Enclosure 1

LILCO, March 4, 1985

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Commission

In the Matter of	)	
	)	
LONG ISLAND LIGHTING COMPANY	)	Docket 50-322-OL-4
	)	(Low Power)
(Shoreham Nuclear Power Station,	)	
Unit 1)	)	

LILCO'S PETITION
FOR REVIEW OF ALAB-800

Pursuant to 10 CFR § 2.786(b)(1), LILCO petitions for review of ALAB-800 (February 21, 1985) insofar as it reversed the Licensing Board's disposition of security contentions, remanded security issues for further consideration, and vacated authorization of Shoreham's Phase III and IV low power testing license.

I. Summary of Proceedings Below and ALAB-800

On February 12, 1985, the Commission declared effective an October 29, 1984 Licensing Board Decision, LBP-84-45, 20 NRC 1343 (1984), granting LILCO an exemption to conduct Phases III and IV of Shoreham's low power testing program without qualified onsite diesel generators. CLI-85-01, 21 NRC ____. Yet, authorization of a Phase III and IV license was short lived. On February 21, 1985, the Atomic Safety and Licensing Appeal Board, reviewing essentially the same issues as those raised during the Commission's immediate effectiveness review, reversed the Licensing Board's dismissal of Intervenors' security contentions, vacated the authorization for Phases III and IV, and remanded the case for further proceedings. ALAB-800 at 20. Because of the errors in ALAB-800 and the confusion and prejudicial delay it will engender, LILCO petitions for review.

II. The Appeal Board Erroneously Reversed the Licensing Board's Security Conclusions

A. Part 73 Does Not Require Emergency Power Sources To Be Considered Vital Equipment

The Appeal Board erroneously rejected the Licensing Board's conclusion that the NRC's regulations do not currently require emergency power sources to be considered vital equipment. ALAB-800 at 13-14. Vital equipment is defined as

> any equipment [or] system . . . the failure [or] destruction . . . of which could directly or indirectly endanger the public health and safety by exposure to radiation. Equipment or systems which would be required to function to protect public health and safety following such failure [or] destruction . . . are also considered to be vital.

10 CFR § 73.2(i).

The Appeal Board was wrong in concluding that this definition leads inevitably to the conclusion that emergency power sources are vital equipment. Onsite power supplies could be completely inoperable and yet the ECCS equipment still operate using offsite power. Indeed, GDC 17 requires an applicant to demonstrate that both the onsite and offsite power systems are capable of performing the necessary safety functions "assuming the other system is not functioning." Consequently, emergency power sources do not automatically fall within the § 73.2(i) definition because, by regulation, the normal offsite power system is equally capable of performing the necessary functions. At Shoreham, offsite power sources, in addition to the EMD diesels and gas turbines at the site, are capable of providing power to Shoreham well within the time needed to mitigate a LOCA at low power.[1] A logical interpretation of ALAB-800, however, would be to require protection of all offsite, as well as onsite, systems as vital -- surely

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[1] Deadline blackstart gas turbines at Holtsville, Southold, East Hampton and Port Jefferson can restore power to Shoreham in 6, 10, 15 and 25 minutes respectively. LBP-84-45 at 82 (¶¶ 45, 46), 83 (¶¶ 49, 51).

not a result consistent with the regulations.[2]

Since the regulations do not clearly require emergency power sources to be vital, written regulatory guidance and past practice are valid indicators of regulatory intent. Neither requires emergency power sources to be vital, as is clear from Shoreham's SSER-5, where the Staff admitted that there was no technical reason to further protect the EMDs or 20 MW gas turbine.[3] The Staff has subsequently revised this position informally, but even that revision (which the Licensing Board rejected) would have called for "vitalizing" only one power train -- the EMD diesels -- not two. The Licensing Board was correct in rejecting the Staff's sudden departure from ten years of consistent practice.[4] The Appeal

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[2] In papers submitted to the Low Power Remand Licensing Board on February 27, Suffolk County has contended that the EMD diesels and the 20 MW turbine must both be fully qualified under Part 73. New York State contends that, in addition, all of the offsite sources listed in footnote 1 must be fully qualified.

