 LILCO has provided to the ratepayer a benefit of $8 million, that presentation is totally erroneous. What has happened at that time is that a substantial rate increase of some $800 million annually has been put in place.

The economic impact of those three months alone, the acceleration, the impact of July, August and September, 1985 produces, according to LILCO's own schedule, a net detriment of $165 million to the ratepayers. In other words, it will cost $165 million. There is no disagreement with that and we are not disagreeing with those figures.

The so-called benefit that derives first becomes apparent on LILCO's presentation almost into the 20th Century in the year 1998. That is when you begin to see on a cumulative basis, which Mr. Nozzolillo agreed with,

Sim 16-14

the benefits of this so-called acceleration.

Now from a pure financial standpoint in today's financial climate and economic climate, I do not think that if someone came to you with a deal requesting you to put up $165 million today ---

MR. ROLFE: Objection, Your Honor. This goes beyond the witness' prefiled testimony.

JUDGE MILLER: Well, it is getting a little argumentative. I think all we want now is sort of a bird's-eye view.

WITNESS MADAN: Okay. Therefore, our initial conclusion is that in fact from a financial point of view that kind of benefit is one that the ratepayers really don't need.

Second, we now move into the area of disagreement in terms of the computations made by Mr. Nozzolillo. The three-month period we believe has a mismatch between the amounts that will result in the cash expenditures for Shoreham in the order of $28 million.

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#17-1-SueT When we look at just those three months between what LILCO claims they will expend if Shoreham is in service versus the time it is not in service, the time that it is not in service contains a cash cumulative addition of some twenty-eight million dollars. We believe that assumption is erroneous.

That has a present value of some twenty-six million dollars. Therefore, rather than being a positive, a benefit as LILCO would present, we believe that this assumption alone will take that positive and make it a negative eighteen million dollars.

The third area that we believe is in error in terms of LILCO's presentation is a cutoff of the analysis at the year 2000. If the analysis were extended for the thirty year life of the plant, there would be an additional detriment which would result, in our opinion, of a cumulative detriment to the ratepayer in the order of forty-nine million dollars.

This is because as you go out, the assumption that we have contained in our analysis is that the output of Shoreham is constant, whether it be placed in service three months earlier or the alternative, three months later. The net output or energy generated from the machine remains constant. That assumption changes the analysis significantly from the cutoff at the year 2000 that Mr. Nozzolillo had

#17-2-SueT 1 assumed.

2 The second area of our testimony -- that concludes
3 the first area. The second area of our testimony really
4 relates to the near term assumptions that LILCO has pro-
5 duced.

6 LILCO, in coming to its economic analysis con-
7 tained in the models of Mr. Nozzolillo, assumes near normal
8 operations from the current time to either July '85 or
9 October '85. Now, Mr. Nozzolillo -- the financial condition
10 of the Company at this time is very acute. Every publica-
11 tion that is available to us, public or otherwise, in the
12 rate proceedings, in the Company's annual reports, the
13 statement of the Company's auditors, the statement of the
14 Company itself in its filings before the SEC, all indicate
15 that the Company is on the verge of a financial disaster.

16 MR. ROLFE: If Your Honor please, LILCO objects
17 on two grounds. One, that this portion of the testimony
18 is irrelevant. And I will bring that up later in accordance
19 with Your Honor's directions concerning motions to strike.

20 But, two, the witness has mischaracterized his
21 prefiled testimony in trying to characterize it as going
22 to the assumptions which LILCO has made in its analysis.

23 If the Board would look at the questions that
24 were asked in this portion of the testimony, the question
25 was: Your prior testimony has dealt with LILCO's planned

#17-3-Sue1

economic benefit resulting from LILCO obtaining a low power license now rather than waiting until the uncertainties surrounding the TDI diesels have been resolved. Have you considered whether the public interest would be served by having LILCO engage in low power operation at this time?

And from that, they launch into a discussion of financial qualifications, the uncertainties of getting a license. This doesn't pertain, as Mr. Madan has mischaracterized it, to the assumptions which LILCO has made in its analysis. And I think in addition to being irrelevant, in accordance with Your Honor's previous rulings, I think that the witness has not properly characterized what he is getting into now.

