

ORIGINAL

UNITED STATES OF AMERICA NUCLEAR REGULATORY COMMISSION

In the matter of:

LONG ISLAND LIGHTING COMPANY

(Shoreham Nuclear Power Station,
Unit 1)

Docket No 50-322-OL-3

Location: Hauppauge, New York

Pages: 15,595-15,714

Date: Wednesday, August 29, 1984

TR-01
0/1

TAYLOE ASSOCIATES

Court Reporters
1625 I Street, N.W. Suite 1004
Washington, D.C. 20006
(202) 293-3930

B409040035 B40829
PDR ADOCK 05000322
T PDR

SueT

1 UNITED STATES OF AMERICA
2 NUCLEAR REGULATORY COMMISSION

3 BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

4 -----X
5 In the Matter of: :
6 LONG ISLAND LIGHTING COMPANY : Docket No. 50-322-OL-3
7 (Shoreham Nuclear Power Station, : (Emergency Planning
Unit 1) : Proceeding)
8 -----X

9
10 Court of Claims
11 State of New York
12 State Office Building
13 Room 3B46
14 Veterans Memorial Highway
15 Hauppauge, New York 11787

16 Wednesday, August 29, 1984

17 The hearing in the above-entitled matter re-
18 convened, pursuant to recess, at 9:00 a.m.

19 BEFORE:

20 JAMES A. LAURENSEN, ESQ., Chairman
21 Atomic Safety and Licensing Board
22 Nuclear Regulatory Commission
23 Washington, D. C. 20555

24 DR. JERRY KLINE, Member
25 Atomic Safety and Licensing Board
Nuclear Regulatory Commission
Washington, D. C. 20555

DR. FREDERICK SHON, Member
Atomic Safety and Licensing Board
Nuclear Regulatory Commission
Washington, D. C. 20555

M mm1

1 APPEARANCES:

2 On Behalf of LILCO:3 JAMES N. CHRISTMAN, Esq.
4 LEE ZEUGIN, Esq.
5 Hunton & Williams
6 707 East Main Street
7 Richmond, Virginia 232128 On Behalf of the NRC Staff:9 DONALD HASSELL, Esq.
10 BERNARD BORDENICK, Esq.
11 ORESTE RUSS PIRFO, Esq.
12 Office of the Executive Legal Director
13 U.S. Nuclear Regulatory Commission
14 Washington, D.C. 2055515 On Behalf of Suffolk County:16 MICHAEL S. MILLER, Esq.
17 CHRISTOPHER M. MC MURRAY, Esq.
18 Kirkpatrick, Lockhart, Hill, Christopher
19 & Phillips
20 1900 M Street, N.W.
21 Washington, D.C. 2003622 On Behalf of the State of New York:23 RICHARD J. ZAHNLEUTER, Esq.
24 Special Counsel to the Governor
25 Executive Chamber
Room 299
State Capitol
Albany, New York 12224

I N D E XWITNESSES:

	<u>DIRECT</u>	<u>CROSS</u>	<u>BOARD</u>	<u>REDIPECT</u>	<u>RECROSS</u>
Gregory C. Minor	15,598	15,611	15,616	15,623	--
Dr. Elias P. Stergakos) John A. Rigert)	15,631	15,636	15,643	--	--
Robert A. Benedict) Marvin W. Hodges) John R. Sears) Theodore R. Quay)	15,652	15,669	15,682	15,706	15,708

EXHIBITS:

	<u>IDENTIFICATION</u>	<u>EVIDENCE</u>
LILCO EP-81 (Calculations re: fission product inventories during cold shutdown following 100% plant operation and 5% power)	15,631	15,642
NRC EP-1 (Prof. Qualifications R.A. Benedict)	15,653	15,656
NRC EP-2 (Prof. Qualifications M.W. Hodges)	15,654	15,656
NRC EP-3 (Prof. Qualifications T.R. Quay)	15,655	15,656

LAY-INSFollowing Page:

LILCO EP-81	15,642
NRC EP-1	15,656
NRC EP-2	15,656
NRC EP-3	15,656

T1 MM/mm

P R O C E E D I N G S

1
2 JUDGE LAURENSEN: The hearing is now open.

3 Pursuant to the agreement by counsel, we will
4 proceed first with the testimony of Mr. Minor on Direct,
5 Cross Examination, to be followed with some reply testimony
6 by some of the LILCO witnesses concerning the Board questions
7 of yesterday.

8 And we will complete the schedule of hearing
9 testimony with the NRC Staff witnesses.

10 Mr. McMurray?

11 MR. MC MURRAY: Thank you, Judge Laurenson.

12 I believe Mr. Minor has already been sworn.

13 JUDGE LAURENSEN: That's correct.

14 Whereupon,

15 GREGORY C. MINOR

16 was recalled as a witness on behalf of the County, and having
17 been previously duly sworn, was further examined and
18 testified as follows:

19 MR. MC MURRAY: I would also like to note for
20 the record that Mr. Minor's resume has previously been bound
21 into the record.

22 DIRECT EXAMINATION

23 BY MR. MC MURRAY:

24 Q Would you please state your name and your
25 business address.

mm2

1 A My name is Gregory Minor, MHB Technical Associates,
2 1723 Hamilton Avenue, San Jose, California.

3 Q Mr. Minor, are you aware of LILCO's proposal to
4 go to cold shutdown in the fact of a strike by LILCO
5 employees?

6 A Yes.

7 Q How did you become aware of that proposal?

8 A I first became aware of that when they submitted
9 their Motion for Summary Disposition or Judgment -- I forget
10 the exact title -- in August of this year, and the
11 Affidavits that were attached to that.

12 Q And what is your understanding of the basis
13 underlying LILCO's proposal?

14 A My understanding is that LILCO looked first at the
15 implications of continuing to operate at full power. And
16 based on a judgment that they could not justify operation at
17 full power if there were no offsite LERO organization in
18 effect because of a strike, that they then chose to propose
19 a shutdown condition during a strike.

20 Therefore, they prepared the affidavits describing
21 what would happen if the plant were in cold shutdown.

22 Q Well, do you agree with LILCO's conclusion that
23 in the event of an accident occurring at full power, a
24 strike by LILCO employees could impair LILCO's ability to
25 implement its offsite plan?

mm3

1 A Yes, I do. I believe that at full power there
2 are several accidents which could cause offsite releases
3 of sufficient magnitude that it would necessitate the
4 presence of an offsite organization such as LERO. Therefore,
5 it would be unjustified to operate at full power. And many
6 of the accidents which could occur in these conditions have
7 been identified in previous probabilistic risk assessments
8 that have been done for full power operation.

9 Q Do you believe that a decision to take the
10 reactor to cold shutdown would preclude offsite releases?

11 A No, I don't believe it would preclude offsite
12 releases.

13 Q Could you explain why, please.

14 A Well, there are several reasons.

15 A decision to take a plant to cold shutdown
16 involves some period of time when you would be operating at
17 full power; some period of time when you would be operating
18 in the transition between full power and a cold shutdown
19 condition; and then that would be followed by the time when
20 you were actually in the cold shutdown condition.

21 It is my opinion that there are accidents which
22 could occur during the 100 percent power portion of this
23 time we are talking about, and the transition portion of
24 this time which could produce source terms larger than those
25 that would be found say, in Chapter 15 events, starting with

mm4

1 the assumption that you are in cold shutdown, and therefore
2 could result in larger releases than you would calculate
3 from the Chapter 15 analysis that was done.

4 Q Could these accidents include those classified as
5 Class 9?

6 A In my opinion they could. Yes, definitely.

7 Q Have you reviewed the scoping estimate of Class 9
8 accidents conducted by LILCO? And that has been identified
9 as Suffolk County Exhibit EP-94. Do you have that?

10 A Yes, I have that in front of me. And, I have
11 reviewed this.

12 Q What is your opinion of it?

13 A My opinion is that the analysis that was done is
14 a fairly -- very, rather -- narrow subset of what would need
15 to be done to do a complete Class 9 analysis.

16 They have looked at one particular phase of
17 operation under one set of conditions and determined some
18 time characteristics for heatup. That is not a complete
19 Class 9 analysis. There are other modes of operation that
20 were considered, there are other accident possibilities --
21 excuse me, that were not considered -- and other accident
22 possibilities that were not considered.

23 Those would have to be done in analysis form to
24 have what I would call a full Class 9 analysis.

25 Q To your knowledge has LILCO performed any

mm5

1 analysis of accidents or releases which could occur during
2 the run mode, or during the transition from 100 percent
3 power down to cold shutdown?

4 A To my knowledge, they have restricted their
5 analysis to Chapter 15 events starting from the condition
6 of cold shutdown.

7 There was some talk yesterday of a brief look
8 at full-power operation, but they did not describe any
9 analyses that were done during those conditions.

10 Q Well, do you foresee any problems, or what are
11 the problems of restricting the analysis such as this to
12 Chapter 15 events?

13 A Chapter 15 events, in my opinion, are the wrong
14 set of accidents to look at to determine the adequacy of
15 this provision that they are proposing in their license.

16 First of all, Chapter 15 events are really only
17 a subset of all the accidents that could occur. They do not
18 include Class 9 accidents, they do not include some accidents
19 and conditions -- plant conditions -- which are for one
20 reason or another not included in the Chapter 15 set.

21 Class 9 accidents I have talked about a little
22 bit, already.

23 The other conditions would include events involving
24 spent fuel pool or fires or things of that nature, which
25 are not included in this review.

mm6

1 Q Just so I understand what you are saying, you
2 are saying then that there are events other than Chapter 15
3 events which could require LILCO to activate LERO personnel
4 and facilities?

5 A Yes. In fact, there are a whole series of
6 event categories that the operators are required to assess
7 in determining which types of activation or emergency
8 levels would be declared. And these include abnormal radio-
9 logical conditions, fires, control room evacuation, fuel
10 handling accidents, security threats and natural events.

11 So there is a category of events there that are
12 not part of the Chapter 15 analyses, that would normally
13 be done for an FSAR or that were done for this particular
14 condition starting from cold shutdown assumption that LILCO
15 made.

16 Q What, then, is your opinion of the way LILCO
17 has conducted its accident analysis for strike conditions?

18 A As an overview, I would say they selected a very
19 narrow set of the total list of possible accidents that
20 could occur. They chose to exclude Class 9 accidents for
21 the reason that they said they considered them noncritical.
22 And, as a result they have ignored some of the causes and
23 initiating events which could cause offsite releases and
24 could necessitate the operation of LERO during the periods
25 of time when the strike is imminent, but perhaps not in

mm7

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

effect;

The period of time when they are in cold shutdown, but due to events other than just core activity;

And, the period of time toward the end of the cycle when other operations are possible. And by their operations I am referring to things like refueling or whatever other operations they may choose to have active at the end of the cycle.

The bottom line in here is, without that kind of complete analysis, you cannot make a reasonable assurance finding that protective actions will be put into place for radiological emergency which could exist.

end T1

Sim 2-1

1 Q Have you reviewed LILCO's proposed licensing
2 condition?

3 A Yes, I have.

4 Q Do you have that with you?

5 A I do.

6 (Pause while witness looks through papers.)

7 Q I believe it is in Mr. Cordaro's affidavit.

8 A Yes, I have it.

9 Q What is your opinion of the licensed condition?

10 A I have several problems with his licensed
11 condition, and these are problems that I feel make it
12 inappropriate for this particular situation, for resolution
13 of this particular situation.

14 If I could divide them into categories, I would
15 say I have problems with when this condition starts, when
16 it ends and what can go on in the middle.

17 Let me take them one at a time.

18 With regard to when this licensing condition would
19 start, I find the proposed licensed condition to be very
20 broad and vague. Now let me just elaborate on that a
21 second.

22 I find this condition broad in the sense that
23 it does not accurately define the condition under which
24 you would initiate it, and I am comparing here to the type
25 of condition that would exist on a plant license, say, in the

Sim 2-2

1 technical specifications where they define if you have
2 a certain system out of operation and another condition you
3 will be shut down within "X" hours. It is a very defined
4 condition that the operator can interpret, know that it is
5 in effect and make his decision and take the plant to that
6 condition.

7 In this particular licensed condition you first
8 start out by having to decide whether you still have a
9 LERO organization that is primarily of LILCO employees and
10 that there is anticipation of the commencement of a strike
11 by a union.

12 Now the anticipation of the commencement of a
13 strike is a very general defined period and the operator
14 doesn't know if he is up to that limit at any particular
15 time, in my opinion, and the strike may be by a union, but
16 it doesn't define which unions. There are two IBEW unions
17 that we talked about yesterday, but there is also the union
18 affecting security forces, and in the future there could
19 be other unions in effect representing some LILCO employees
20 and possibly some LERO employees.

21 So there is a rather generalized starting
22 condition on this.

23 With regard to the end of the condition, it says
24 LILCO shall maintain this condition until "the end of the
25 strike, except," and then it goes on to describe some

Sim 2-3

1 exceptions, just taking the words "the end of the strike."

2 When I read this I had empathy with Dr. Cordaro's
3 comments about when he first read it. It read like a legal
4 contract and I wondered what the end of the strike meant.
5 Does that mean when there is a notice in the newspaper for
6 instance that an agreement has been reached? Does it mean
7 that that is the date that the union has actually voted to
8 go back to work? Does that mean the date that the contract
9 is actually in place that affects the union people? Or
10 does that mean the date that a certain percentage, 90 or 99
11 percent of the employees are actually back to work so that
12 you are sure that LERO would be effective. It is a generalized
13 ending for this whole process.

14 And then the exception is another major concern
15 of mine. Until the end of the strike, except, clause goes
16 on to define two conditions under which you would not keep
17 it in cold shutdown.

18 One of those is the refueling mode, and the
19 refueling mode represents perhaps by LILCO's calculation
20 the worst release that could occur given the strike condition
21 and a reactor that is in the cold shutdown or refueling
22 modes, the refueling accident that they have analyzed that
23 represented the worst release.

24 The second part of this exception talks about
25 "to conduct such other operations as the staff shall approve,"

Sim 2-4

1 and it goes on to put some other conditons on it.

2 In my opinion, this is so open-ended that it
3 could justify almost anything. There was talk yesterday
4 of maintenance and repair and core inspection, removing
5 fuel from the core and removing the entire core for that
6 matter.

7 It would also, based on the discussion we heard
8 yesterday, in my opinion not rule out low-power operation
9 if LILCO made such request to the NRC and requested it on
10 the basis that they feel either a disbelief in the source
11 terms or that there is a pending new ruling on source terms
12 and the effective EPZ's that are required for a plant and
13 therefore they think it is safe enough to operate at reduced
14 power levels and so forth.

15 There is almost no limit to what could be done
16 under those conditions -- excuse me, those other conditions
17 that LILCO was asking for.

18 So I find that that part of the licensed condition
19 as proposed would be untenable in my mind.

20 Also, there is the general proviso at the end
21 that this whole licensed condition could go away at any time
22 any or any combination of agencies of the Federal, State,
23 County and so forth decide to accept responsibility for
24 an undefined portion of the LERO operation.

25 So in general I read this as a legal contract

Sim 2-5 1

2 with a lot of loop holes favoring LILCO and not much to
3 protect the public health and safety.

4 Q What then is your conclusion about the ability
5 of the licensed condition to provide reasonable assurance
6 that adequate protective measures can and will be taken
7 in the event of a radiological emergency?

8 A As posed by the Board, their third question
9 asks that basic issues, whether there is reasonable assurance
10 that adequate protective measures can and will be taken
11 in the event of a radiological emergency.

12 It does not define whether that radiological
13 emergency originates in a cold shutdown condition and it
14 does not say that radiological emergency excludes refueling
15 or other full power or transition modes that the plant would
16 be in while approaching cold shutdown.

17 It requires that there be reasonable assurance
18 that there be protection for any radiological emergency
19 that would require an offsite organization. The condition,
20 as I read it, does not provide that assurance. The
21 analysis that has been provided does not provide a basis
22 for that assurance and, therefore, I don't see how it can
23 be found at this point.

24 MR. McMURRAY: Judge Laurenson, I have no
25 further questions.

JUDGE LAURENSEN: Mr. Seugin.

Sim 2-6

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

MR. ZEUGIN: Judge Laurenson, could we ask
for a 10 or 15-minute break to discuss our cross-examination.
I think it is going to be rather short.

MR. McMURRAY: No objection.

JUDGE LAURENSEN: Yes, we will give you 15
minutes.

(Recess.)

end Sim
Sue fols

#3-1-SueT 1 JUDGE LAURENSEN: Mr. Zeugin.