[3] Supplemental Safety Evaluation Report No. 5 says:

> [T]he staff finds . . . there is no technical reason to protect the temporary diesels and the gas-turbine generator as vital equipment because they are not required for safe shutdown* (in the absence of a LOCA).
>
> *NUREG-0992 recommends that the emergency power source be protected as vital equipment (even though no site specific need has been identified). This is not a formal requirement at this time. However, a proposed rule is presently before the Commission that, if adopted, would require the protection of onsite AC and DC power sources as independent vital islands.

NUREG-0420 (SSER No. 5) (April 1984) at 13-3. The EMDs were and are within the Protected Area of the plant. The 20 MW turbine, though not in the Protected Area, was and remains within the Owner Controlled Area. The existing security arrangements for each of these pieces of equipment are set out in LILCO's Response to Board's August 14, 1984 Request for Information on the Shoreham Security Program and Reply to Proposed Security Contentions. Although the Staff subsequently asked LILCO to "vitalize" the EMD diesels (which LILCO agreed to do), it continued to concede that there was no technical justification for doing so. Tr. S-281, -285, -295 (Kasun). The Staff's change in position was apparently prompted by the belief that its position in SSER No. 5 might somehow prejudice its pending rulemaking proposal. See Tr. S-286, -295, -296 (Kasun).

[4] An agency's long-standing construction and application of its own regulations strongly suggest their correct intepretation. See, e.g., National Ass'n of

(footnote continued)

Board's reliance on a proposed rulemaking for the proposition that emergency power sources are now required to be treated as vital areas was incorrect.[5]

B. There Is No Technical Need to Make the Enhanced Offsite Power Sources Vital

The Appeal Board found that the enhanced offsite power sources must be considered vital equipment because (1) in a LOCA no damage would occur if power could be restored in 55 minutes, and (2) the enhanced power sources could restore power within 55 minutes. ALAB-800 at 14. Reliance on these two findings ignores the Licensing Board's conclusion that no need exists to make the enhanced power sources vital equipment given the remote likelihood of their ever being needed. September 19 Order [Restricted] at 7-9. The uncontested record supports the Licensing Board. It demonstrates that for any of the accident and transient events normally analyzed in licensing a plant, except a LOCA, AC power would not be

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(footnote continued)

Greeting Card Pub. v. U.S. Postal Service, 569 F.2d 570, 600 (D.C.Cir. 1976), vacated on other grounds sub nom. U.S. Postal Service v. Assoc. Third Class Mail Users, 434 U.S. 884 (1977); U.S. v. Bd. of Supervisors, 611 F.2d 1367, 1372 (4th Cir. 1979). A new interpretation should be accorded little weight if inconsistent with prior agency interpretation and action. See Morton v. Ruiz, 415 U.S. 199, 237 (1974); Standard Oil Co. v. Dep't of Energy, 596 F.2d 1029 (TECA 1978). Changes in established agency practice require rulemaking. See Batterton v. Marshall, 648 F.2d 694, 710 (D.C.Cir. 1980).

[5] A rulemaking now underway would, among other things, designate emergency diesels, along with various other equipment, as vital for the first time. 49 Fed. Reg. 30,735 48,200 (1984). The Appeal Board's observation that the rule purports to "clarify and refine" existing requirements, ALAB-800 at 15, is not dispositive, see New England Power Company v. NRC, 683 F.2d 12, 15-16 (1st Cir. 1982); and in any event, the Commission chose not to proceed by an immediately effective "interpetive rule" but by notice and comment, as is done when existing requirements are being altered. Whether or not existing practice is to consider containments and control rooms vital, the undisputed record reflects that, until very recently, emergency power supplies were not considered vital under any circumstances, and that the Staff has taken both positions in this case. Thus, as to emergency power sources at Shoreham, the rule does impose new regulatory requirements.

needed for at least 30 days. LBP-84-45 at 34-35. A loss of coolant accident itself is an extremely unlikely event, LBP-84-45 at 52, as is a loss of offsite power, LBP-84-45 at 40-46; an unrestored loss of power in the time frame available is unlikelier still.[6] The likelihood of sabotage attempts aimed at causing harm to the public is also remote.[7] Thus, for security of the enhanced power sources to be of concern, four unlikely events must occur simultaneously. The Licensing Board's conclusion that the NRC's regulations did not require consideration of such multiple independent unlikely events, September 19 Order [Restricted] at 12, was reasonable.