JUDGE MILLER: Well, I think we had better shorten what it's going to be and give us a chance to consider some of these matters.

MR. SEDKY: Your Honor, there is no question, apparently in Mr. Rolfe's mind, that there is going to be a dispute here over what is the testimony and what its significance is. Again, I don't -- we are prepared to handle it any way.

But I don't see how that issue can really be addressed in a vacuum. Mr. Rolfe seems to have a view of what the testimony is or is going to be. The witness obviously has a different view. He is trying to give an

#17-4-SueT

overview of what his testimony is. And it sounds like Mr. Rolfe is moving to strike. I just suggest that we wait and see what happens.

MR. ROLFE: Judge Miller, I would like to make myself clear. I will be moving to strike. That's not the purpose of my interrupting the witness' answer at this time.

My purpose is that he is supposed to be summarizing his direct testimony. In an effort perhaps in anticipation of my motion to strike, he has mischaracterized his prefiled direct testimony and mischaracterized the questions he was asked in giving the responses which LILCO will ultimately move to strike.

JUDGE MILLER: Well, we would rather not at this time get into a controversy regarding the admissibility of certain broad -- apparently broad -- areas of projected testimony. It's going to be a little awkward to handle it on that basis.

I suggest that we foreshorten this matter, the acute financial difficulties, with the understanding that they are shortening their summary because there are some problems we are apparently going to have to get into. So, rather than anticipate them now, I would rather go ahead and get the overview.

If you will direct your witness --

#17-5-SueT1

MR. SEDKY: I will, Your Honor.

BY MR. SEDKY: (Continuing)

Q Mr. Madan, correct me if I'm wrong, but I think that the gist of your testimony is that -- is to the effect of LILCO's financial condition and so forth. In order to avoid a controversy on that subject at this time, you have made the statement. Let's stay away from all the detail until we have to address it on a specific basis.

And if you would then, assume that you have covered that particular point and move on to the next one.

A (Witness Madan) Okay. The third area of our testimony deals with the analysis or the exploration of the hypothesis which is in effect the contrary to the hypothesis that is contained in LILCO's testimony, that an acceleration of the schedule results in an acceleration of the in-service date.

At this point, from a financial standpoint we explore the public interest implications of the other hypothetical is as to what the result would be if the plant did not go into service. Our conclusion is that there is a substantial financial consequence to such an action, and we have indicated that we believe that that could be in the range of some hundred million dollars.

That, in fact, concludes the third major point in summary of our testimony.

#17-6-SueT

MR. SEDKY: Your Honor, I invite the parties to cross-examine.

JUDGE MILLER: It appears to the Board we have got some detailed, rather complex testimony coming up. And we have some serious disputes, some legal in nature, and some I suppose factual or expert testimony connected.

I'm just wondering frankly if we shouldn't recess and give the Board and parties a chance to address that first thing in the morning. I'm afraid we are going to get into the middle of things, and we are going to have constant preliminary controversies on these matters, which would be heard by the Board, so we know if we can what the ground rules are going to be.

I'm aware, for example, I haven't read all of these motions. I'm aware of the question raised last week or so of the impact of the projected testimony in connection with the previous discovery ruling of the Board on some extensive documentary and other requests in the discovery area.

The Board made a ruling there which I think we have to reconcile and see where we are now that we are down to admissibility which is a somewhat different matter, and also in the Order, you recall, where we sustained the objection to some very broad gauged discovery matters. We did indicate that there were areas in connection with the differences, if any, between financial and economic,

#17-7-SueT

between earlier rather than later low power operations, was not excluded.

So I think we are going to have to reconcile some things. And we might as well, I think in an orderly way, perhaps address first.

MR. SEDKY: Your Honor --

JUDGE MILLER: We will do it any way it's easiest for counsel. We realize your problem with the witnesses, but I really think you probably ought to excuse them.

You said now you and other counsel want to approach our --

MR. SEDKY: Well, I'm not going to say anything that could possibly be misinterpreted by my witnesses, you can be assured of that.

JUDGE MILLER: I just mean I think they are through for the day. They might have something they wanted to do.