2 CROSS EXAMINATION

3 BY MR. ZEUGIN:

INDEXXX 4

5 Q Mr. Minor, if I could have you look at LILCO
6 Exhibit EP-73, which is the affidavit of John Scalice,
7 do you have that in front of you?

8 A (The witness is complying.)

9 Yes, I have that in front of me now.

10 Q If you could turn to Page 4 of that affidavit,
11 and particularly Item Number 6, that item contains a
12 statement by Mr. Scalice that the time needed to bring the
13 reactor from full power to cold shutdown is approximately
14 12 to 16 hours.

15 Do you see that statement?

16 A Yes, I do.

17 Q Now, Mr. Minor, during your deposition, I asked
18 you if you had formed any views about the reasonableness
19 of those time estimates, and I will read your answer to
20 you.

21 You stated, "I think if we are trying to
22 maintain ..."

23 MR. MC MURRAY: Excuse me. Judge Laurenson, I'm
24 not sure that reading the deposition in the record is the
25 proper way to go.

If Mr. Zeugin has a question, he should ask it

#3-2-SueT 1

2 and use the deposition for impeachment purposes if he sees
3 that it is necessary.

4 MR. ZEUGIN: Judge Laurenson, I am merely going
5 to read the statement to Mr. Minor and ask him if he
6 still agrees with it.

7 WITNESS MINOR: What page is that on?

8 MR. ZEUGIN: Page 11.

9 JUDGE LAURENSON: I think LILCO complained
10 yesterday about the potential misuse of the deposition
11 transcripts, and I think that the County is correct in
12 its objection.

13 There isn't any foundation at this point. The
14 objection is sustained.

15 BY MR. ZEUGIN: (Continuing)

16 Q Let me see if I can get at this directly, then,
17 Mr. Minor.

18 Do you have any views on the reasonableness of
19 the time estimates of 12 to 16 hours presented in the
20 affidavit of Mr. Scalice to perform the operation for
21 bringing the plant from full power to a cold shutdown
22 condition?

23 A (Pause.)

24 I don't have any reason to disagree with those,
25 but I haven't really tried to quantify each of the steps
in the process in order to determine if the proper soaking

#3-3-SueT

1 times of the different temperatures on the way down would
2 be appropriate. I assume that they are predicated on
3 the cooling rates necessary for the vessel so that you
4 have -- you stay within the degrees per hour change that
5 are required.

6 I have not done an independent calculation of
7 that.

8 MR. ZEUGIN: Thank you, Mr. Minor. We have
9 no further questions, Judge Laurenson.

10 JUDGE LAURENSEN: Mr. Zahnleuter.

11 CROSS EXAMINATION

12 BY MR. ZAHNLEUTER:

13 Q Mr. Minor, yesterday we heard testimony concern-
14 ing the comparison of operation at five percent power to
15 cold shutdown following full operation.

16 In your opinion, can a valid analogy be drawn
17 between operation at five percent power and operation --
18 and cold shutdown following full power operation?

19 A In my opinion, these are comparing apples and
20 oranges. The problem I have with this comparison is that
21 the two conditions are not comparable in so many ways that
22 to try and compare one parameter of the two conditions is
23 perhaps an unfair comparison, or an unrealistic comparison,
24 for the judgment that is being sought in the end.

25 If you think about five percent power operation,

#3-4-SueT

1 you are dealing with a new reactor, you are dealing with
2 new fuel, you are dealing with a buildup of short-lived
3 isotopes but not to the level it would be with a hundred
4 percent. You are dealing with a condition where the spent
5 fuel pool has no spent fuel in it.

6 You have no generator connected to the lines.
7 You have fewer chances of load rejection transients and
8 things of that nature, MSIV closures and so forth that
9 would cause a problem for the plant in terms of transient
10 initiators.

11 While at a hundred percent, this could be any-
12 where up to the forty-year lifetime of the plant that you
13 are dealing with at a hundred percent. You have used
14 and irradiated fuel in the core, which is probably a high
15 burn-up and some parts of the cycles, of course, would
16 have the characteristics of older fuel. You have a buildup
17 of longer-lived isotopes as well as the short-lived isotopes.

18 You have a spent fuel pool that could not only
19 be -- have spent fuel in it but toward the end of the life
20 of the plant or toward an earlier time than that even, it
21 could be almost full of spent fuel. You have conditions
22 where a cask movement or a refueling operation would be
23 possible.

24 And you have the condition also where the
25 generator is connected to the line. You have the possibility

#3-5-SueT 1

2 of load rejections and turbine trips and so forth that would
3 cause transients which can be part of the initiating
4 events for accidents.

5 And the full power PRA for Shoreham describes
6 transient initiated events as being the cause for something
7 like a third of all the conditions which could lead to core
8 vulnerable.

9 So, I find the two conditions quite different
10 and, therefore, difficult to compare just for, say, a
11 short-lived isotope.

12 Q During your direct testimony this morning,
13 you remarked that the start of the proposed licensing
14 condition was vague and broad and ambiguous.

15 Is the proposed -- well, I would ask you to
16 elaborate more on that. Is the proposed licensing condi-
17 tion sufficiently clear so that a violation of it could
18 be monitored and enforced by the NRC?

19 A That's part of the problem I was identifying.
20 I identified the part of it where it's difficult for the
21 operators to know that they really are at the point where
22 they must take this action.

23 In my opinion, it would be equally difficult
24 for them to know if they should report that they violated
25 their licensing condition, because you can interpret it a
lot of ways. And they are required to report through LER

#3-6-SueT 1

2 process and so forth deviations from either their tech
3 specs or their operating license.

4 Similarly, it would be hard for the NRC to
5 enforce that or decide whether they hadn't violated their
6 conditions. It's just too general and too vague.

7 MR. ZAHNLEUTER: Thank you, Mr. Minor. I
8 have no other questions.

9 JUDGE LAURENSEN: Mr. Hassell.

10 MR. HASSELL: The Staff has no questions.

11 JUDGE LAURENSEN: Judge Shon.

12 BOARD EXAMINATION

13 BY JUDGE SHON:

INDEXXX13

14 Q I have a few questions for you, Mr. Minor.

15 First of all, I would like to discuss with you a term that
16 you and the Suffolk County attorneys have been using that
17 in my own background and knowledge of the term has rather
18 recently virtually become meaningless, and that's Class 9
19 accidents.

20 If I'm not mistaken, it was a term of art that
21 arose as a result of a proposed regulation that was
22 never adopted and the Commission finally said: Oh, we
23 don't even want to talk about those anymore.

24 So that you confuse me a little bit when you
25 say these people have failed to account for all Class 9
accidents. As far as I know, Class 9 accidents more or less

#3-7-SueT 1

officially don't exist anymore.

2

What do you mean?

3

A Well, I perhaps shouldn't use the term, but I think the accidents exist. And what we call them is subject to debate.

4

5

6

In my opinion, the accidents that I am referring to are those accidents which may be beyond the presumed sequence of events of Chapter 15 events. And, therefore, involve additional failures or additional human errors but actually do analyze the sequence of events that would need to occur to have an actual release of radiation and, therefore, threaten the public and require an offsite action to provide the necessary protection under these radiological release conditions.

7

8

9

10

11

12

13

14

15

These sets of accidents are regularly analyzed and have been analyzed under a couple of conditions of operation for the Shoreham plant, in the probabilistic risk assessments, for instance.

16

17

18

end #3 19
Joe flws

20

21

22

23

24

25

1 Q Well, in those PRA scenarios, I take it then the
2 high dose accidents, the ones against which LERO is intended
3 to protect, the ones for which LERO is supposed to offer some
4 recovery or avoidance of dose, are they generally the same
5 as those analyzed in Chapter 15, or are they generally
6 others?

7 A They involve a combination of events, some of
8 which are in Chapter 15, some are not. They would involve
9 LOCAs, for instance, which is a Chapter 15 event, but they
10 would also involve the failure of equipment to mitigate
11 LOCAs, which has a finite probability of occurring, and the
12 probability of additional sequences of events occurring which
13 would result in the release of that radiation.

14 Similarly, they analyze in some of the analyses
15 natural phenomenon, such as earthquakes or also fires and
16 security threats, and some of the other things that -- I
17 wouldn't say the PRA addresses security threats, it does not,
18 I take that back, but that is one of the ones that I would
19 include.

20 Q Are there any PRA scenarios for this plant, or
21 others like it, to your knowledge, which originate with the
22 plant in a shutdown -- cold shutdown condition, having run
23 for some time, but in a cold shutdown condition, which result
24 in substantial offsite doses?

25 A Not to my knowledge. The events that I am talking

1 about would be at the start of the descent to cold shutdown.
2 It would be during the time when the plant was still operating
3 presumably at a hundred percent power, and a strike is
4 declared but not in effect yet.

5 We heard yesterday that if they had notice and
6 it took 16 hours to put the plant into cold shutdown, they
7 would wait until 16 hours before the strike was supposed to
8 be in effect before they would start that. That is one
9 possible scenario.

10 Well, you can hypothesize that if they had three
11 days notice, they might run at a hundred percent power for
12 two and a half days, and then shut down during the last
13 sixteen hours of that time. During that period, you have,
14 in effect, a declared strike, but not in effect strike.
15 You would have the possibility of accidents occurring where
16 you would not have assurance that LERO would even function
17 if such an accident did occur, and there were offsite
18 consequences.

19 You have also the transient condition, the
20 changing of power levels is one of the transient initiating
21 periods where it is possible to get initiators which could
22 cause offsite consequences, and then you have the back in
23 possibility that LILCO could seek and obtain authorization
24 to run at reduced power level on the premise that it was
25 safe enough to do so.

1 That is part of the license condition, as I
2 read it. I don't know what those reduced power levels would
3 be, but arguments could be made, I would imagine, up to a
4 substantial part of full power operation.

5 Q That , however, goes mainly to whether or not
6 the licensed condition should permit the NRC staff, in effect,
7 alone to judge whether a particular power level is safe
8 without LERO, is that right?

9 A Perhaps I am being more presumptuous than that.
10 Judge Shon. I am saying in my opinion they should not be
11 allowed.

12 Q I see. We asked the panel from LILCO to discuss
13 three aspects of cold shutdown contrasted to low power
14 operation, where low power is understood to be the situation
15 in which the reactor has never run before.

16 To compare the two with respect to fission product
17 inventory, the time that a reactor operator has to respond to
18 something off normal, and the challenge which each presents
19 to engineered safety features, could you say a few words about
20 each of these things?

21 A Certainly. I guess I have to premise my statement
22 by saying I address some of the reasons that I feel this is
23 an apples and oranges comparison.

24 Q Yes.

25 A But the three areas you are talking about, the

1 fission product inventory , if you restrict your comparison
2 to short lived isotopes under those two conditions, and I
3 believe -- let me clarify your condition before I answer
4 this.

5 Did your condition describe cold shutdown after
6 full power, versus operation at low power, operation up
7 to five percent?

8 Q Yes.

9 A Okay.

10 Q I realize I may be sort of asking you to say
11 whether you can whistle higher than you can sing low, or
12 something like that.

13 A I would agree that if you take a plant to cold
14 shutdown, after a period of time you would have a lower fission
15 product inventory of short lived isotopes than you would have
16 at operation at five percent power.

17 However, you would probably still have a larger
18 inventory of long lived isotopes, because they have not had
19 time to build up at least during the early phases of low power
20 operation, and low power operation is usually for a short
21 phase of time.

22 As for the time to respond, when you are operating
23 at five percent, and you shut down from five percent power,
24 you have a certain decay heat present, which is less than
25 it would be, say, if you were shutting down from a hundred

1 percent.

2 But after a period of time that decay heat would
3 be comparable to the decay heat you are dealing with from a
4 plant that has been shut down from a hundred percent for a
5 longer period of time. I don't know that exact measure of
6 how long that is, but I am sure there is some quantification
7 of that that would be possible.

8 As to the challenges to the safety systems, this
9 is clearly one that you would expect an operating plant to
10 have more potential for challenges than you would a shutdown
11 plant, simply because in one case you are dealing with fewer
12 operating systems of monitoring and measurement.

13 However, when I get to these points is when I
14 really feel this comparison is inappropriate, because if you
15 are going to compare those two, you also have to compare the
16 period of time they would be operating at full power
17 transition periods on the way to cold shutdown, to the period
18 of time you might be operating at low power.

19 And in those cases, I would say that the measures
20 would come out unfavorable to the full power state. That
21 it is providing a condition of more challenge. Providing
22 less response time. It is providing the situation with a
23 higher build-up of fission products.

24 Q Pardon me. Did you say to the full power or the
25 low power?

1 A The full power operation, even for that short
2 interval, would probably provide a larger inventory a shorter
3 period of time and a greater number of challenges.

4 JUDGE SHON: I have no further questions. Thank
5 you.

6 JUDGE LAURENSEN: Any redirect examination?

7 MR. McMURPAY: Judge Laurenson, did the Board
8 intend to ask Mr. Minor his opinion on how the Board should
9 apply -- what standard the Board should apply?

10 JUDGE LAURENSEN: I put that on the table
11 yesterday, and I just thought if you were interested in
12 pursuing that that you can do that. If you would rather
13 have me ask the question, I can do that.

14 MR. McMURRAY : We will be happy to do it.

15 JUDGE LAURENSEN: Fine.

16 REDIRECT EXAMINATION

17 BY MR. McMURRAY:

18 Q Mr. Minor yesterday the Board asked the parties
19 and witnesses opinions on what standard the Board should
20 apply in addressing this issue. Do you have an opinion
21 on that?

22 A Yes, I do. The question posed as a basis for
23 this proceeding, this particular issue rather of this
24 proceeding, was whether there was reasonable assurance that
25 protective actions could be taken in the event of radiological

1 emergencies.

2 LILCO is proposing an alternative approach,
3 which if you are going to assess that alternative you have
4 to find the same reasonable assurance, in my opinion, and
5 that brings the question of whether you found the reasonable
6 assurance in the first place. That is the question the
7 rest of the hearing is about.

8 You have 100 percent operation, and you have
9 the question of whether there is reasonable assurance LERO
10 will even function properly to do the job that is needed
11 for a hundred percent operation.

12 I am not going to pre-judge that decision, but
13 let's say that one is being made separately. However, it
14 seems to me that if you took a slice of time out of the
15 hundred percent operation, and you say during this period
16 of time we are going to have a strike, and we are going to
17 have a certain period of time until they initiate the
18 starting of the process toward cold shutdown, we are going
19 to have a transition to cold shutdown for a sixteen hour
20 period -- up to sixteen hours, we are going to have a period
21 of time in cold shutdown, and then we are going to have a
22 period of time where you might be refueling, maintenance,
23 repair, even low power operation, whatever -- reduced power
24 operation, whatever you want to hypothesize as the back in
25 that LILCO may propose, and then you are going to ascend back

1 to power, and at the end of that time you assume LERO is
2 operational again.

3 This, to me, is the period that needs to be
4 assessed fully to decide if you have reasonable assurance
5 that protective action would be taken in that period if
6 there were a radiological emergency, and in my opinion
7 the analysis and basis that are in front of us today, so
8 far, do not show that reasonable assurance.

9 But the test that has to be made is the same
10 test: Is there reasonable assurance that that period of time
11 would provide the necessary protective actions.

12 And that is my feeling about what needs to be
13 done. I don't believe it has been done yet.

14 End 4.
15 MM fols.

16
17
18
19
20
21
22
23
24
25

1 JUDGE LAURENSEN: Let me just follow up on that,
2 since the matter has been raised.

3 Dr. Cordaro yesterday stated his opinion that
4 the reactor at cold shutdown, after having operated at full
5 power, presents much less of a hazard for emergency planning
6 than a reactor operating up to 5 percent low power.

7 Do you want to comment on that conclusion of
8 Dr. Cordaro? If you disagree, tell us in what way you
9 disagree with that.

10 THE WITNESS: This is part of what I was answering
11 Judge Shon earlier. I believe there are comparisons you can
12 make during that period which say you are better off to be
13 shut down than operating.

14 I think your best condition is to never start up,
15 maybe, if you want to make that comparison. But, my feeling
16 is that is not the appropriate comparison, that you cannot
17 compare those two situations. They aren't the right
18 comparisons to make.

19 However, as I was indicating to Judge Shon, there
20 are in the three areas he poses comparisons, that there are
21 advantages to being shut down.

22 JUDGE SHON: As I understand what you have told us,
23 you feel that given that the reactor is shut down and in
24 cold shutdown it is safer than it would be at 5 percent,
25 having not operated before.

mm2
1 But, you also point out that as drawn, the
2 license codicil, or amendment, or whatever you want to call
3 it, the condition would really allow for a period of descent,
4 possible operations during shutdown, and then a period of
5 ascent again, and you are not certain that the sum total
6 of all of these compares at all with 5 percent operation.