III. The Terms of the Appeal Board's Remand Require Commission Review

The Appeal Board's decision also confused potential issues on remand. After holding, incorrectly, that the EMD diesels and the 20 MW turbine must be treated as vital equipment, it suggested alternatively that perhaps (1) LILCO might rely on the EMD diesels alone,[8] ALAB-800 at 19 (though without guidance as to

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[6] Realistic calculations demonstrate that at Phase III over 24 hours would be available to restore power during a LOCA, and at Phase IV three hours would be available; even the most conservative calculations at Phase IV still leave 55 minutes to restore power. Tr. 252, 298, 302-09 (Rao).

[7] The Federal Register notice promulgating the NRC's security regulations stated that there were no known terrorist groups in the United States capable of sabotage efforts envisioned by the regulations. 42 Fed. Reg. 10,836 (1977). Though incidents of vandalism have occurred, no known radiological sabotage events took place between 1974 and 1982, the period studied, at operating reactors in the U.S. Nuclear Regulatory Commission, Report of the Committee to Review Safeguards Requirements at Power Reactors (NUREG-0992), May 1983, at I-2.

[8] Such an analysis would not be inconsistent with the Staff's apparent current position, which is to require protecting as vital one power train to the ECCS system. It is also not inconsistent with the proposal in the Commission's proposed rule on security, 49 Fed. Reg. 30,735 col. 2: "Many vital areas are so configured that a saboteur must enter two or more areas in order to carry out successful sabotage. In such cases, it is not necessary to protect all of the areas in order to thwart sabotage." It is, however, irreconcilable with the Appeal Board's other conclusions in ALAB-800.

implications for the low power safety proceedings record), and (2) LILCO might rely on both the EMD diesels and the 20 MW turbine, with "somewhat less" security "than normally provided to vital equipment." Id. at 19-20. These observations, even if intended to be helpful, raise inevitably the following questions for remand:

1. May LILCO rely solely on the EMDs as vital equipment for purposes of Part 73, while relying on both the EMDs and the 20 MW turbine for purposes of the Part 50 analysis? Or may LILCO rely on the EMD diesels alone for Part 73 purposes only if it reopens the low-power record so as to establish reliance on the EMDs alone for Part 50 purposes?

2. May a different standard suffice for temporary vital equipment to be used only in low power operation than is necessary for full power?[9]

3. Whatever the answers to Questions 1 and 2, should either of these options require obtaining an exemption from Part 73? ALAB-800, at 18-20, says nothing about an exemption from Part 73 but might be taken to suggest that the Appeal Board contemplated any method of compliance with § 73.55, other than meeting the specific requirements of §§ 73.55(b) through (h), would require an exemption.[10]

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[9] Such an interpretation would be consistent with the Appeal Board's opinion in Pacific Gas and Electric Company (Diablo Canyon Nuclear Power Plant), ALAB-653, 16 NRC 55, 86-87 (1982), where low power operation was conditioned, without need for a Part 73 exemption, on bringing concedely inadequate guard training into full compliance prior to commencement of full power operation.

[10] LILCO believes that it can qualify the EMD diesels as vital equipment according to the specific "cookbook" provisions of § 73.55(b) through (h). However, the 20 MW turbine cannot be so qualified, though other measures can be taken to protect it. LILCO believes that such measures, taken together, may still meet the "high assurance objective" and an equivalent "overall level of system performance" required by § 73.55(a), without specific compliance with § 73.55(b) through (h) for both the EMD diesels and the 20 MW turbine, or an exemption. Intervenors disagree.

4. If an exemption proceeding is required, must there be new evidence and a separate decision on safety and public interest/exigent circumstances and, if so, does CLI-84-8 apply? Or does LILCO's Part 50 exemption request include any necessary security exemption (the operative language of §§ 50.12(a) and 73.5 is identical) and therefore render the applicable inquiry simply whether the security contentions affect the relative safety of plant operation as suggested in the Commission's July 18, 1984 Order?