MR. SEDKY: The only comment I would have that might have an impact on Your Honor's consideration of this matter is perhaps in fairness to them that the cross-examination ought to be concluded and so forth so that they can then leave, and you would have the entire record on which to deliberate and all parties would have a record on which to argue whether or not it should be striken or not

#17-8-SueT

striken. That's how it has always been the case.

JUDGE MILLER: That's how it has been. But I think we have a -- pardon me for interrupting you. I think we have a motion that goes into such broad areas that if we don't address it I just believe that our whole time of testifying is just going to be constantly interrupted on one ground or another.

It's the massiveness, I guess, of the controversy between the parties that causes me to approach it a little bit differently.

MR. SEDKY: We will abide by Your Honor's ruling. I would like to get the witnesses on and off and back to their families if we could.

JUDGE MILLER: Well, we all want to get to our families, and I appreciate that.

I thought these witnesses were going to have to leave tomorrow for other engagements. Did I misunderstand you?

MR. SEDKY: No, no. Definitely not. That was the understanding and my understanding and that was my representation to the Board.

They frankly rearranged their schedule so that they can either do it later in the afternoon tomorrow, mostly because they wanted to get this over and behind them before the week-end. You know, an understandable human

#17-9-SueT 1 desire.

JUDGE MILLER: In other words, they will be available at 9 in the morning to start testifying?

MR. SEDKY: Yes.

JUDGE MILLER: As I indicated to you, the Board is more or less inclined to recess today at 4:30, however we don't want it to be unproductive time. We are willing to take with us things that have been filed.

If you have got any last minute, five minute admonitions, get it because we do want to get an overview. But I think we are going to have to give some study to the motions. We just want to hit the highpoints of the testimony and have a chance to then hear from you in the morning perhaps if you want.

We have got to resolve it in some way, because I don't think the witnesses will get to see their families very soon if we are going to be constantly having legal questions. I really believe we ought to get those over with one way or the other.

However, I am hopeful to do it fairly expeditiously. So, the witnesses, if they wish to start in the morning, will be able to start and hopefully conclude. But I can't predict --

MR. SEDKY: Yeah. The only -- frankly, I was viewing it just from having seen LILCO's position and the

#17-10-SueT

gravity of the -- the width of the schism on this question, I actually was foreseeing that there might be a rather lengthy legal argument on this matter and was hoping that, consistent with prior practice, that we would just defer that legal argument so that the witnesses don't have to be inconvenienced and --

JUDGE MILLER: Yes, but prior testimony has been much less in depth and volume and the number of exhibits and the like. You have identified just a few of your proposed exhibits and they look like they are somewhat massive in their stretch and reach. Now, we certainly ought to know where we are going before we address this. You know, it's six to eight, ten inches deep.

We are not dealing with a small amount of data, opinion evidence and the like. We are dealing with a massive proposition.

It, therefore, makes sense to the Board that we see about at least resolving, or at least identifying the legal and quasi-legal issues and the other matters, and we are willing to move into the testimony as soon as we can. But it looks to us like we are going to have anticipatory arguments raised, at least in the form of preserving the record and often it comes in the way in which answers are given and questions asked.

I believe we are asking for trouble if we don't

#17-11-SueT

settle down for at least fifteen or twenty minutes in the morning. And the Board will undertake overnight now to examine all the documents.

So I think that is what we had better do. Yes, Mr. Palomino.

Mr. Palomino, do you have any motions or any written documents that you could leave with the Board to review tonight? We do plan to work on this to get a consideration of what we are confronted with, legal and factual issues.

If there is anything that you want to give us to read overnight, you and the other parties, why we certainly will do so.

MR. PALOMINO: No. I don't have anything. What I wanted to say was I won't be able to be here tomorrow, but I will have another attorney representing the State.

JUDGE MILLER: All right. You will work that out then with your colleague so --

MR. PALOMINO: Yeah. There won't be any problem.

JUDGE MILLER: Is there anything you want to say since you won't be here? We will give you an opportunity.

MR. PALOMINO: Well, I would just like to say in a broad sense that since the testimony that the LILCO witnesses gave in this area, all the benefits they testified

#17-12-SueT

to, are based on commercial operation, that I think all the issues I've heard relate to the -- either commercial operation or the possibility of it. I don't see why they are not relevant and admissible.