7 Is that correct?

8 THE WITNESS: That is correct. With the addition
9 that I am saying the other events which could occur, which
10 are not directly related to the core need to also be
11 entered into the equation. That is, the spent fuel accident,
12 accidents in the spent fuel pool.

13 The Wall Street Journal had an article yesterday
14 where Connecticut Yankee lost 200,000 gallons out of their
15 spent fuel pool, a leak of vents. That didn't lead to
16 radiological consequence, but spent fuel pool cooling
17 accidents are possible.

18 If you have a full spent fuel pool after 100
19 percent operation, regardless of whether your plant is in
20 cold shutdown, it represents a different potential risk than
21 an empty spent fuel pool.

22 Fires under these conditions have to be compared;
23 what are the two effects of security threats in the two
24 situations. There are just a lot of other factors which do
25 not directly relate to the fact that the reactor itself is

mm3

1 in cold shutdown, which must also be entered into the
2 equation.

3 JUDGE SHON: Thank you.

4 BY MR. MC MURRAY:

5 Q Just to clarify your explanation to Judge Shon,
6 Mr. Minor, it is true that your concerns include the time
7 that one commences when one is running at 100 percent power
8 and going down in the descent to cold shutdown, isn't
9 that correct, and the possible accidents that could occur
10 then?

11 A Yes.

12 Q And those concerns have not been addressed by
13 LILCO?

14 A To my knowledge they have restricted their
15 analysis to Chapter 15 events, starting from a cold shutdown
16 condition. And that does not include the periods prior to
17 that. The assessment they made of 100 percent operation
18 was that it provided the potential for radiological releases
19 which they said -- well, I won't characterize what they said,
20 but anyway they decided that was not a condition that they
21 could continue to operate in.

22 Q Mr. Zeugin asked you whether you had any reason
23 to disagree with the time estimates for going to shutdown
24 in Mr. Scalice's Affidavit. Do you recall that?

25 A Yes, I do.

mm4

1 Q If those estimates -- even assuming those
2 estimates were true, would that alleviate your concerns?

3 A No, I don't believe that is an issue.

4 The question is, when you start initiating those
5 hours and what happens prior to that, and what happens
6 after that? It is not just a matter of how long those hours
7 are.

8 Q One more question.

9 You mentioned that in making the comparison between
10 5 percent operation and cold shutdown, in the cold shutdown
11 mode, after a plant had been operating at 100 percent, there
12 would be more long-lived isotopes. Do you recall that?

13 A Yes.

14 Q What is the consequence of that?

15 A Well, there is two factors to consider here.

16 In a radiological release, a large part of the
17 consequences are often due to halogens and noble gases.
18 However, the long-lived isotopes, the strontiums and cesiums
19 and other longer-lived isotopes also have an impact if they
20 are released into the environment.

21 And even if you had none of the halogens and noble
22 gases, you could still have releases of a magnitude that
23 would require action by LERO. So that is the point of drawing
24 attention to those longer-lived isotopes.

25 MR. MC MURRAY: I have no further questions,

mm5

1 Judge Laurenson.

2 JUDGE LAURENSEN: Any other questions for
3 Mr. Minor?

4 MR. ZEUGIN: No questions.

5 MR. HASSEL: I have no questions.

6 MR. ZAHNLEUTER: No questions.

7 JUDGE LAURENSEN: That completes Mr. Minor's
8 testimony.

9 Thank you.

10 (Witness excused)

11 JUDGE LAURENSEN: I believe we are now ready to
12 call back at least a portion of the LILCO panel from
13 yesterday to complete the testimony.

14 MR. ZEUGIN: Yes, Judge Laurenson.

15 We would like to call back Dr. Stergakos and
16 Mr. Rigert.

17 JUDGE LAURENSEN: All right. If you will
18 resume the witness stand you have been previously sworn and
19 you are still under oath.

20 Whereupon,

21 DR. ELIAS P. STERGAKOS

22 JOHN A. RIGERT

23 were recalled as witness on behalf of the Applicant, and
24 having been previously duly sworn, were further examined
25 and testified as follows:

DIRECT EXAMINATION

mm6

XXX

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

BY MR. ZEUGIN:

Q Dr. Stergakos, yesterday Dr. Cordaro committed that over the evening LILCO would perform some calculations regarding fission product inventories during cold shutdown following 100 percent operation of a plant, and also at a power plant operating at 5 percent power.

Have you conducted those calculations overnight?

A (Witness Stergakos) Yes, I have.

Q Dr. Stergakos, let me show you a document that I would like to have marked LILCO Exhibit 81, Exhibit EP-81.

(The document referred to was marked LILCO Exhibit EP-81 for identification.)

XXX

BY MR. ZEUGIN:

Q Do you have that document in front of you?

A (Witness Stergakos) Yes, I do.

Q Could you identify that document for me, please?

A This is the document which reflects the calculations that we did last night.

Q Could you please explain those calculations?

A Yes.

As I understood the question yesterday, we had to compare the isotopic inventory when the reactor operated at 100 percent power enriched equilibrium, and then it

mm7

1 decayed down for 24 hours.

2 And then compare that inventory with a reactor
3 which is operating at 5 percent power enriched equilibrium.

4 As we specified yesterday, we picked up all the
5 isotopes that are used to have an effect upon doses to the
6 public, as they are used in Chapter 15 and other accidents.

7 As you see, there are several columns; one I called
8 A and the other B. A, where I say core inventory in curies
9 is the inventory at 100 percent power and after a decay of
10 24 hours.

11 It can be seen there that after 24 hours, a lot
12 of the isotopes have decayed down, some of them -- really the
13 bromines, some of the kryptons, some of the xenons have
14 decayed down to zero. Others, however, which have long life
15 still remain.

16 For the 5 percent power equilibrium, column B,
17 you can -- well, the numbers there speak for themselves.
18 The last column there, I have a ratio of column A to column
19 B. And those numbers -- you can see the numbers there. And
20 many of them you see that the inventory after 24 hours of
21 decay, is smaller than at 5 percent power equilibrium.

22 However, the long-lived isotopes still remain.

23 And, if you will look at the total of all the
24 isotopes, it is concluded that after 24 hours of decay for
25 the 100 percent power equilibrium, the isotopes still are

mm8

1 by a factor of 4.5 larger than those at 5 percent power.

2 Then we went further, and if we turn to the next
3 page, we looked after seven days of decay, and we did the
4 same comparison. And we see that within seven days that
5 factor has dropped now to 1.5.

6 Finally, we went to fourteen days and we see
7 that the total now after fourteen days of decay, 100 percent
8 full power, is less than 5 percent power, and that drops
9 down to .6. That is between seven and fourteen days, some-
10 where inbetween thatperiod the isotopic concentrations at
11 100 percent power equilibrium core and decay between seven
12 and fourteen days has dropped below that of the 5 percent
13 power equilibrium inventory.

14 I must say though, that when we compare this
15 inventory we have to be careful in the sense that this
16 inventory does not exist in the gap. As a matter of fact,
17 it has been shown and documents exist that most of the
18 inventory for, let's say, 100 percent power exists within
19 the pellet. That fraction for the noble gases is approxi-
20 mately 1.8, I believe, and for the halogens is .32 percent.

21 Thus, there is a barrier before those isotopes
22 can be released. And that barrier has to be -- to deteriorate
23 and let the isotopes diffuse and migrate to the gap and
24 vent to be released.

25 To assume that we will allow the machine -- the

mm9

1 equipment, rather -- and the whole core to follow its own
2 path without reacting to mitigate the increase in
3 temperature which will deteriorate the fuel, I think is very
4 naive, and we have shown yesterday we have plenty of time
5 before that time is reached, to allow these isotopes to
6 escape from the pellet to the gap and finally to the
7 environment.

8 Q Dr. Stergakos, let me make sure that one of your
9 statements is clear for the record.

10 I believe you stated that in full-power
11 operation a number of the noble gases and halogens are in
12 the pellets rather than in the gaps. Could you give the
13 percentage again of the noble gases and the halogens that
14 are in the gap, as compared to -- well, could you clearly
15 distinguish for us which percentage is in the pellet and
16 which percentage is in the gap?

17 A In the gap it is 1.8 percent for the noble gases
18 and for the halogens it is .32 percent.

19 It has been estimated, it has been investigated.

20 JUDGE SHON: And the difference between that and
21 the 100 percent in each case is still bound up in the
22 pellet, is that right?

23 WITNESS STERGAKOS: I'm sorry, I didn't understand
24 the question.

25 JUDGE SHON: The difference in the number you just

mm10

1 gave and 100 percent is what is bound up in the pellet.
2 That is what Mr. Zeugin had asked, how much in the pellet
3 and how much in the gap.

4 I think it is obvious.

5 WITNESS STERGAKOS: Yes, it is 98.2 percent is
6 in the pellet for the noble gases and 99. -- what is it --
7 60-something is still in the pellet for the halogens.

8 JUDGE SHON: I sort of expected that might be
9 different for the two cases you are comparing; that is, for
10 the 5 percent case you would probably not have cracked
11 pellets and things on this order. And, for a case that had
12 run some time you might get a larger fraction in the gap,
13 wouldn't you think?

14 WITNESS STERGAKOS: The number which I quoted
15 comes from our FSAR, and the FSAR has references to actual
16 measurements of fractions of the isotopes that exist in
17 the gap.

18 JUDGE SHON: Thank you.

19 I didn't mean to interfere, Mr. Zeugin. Go right
20 ahead.

21 MR. ZEUGIN: I have no further questions.

22 JUDGE LAURENSEN: Mr. Miller?

23 MR. MILLER: Judge Laurenson, either I would
24 request a quick break, or just indulge me while I talk to
25 Mr. Minor for a few moments here.

mm11

1 JUDGE LAURENSEN: Let's take a few moments
2 then.

3 (Short recess)

4 JUDGE LAURENSEN: Is the County ready?

5 MR. MILLER: Yes, sir.

6 CROSS-EXAMINATION

XXX

7 BY MR. MILLER:

8 Q Mr. Stergakos, I want to ask you some questions
9 about LILCO Exhibit 81, your listing of these isotopes.

10 For some of the critical isotopes, there are core
11 inventories in the gap which are larger for periods up to
12 and exceeding 30 days, than at 5 percent operation.

13 Isn't that correct?

14 A (Witness Stergakos) Repeat your question,
15 please?

16 Q For some of the critical isotopes, there are core
17 inventories in the gap which are larger for periods up to
18 and exceeding 30 days, than at 5 percent operation.

19 Isn't that correct:

20 A Not very much so, because the decay will have
21 taken its toll by then.

22 Q Okay.

23 Let's look at a few of the isotopes you have in
24 your listing. Let's look at isotope Iodine 131.

25 A Yes, sir.

mm12

1 Q Now if I understand this correctly, the half life
2 of Iodine 131 is 8.065 days, is that correct?

3 A It is stated so on the document, yes.

4 Q And comparing the core inventory in curies that
5 you have listed with the equilibrium inventory in curies at
6 5 percent power, at full power operation the isotope is
7 about 20 times greater, is that correct?

8 A Yes.

9 Q And that is after a period of 24 hours?

10 A Correct.

11 Q If you go to the next page, after a period of
12 approximately seven days, the Iodine 131 isotope is still
13 approximately 12 times greater at full power operation,
14 correct?

15 A Correct.

16 Q And if you go to after fourteen days, Iodine 131
17 isotope is still approximately 7 times greater at full
18 power than at 5 percent operation, correct?

19 A I agree.

20 Q And even after thirty days, the Iodine 131
21 isotope is approximately two times greater than at 5
22 percent operation, correct?

23 A Yes.

24 And my answer was that not very much so. If
25 you do that calculation, you will come up, I believe, within,

mm13

1 like 35 days or so, that equilibrium will have been
2 established. 33 to 35 days.

3 Q We could do the same sort of questioning,
4 Mr. Stergakos for other isotopes in this list though
5 couldn't we, such as Xenon 133. Same line of questions
6 would lead to the same answers, that is that your isotopes
7 would remain greater at full power operation than at 5
8 percent operation, correct?

9 A Not correct, if you look at the document. After
10 thirty days Xenon 133 has dropped down to .5.

11 Q Yes, sir. After 30 days your calculations
12 show that the Xenon 133 isotope would be only about .5 times
13 greater at full-power operation. But up until that time --

14 A Not after 30 days. AT 30 days.

15 Q At 30 days, yes sir.

16 Up to that time, looking at your calculations
17 for 24 hours for seven days, for fourteen days, the Xenon
18 133 isotope remains greater at full-power operation than at
19 5 percent power, correct?

20 A If you solve the equation properly, I think you
21 will come out with 23 days or so.

end T5

22

23

24

25

Sim 6-1

1 Q Yes, but my question is up to that time Xenon 133
2 remains greater at full-power operation, correct?

3 A That is what I answered you.

4 Q Does this list, this Exhibit 81, Mr. Stergakos,
5 include any of the long-lived isotopes?

6 A It includes all the isotopes which are used for
7 dose analysis in Chapter 15 and other types of accidents.

8 Q The isotopes used in the analysis under Chapter
9 15?

10 A Yes, sir.

11 Q Is strontium or cesium included in this list?

12 A We don't ususally have those isotopes in the
13 analysis.

14 Q And the list does not include those isotopes,
15 does it?

16 A We specifically stated yesterday that we shall
17 look at those types of isotopes which are used in our
18 analysis and that is what was agreed I believe.

19 Q Let's look at the total then of the inventory
20 levels, Mr. Stergakos, at the bottom of the first page. The
21 total inventory for the core inventory in curies that you
22 have expressed is 3.81 times 10 to the 8th, correct?

23 A Yes, sir.

24 Q That is about one-third of the total of the
25 inventory that would exist at full-power operation; isn't

Sim 6-2

1 that correct?

2 A One-third at full power? I do not see where
3 you see that.

4 Q Well, I am asking you if my question isn't
5 correct? Is that 3.81 times 10 to the 8th about one-third
6 of the actual total of core inventory expressed in curies
7 that would exist at full-power operation?

8 A That information does not exist on there, and
9 to give you an answer to that, I would have to approximate
10 the number. However, the approximation that I will have
11 to make is take, for example, the five percent power and
12 multiply that by the fraction that represents to be 100
13 percent power, which is approximately 20.

14 Q I understand that the number I am asking for is
15 not on your list, Mr. Stergakos. Why don't you tell me,
16 if you could?

17 A And I told you how you can perhaps get it.

18 Q Why don't you tell me the answer?

19 A The answer? You multiply 20 times 3.8 and
20 you will get it approximately, and I am not saying that
21 that is the accurate answer. That is an approximate number.

22 (Pause while the witnesses and counsel confer.)

23 Q Mr. Stergakos, let me make sure that you and
24 Mr. Rigert understand what I am asking. I am looking at your
25 first column to the left at 3.81 times 10 to the 8th, and I

Sim 6-3

1 am asking you what the number would be for the core inventory
2 expressed in curies for all isotopes at full power operation.
3 I know that number does not appear in your list. I am
4 asking you to approximate what that number would be.

5 A For isotopes in the core?

6 Q Yes.

7 A I cannot approximate that number. It would be
8 a wild guess. I do not know.

9 Q Isn't the number you have listed 3.81 times 10
10 to the 8th approximately one-third of the total number that
11 would exist if you gave me the total inventory for the core
12 at full power?

13 A That is your statement and not mine, sir. I do
14 not know.

15 Q Do you disagree with my statement?

16 A I do not know I said.

17 (Pause while counsel confer.)

18 MR. MILLER: Judge Laurenson, Suffolk County
19 would request that LILCO Exhibit 81 be moved into evidence,
20 and I have no further questions for Mr. Stergakos or
21 Mr. Rigert.

22 MR. ZEUGIN: I have no problem with that,
23 Judge Laurenson. I think it is probably easier. We can
24 just introduce it into evidence and it can still be called
25 LILCO Exhibit EP-81.

Sim 6-4

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

JUDGE LAURENSEN: Is there any objection to the admission in evidence of LILCO EP-81?

MR. ZAHNLEUTER: No objection.

MR. HASSELI: No objection.

JUDGE LAURENSEN: It will be received in evidence and you will supply copies. It will be bound into the transcript.

(The document referred to, LILCO Exhibit EP-81 for identification, was admitted into evidence.)