5. What is the ambit of admissible issues in any remand proceeding? As an independent ground of decision, the Licensing Board found they contained insufficient specificity and nexus to other issues given the late stage of the proceedings.[11] The Appeal Board did not disturb this basis, stating only that some of the perceived lack of specificity should be re-evaluated in light of the reversal on the question of vital equipment. Yet, most of the contentions had nothing to do with vital equipment. The Appeal Board's failure to treat this issue could give rise to an open season for pleading new issues not opened by ALAB-800 itself or LILCO's subsequent "vitalization" of the diesels.

These questions are unavoidably raised, but not resolved, by ALAB-800. Absent their resolution, any remand proceeding will almost unavoidably wallow in multidimensional confusion, plagued by interlocutory appeals and noncongruent direct cases. The result will be delay and potential error.

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[11] Intervenors have long had access to LILCO's security plan and the site generally. They also have known details of LILCO's proposed low power configuration since March, 1984 and inspected the equipment in a May 1984 site tour. The Licensing Board correctly relied on this background in order to reject general unspecified contentions proffered, and then refined by Intervenors, in August 1984. The Appeal Board did not disturb the Licensing Board's conclusions that Intervenors should not be allowed to protract licensing proceedings by filing late and unspecific contentions, and that a heavier burden rests upon Intervenors at this stage to identify specific rather than abstract safety problems. Order Denying Security Contentions (September 19, 1984) at 10-11.

IV. The Appeal Board
Erroneously Vacated LILCO's Exemption

Even if the Appeal Board correctly remanded security issues, it should not have vacated authorization for LILCO's low power license. The test for whether previously authorized activities should be permitted pending a remand has three elements. First, the gravity of the questions being litigated must be considered. Consumers Power Co. (Midland Plant, Units 1 and 2), ALAB-458, 7 NRC 155, 159 (1978); see Pacific Gas and Electric Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2), CLI-83-27, 18 NRC 1146, 1150 (1983) (fuel load permitted while hearings underway). Second, the Board should undertake a "traditional balancing of the equities." Public Service Co. of New Hampshire (Seabrook Station, Units 1 and 2), CLI-77-8, 5 NRC 503, 521 (1977); Midland, 7 NRC at 169. And third, consideration must be given to any likely prejudice to further decisions that might be called for by the remand. Seabrook, 5 NRC at 521; Midland, 7 NRC at 173.

No serious safety concern has yet to be identified with respect to the remanded security issues. As noted above, the low power record establishes that any need to protect the enhanced AC power sources arises, if at all, only upon the concurrence of four unlikely events. Thus, even if the Appeal Board was correct that § 73.2(i) requires the enhanced AC power sources to be considered vital, the matter is not a pressing safety concern. Indeed, steps have already been taken by LILCO and approved by the Staff to protect the EMD diesels as vital equipment. LBP-84-45 at 21. Consequently, even if Intervenors have the right to litigate security issues for the enhanced power sources, there is significant assurance that the EMDs will be protected while that litigation is in progress.

The equities involved also favor restoring a Phase III and IV license. Both the Commission and the Appeal Board have had occasion to consider the equities associated with immediate operation of Shoreham versus further delay. Those considerations were found to weigh in favor of licensing Shoreham now. CLI-85-01 at 3-4; ALAB-800 at 8. The Appeal Board's failure to balance the equities in determining whether to vacate authorization for the Phase III and IV license on remand raises an important question concerning the Commission's policy that it has a responsibility to allow a plant to undertake testing once the plant has been determined safe. (Feb. 12 Tr. 15 (Bernthal)).

Another important equitable consideration is Suffolk County's failure to use the avenues of communication established under the comprehensive 1982 Final Security Settlement Agreement to raise any specific safety concerns. Under the terms of the agreement, LILCO is required to submit all revisions to the Shoreham security plant to the Suffolk County Police Department for review and comment. Accordingly, LILCO in November 1984 submitted Revision 9, describing the security aspects of the low power configuration at Shoreham. The Suffolk County Police Department has never offered comment or criticism on this revision. This failure suggests either that no concern exists or that Suffolk County, for tactical reasons, did not want to resolve security disputes expeditiously.

Finally, issuance of a low power license would not prejudice future resolution of the security issue. As the Commission has oft repeated, limited authorization to conduct operations in no way prejudices future decision. <u>See</u> <u>Diablo Canyon</u>, 18 NRC at 1149. If remanded security proceedings reveal any significant deficiencies, testing can be stopped until the shortcoming is remedied.