JUDGE MILLER: We don't know. We don't even have enough information --

MR. PALOMINO: That was just my broad overview.

JUDGE MILLER: We appreciate your point of view, because it will be helpful to us.

Is there any period of time in a broad way, are we going back a long way with a lot of financial considerations or are we going present and forward with --

MR. SEDKY: I believe -- in fact, we cut back a few -- this is going to sound silly in a way, but the ten inches or so at least was struck down to approximately four inches. But basically the financial information on which the witnesses have been relying are all within the last year and prognoses and their views, of course, subject to whatever weight they have, was to what the future looks like.

So I think the legal issue is going to be fairly well focused. I don't think the facts are -- the facts really probably aren't that much in dispute.

JUDGE MILLER: As a matter of fact, in terms of the financial situation of the Company, is there any

#17-13-SueT

reason why we couldn't have a stipulation? We have seen from time to time various motions referred to documents filed with State and federal agencies. I don't know if this is possible, but if we could spare a lot of time and documents and maybe two out of those four inches on matters which are not truly in dispute, this might help all of us, too. You might give that some thought.

I assume there are certain basic factual data that are not seriously controverted. I've had indications of it from your witness, for example.

MR. ROLFE: Judge Miller, LILCO would like this evening to think about that possibility. I will say that we may be able to stipulate the accuracy of the documents but even if we could stipulate as to those facts, LILCO would still maintain its objection that none of this is material or relevant based on the Board's earlier ruling.

JUDGE MILLER: All right. You will not be asked to either -- neither one of you would be asked to jeopardize your own position or that of your client. That's understood.

The point is if we could cut down, by agreement, certain documents that were filed -- they have been alluded to several times here and if you see they were filed and said X, Y, Z, my goodness, it's probably X, Y, Z.

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MR. SEDKY: I could be wrong. But I don't think LILCO is going to dispute the financial facts in any real substantive fashion. I mean, they may -- there may be some nuances that may be in dispute but I don't think they are going to dispute it.

JUDGE MILLER: Why don't you give it some thought overnight? To the extent that we can eliminate those matters that are not going to be seriously controverted, so much the good.

Now, what you do with, that's a whole different matter. And there we will appreciate it again helping us to focus in upon the issues that are between you.

MR. ROLFE: I think that's the problem, Judge. It's not so much the facts, although I'm not ready to stipulate to all of them. It's the relevance and materiality.

JUDGE MILLER: I suggest the first gasp.

MR. ROLFE: Mr. Sedky and I get along very well, and we will certainly explore that.

JUDGE MILLER: I will see you at 9 in the morning.

MR. PERLIS: Mr. Chairman, I just --

JUDGE MILLER: Do you want to go with them? That's fine.

(Laughter.)

MR. PERLIS: No, I would much rather go home. I

#17-15-SueT

just did want to point out to the Board that the Staff filed, in response to Suffolk County's motion en illuminae its views, at least preliminary views, on the admissibility of the testimony in question here.

JUDGE MILLER: My recollection is that went to the rule regarding the consideration of financial capability in licensing cases.

MR. PERLIS: In part. It also went to -- I just say in part. There is more in there than that. But I did want the Board to be aware we have filed something in writing.

JUDGE MILLER: We brought it with us.

MR. PERLIS: Okay.

JUDGE MILLER: Okay. Thank you. Have you got anything else? If you do, hand it up.

MR. ROLFE: This is not related. This is another motion which has just been filed. Since you are here, we thought we would --

JUDGE MILLER: Okay. We will accept service.

(Mr. Rolfe is distributing documents to the Board members.)

MR. ROLFE: Thank you.

JUDGE MILLER: Okay. See you at 9 in the morning.

Stand in recess.

#17-16
SueT

(Whereupon, at 4:26 p.m., the hearing was adjourned, to reconvene at 9:00 a.m., Friday, August 3, 1984.)

* * * * * * * * * * *

ENDDDDDD

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: Thursday, August 2, 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

Rebecca E. Eyster
Official Reporter - Typed

Rebecca E. Eyster
Official Reporter - Signature