(LILCO Exhibit EP-81 follows:)

XXXXXXXXXXXX

100% Pure

14d Decay

Column B

Sample ID	Half-life	Column A	Column B	Column C
Br-82	2.8 hr	○ ✓	5.5×10^5	
Br-84	32.8 hrs	✓	1.0×10^6	
Br-85	172 sec	✓	1.25×10^6	
Br-85	55.2 sec	✓	9.9×10^5	
Br-87m	4.5 sec	✓	9.5×10^5	
Br-87	56.1 sec	✓	2.15×10^6	
Br-88	16.4 sec	✓	2.5×10^6	
Br-89	4.4 sec	✓	1.9×10^6	
Br-90	1.8 sec	✓	1.27×10^6	
I-131	8.065 d	2.00+7 ✓	2.99×10^6	6.69 ✓
I-132	2.29 hr	4.90+6 ✓	4.45×10^6	1.10 ✓
I-133	20.8 hr	1.95+3 ✓	6.8×10^6	2.874 ✓
I-134	52.6 min	○ ✓	7.7×10^6	○ ✓
I-135	6.6 hr	6.5-8 ✓	6.5×10^6	○ ✓
Kr-83m	1.86 hr	○ ✓	5.5×10^5	○
Kr-85m	4.48 hr	✓	1.26×10^6	
Kr-87	76 min	✓	2.5×10^6	
Kr-88	2.08 hr	✓	3.6×10^6	
Kr-89	3.15 min	✓	4.6×10^6	
Kr-90	32.3 sec	✓	4.5×10^6	
Xe-133	5.25 d	2.67+7 ✓	6.2×10^6	3.87 ✓
Xe-135m	15.3 min	1.04-8 ✓	1.15×10^6	○ ✓
Xe-135	9.09 hr	2.85-3 ✓	5.0×10^6	4.9-10 ✓
Xe-137	3.85 min	○ ✓	6.0×10^6	○ ✓
Xe-138	14.2 min	○ ✓	6.3×10^6	○ ✓
		5.16+7	0.40×10^7	.61

100% Power - Equilibrium

5% Power

Column A (cc)

Shutdown & Decayed for 7 days

Equilibrium

Column B (cc)

Isotope	Half-Life	Ci	Inventories: Ci	Column A (cc)	Column B (cc)
Br-82	2.4 hr	1.26-15	5.5×10^5		1.3 -20
Br-84	368 min	0	1.0×10^6		0
Br-85	172 sec	0	1.25×10^6		0
Br-86	55.5 sec	0	9.9×10^5		0
Br-86m	4.5 sec	0	9.5×10^5		0
Br-87	56.1 sec	0	2.15×10^6		0
Br-88	16.4 sec	0	2.5×10^6		0
Br-89	4.4 sec	0	1.9×10^6		0
Br-90	1.8 sec	0	1.27×10^6		0
- I-131	8.065 d	3.65+7	2.99×10^6		1.22+1
I-132	2.29 hr	2.17+7	4.45×10^6		4.88
I-133	20.8 hr	5.25+5	6.8×10^6		7.72-2
134	52.6 min	0	7.7×10^6		0
I-135	6.6 hr	2.89+0	6.9×10^6		4.52-7
- Kr-83m	1.86 hr	3.1-14	5.5×10^5		5.6 -20
Kr-85m	4.48 hr	1.13-4	1.26×10^6		9.0 -11
Kr-87	76 min	0	2.5×10^6		0
Kr-88	2.84 hr	9.24-11	3.6×10^6		2.6 -17
Kr-89	3.15 min	0	4.6×10^6		0
Kr-90	32.3 sec	0	4.5×10^6		0
Xe-133	5.25 d	6.67+7	6.9×10^6		9.7+0
Xe-135m	15.3 min	4.62-1	1.15×10^6		4.0-7
Xe-135	9.09 hr	1.04+3	5.8×10^6		1.8-4
Xe-137	3.85 min	0	6.0×10^6		0
Xe-138	14.2 min	0	6.3×10^6		0
		1.25 EB ✓	8.40×10^7		1.5 ✓

A

B

100% Power - Equilibrium

5% Power

Column A

Shut down & Decayed for 24 hrs

Equilibrium

Column B

Isotope	Half-Life	Core-Inventory, Ci	Inventory, Ci	
Br-83	2.14 hr	9.96×10^3	5.5×10^6	1.8×10^{-2}
Br-84	36.8 min	9.56×10^7	1.0×10^6	4.6×10^{-13}
Br-85	172 sec	0	1.25×10^6	0
Br-86	55.5 sec	0	9.4×10^5	0
Br-86m	4.5 sec	0	9.5×10^5	0
Br-87	56.1 sec	0	2.15×10^6	0
Br-88	16.4 sec	0	2.5×10^6	0
Br-89	4.4 sec	0	1.9×10^6	0
Br-90	1.8 sec	0	1.27×10^6	0
- I-131	8.065 d	6.03×10^7	2.99×10^6	2.0×10^1
I-132	2.29 hr	7.78×10^7	4.45×10^6	1.75×10^1
- I-133	20.8 hr	6.38×10^7	6.8×10^6	9.4×10^0
I-134	52.6 min	3.60×10^0	7.7×10^6	4.07×10^7
I-135	6.6 hr	1.04×10^7	6.9×10^6	1.62×10^0
- Kr-83m	1.86 hr	3.85×10^4	5.5×10^5	7.0×10^{-2}
Kr-85m	4.48 hr	5.35×10^5	1.26×10^6	4.2×10^{-1}
Kr-87	76 min	9.21×10^1	2.5×10^6	3.7×10^{-5}
Kr-88	2.84 hr	1.72×10^5	3.6×10^6	4.8×10^{-2}
Kr-89	3.15 min	0	4.6×10^6	0
Kr-90	32.3 sec	0	4.5×10^6	0
- Xe-133	5.25 d	1.53×10^8	6.9×10^6	1.9×10^1
Xe-135m	15.3 min	1.67×10^6	1.15×10^6	1.15
Xe-135	9.09 hr	3.35×10^7	5.8×10^6	5.8
Xe-137	3.85 min	0	6.0×10^6	
Xe-138	14.2 min	0	6.3×10^6	0
		3.81×10^8	8.40×10^7	4.5

Sim 6-5

1 JUDGE LAURENSEN: Did you say, Mr. Miller, you
2 had no further questions?

3 MR. MILLER: No further questions, yes, sir.

4 WITNESS STERGAOS: For the record, I may have
5 stated wrongly something here. I said multiply 20 times
6 3.8 times 10 to the 8th to get the total core inventory
7 I think. I should have said 20 times 8.4 times 10 to the
8 7th.

9 If we were dealing with the isotopes that are
10 listed in this document here, if we are talking about the
11 total isotopic concentrations, still my answer remains, I
12 do not know.

13 JUDGE LAURENSEN: Any questions, Mr. Zahnleuter?

14 MR. ZAHNLEUTER: No questions.

15 JUDGE LAURENSEN: Mr. Hassell?

16 MR. HASSELL: No questions.

17 BOARD EXAMINATION

18 BY JUDGE SHON:

19 Q I have a couple of questions. I just wanted
20 to clarify and the questions do hinge, not on such details
21 as exactly when these two quantities become equal, but upon
22 that there is something else that Suffolk County touched
23 upon, which is the longer lived isotopes.

24 When we first started discussing this I suggested
25 that as a model for the high-power case you take an

Sim 6-6

1 equilibrium core, which is rather a different thing concep-
2 tually than the equilibrium value for the reactor, because
3 an equilibrium core is the kind of core we have been shifting
4 stuff in and out of, if you see what I mean. But it does
5 have a lot of long-lived isotopes in it.

6 A (Witness Stergakos) Yes, sir.

7 Q Now as I gathered, you considered, and in fact
8 I think you said directly only gap activity; is that correct?

9 A No, sir. This activity here is the total
10 activity.

11 Q I am sorry, only the total activity of the volatile
12 isotopes, the iodines and the noble gases.

13 A So that you did not include any of the things
14 that might emerge in the event of substantial core damage
15 as aerosols such as strontium and cesium. You did not
16 consider these?

17 A No, sir, those isotopes are not included on here.

18 Q And those are, are they not, precisely the isotopes
19 that would be present in much larger concentration in the
20 core that had functioned for years rather than the core that
21 had run at five percent for a few days or months; is that
22 right?

23 A Yes, I would say so.

24 Q The reason you did this I trust is because you were
25 making essentially what I will call in sort of jargon a

Sim 6-7

1 Chapter 15 analysis; is that right?

2 A That is correct, sir, and I thought that that
3 was the agreement yesterday because Dr. Cordaro's last
4 statement which he made, he says we will look at those
5 isotopes and I got my direction from that statement since
6 there was no other comment on it.

7 Q I see. I didn't recall the statement and I
8 didn't recall Dr. Cordaro saying that. But, nevertheless,
9 I wanted to make clear in my own mind as well as on the
10 record what this consists of.

11 The logic behind that, I take it, although
12 Dr. Cordaro isn't on the stand I realize, the logic behind
13 looking at that is because it is postulated that in the
14 cold shutdown condition nothing can happen that would
15 release anything more than at most the gap activity; is
16 that right?

17 A That is correct, sir. And I must state here
18 that this does not reflect the gap activity. This reflects
19 the total activity.

20 JUDGE SHON: Yes. I understand that.

21 I have no further questions.

22 BOARD EXAMINATION

23 BY JUDGE KLINE:

24 Q If you had included the longer lived isotopes,
25 this cesium and strontium, do you have a feel for the

XXXXXXXX

Sim 6-8

1 effect it would have had on your overall ratio, say on page
2 12.

3 A (Witness Stergakos) No, sir, unfortunately I
4 don't.

5 Q I just want to clarify my understanding that
6 the reason that these are not included I understand is
7 that you do not see a pathway for particulate formers leaving
8 the core, is that right, while in cold shutdown?

9 A That is correct. And in the Chapter 15 analysis,
10 the classical isotopes, I think these isotopes are as they
11 found them in Chapter 15. That is the two reasons I did
12 that and not for any other reason.

13 JUDGE KLINE: Okay. Thank you.

14 JUDGE LAURENSEN: Any further questions?

15 MR. ZEUGIN: No questions.

16 MR. McMURRAY: No questions.

17 JUDGE LAURENSEN: All right. Thank you for
18 your testimony.

19 We will go off the record for a moment.

20 (Discussion off the record.)

21 JUDGE LAURENSEN: We are back on the record now.

22 MR. CHRISTMAN: I believe, and the other parties
23 can state if they agree with me, that there is an agreement
24 among the parties as to how we shall submit our proposed
25 transcript corrections to the Board, and my proposal is

Sim 6-9

1 that LILCO provide its proposed transcript corrections along
2 with its initial proposed findings and that the other parties
3 do the same. They can either supplement, and if they take
4 issue with any of our proposed corrections, they can say
5 so at the time they file their proposed findings.

6 JUDGE LAURENSEN: Is that agreed to?

7 MR. McMURRAY: Yes. I think that is the best
8 and most reasonable way to do it.

9 MR. ZAHNLEUTER: The State agrees.

10 MR. HASSELL: The staff agrees.

11 JUDGE LAURENSEN: All right. That will be
12 accepted then.

13 While we are also waiting to begin the testimony
14 of the staff witnesses, the Board will take this opportunity
15 then to announce its final, and I mean final decision on
16 the County's request for reconsideration of our schedule
17 and page limitations concerning proposed findings of fact
18 and conclusions of law.

19 We first raised the question concerning the
20 schedule and page limits with the parties on July 19th and
21 thereafter we issued our order on July 27th. As it is
22 relevant here, we limited the initial submissions to 500
23 pages and a schedule beginning on October 5th with LILCO's
24 proposed findings and conclusions. The County and State's
25 were to be combined and to be filed on October 19th. The

Sim 6-10

1 staff's was due on October 29th and the LILCO reply was
2 due on November 7th.

3 After extensive discussions over several weeks
4 concerning this matter, the present position of the County
5 is that it needs at least 80 days after the record closes,
6 which will presumably be today, and that it requests at
7 least 900 pages for its findings of fact.

8 The staff asserts that LILCO's initial proposed
9 findings and its reply should be limited to the same number
10 of pages as are given to the intervenors. New York agrees
11 with the County's position and the NRC does not object
12 to our prior order.

13 We have considered the arguments of the parties
14 and we note that we have already extended the schedule
15 specified in the NRC regulations. We will begin with the
16 first scheduled event, which is the LILCO findings of fact
17 and conclusions of law which we set for October the 5th.

18 LILCO does not object to that and that date
19 will remain unchanged.

20 The next event is the combined Suffolk County
21 and New York, and I guess any other intervenors that wish
22 to participate findings of fact which is due on October
23 the 19th.

24 The State and County asked us to push this back
25 about one month. We are not impressed by the reasons that

Sim 6-11

1 have been offered to date.

2 However, instead of the original two weeks in
3 our original schedule, we will add one additional week for
4 the intervenors so that they will have three weeks to
5 respond to LILCO's proposed findings of fact and conclusions.

6 We note that the NRC regulation gives an intervenor
7 10 days after the applicant's filing to file its proposal
8 and we have doubled that to 21 days.

9 So the Suffolk County and New York proposed
10 finding of fact is now moved back to October 26th. Accord-
11 ingly, we will also move the other two events back one week
12 so that the NRC staff's proposed findings are due on
13 November 5th and the LILCO reply is due on November 14th.

14 I believe it goes without saying that all of
15 the dates we are talking about are dates that these docu-
16 ments are to be received by the Board.

17 Turning to the question of the page limitation,
18 we find that nothing said by the parties has convinced
19 us that our initial 500 page limit was unfair or wrong.
20 However, we do find that it would be unfair to allow LILCO
21 to file an additional 250 pages in a reply brief.

22 Accordingly, we will modify the page limitation
23 portion of our order of July 27th to provide that the
24 submission of proposed findings of fact and conclusion of
25 law, including briefs, if any, on the subjects addressed

Sim 6-12

end Sim
Sue fols

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

in the agreed table of contents submitted yesterday shall be limited to 600 pages for LILCO, 600 pages for a combined submission of all intervenors and 600 pages for the NRC staff.

LILCO shall allocate its 600 pages between the initial proposed findings and its reply.

That completes the Board ruling on the County's request for reconsideration.

We will take a 10-minute recess and we will reconvene at 11 o'clock with the NRC staff witnesses.

(Recess.)

#7-1-SueT 1

2 JUDGE LAURENSEN: We are back on the record
3 now. I believe we are ready for the testimony of the NRC
4 Staff witnesses.

5 Mr. Hassell.

6 MR. HASSELL: Yes, Judge Laurenson. The NRC
7 Staff witnesses now present are Mr. Marvin Wayne Hodges,
8 and Mr. Robert A. Benedict and Mr. John R. Sears. Mr.
9 Hodges and Mr. Benedict have not been previously sworn for
10 this proceeding. It is my understanding that Mr. John Sears
11 has been previously sworn.

12 JUDGE LAURENSEN: That's correct. Mr. Sears,
13 you are still under oath.

14 Mr. Hodges, Mr. Benedict, will you please stand,
15 raise your right hand and be sworn?

16 (Mr. Hodges and Mr. Benedict are sworn by
17 Judge Laurenson.)

18 Whereupon,

19 ROBERT A. BENEDICT,

20 MARVIN W. HODGES

21 -and-

22 JOHN R. SEARS

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

#7-2-SueT₁

DIRECT EXAMINATION

2

BY MR. HASSELL:

INDEXXX 3

4

Q Would each member of the panel please state his name and business address for the record?

5

A (Witness Hodges) My name is Wayne Hodges. I am a Section Leader in the Reactor Systems Branch in the Office of the Nuclear Reactor Regulation of the NRC. And my office is in Bethesda.

6

7

8

9

10

11

12

13

(Witness Benedict) I am Robert A. Benedict. I am a Senior Management Systems Engineer in the Licensee Qualifications Branch of the Division of Human Factors Safety, Office of Nuclear Reactor Regulation of the NRC, also in Bethesda.

14

15

16

17

(Witness Sears) My name is John R. Sears. I am a Senior Reactor Safety Engineer in the Emergency Preparedness Branch of the Office of Inspection Enforcement, US NRC.

18

19

20

21

Q Mr. Benedict, do you have before you a copy of your statement of professional qualifications, which is titled "Robert A. Benedict, Professional Qualifications" consisting of one page?

22

23

A (Witness Benedict) I don't think I brought it. I think I forgot to bring it with me.

24

Q All right.

25

A Do you have a copy?

#7-3-SueT

1 (Mr. Hassell hands to Mr. Benedict a copy
2 of the above-referred to document.)