V. <u>Delay</u>

Delay at this point for Shoreham impacts heavily, prejudically and punitively on LILCO. The attached Affidavit of John D. Leonard, Jr. shows that delay in Phase III and IV testing has already cost LILCO a one-time out-of-pocket cost of \$250,000, that LILCO is also already incurring out-of-pocket costs from between \$300,000 and \$800,000 per month, that it will suffer an unavoidable additional four-month additional delay if this matter is not resolved before the end of June, and that personnel retention may become a serious problem from any extended delay. Failure to review ALAB-800 will cause further delay by (1) failing to reverse and thereby leading to unnecessary further Licensing Board proceedings, (2) prolonging any necessary Licensing Board proceedings by failing to clarify points of essential Commission policy, and (3) failing to reinstate the Phase III and IV authorization pending any necessary remand proceedings.

VI. Commission Review Is Appropriate

At least three reasons support the granting of the Petition for Review: (1) there are important questions involving public health and safety, important procedural issues, and important questions of public policy and interpretation of Commission regulations warranting reversal of ALAB-800; (2) numerous issues should be clarified, even if reversal is not warranted, in order to eliminate confusion before the Licensing Board; and (3) the erroneous decision will cause significant and unwarranted prejudicial delay in Shoreham's testing and thus contravene the Commission's public policy considerations leading to authorization of Phase III and IV testing. CLI-85-01.

VII. Conclusion

To resolve these issues and to avoid inequitable delay, the Commission should conduct an expedited review of ALAB-800.

Respectfully submitted,

LONG ISLAND LIGHTING COMPANY

Donald P. Irwin
Robert M. Rolfe
Anthony F. Earley, Jr.

Hunton & Williams
Post Office Box 1535
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DATED: March 4, 1985

CERTIFICATE OF SERVICE

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

I hereby certify that copies of LILCO'S PETITION FOR REVIEW OF ALAB-800 were served this date upon the following by U.S. mail, first-class, postage prepaid or by Federal Express (as indicated by an asterisk).

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DATED: March 4, 1985

Enclosure 2

UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT

DOCKETED USNRC

'85 MAR -6 A10:46

OFFICE OF SECRETARY DOCKETING & SERVICE BRANCH

MARIO M. CUOMO, GOVERNOR OF THE STATE OF NEW YORK and COUNTY OF SUFFOLK,	)
Petitioners,	)
v.	) Docket No. 85-1042
UNITED STATES NUCLEAR REGULATORY COMMISSION,	)
Respondent,	)
and	)
LONG ISLAND LIGHTING COMPANY,	)
Intervenor.	)

AFFIDAVIT OF JOHN D. LEONARD, JR.

John D. Leonard, Jr., being first duly sworn, deposes and says as follows:

1. My name is John D. Leonard, Jr. I am Vice President, Office of Nuclear Operations, Long Island Lighting Company (LILCO). My work address is Shoreham Nuclear Power Station, North Country Road, Wading River, New York 11792.

2. I received my bachelor's degree in physics from Duke University in 1953, and was President of Sigma Pi Sigma, the physics honorary society. I received my master's degree in physics, with a minor in radiobiology, in 1962, from a nuclear engineering curriculum of the U.S. Naval Postgraduate School, Monterey, California. I am a member of Sigma Xi and a registered professional engineer in New York State. I served in the U.S. Navy from

1954 to 1974, of which 12 years were spent on nuclear submarines. I was the Commanding Officer of two nuclear submarines, the U.S.S. Abraham Lincoln (SSBN-602) and the U.S.S. Benjamin Franklin (SSBN-640). Following my retirement from the Navy with the rank of Commander, I went to work for the Virginia Electric and Power Company from 1974 through 1976; there I was corporate Supervisor of Operational Quality Assurance. From 1976 through 1980 I was the first Resident Manager of the James A. Fitzpatrick Nuclear Plant, a boiling water reactor very similar to Shoreham, owned and operated by the Power Authority of the State of New York (PASNY). While I was at Fitzpatrick, in 1977, it was judged by the NRC to be one of the 12 best-managed nuclear power plants in the country from a safety standpoint. In 1980 I was promoted to Vice President-Assistant Chief Engineer for Design and Analysis at PASNY, with responsibility for the Fitzpatrick plant as well as PASNY's interest in the Indian Point reactors. I remained in that post until I came to work at LILCO as Vice President-Office of Nuclear Operations in May 1984.