3 MR. HASSELL: Does the Board or the parties need
4 additional copies of the professional qualifications?

5 JUDGE LAURENSEN: We have our copy.

6 BY MR. HASSELL: (Continuing)

7 Q Mr. Benedict, was your statement of professional
8 qualifications prepared by you or under your supervision
9 or control?

10 A Yes, it was.

11 Q Do you have any corrections or additions to make
12 to that document?

13 A No.

14 Q Is your statement of professional qualifications
15 now true and correct to the best of your knowledge and
16 belief?

17 A Yes, it is.

18 MR. HASSELL: Judge Laurenson, I would request
19 that the statement of professional qualifications, entitled
20 "Robert A. Benedict, Professional Qualifications" consisting
21 of one page be marked for identification as Staff Exhibit
22 1.

23 JUDGE LAURENSEN: It will be marked NRC EP-1.

24 (The above-referred to document
25 is marked NRC EP-1 for identifica-
tion.)

INDEXXX

#7-4-SueT₁

BY MR. HASSELL: (Continuing)

2 Q Mr. Hodges, do you have before you a copy of your
3 statement of professional qualifications, which is titled
4 "Marvin W. (Wayne) Hodges, Professional Qualifications,
5 Reactor Systems Branch, Division of Systems Integration,
6 U. S. Nuclear Regulatory Commission" which consists of two
7 pages?

8 A (Witness Hodges) Yes, I do.

9 MR. HASSELL: Judge Laurenson, I request that
10 statement of professional qualifications be marked as
11 Staff Exhibit Number 2.

12 JUDGE LAURENSEN: It will be marked NRC EP-2.

13 (The above-referred to document
14 is marked NRC EP-2 for identifi-
15 cation.)

16 BY MR. HASSELL: (Continuing)

17 Q Mr. Hodges, was your statement of professional
18 qualifications prepared by you or under your supervision
19 or control?

20 A Yes, it was.

21 Q Do you have any corrections or additions to make
22 to that statement?

23 A No.

24 Q Is that statement now true and correct to the
25 best of your knowledge and belief?

INDEXXX

#7-5-SueT 1

A Yes, it is.

2

MR. HASSELL: Excuse me, Judge Laurenson. Mr. Quay is now here, so I can add him now and I would like to do that.

3

4

JUDGE LAURENSEN: All right. Mr. Quay, if you would remain standing and raise your right hand and be sworn.

5

6

(Mr. Quay is sworn by Judge Laurenson and then joins the panel of witnesses already on the stand.)

7

8

BY MR. HASSELL: (Continuing)

9

Q Mr. Quay, do you have before you a copy of your statement of professional qualifications entitled "Theodore R. Quay, Professional Qualifications, Office of Nuclear Reactor Regulation, U. S. Nuclear Regulatory Commission" which consists of two pages?

10

11

A (Witness Quay) Yes, I do.

12

MR. HASSELL: Judge Laurenson, I would request that the document just described be marked for identification as Staff Exhibit Number 3.

13

14

JUDGE LAURENSEN: It will be marked NRC EP-3.

15

(The above-referred to document

16

is marked NRC EP-3 for identification.)

17

INDEXXX4

18

#7-6-SueT1

BY MR. HASSELL: (Continuing)

2 Q Mr. Quay, was your statement of professional
3 qualifications prepared by you or under your supervision
4 or control?

5 A Yes, it was.

6 Q Do you have any corrections or additions to add
7 to that statement of professional qualifications?

8 A No.

9 Q Is that document now true and correct to the
10 best of your knowledge and belief?

11 A Yes, it is.

12 MR. HASSELL: Judge Laurenson, I would move
13 the admission in evidence the statements of professional
14 qualifications of Mr. Benedict, Mr. Hodges and Mr. Quay
15 as previously described as Staff Exhibits 1, 2 and 3 and
16 request that they be bound into the record as if read.

17 MR. MC MURRAY: No objection.

18 MR. ZAHNLEUTER: No objection.

19 MR. ZEUGIN: No objection.

20 JUDGE LAURENSEN: The three exhibits, NRC EP-1,
21 2 and 3 will be received in evidence and bound as indicated.

22 (The documents previously marked
23 NRC EP-1, 2 and 3, respectively,
24 are received in evidence.)

INDEXXXX24

25

ROBERT A. BENEDICT

PROFESSIONAL QUALIFICATIONS

I am a Senior Management Systems Engineer in the Licensee Qualifications Branch of the Division of Human Factors Safety, Office of Nuclear Reactor Regulation, U. S. Nuclear Regulatory Commission. In this position, my duties include review and evaluation of assigned operating license applications to determine acceptability of the operating organization, plant staffing patterns and overall utility management structure, and preparation of Safety Evaluation Report contributions on findings. I had previously performed as a Senior Project Manager for nine years within the Division of Licensing, managing the overall safety reviews of various applications for construction permits and operating licenses for nuclear power plants.

Before joining the then-Atomic Energy Commission in 1971, I spent 5 years with First Atomic Ship Transport Inc., in New York, performing nuclear shore staff duties related to operation, equipment up-grading, and port safety evaluation of the Nuclear Ship SAVANNAH. I also served as nuclear advisor aboard the SAVANNAH.

From 1952 to 1965, I was employed by the Babcock & Wilcox Company, Atomic Energy Division, holding various positions associated with the design of fluid systems and equipment for both liquid metal cooled and water or gas cooled reactors and test facilities. In 1964 I was certified as a Senior Reactor Operator on the N. S. SAVANNAH.

I have a Bachelor of Engineering degree in Mechanical Engineering from Yale University.

I am a member of the American Nuclear Society and the American Society of Mechanical Engineers.

Marvin W. (Wayne) Hodoes
Professional Qualifications
Reactor Systems Branch
Division of Systems Integration
U. S. Nuclear Regulatory Commission

I am employed as a Section Leader in Section B of the Reactor Systems Branch, DSI.

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.

In my present work assignment at the NRC, I supervise the work of 5 graduate engineers; my section is responsible for the review of primary and safety systems for BWRs. I have served as principal reviewer in the area of boiling water reactor systems. I have also participated in the review of analytical models use 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 the Three Mile Island, Unit-2 accident.

As a member of the Bulletin 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 transient 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.

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.

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 1967, 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.

#7-7-SueT 1

BY MR. HASSELL: (Continuing)

2 Q Mr. Benedict and Mr. Sears, have each of you
3 reviewed LILCO EP Exhibits 77 and 78?

4 A (Witness Benedict) Yes, I have.

5 (Witness Sears) Yes, I have.

6 Q Mr. Benedict, what are the minimum staffing
7 requirements for a BWR plant?

8 A (Witness Benedict) NUREG 0737, a clarification
9 of TMI action plan, includes in Item 1.a.1.3 certain require-
10 ments for minimum staffing for operators, both licensed and
11 non-licensed.

12 In the case of a plant operating at power, that
13 is above cold shutdown, two senior licensed operators, two
14 licensed operators, and two auxiliary operators are required
15 as minimum staffing.

16 For a reactor in the cold shutdown condition,
17 one licensed senior operator, one licensed operator and one
18 auxiliary operator is required.

19 As of January 1st of this year, the requirements
20 for the licensed operators, both senior and regular reactor
21 operator, were codified in 10 CFR Part 50. That does not
22 address the requirements for auxiliary operators.

23 The standard review plan, NUREG 0800, in Section
24 13.1.2, establishes a requirement that a health physics
25 technician shall be on site whenever there is fuel in the

#7-8-SueT1

2 reactor. It also requires that a five-man fire brigade
3 be on site.

4 NUREG 0737 also in Item 1.a.11 established the
5 requirement for a shift technical advisor or STA who shall
6 be readily available to advise the shift supervisor.

7 All of these requirements that I have just
8 mentioned would be -- will form a part of the Shoreham
9 technical specifications that will be a part of the operat-
10 ing license.

11 Q Mr. Benedict, what staffing requirements are
12 addressed by 10 CFR 50.54?

13 A 50.54(m)(2) establishes the number of licensed
14 senior operators and the number of licensed operators that
15 must be on shift for various modes of operation of the
16 reactor, whether it's shutdown or is operating.

17 Q Mr. Benedict, what are the minimum shift require-
18 ments for a BWR plant?

19 A The NRC has not developed minimum number of
20 shifts for nuclear power plants. Instead, we have concentrated
21 mostly on the number of operators and also on working hour
22 limitations and training requirements.

23 Generally, four shifts would be necessary if
24 they were normal eight-hour a day, forty-hour a week,
25 operations, would require four shifts to provide 24-hour
coverage seven days a week. However, this does require

#7-9-SueT 1

2 some overtime and there is very little opportunity for
3 vacations -- to accommodate vacations or extended illnesses.

4 With the training requirements, it is pretty
5 difficult to run on the four shifts. A fifth shift will
6 accommodate some of the retraining requirements but also
7 still require some overtime. You can also cover vacations
8 and extended illnesses with five shifts.

9 Since TMI-2 and the additional retraining and
10 working hour limitations, a sixth shift pretty well covers
11 retraining, vacations, illnesses and time off.

12 Q Mr. Benedict, are twenty licensed senior opera-
13 tors sufficient to maintain the Shoreham plant in the
14 cold shutdown mode?

15 A Twenty licensed senior operators could cover
16 the requirements for at least six shifts for the positions
17 of licensed senior operator, licensed operator and auxiliary
18 operator. In addition, of course, as I mentioned earlier,
19 a health physics technician and a five-man fire brigade
20 must also be provided in order to meet the technical
21 specification requirements.

22 Q Mr. Sears, have you reviewed LILCO EP Exhibits
23 71, which is the affidavit of Mr. Cordaro, 72, which is
24 the affidavit of Mr. Stergakos and Mr. Rigert, and 73, which
25 is the affidavit of Mr. Scalice?

A (Witness Sears) Yes, sir.

#7-10-SueTl

2 Q Mr. Sears, does the Office of Inspection and
3 Enforcement of the NRC make provision for inspection
4 activities during a strike?

5 A Yes, sir. There have been strikes of operations
6 personnel at a number of reactors. There was a strike at
7 Maine Yankee, at Indian Point, at Salem, at Farley, and
8 in all of these cases the management personnel continued
9 to operate the plant when the union operators went on
10 strike.

11 The NRC Office of Inspection Enforcement has
12 inspection requirements to its field inspectors that at
13 the initiation of a strike, during the transfer of operations
14 responsibility from the people who are going to go on
15 strike to management personnel who are taking over the
16 control room, that that transfer must be observed by the
17 field inspector.

18 There is further instruction that the field
19 inspector shall verify through direct observation in the
20 control room after the initial transfer that indeed the
21 management personnel who are now operating the plant operate
22 it safely and properly.

23 And, then, finally when the strike is terminated
24 and the transfer is made from the -- whoever is operating
25 the plant, let us say the management personnel, back to
the union operators, that that transfer in the control

#7-11-SueT

room will also be directly observed by the field reactor inspectors.

- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- 21
- 22
- 23
- 24
- 25

end #7
Joe flws

1 Q Mr. Hodges and Mr. Quay, have each of you
2 reviewed LILCO EP Exhibit 71, which is the affidavit of Mr.
3 Cordaro; 72, which is the affidavit of Mr. Stergakos and Mr.
4 Rigert; and 73, which is the affidavit of Mr. Scalice?

5 A (Witness Quay) Yes, I have.

6 A (Witness Hodges) Yes, I have.

7 Q Okay. Mr. Hodges, can the Shoreham nuclear power
8 plant be placed in a cold shutdown condition following full
9 power operation, within 24 hours?

10 A Yes. The plant can be brought to cold shutdown
11 using this normal shutdown procedures within 24 hours. This
12 is based upon reducing the flow with the recirculation pumps
13 and inserting rods to achieve a hot critical zero power
14 condition in one eight hour shift, and the cooling down from
15 approximately 550 degrees, which would be the saturation
16 temperature at 1050 PSIA, to 330 degrees Fahrenheit, which
17 is the saturation temperature at 103 PSIA, at a hundred
18 degrees F per hour, gives an additional two point two hours,
19 and then cooling from the 330 degrees to less than 200
20 degrees; using the RHR system would take on the order of
21 three hours, considering the capability of the heat exchangers.

22 Therefore, you can get to the cold shutdown
23 condition following an orderly, normal procedure in thirteen
24 to fourteen hours.

25 If needed, you could reach cold shutdown much

1 more rapidly. Two things could be done.

2 You could trip the reactor rather than taking
3 the orderly insertion of the control rods, and trim a sizeable
4 amount of time off of that. If, in addition, you needed to
5 get down to cold shutdown conditions immediately, you could
6 go through a rapid depressurization using the ADS. However,
7 that provides a rapid cool down, and because of thermal
8 stresses and fatigue usage, it is not recommended unless it
9 is necessary.

10 Q Would you please describe ADS?

11 A That is the Automatic Depressurization System.

12 Q Where are transients and accidents analyzed in
13 licensing documents?

14 A Chapter 15 of the final safety analysis report
15 includes most of the transient and accident analyses. The
16 LOCA analyses are given in Chapter 6, Section 3. Sometimes
17 the Chapter 15 analyses term is used to discuss both the LOCA
18 and the other transient and accident analyses, and quite
19 often there would be a reference in Chapter 15 to the
20 analyses in Chapter 6, but the bulk of the analyses for the
21 LOCA are provided in Chapter 6.

22 Q Should any of the Chapter 15 events lead to
23 radiological consequences in excess of EPA's protective
24 action guidelines of 1 rem whole body, and 5 rem thyroid?

25 A No. Most of the Chapter 15 events cannot occur

1 from cold shutdown, but all those that can occur, the
2 consequences should be negligible, or very small.

3 Q What are some of the Chapter 15 events that
4 can occur from cold shutdown?

5 A Examples would be a shutdown cooling, or RHR
6 system malfunction, with a decrease in temperature, a loss
7 of AC power, core coolant temperature increase. There
8 are several of them.

9 Q Are Chapter 15 events the only events that
10 need be considered for emergency planning purposes?

11 A No. Even for accidents occurring from the full
12 power condition, the Chapter 15 events do not lead to the
13 large offsite doses. More severe accidents, which are beyond
14 the design basis, are normally the basis for the emergency
15 planning, and I would think be the case with a cold shutdown
16 condition as well.

17 Q How does cold shutdown affect the time for
18 preventive or mitigative action relative to the time available
19 at full power operation?

20 A I have not gone through and tried to quantify
21 this for a range of conditions, because the time available
22 for my evaluation, but the time to respond to an accident
23 starting from the cold shutdown should be at least an hour
24 and a half as a minimum, compared to minutes for some accidents
25 which could start from full power.

1 Also, the number of systems which are available
2 to provide make-up flow or alternate cooling paths is
3 increased.

4 Q Are there accidents which can occur at cold
5 shutdown -- are there accidents which can occur from cold
6 shutdown and which lead to core melt?

7 A I believe they can occur. Their likelihood
8 would be small. There have been precursors at some operating
9 plants, but in those cases, multiple failures have to occur,
10 and there would be a significant amount of time available for
11 corrective action.

12 Although a pipe break itself would be very
13 unlikely to occur, because of the low pressure conditions
14 that you have at cold shutdown, valves can be misaligned
15 so that the water would drain from the reactor vessel to
16 -- into the suppression pool. If the draining is undetected
17 or no corrective actions are taken, then core melt could
18 occur in several hours.

19 Both Grand Gulf and LaSalle have experienced
20 drain from the reactor to the suppression pool because of
21 this mispositioning of the valves, and in those two cases,
22 though the operators recognized the conditions rapidly and
23 took corrective actions, and so there was no fuel damage or
24 any uncovering of the fuel even, but I would consider that
25 a precursor to what might occur.

1 Also, at the Brunswick plant, they experienced
2 a condition in which both RHR heat exchangers were damaged
3 and were not totally incapacitated, but were near incapacitated
4 for a period of time due to a common cause failure, and in
5 that case the fuel pool heat exchanger was available to
6 provide an alternate means of cooling the core, and you would
7 normally expect such a system would also be available for
8 Shoreham.

9 But if there were no such system available, then
10 eventually the core would -- the water in the core would boil
11 down and the core would melt, but you would expect at least a
12 day or more before something like that would happen, because
13 of the low decay heat levels.

14 So, again, it is a possibility, but an unlikely
15 event because of all the failures that would have to occur.

16 Q Mr. Quay, is LILCO's proposal to place the
17 reactor in cold shutdown during the strike, and to not
18 undertake any refueling activities without NRC Staff's
19 permission acceptable with respect to the possibility of
20 fuel handling accidents?