3. My professional responsibilities at LILCO include overseeing the safety and operational aspects of the Shoreham Nuclear Power Station (Shoreham) and development of the plant.

I. BACKGROUND

4. Shoreham is a boiling water commercial reactor of approximately 810 MW net electrical capacity, owned by LILCO and located

at Wading River, on the north shore of Long Island approximately 60 miles east of New York City. I am familiar with the effects of LILCO's being able to conduct low power operations up to 5% of rated power at Shoreham. The purposes of this Affidavit are to provide background on the current posture of the Shoreham licensing proceeding, particularly as it relates to low power operation, to describe the benefits that will accrue from LILCO's conducting low power operation up to 5% of rated power as permitted by the license authorized on February 12, 1985 by the Nuclear Regulatory Commission in its decision CLI-85-01, and to indicate the harm that will occur if LILCO is delayed in conducting such testing.

5. Low power testing is the first experience of a reactor and its crews with actual operation. It is the foundation for the reactor's entire operating life. A soundly designed and executed low power testing program accomplishes the necessary transition from unirradiated, no-power conditions to irradiated operation at commercial power levels and provides a final check on the physical functioning of reactor systems. It also provides a baseline of training and experience that helps to set the tone for future operations. Shoreham's low power testing program has been divided into four phases designed to emphasize training, deliberate procedural actions, thoroughness in operations, and mechanical soundness of equipment. As a result, LILCO has built more testing and training into its low power testing program than is required or customary, and plant management is under operating instructions to

emphasize deliberatness using well-conceived procedures and thoroughness over speed.

6. On December 7, 1984 the Nuclear Regulatory Commission declared effective a September 5, 1984 Licensing Board Order authorizing issuance of a license permitting LILCO to load fuel ("Phase I" of low power testing) and conduct cold criticality testing ("Phase II" of low power testing) at Shoreham. Pursuant to License NPF-19, issued December 7, 1984, LILCO commenced loading fuel on December 21, 1984 and completed that process on January 19, 1985. LILCO commenced cold criticality testing on February 15, 1985, and Shoreham achieved its first self-sustaining nuclear chain reaction at approximately 6:25 pm that day. LILCO completed cold criticality testing on February 17, 1985 at approximately 6:00 am. Shoreham is ready now to proceed to Phase III of low power testing.

7. On February 12, 1985, the Nuclear Regulatory Commission declared effective an October 29, 1984 Licensing Board Initial Decision authorizing issuance of a license permitting LILCO to conduct heatup and low power testing to rated temperature and pressure conditions (1% of rated power) (Phase III) and low power testing to 5% of rated power (Phase IV).

8. This Affidavit is written in the context of a motion for a stay of the Commission's February 12, 1985 decision, pending later reviews on the merits. Consequently, it does not attempt to quantify the monetary cost of delays beyond the time when Shoreham

could otherwise enter commercial service. Rather, it focuses on the costs to LILCO of near-term delays and reviews the cost estimates prepared by Petitioners. A summary of this Affidavit is as follows:

1. Shoreham has a soundly designed, four-phase low power testing program. Phases I and II are complete. Fuel has been loaded into the reactor and it has "gone critical" -- it has had its first self-sustaining chain reaction. The reactor's fuel and vessel internals are by now irretrievably irradiated. The plant is ready to embark now on Phases III and IV of low power testing.

2. As presently planned, Phases III and IV could be completed in 42 days, or by about the end of March, if no complications develop. It would be unusual if at least minor complications, extending the completion of Phases III and IV by several days to several weeks, do not arise.