21 A (Witness Quay) LILCO's proposal is acceptable
22 because it prohibits refueling operations.

23 Q What would the Staff require prior to the movement
24 of fuel under strike conditions?

25 A The Staff would require approximately sixteen

1 days. This period would allow under extremely conservative
2 assumptions, that we would use under the safety analysis,
3 the doses to be lowered below the protective action guideline
4 levels.

5 Q Would the protective action guidelines be exceeded
6 for a loss of coolant accident that could be postulated to
7 occur at cold shutdown?

8 A Yes. As Mr. Hodges said before, there are events
9 that could be postulated to exceed the PAGs that result from
10 operation at cold shutdown, or from the plant at cold shutdown
11 rather.

12 They are extremely low probability events. While
13 the Staff cannot quantify the frequency of these events, we
14 can make some observations. With respect to similar contain-
15 ment designs and similar BWRs, the Staff has found that the
16 risk nominating events occur during power operation.

17 Several items that can tend to mitigate the
18 consequences of accidents occurring at low power or cold
19 shutdown, are the fact that the primary system is depressurized,
20 and therefore, it is highly unlikely that you are going to
21 get a piping system failure.

22 The time, as Mr. Hodges said before, is significantl
23 increased from minutes to approximately over an hour and a
24 half, and these coupled with each other tend to reduce the
25 amount of cooling needed for the core, and allow the operators

1 significantly more time to respond to any accidents.

2 Q Would that also allow for a greater amount
3 of time for the operators to manipulate the plant systems
4 and structures to cope with a LOCA?

5 A Certainly.

6 Q Mr. Sears, have you verified that the Shoreham
7 nuclear power station has an ultimate cooling capability to
8 keep the core covered in the event of an extended station
9 blackout?

10 A (Witness Sears) Yes, sir. I have seen the
11 equipment and I have examined the process drawings for this
12 cooling capability, which uses a diesel fire pump through
13 a series of valves, and directly into the recirculation.
14 The core recirculation pump discharge, and directly getting
15 essentially fire water directly into the reactor vessel.

16 MR. HASSELL: Judge Laurenson, I now tender
17 this panel for cross examination.

18 JUDGE LAURENSEN: Any questions, Mr. McMurray?

19 MR. McMURRAY: Judge Laurenson, I would like
20 to request a break so that we can go over this testimony.

21 JUDGE LAURENSEN: Ten minutes or so?

22 MR. McMURRAY: Fifteen.

23 JUDGE LAURENSEN: We may as well finish the
24 way we started. All right, we will take a fifteen minute
25 recess and resume with the cross examination by the County.

(Short recess taken)

1 JUDGE LAURENSEN: Mr. McMurray?

XXINDEX 2

CROSS EXAMINATION

3 BY MR. McMURRAY:

4 Q Mr. Sears, you mentioned strikes that have
5 occurred at some other plants. Do you recall that in your
6 direct testimony?

7 A (Witness Sears) Yes, sir.

8 Q And I believe you said that you or other field
9 inspectors had watched the transfer from the regular operating
10 staff to management staff, correct?

11 A What I testified is that we have instructions
12 to our field inspectors to do that, yes, sir.

13 Q Now, in the case of previous strikes that have
14 occurred at nuclear power plants, there have been offsite
15 organizations available to respond in a radiological emergency
16 during the course of those strikes, correct?

17 A To the best of my knowledge, yes, sir.

18 Q Mr. Hodges, I believe you said earlier that
19 some Class 9 accidents were possible at cold shutdown. I
20 think you would agree with me, would you not, that it is
21 -- Class 9 accidents are even more possible at intermediate
22 power levels between one hundred percent power and cold
23 shutdown, isn't that correct?

24 MR. HASSELL: I think I am going to object. I
25 think it mischaracterizes his testimony. I don't recall

1 Mr. Hodges ever using the phrase, 'Class 9 accidents.'

2 BY MR. McMURRAY: (Continuing)

3 Q I am sorry. Let me rephrase that and substitute
4 core melt accidents for Class 9's.

5 End 8.
6 MM fols.

7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

T9 MM/mm1 1

2 A (Witness Hodges) It is difficult to give an
3 answer to your question because this is an example of the
4 amount of time that you had typically operated at some power
5 level between zero and 100 percent as compared to shutdown,
6 is a very small time period. And that affects the probability.

7 I would expect that it would be more probable
8 that you could get a core melt from an intermediate
9 power condition. I have not done any calculations to
10 verify that.

11 Q Mr. Hodges, when did you first see the Affidavits
12 that you have discussed and the LILCO Proposed Licensing
13 Conditions, do you recall?

14 A I don't recall the exact date. I notice there is
15 a letter here that is dated July 24th, and it would have been
16 within a day or two of that, I would think. Our legal staff
17 got copies of the filing to us very shortly after they
18 received them.

19 Q I take it once you received these you reviewed
20 them?

21 A That's correct.

22 Q Did your review prompt you to make any inquiries
23 to LILCO about the condition?

24 A I initially called some of the licensing people
25 at LILCO to ask if they intended to supplement what was in
that package.

mm2

1 Q And why were you concerned about whether or not
2 they intended to supplement what was in the package?

3 A Primarily because my judgment was that they had
4 based all of their conclusions on a Chapter 15 analyses.
5 And that the Chapter 15 analyses alone were not sufficient,
6 that it would require more than that. And so I was inquiring
7 if they intended to submit more.

8 Q To date has LILCO submitted anything more to
9 allay your concerns?

10 A I received a copy of some calculations that were
11 done by LILCO and I think that were obtained by the County
12 through discovery. I got them early this week. I don't
13 recall the day. It must have been Monday or Tuesday. I
14 believe it was Tuesday.

15 Q Is what you received the type of analysis that you
16 had in mind when you made your inquiry to LILCO's licensing
17 people?

18 A Well I will say two things: One is, I did not
19 have a specific type of analysis in mind. I didn't request
20 any specific type of analysis. I was just inquiring as to
21 whether or not they intended to submit additional information.

22 Second, although there is some useful information
23 in what they submitted, it is not the type of analysis I
24 would have done for this.

25 Q Mr. Hodges, I would just like to go back to

mm3

1 something you said earlier. You referred to a letter or
2 something of July 24th when you first saw the Affidavits.

3 A Yes. It is a Memorandum and Order determining
4 that a serious safety matter exists. This includes the
5 Order from the Board and the package that I had included
6 that, plus these -- I think the Affidavits were in draft
7 form at the time.

8 Q Mr. Quay, correct me if I am wrong, but I thought
9 I heard you say that LILCO's proposal is acceptable because
10 it prohibits refueling operations.

11 Was that your testimony?

12 A (Witness Quay) That's correct.

13 Q Okay. Let's look at the licensing condition for
14 a second.

15 Do you have a copy of that with you, Mr. Quay?

16 A We are getting one.

17 Q Okay.

18 A I have it.

19 Q Where in that proposed license condition does it
20 say that refueling operations are prohibited?

21 A Okay, right at the bottom of that it says:

22 "LILCO shall maintain SNPS in cold shutdown
23 condition until the end of the strike, except that
24 with the prior approval of the NRC Staff upon review
25 of the written application by LILCO, LILCO shall be

mm4

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

permitted to take the reactor to a refueling mode. . ."

And, it continues on.

Q So, it doesn't prohibit refueling, it just premises or predicates refueling upon NRC approval, correct?

A That's correct.

Q Okay. And that is the reason you find it acceptable?

A That's correct.

Q Any other reasons why you find it acceptable?

A That's primarily the reason.

Q Let me ask you this, Mr. Quay. At the top of the proposed license condition it states that the proposed license condition would be -- would commence in anticipation of the commencement of a strike by a union representing LILCO employees.

When is the commencement of a strike?

A I would presume whenever the contract runs out would be -- or whenever a strike was threatened.

Q Whenever a strike was threatened.

And how would that be determined, whether a strike was threatened or not?

A I don't know how that would be determined. I would assume that would be communicated to LILCO that their union employees would be going out on strike at a certain

mm5

1 time.

2 Q But you don't have any criteria for when that
3 threat becomes real and the proposed licensing condition is
4 put into effect?

5 A No.

6 Q What is meant by the term "strike"? How do
7 you define a strike?

8 A I would assume a strike is the commencement -- I
9 don't know why we are getting into the definitions, but my
10 definition of it would be the commencement of activities
11 in which union employees fail to report for work or leave
12 the job.

13 Q Do you think it is unimportant for you as a
14 member of the NRC Staff to try to determine what these terms
15 mean?

16 A I think there has got to be a certain amount of
17 common sense applied to them.

18 Q And you think that the term "strike" is a clear
19 term?

20 A I would not get into a legal battle as to what
21 the term would mean.

22 Q What sorts of job actions would be included in
23 the strike?

24 A What sort of job actions? I assume all union
25 personnel.

mm6

1 Q I'm talking about what sort of job actions would
2 be included, though.

3 A Obviously they have some reactor operators, some
4 plant maintenance personnel. You can go right down the
5 list. I'm not totally familiar with quality personnel.

6 JUDGE SHON: If you will excuse me for a moment,
7 I think Mr. McMurray is asking a question about job action
8 and you are trying to answer about job classifications.

9 He wanted to know what kind of actions, things
10 such as sit-ins, sick-outs and that sort of thing.

11 WITNESS QUAY: I don't know. I don't know what a
12 union is going to do.

13 BY MR. MC MURRAY:

14 Q Mr. Hodges, let me ask you this: Do you find the
15 licensing condition as proposed by LILCO to be acceptable?

16 A (Witness Hodges) Do you mind if I look at a
17 licensing condition as I answer that?

18 Q Sure.

19 A Yes. I would find it acceptable.

20 Q Is this the first time you have read it?

21 A No.

22 Q And why would you find it acceptable?

23 A I would find it acceptable because I believe
24 they can take the reactor to the condition they describe
25 in the timeframe they describe easily. Once in that

mm7

1 condition, although the possibility of a Class 9 accident
2 as you characterize it is possible, I think it is extremely
3 unlikely. And I think it would be the safest condition
4 they could put the reactor in.

5 Q Your answer, Mr. Hodges, you were focusing on
6 the cold shutdown mode, correct?

7 A Yes, I was.

8 Q You weren't focusing on the descent to cold
9 shutdown, correct?

10 A No, I am not sure that answer is correct, because
11 part of my answer did include getting to cold shutdown from
12 full power operation.

13 Q Is it your understanding that there would be no
14 operation at 100 percent power between notice of a strike --
15 Let's say LILCO received notice of a strike. Would there
16 be an immediate descent to cold shutdown, or could there
17 be some operation at 100 percent power before that was
18 started?

19 A In absolute terms I would expect some operation
20 at 100 percent power before it started. I would expect that
21 LILCO's management would receive the notice of a strike,
22 they would make some judgment as to when the strikers would
23 go out. That could be based upon when the union tells them
24 they are going to go out. Or, if they think it is going to
25 be imminent, they can commence to proceed to cold shutdown

mm8

1 very quickly.

2 But, it still takes some time to make the
3 decision, so you are probably talking about a period of an
4 hour or two of continued operation at that power level before
5 they would proceed to cold shutdown.

6 But I would consider starting to go to cold
7 shutdown within a few hours after the notice, is going
8 immediately.

9 Q You wouldn't foresee then under the licensing --
10 proposed licensing condition operation at full power for
11 more than a few hours after the notice of a strike:

12 A That's correct.

13 Q Mr. Quay, let me refer you to subpart 2 of the
14 li e condition.

15 What is your interpretation of the scope of the
16 term "other operations" which the Staff could approve?

17 A (Witness Quay) Okay. I would interpret that to
18 possibly be operations involving, let's say movement of
19 casks or things of that nature. Spent fuel shipping casks.

20 Q Is that all?

21 A That would probably be about the extent of it.
22 I think that looks like just a catchall clause.

23 Q But you would limit the interpretation to
24 movement of casks?

25 A Yes.

mm9

1 Q What is the -- how would the Staff -- what
2 criteria would the Staff apply to determine whether the
3 strike in fact impaired LILCO's ability to implement its
4 offsite emergency preparedness plan?

5 A Probably we would use something like the PAG
6 in examining their actions.

7 Q Could you explain a little bit more?

8 A 5 rem thyroid, one rem home body offsite exposure.

9 Q How would you apply those PAGs to what LILCO
10 proposed to do?

11 A We would examine their operations, examine what
12 the potential releases could be from those operations and
13 based on that approve, or disapprove.

14 That is essentially what we did with respect to
15 the fuel handling accident.

16 Q Mr. Quay, have you or any member of the Staff, to
17 your knowledge, discussed the license condition, proposed
18 license condition with LILCO to determine the meaning of
19 the terms used in this proposed license condition?

20 A No.

21 Q So what you have given me is your opinion or
22 personal understanding of those terms?

23 A That's correct.

24 Q You don't really know whether those, your
25 views, are consistent with LILCO's, correct?

mm10

1 A That's correct.

2 MR. HASSEL: I believe that question was
3 addressed to the whole panel, wasn't it Mr. McMurray?

4 MR. MC MURRAY: I asked Mr. Quay whether he
5 or any of the Staff had consulted with LILCO. I would be
6 happy to throw that question out to the rest of the panel.

7 WITNESS SEARS: I have not consulted with any
8 LILCO People about the wording of this license condition.

9 WITNESS BENEDICT: Nor Have I.

10 WITNESS HODGES: I have not consulted with them
11 concerning the wording of the license condition.

12 BY MR. MC MURRAY:

13 Q Would any of your interpretations of any of
14 the terms used in this proposed license condition, differ
15 from those that Mr. Quay has explained?

16 (Pause)

17 Gentlemen?

18 A (Witness Hodges) There were some very general
19 discussions of strike, and I don't recall all the details
20 there. But in general I would agree with what he said.

21 end 9

22

23

24

25

Sim 10-1

1 Q Are there any specifics where you wouldn't
2 agree?

3 A (Witness Hodges) Well, as I said, it was
4 a fairly lengthy discussion that got into the various
5 details of the strike and the definitions of strike, and to
6 try to remember at this point and say, yes, I agree with
7 everything identically as he said it, I can't do that
8 because I just don't recall everything that was said.

9 But in general terms, yes, I agree with what
10 he has said.

11 MR. McMURRAY: No further questions.

12 JUDGE LAURENSEN: Mr. Zahnleuter?

13 MR. ZAHNLEUTER: No questions.

14 JUDGE LAURENSEN: Mr. Zeugin?

15 MR. ZEUGIN: Just one second, Judge Laurenson.
16 I think we may have one or two questions.

17 (Pause.)

18 CROSS-EXAMINATION

19 BY MR. ZEUGIN:

20 Q Mr. Sears, in your direct testimony you indicated
21 that management personnel operated a number of nuclear
22 plants during strikes, and I think you mentioned Maine Yankee
23 and Salem and a couple of others, and I guess Farley was
24 one of the others.

25 When you stated that those plants were operated,

XXXXXXXX

Sim 10-2

1 were they operated at full power or were they maintained
2 in a cold shutdown condition during the strike?

3 A (Witness Sears) Some of them were operated at
4 full power, yes, sir.

5 MR. ZEUGIN: I have no further questions,
6 Judge Laurenson.

7 JUDGE LAURENSEN: Before we go to the redirect
8 and before Judge Shon asks some questions, I have one
9 general question for the panel.

BOARD EXAMINATION

BY JUDGE LAURENSEN:

10
11 XXXXXXXXXXXX
12 Q Mr. Hodges testified that the licensing conditions
13 submitted by LILCO is acceptable to the staff. Is that
14 the testimony of all four members of this panel?

15 A (Witness Quay) My testimony stated a similar
16 position.

17 A (Witness Sears) My testimony is that the
18 concept involved here is acceptable. The particular language
19 may be questioned as this is proposed through the regular
20 NRC process and there may be some words within this which
21 some management people in NRC may want to have changed.

22 A (Witness Hodges) Excuse me. When I was saying
23 that I found it acceptable, I was stating my position and
24 not attempting to state a staff position.

25 Q Well, I am asking for the staff position. We

Sim 10-3

1 want to know what the NRC staff position is on this proposed
2 condition.

3 A I have not heard a staff position. I don't know
4 that one has been given.

5 JUDGE LAURENSEN: Well, perhaps we need a
6 clarification from staff counsel. Are these witnesses
7 presenting the staff position on this matter, Mr. Hassell?

8 MR. HASSELL: Yes, they are presenting the staff
9 position. Whether there in fact exists a staff position
10 on this particular proposed licensed condition, it is my
11 understanding it does not. I think that is essentially what
12 they are getting at.

13 BY JUDGE LAURENSEN:

14 Q Mr. Benedict?

15 A (Witness Benedict) Thank you. I have not
16 expressed any opinion on the licensed condition. I do
17 not consider myself in a position of responsibility to so
18 make that judgment.

19 So I don't have an opinion and, therefore, I
20 cannot speak for the staff. I also believe that a final
21 decision on the acceptability of any given licensed condi-
22 tion will be at high management levels in the NRC.

23 Q Let me ask Mr. Hodges what regulatory standard
24 or guidance you applied to reach your conclusion that the
25 condition was acceptable?

Sim 10-4 1

2 A (Witness Hodges) It is a judgment. It is a
3 situation we do not normally deal with and it is a judgment
4 that the risk involved when you are in the cold shutdown
5 condition, even if the workers were to go on strike, would
6 be an acceptable risk.

7 The likelihood of a severe accident that is going
8 to damage the fuel or melt the core is extremely small. It
9 would be smaller than a similar situation if the plant were
10 operating at full power, and based upon that judgment, I
11 would find it acceptable.

12 Q Are you saying that there isn't any regulation
13 or regulatory guidance that you used in arriving at this
14 opinion?

15 A That is correct.

16 Q Let me ask Mr. Sears in connection with his
17 testimony about other plants that have been on strike and
18 have operated whether there is any NRC guidance or position
19 concerning the standards to be applied in connection with the
20 question of whether they should be shut down or may operate
21 at power?

22 A (Witness Sears) None that I know of, sir. The
23 only guidance that I know of is what I mentioned before
24 to our field inspectors to increase their surveillance of
25 the plant.

JUDGE LAURENSEN: Judge Shon.

Sim 10-5

BOARD EXAMINATION

BY JUDGE SHON:

XXXXXXXXXXXX

Q Gentlemen, I think that you were not here yesterday when we discussed these matters with the LILCO witnesses. You have touched on some of the things that we touched on with them, but I would like to explore them a little more explicitly.

We are aware of the fact that before a reactor has run at five percent of full power there is no requirement in the regulations for an offsite emergency organization. Are you aware of that?

A (Witness Quay) Yes.

Q We are also aware of the fact that the reasoning upon which that lack of a requirement is based or relaxation of the requirement is based is at that time the fission product inventory is low, the time to respond to any kind of emergency is long and the challenge to engineered safeguard features is greatly lessened.

I would like to have you, one of you or all of you, give me your opinion as to how a reactor which has operated until it has an equilibrium core and has been shut down over a period of whatever it is, 12 to 16 hours in anticipation of a strike and is at cold shutdown, how that compares for each of these three items with a reactor that has never run above five percent of power, that is

Sim 10-6

1 fission product inventory, time to respond to emergencies
2 and challenge to engineered safety features. Could you do
3 that?

4 A (Witness Quay) I can respond to the fission
5 product inventory. That would require some detailed calcula-
6 tions. I understand LILCO has submitted an exhibit, and I
7 have just briefly looked at it, and I have no basis for
8 denying or disputing what LILCO has submitted in terms of
9 fission product inventory.

10 Q And that is all any of you care to say about
11 fission product inventory?

12 A That is correct.

13 Q Then I would like to ask one or two questions
14 about that specific feature, fission product inventory.

15 The sheet of paper which we were handed from
16 LILCO, which indeed represents quite a collection of numbers
17 to have been crunched overnight, and I must say we are
18 delighted they were able to get them all out in such short
19 order, nevertheless deals only with halogens and noble gases.

20 The reason for that was, as you may know, it
21 was brought out on questioning this morning primarily that
22 LILCO is of the opinion that no severe core damage accident
23 can happen and that therefore the most that could get out
24 is halogens and noble gases, and that this as presently
25 presented even overestimates that because it is total

Sim 10-7

1 inventory instead of gap inventory.

2 Now you said things that suggest to me that you
3 don't think that there is a total absence of any possibility
4 of core damage. So I would like to say that given the
5 fact that that analysis there, that comparison treats only
6 of halogens and of noble gases, do you think it fairly
7 represents the comparison between the fission product
8 inventories for the operated reactor and the never operated
9 at five percent?

10 A (Witness Quay) Obviously you could consider
11 several other nuclides in this listing, but I think the
12 response to your question is the way we looked at it is
13 we believed the likelihood of an accident leading to
14 severe core damage is significantly reduced over that
15 power operation, and on that basis we have not looked at
16 the fission product release.

17 Q Now the kinds of accidents against which LERO,
18 the local emergency response organization, has meant to
19 afford some protection are accidents that involve offsite
20 dose; is that not correct?

21 A That is correct.

22 Q If LERO is not there then the accidents that
23 you are chiefly worried about that they are not there to
24 portect against, would these not be core damage accidents?

25 A Certainly.

Sim 10-8

1 Q So that the only assurance we have that their
2 absence makes no difference is if a core damage accident
3 were no longer possible. That is more or less LILCO's
4 position, I think I am not stating it wrongly; is that
5 correct?

6 A That is correct.

7 Q But you have told us that you don't believe that
8 there is the complete absence of the possibility of a core
9 damage accident; is that also correct?

10 A That is correct.

11 A (Witness Hodges) That is correct.

12 Q Now I would like to take the next thing that
13 we talk about, that is time to respond. I believe you told
14 us you felt that time to respond to any accident was longer
15 for the shutdown core than for the operating five percent;
16 is that right?

17 A (Witness Hodges) No. I said I was comparing
18 it against operation at full power.

19 Q I see. How about operation at five percent?

20 A When you compare against operation at five
21 percent, if you take the limiting cases, to start with,
22 for a loss-of-coolant accident occurring at five percent
23 power, sort of at time zero that the reactor trips, but
24 now you are going to rapidly drain the water from the vessel.
25 and if you had, as we looked at for the low-power hearing

Sim 10-9

1 case, no initial makeup because you had lost offsite
2 power and the emergency diesels didn't work, which we took
3 as a limiting case, and we said how long do you have to
4 respond to get something working in order to prevent getting
5 up to the 2200 degree limit, the Appendix K type of limits,
6 for the five percent power case that said that you had, if
7 you took a very conservative licensing calculation with
8 conservative peaking factors, 55 minutes, all the way up
9 to a best estimate analysis that showed greater than three
10 hours.

11 For the cold shutdown case where if you assume
12 that you have operated for an extended period of time such
13 that you have an equilibrium condition, and then you go to
14 cold shutdown and it takes you 24 hours to get to cold
15 shutdown, and then an accident occurs at 24 hours, so
16 that you instantaneously take all the water out, which is
17 not going to happen quite that quickly, but if you take
18 that assumption, then you have a little over 40 minutes
19 to get up to the point where you start worrying about fuel
20 damage. That is using the 1600 degrees Fahrenheit that
21 LILCO used in their calculations. That is after one day.

22 The time increases, and if it occurred two days
23 after shutdown, you are talking about almost 53 minutes. If
24 you go out to 10 days, you are talking about 100 minutes.

25 So that the time to respond for the cold shutdown

Sim 10-10

1 condition is considerably longer than you would have from
2 the full power case, but in general would be less than
3 the time for a severe accident occurring at the five percent
4 power case.

5 Q Fine. Now, lastly, the challenge to systems
6 thing. Do you think that an accident occurring in the
7 shutdown after run condition would be more or less of a
8 challenge to the safeguards systems than an accident at
9 five percent, while you are running at five percent?

10 A You will have more systems available that can
11 respond successfully. You have a low decay heat. Many
12 of the events that you have to worry about when you are
13 operating at five percent, and I can't say many because
14 there is not a lot you worry about, but of the events that
15 you do have to worry about, several of them disappear when
16 you are at cold shutdown conditions.

17 One would be, for example, an ATWS, which would
18 be a limiting type of case that you would worry about at
19 five percent power. You are already shut down and you
20 are already scrammed and the rods are already in. So that
21 goes away.

22 For the five percent power case you can postulate
23 a break in piping and you have the high-stress conditions.
24 When you are in cold shutdown, you are essentially at
25 atmospheric pressure and it is very incredible to consider

Sim 10-11

1 a pipe break as such. So you have to start looking for
2 other things that can cause a problem.

3 That is the reason in my initial testimony I
4 talked about a couple of precursors, and it is that type
5 of thing which tells me that there is a possibility you
6 could have the severe accident, one of which would be
7 opening an valve in an RHR system so that the water in the
8 vessel drains back to the suppression pool. It occurred
9 twice in 1983. It didn't drain for long, approximately a
10 half a minute before the operator isolated it in each case,
11 and there are plenty of indicators for the operator to
12 know that it is draining.

13 He has water level indication that it is on scale
14 and he has other water level instrumentation that it is
15 not on scale at cold shutdown, but as the water level drains
16 down, it gets on scale and would indeed give him alarms and
17 automatic actuations before you ever got down to the top
18 of the core.

19 He has indications on the valve positions to
20 tell them where they are. So there are a number of things
21 that would tell him he is in less than a desirable condition
22 and there is a sizeable time available for him to close
23 valves, to stop the leak and then almost any system that
24 he has available, whether it is a control rod drive system,
25 a core spray system, a service water system or fire pump,

Sim 10-121

2 a number of systems can inject water to provide the makeup
3 that is needed.

4 So with that combination of systems available and
5 the alarms and indications that the operator would have,
6 I would not expect an event to have a high probability of
7 occurrence as far as going to the point of core melt, but
8 I can't rule it out totally.

9 Q Thank you.

10 I don't know whether you were here for the testi-
11 mony of Suffolk County's witness, but their expert witness
12 pointed out that there are things to consider other than
13 simply the reactor in cold shutdown as the thing that
14 exists during this strike.

15 To begin with, he pointed out that there was
16 some chance that there might be a bit of overlap between
17 the loss of the LERO, the emergency response organization,
18 and the power discent, or there might be other operations
19 performed during the shutdown and that you had to get ready
20 to start up again and that all of these things involved
21 unanalyzed risks that were of a different nature than simply
22 a reactor in cold shutdown, that a reactor in cold shutdown
23 wasn't all there is to it.

24 What do you think of that argument? Do these
25 things seem to you intuitively perhaps to contribute a large
fraction to the risk?

Sim 10-13 1

2 A I don't think they contribute a large part to the
3 risk, and one of the reasons is you spend such a short
4 period of time in those conditions.

5 Any time you take the reactor from a condition
6 that is stable, that the operator has well under control and
7 you attempt to go to another condition that may also be a
8 stable controlled condition, but you have a transition, you
9 are leaving open an opportunity for a mistake.

10 So there is a risk involved in doing that, but
11 I think it is a small risk. They are trained to do that.

12 Q How about a totally different risk, the risk
13 presented by the fuel storage pool. That is there and pre-
14 sents its risk whether the reactor operates or not. And,
15 as has been pointed out in a couple of cases here, if the
16 fuel pool contributes any risk, any possibility to the risk
17 of offsite dosage, that risk of offsite dosage doesn't go
18 away.

19 Do you think that is important enough to say
20 that this condition should not be a guarantee of safety?

21 A I followed your comment up until the last sentence.

end Sim 22

Sue fols 23

24

25

26

#11-1-SueT

2 Q Well, perhaps I put it wrong. Do you think
3 that that, the fuel pool, would contribute an undue risk
4 absent the emergency response organization?

5 A (Witness Quay) I don't know of a case where
6 the fuel pool contributes significantly to the risk.

7 Q Thank you. That's exactly the kind of answer
8 I want.

9 One of you, I think Mr. Hodges, said that cold
10 shutdown was the safest condition they could put the reactor
11 in.

12 Is that right?

13 A (Witness Hodges) Yes, I think I said that.

14 Q What about conditions like completely defueled
15 or with all fuel shipped off-site?

16 A Yes, if you had sufficient warning to do that,
17 that would probably be a safer condition, yes, but in the
18 process of getting to that condition you are going to take
19 the top off the vessel, you are going to open up the
20 containment, you are going to be moving fuel. If you have
21 a limited work force with the strike conditions you may not
22 want to do that. You may want to leave the fuel in there
23 where you have a good cooling source, you have got people
24 who know how to operate the systems.

25 So, it's a very safe condition.

Q Lastly, I have a question about the interpretation

#11-2-SueT1

2 of this proposed license condition. Something Mr. Quay
3 said confused me, and then everyone else agreed to the
4 same statement and it bothered me even further.

4 Yes.

5 A (Witness Benedict) I think I did not respond
6 in any way to what Mr. Quay had said.

7 Q I see. Okay. It concerns the Paragraph Number 2
8 which permits them to conduct such other operations. And
9 the question was what other operations were. And Mr. Quay
10 said he thought they were things like movement of casks and
11 such.

12 Is that not correct?

13 A (Witness Quay) That's correct.

14 Q I note that the rest of that sentence says --
15 in fact, I will read the whole thing, "Conduct such other
16 operations as the staff shall approve if it is shown that
17 the strike does not in fact impair LILCO's ability to
18 implement its off-site emergency preparedness plan."

19 One would think that such codicil would be
20 included with the notion that if the off-site emergency
21 preparedness plan was not, in fact, impaired in any way
22 they could do anything, including running at full power,
23 couldn't they?

24 A (Witness Hodges) Yes.

25 (Witness Quay) I think that depends on the

#11-3-Sue#

2 staffing level, though. The number of on-site personnel
3 available under the tech specs.

4 Q They could do anything that they had on-site
5 people for?

6 A Yes.

7 Q Including running.

8 A (The witness, Mr. Quay, nodded in the affirma-
9 tive.)

10 JUDGE SHON: Thank you. I have no other
11 questions. Oh, one thing.

12 (Judge Shon and Judge Laurenson are conferring.)

13 JUDGE LAURENSEN: Judge Shon has raised a
14 question about the submission of the Staff, the official
15 Staff, position concerning this proposal and to the extent
16 that the Staff may wish to submit language different than
17 the language proposed by LILCO.

18 Under the schedule that we have previously
19 announced for submission of findings of fact, there would
20 be no opportunity for anyone except LILCO to comment on
21 such a proposal. We feel that because of the doubt that
22 has been added to this question by these witnesses that
23 there should be an opportunity to have the Staff's position,
24 as a formal position, submitted to this Board and to have
25 everyone -- to allow everyone to have an opportunity to
comment on that proposal.

#11-4-SueT

2 MR. HASSELL: We would be prepared to do that
3 in approximately two weeks at the outside. Obviously,
4 if it became earlier we would provide it to the Board and
5 the parties earlier.

6 JUDGE LAURENSEN: And in what format would you
7 propose for that?

8 MR. HASSELL: A written submission in the form
9 of a letter to the Board and parties.

10 JUDGE LAURENSEN: If that were done, would
11 seven days be an appropriate time for a response by every-
12 one?

13 MR. ZEUGIN: I think seven days would be
14 appropriate. Let me just clarify just one thing, Judge
15 Laurenson.

16 I take it that if the Staff concluded at the
17 end of two weeks that the LILCO proposal as written is
18 acceptable, there would be no need for parties to reply?

19 JUDGE LAURENSEN: Yes. That's my assumption.
20 If the Staff endorses the proposal that we have before us
21 right now in Dr. Cordaro's affidavit, then there would not
22 be a need because that's what we have been talking about
23 yesterday and today.

24 MR. MC MURRAY: Judge Laurenson, let me just --

25 MR. HASSELL: It may help if I submit that in
affidavit form if you have a preference that the Staff

#11-5-SueT1

position should be submitted in that manner.

2 MR. MC MURRAY: First of all, was the Board
3 contemplating a reply in writing, or are we going to be
4 coming back and presenting our views to the Board?

5 Or, what did you have in mind?

6 JUDGE LAURENSEN: I guess we were talking about
7 written responses.

8 MR. MC MURRAY: I can tell the Board now that
9 we are going to be busy writing findings. And if, in fact,
10 the Board orders some sort of response within a certain
11 number of days, that's going to have an impact, or should
12 have an impact, on our ability to complete the findings
13 within the schedule ordered by the Board.

14 We are going to need some time to review LILCO's
15 proposal, some time to sit down and write a response, and
16 it is going to have to be built into the finding schedule.

17 MR. ZEUGIN: I take it, Mr. McMurray, you mean
18 the Staff's proposal rather than LILCO's proposal?

19 MR. MC MURRAY: Well, yes, or the Staff's
20 revision of the proposal or whatever, whatever the Staff
21 comes up with as a proposed licensing condition.

22 (Judge Laurenson and Judge Shon are conferring.)

23 JUDGE LAURENSEN: After thinking about this, I
24 don't think there is really any need for anyone else to
25 respond to it on the schedule that I have talked about,

#11-6-SueT

2 because you will have the opportunity to respond in your
3 proposed findings and conclusions.

4 What we were trying to do is to get before every-
5 one within the proper type frame the official staff proposal
6 or position concerning this matter. Once that is filed
7 and everyone has that opportunity, you can then address the
8 Staff position in your proposed finding and conclusion.

9 So, I don't think any additional response would
10 be necessary. So, to the extent I said anything to the
11 contrary I withdraw that and correct it.

BOARD EXAMINATION

BY JUDGE KLINE:

12 INDEXX 13 Q I'm sure you understand that the Board raised
14 the issue of comparison of the cold shutdown case to the
15 five percent power case, because it's the only thing in
16 our regulations that contemplates some exemption from the
17 need for emergency preparedness.

18 We asked the question yesterday, which some
19 of you weren't here, regarding the kind of regulatory
20 standard that ought to apply. One would be -- one
21 possibility is that the cold shutdown case would be as
22 safe as or more safe than the five percent power case,
23 which already has an exemption from the need for emergency
24 preparedness.

25 And the panel today has appeared to take a

#11-7-SueT1

2 different standard, that being that it is just very safe,
3 and not make a comparison to five percent, to the five per-
4 cent case. It appeared to me that the witnesses wanted to,
5 in a sense, resist making a comparison.

6 So, I would ask you now, what regulatory basis
7 is there for permitting a condition to exist such that
8 a reactor has operated at full power, is now in cold
9 shutdown, and no emergency preparedness exists off-site?

10 Is there a regulatory basis now which would
11 permit you to approve such a condition?

12 A (Witness Sears) I will attempt to answer your
13 question. Rather, I will give you my personal opinion.

14 My personal opinion is that the case here will
15 be as safe as any other case with this reactor operating.
16 And the reason I say that, LILCO, in this case, has
17 stipulated that, the first conditions, that LERO organiza-
18 tion would not be functional in a strike. Well, it is a
19 fact that I have interviewed the two business managers of
20 the two unions involved.

21 And I have asked one in particular the specific
22 question, in case of a strike, in view of the fact that the
23 LERO organization is strictly voluntary, would your workers
24 be considered to be strike-breakers if indeed they performed
25 this voluntary LERO function. And he smiled, and he said:
I can't answer that question. You know that. But he said:

#11-8-SueTl

2 I will give you a statement that should answer the
3 question. And he gave me a written statement. And I have
4 a copy of it. And, I don't know whether he has even
5 transmitted this statement to LILCO. He gave it to me.

6 And it says that the union recognizes -- and
7 this is the statement of Don Daley, Business Manager,
8 Local 1381, IBEW. And it was -- he made this statement
9 after the vote was made to return to work, and it says
10 that the union recognizes that the LILCO emergency response
11 organization is a voluntary organization and outside the
12 normal scope of the Company's business. It further
13 recognizes that members of Local 1381 who have volunteered
14 for assignments in LERO are performing duties and functions
15 not associated with normal operations of the Company or
16 in job classifications covered by the collective bargaining
17 agreement between the Company and the union. Accordingly,
18 the union has no objection to any of its members volunteer-
19 ing for LERO assignments.

20 Now, this gives me reasonable assurance that
21 indeed in the event of a strike and a subsequent emergency
22 where the LERO organization was necessary to protect the
23 health and safety of the public that this union considers
24 LERO operations to be voluntary and so that it is up to
25 each man in the organization to make up his own mind
whether or not he will do this voluntary function.

#11-9-SueT₁

2 In my discussion with the business manager of
3 the other union, he did not give me a statement like this.
4 But he talked in the same vein, that is it's a voluntary
5 organization, that it's quite outside of the normal job
6 functions that the union has jurisdiction over. And we
7 sort of left it at that.

8 Q Let me ask the other panel members --

9 MR. MC MURRAY: Excuse me, Judge Kline.

10 Judge Laurenson, I would like to move to strike
11 Mr. Sears' reading of that stipulation into the record.
12 It really didn't -- it was not responsive to Judge Kline's
13 question, and I think it was just an unnecessary speech
14 by Mr. Sears.

15 I'm sorry for interrupting, Judge Kline.

16 MR. ZEUGIN: Judge Laurenson, I would argue it
17 was responsive to Judge Kline's question, because I
18 think what Mr. Sears was trying to explain was he wasn't
19 necessarily accepting the premise that LERO wouldn't exist
20 and was trying to give his grounds for suggesting that a
21 good part of LERO may well exist during a strike.

22 (Judge Laurenson and Judge Kline are conferring.)

23 JUDGE LAURENSEN: I have consulted with Judge
24 Kline, and his view is that it is important to determine
25 what the Staff is relying on, including anything other
than the condition of the reactor. To that extent, the

#11-10-SueF

motion to strike is denied.

2 And I think he wishes to pose the same question
3 to the other members of the panel.

4 BY JUDGE KLINE: (Continuing)

5 Q To the other members of the panel, is there a
6 regulatory basis for finding the condition that I outlined
7 to Mr. Sears acceptable based on an analysis of the
8 condition of the reactor alone and not relying on any
9 partial or any other aspect of the emergency planning
10 preparedness?

11 A (Witness Benedict) That's out of my areas of
12 expertise and responsibility, Judge Kline.

13 (Witness Hodges) Basically, I think you are
14 still going to the as safe as question. And at this
15 point, it can only be a judgment that it's as safe as.

16 Some of what I would have liked to have seen
17 submitted from LILCO is some evidence that it was as safe
18 as. I never saw that. And I'm -- so I'm going to a large
19 extent on judgment, considering a lot of events that could
20 not happen in the cold shutdown condition that would at
21 the other condition.

22 In both cases, there is a fairly substantial
23 period of time to respond to the event so that the risk
24 should be very small. And I have not seen any analysis
25 by LILCO, by other contractors or other utilities or the

#11-11-SueT

2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

NRC which would say it's as safe as. I have heard that there is a study been done by EPRI that is under review that says it's very safe. I have not seen that study.

But it would tend to at least support the judgment that we have made.

end #11
Joe flws

1 Q And I want to hear you say it explicitly. Is
2 it your judgment that a reactor in cold shutdown after having
3 operated is as safe as the reactor which has operated at
4 five percent power, with regard to potential exposures to
5 the public, by any mechanism?

6 A I would think it is, yes.

7 Q Does the rest of the panel agree with that?

8 A (Witness Sears) I do.

9 Q Okay. There is another aspect of NRC policy
10 that I want to explore briefly. That is the role of
11 probabilistic analysis in licensing. My understanding is
12 that probabilistic risks or goals are not to be used as
13 criteria for licensing, or for ultimate approval of licenses.
14 Is this still correct?

15 A (Witness Hodges) That is correct.

16 Q Is it possible for you to make a conclusion
17 as safe as without relying on probabilistic argument or
18 consideration. That is, an argument based solely on
19 deterministic facts?

20 A It is a relative judgment, and it becomes more
21 a judgment of substantially as safe as, because now you
22 are starting comparing two extremely low probability
23 situations, and you are comparing them in a situation where
24 you don't have the hard analysis, and even if you had it,
25 that might not be sufficient, because there is always

1 large uncertainties associated with them.

2 And so it is a judgment that substantially it is
3 as safe as. I mean, we don't think we can get much closer
4 in the answer.

5 Q Substantially as safe as, relies principally
6 on deterministic analysis? Does it?

7 A Yes. From my perspective it does.

8 JUDGE KLINE: Thank you. That is all I have.

9 JUDGE LAURENSEN: Any redirect examination

10 MR. HASSELL: Yes, Judge Laurenson. I just
11 have one area that I think needs clarifying.

XXX INDEX

12 REDIRECT EXAMINATION

13 BY MR. HASSELL:

14 Q Mr. Hodges, do you have before you a document
15 dated August 3, 1984, which is a letter from Donald P. Irwin,
16 to this Board, transmitting a copy of LILCO's Motion for
17 Summary Resolution of board determination involving effective
18 strike on LERO, and proposal of license condition?

19 A (Witness Hodges) Yes, I do.

20 Q That -- I believe you responded to a question
21 of Mr. McMurray's, where you suggested that the affidavits
22 that we -- that you received affidavits in draft form, that
23 were attached to the July 24th Board order, am I correct?
24 That was your prior testimony?

25 A When I responded to the question, I was looking

1 at the top document in the package I have been given, which
2 had a July 24th date, without thumbing through to look at
3 all the submittals to see what the dates were on the
4 submittal. I assume that was representative, and gave my
5 answer based upon that.

6 Q But looking at the attachments to the August 3,
7 1984 letter, which set forth the affidavits of Mr. Cordaro,
8 Mr. Scalice, John Rigert, and Elias Stergakos, are those
9 the same affidavits as LILCO EP Exhibit 71, 72, and 73?

10 A Yes, those are the same.

11 Q So, is it your testimony then that we received
12 -- is it still your testimony that we received the affidavits
13 in draft form?

14 A The copies that I received were not signed at
15 the time I received them.

16 Q Okay. So that is what you mean by received
17 in draft form?

18 A That is correct.

19 MR. HASSELL: Okay. I have no further questions.

20 JUDGE LAURENSEN: Any further questions for
21 this panel?

22 MR. McMURRAY: Judge Laurenson, I would just
23 like a minute to consult with our consultant.

24 MR. HASSELL: Judge Laurenson, so I am clear
25 on this, is two weeks acceptable to the Board. You never

1 really responded to whether that time period --

2 JUDGE LAURENSEN: Yes. I was going to wrap that
3 up as part of the final remarks, but that is acceptable, and
4 there will be no responses to that except in the proposed
5 findings of fact and conclusions of law. So, that will be
6 due on September 12th then.

XXX INDEX

7 RECROSS EXAMINATION

8 BY MR. McMURRAY:

9 Q Mr. Hodges, I think in response to some questions
10 by the Board, you stated that you believe that the cold shut-
11 down mode, I think you were talking specifically about the
12 possibility of a LOCA, would be as safe as operation at five
13 percent power. Do you recall that?

14 A (Witness Hodges) I recall that statement. I
15 don't recall it was confined to the LOCA.

16 Q Okay. You were talking about all possible
17 accidents, then?

18 A I was trying to consider the spectrum.

19 Q Okay. Were you considering the -- just cold
20 shutdown, or were you considering as well the period
21 of time from 100 percent power down to the achievement
22 of cold shutdown?

23 A My comment is really predicated on the cold
24 shutdown conditions themselves, although I don't think
25 that would add substantially to the risk.

Q Let's say if you just focused on the descent

1 from 100 percent power down to cold shutdown precisely to
2 that period of time, okay? Would that be as safe as
3 operation at five percent power?

4 A How long would you intend to operate at five
5 percent power for comparison?

6 Q Whatever you were discussing with Judge Shon.

7 A If an event occurred that could challenge -- or
8 could potentially lead to core melt, during the process of
9 descent from 100 percent power, there is less time to respond,
10 and may not be as many systems available to respond as compared
11 to operation at the five percent power level.

12 So, if something were to occur during that
13 time frame, it would be more severe, possibly. However,
14 you are in that mode of operation, this power transition
15 mode, for a short period of time compared to what you may
16 be at operating at the five percent power, as was discussed
17 with the low power hearing.

18 So, on balance they would probably be -- the risk
19 which is a combination of the consequences and the probability,
20 would, I still think, be roughly the same.

21 Q And I take it from what you told me earlier that
22 if there was -- after the notice of a strike there was
23 operation for more than one or two hours at one hundred
24 percent power, that that condition would not be as safe as
25 operation at five percent?

1 A I don't think that is what I said. I said
2 I would not be at all surprised nor upset if they continued
3 to operate for a short period of time in order to determine
4 those actions needed to be taken.

5 Q If they exceeded that short period of time, then
6 it would not be as safe as five percent operation, correct?

7 A I believe that the probability of an accident
8 leading to core melt is sufficiently small that if, for some
9 reason, it should happen that they did not start to go to
10 cold shutdown until after the workers went out on strike,
11 there would not be any large increase in risk, but I would
12 expect a period of a couple of hours to be a reasonable period
13 of time for them to take to say, yes, we are going to go there,
14 and then start, if that is what they are committing to
15 do.

16 Q I am asking you to focus on what happens if they
17 do not begin the cold shutdown within that one to two
18 hour period. You would agree with me, wouldn't you, that
19 operation at 100 percent would not be as safe as operation
20 at five percent. During that period of time before they go
21 down to cold shutdown?

22 A During that brief period of time, that is
23 correct.

24 Q Let's talk about the possibility of refueling,
25 Mr. Hodges. Would refueling operations under the conditions

1 that were postulated here without any LERO organization, be
2 as safe as operations at five percent power?

3 A Mr. Quay would be better qualified to answer
4 that particular question.

5 Q Mr. Quay?

6 A (Witness Quay) Would you repeat that again,
7 please.

8 Q Would refueling operations under the circumstances
9 that we have postulated here, with no offsite organization,
10 be as safe as operation at five percent power?

11 A First of all, I would like to add that they
12 have a license condition, or proposed license condition
13 that would restrict that, and aside from that, our basis
14 of comparison were the PAGs. We did no comparison of that
15 versus the five percent case.

16 We have no basis of comparing.

17 Q What you are telling me is you don't know.

18 A That is correct.

19 MR. McMURRAY: Judge Laurenson, I have no
20 further questions. I would just like to state, however,
21 that if in fact the Staff, after looking at LILCO's proposed
22 licensed condition does determine that there is going to be
23 a Staff position, so far we have only heard personal opinions
24 about the adequacy of LILCO's proposal -- the County believes
25 it has a right to cross examine the staff witnesses on any

1 proposal that the Staff makes that is different from LILCO's.
2 Cross examine those witnesses on the substance of their
3 changes, or the substance of their proposal. Why they
4 made those proposals, and why they consider those proposals
5 adequate.

6 And we believe we have a right to a hearing
7 and for cross examination.

8 JUDGE LAURENSEN: Any further questions of this
9 panel.

10 MR. ZAHNLEUTER: In order not to waive any
11 rights, the State joins in that statement by the County.
12 There are no other questions by the State.

13 MR. ZEUGIN: LILCO has no questions. We only
14 note that I think it is premature to consider whether or
15 not we should have additional hearings on a proposal on
16 a staff position we haven't seen, and can only speculate
17 on at this point in time.

18 JUDGE LAURENSEN: The panel of witnesses is
19 excused, and we thank you for your testimony.

20 (Panel stands aside.)

21 JUDGE LAURENSEN: Any rebuttal on this subject?

22 MR. ZEUGIN: LILCO has no rebuttal.

23 JUDGE LAURENSEN: Does the County have any
24 rebuttal?

25 MR. McMURRAY: No, Judge Laurenson.

1 JUDGE LAURENSEN: All right. That will conclude
2 the testimony on the sua sponte strike issues, and based on
3 our prior schedule, this should complete the hearing of all
4 matters in the Emergency Planning Proceeding.

5 I just want to review the matters that are still
6 unresolved at this point. First, we have the Motion of the
7 County to admit a new contention, which we have received
8 briefs and argument on, and we will attempt to decide that
9 next week. We have the LILCO motion for summary disposition
10 of the legal authority contentions.

11 The briefs are due from all other parties on
12 September 17th. By next Friday, September 7th, we will receive
13 a report concerning the other appendices consisting of the
14 witnesses list, exhibit list, and so forth.

15 The NRC Staff will file its position, if any,
16 on the LILCO license condition we have been talking about
17 by September 12th.

18 I am not going to review the rest of the dates
19 that we had previously set today. Are there any other
20 matters before the Board at this time?

21 (NOTE: No response.)

22 JUDGE LAURENSEN: Since there are apparently
23 none, this will complete the hearing on Emergency Planning,
24 and we have a lot of work to do. We wish you all well.

12-10-Wal

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- 21
- 22
- 23
- 24
- 25

(Whereupon, the hearing concluded at 1:10 p.m.,
August 29, 1984.)

* * * * *

CERTIFICATE OF PROCEEDINGS

This is to certify that the attached proceedings before the
NRC COMMISSION

In the matter of: Long Island Lighting Company, Emergency
Planning

Date of Proceeding: Wednesday, August 29, 1984

Place of Proceeding: Hauppauge, New York

were held as herein appears, and that this is the original
transcript for the file of the Commission.

Garrett J. Walsh, Jr.

Official Reporter - Typed

Garrett J. Walsh, Jr.
Official Reporter - Signature

MYRTLE H. TRAYLOR

Official Reporter - Typed

Myrtle H. Traylor
Official Reporter - Signature

MARY SIMONS

Official Reporter - Signature

Mary Simons
Official Reporter - Signature

MIMIE MELTZER

Official Reporter - Typed

Mimie Meltzer
Official Reporter - Signature