3. If any delay is imposed on Phases III and IV of low power testing, LILCO will incur, day-for-day, incremental out-of-pocket costs for expert technical advisors at a rate of between \$300,000 and \$820,000 per month. If LILCO is unable to undertake Phases III and IV by March 1, it will have to order new neutron sources for Shoreham at an out-of-pocket cost of \$250,000. If LILCO cannot undertake low power testing before July 1, it will have to replace the neutron sources. This would mean an unavoidable 60 to 70 day further delay before low power testing can commence, in addition to the time for low power testing (42 days plus

time for any complications), for a total delay of nearly four months at least. Thus if the start of low power testing is delayed, for any reason, beyond the end of June, it will be very unlikely that it can be completed before November; if the start were delayed until the end of July, testing could not readily be completed before December. In addition, delays would disrupt what has been to date an orderly and successful plant startup, and would create the risk of damaging losses by attrition from three groups of expert technical advisors retained to assist in plant startup, from the 300-person Plant Staff, and from 300 persons in related support organizations.

4. Petitioners overestimate by about a factor of ten the costs of undertaking Phases III and IV of low power testing, assuming Shoreham never subsequently operates commercially. The fuel in the reactor is already irradiated and not usable except at Shoreham; the incremental fuel cost of proceeding to Phases III and IV is not \$120 million as Petitioners suggest, but zero. The same is true of control rods and other reactor internals; the incremental cost of proceeding to Phases III and IV is not \$1 to \$2 million, but zero. The cost of defueling and decommissioning, put by Petitioners at unquantified "tens of millions" of dollars, has been estimated by LILCO at \$13 million. Thus if Shoreham completes low power testing but never operates commercially, the incremental cost is approximately \$13 million, not \$120 million plus "tens of millions" more. If Shoreham operates commercially, the incremental cost of proceeding to Phases III and IV is zero.

II. THE SHOREHAM LOW POWER TESTING PROGRAM

9. Conducting testing at up to 5% of rated power pursuant to the license for Phases III and IV authorized on February 12, 1985 will produce the following types of benefits, discussed in more detail in ¶¶ 10 below:

a. Testing of the reactor and its components up to the turbines at rated temperature and pressure, during both Phases III and IV;

b. Testing steam operated reactor safety equipment such as the High Pressure Coolant Injection System (HPCI) turbine driven pump and the Reactor Core Injection Cooling System (RCIC) turbine driven pump;

c. Testing the main steam system up to the turbine, including the main steam piping and steam drain system, the condenser under vacuum, and operating the steam driven main feed pump turbines;

d. Testing the off gas system including the catalytic recombiner, steam dilution and reheat systems;

e. Testing the rad waste systems and their associated steam driven concentrators;

f. Testing the steam reboiler system, which utilizes reactor steam to produce auxiliary steam from an enclosed pressure vessel in a separated loop, thus precluding radioactivity from the reactor from entering certain auxiliary systems;

g. Identifying and resolving unforeseeable equipment malfunctions and other systems operability problems which can be detected only during startup testing;

h. Training of the reactor's crews and other station personnel;

i. Accelerating the date of commencement of full power operation.

10. LILCO's division of low power testing into four steps was intended to permit accomplishment of discrete goals at each step. These were described in detail in the attached Affidavit of Jack A. Notaro and William E. Gunther, Jr., dated March 30, 1984, which accompanied LILCO's Supplemental Motion for Low Power Operating License, and the Testimony of William E. Gunther, Jr. during hearings leading to the Initial Decision now under appeal. (Tr. 152 ff.). Without repeating the details of that Affidavit, the following will summarize the activities at each stage of low power testing:

A. <u>Phases I and II: Fuel Loading and Precriticality Testing (December 21, 1984 - January 19, 1985); and Cold Criticality Testing (February 15-17, 1985) (Gunther-Notaro Affidavit, ¶¶ 6-11)</u>: Phase I, now completed, involved placing some 560 fuel bundles, each containing 62 fuel rods, into the reactor at predetermined locations. It also involved installation and utilization of specially designed startup neutron sources and instrumentation to monitor the reactivity in the core and the functioning of reactivity control measures needed beginning with Phase II. Control rod insertion drives, radiation monitoring, and other systems and instruments were checked. During this phase the plant was not critical -- i.e., there was no self-sustaining nuclear chain reaction occurring in the reactor core.

Phase II, also completed, involved withdrawal of control rods from the reactor core to a predetermined extent and sequence so as to achieve criticality -- i.e., a self-sustaining chain reaction -- at extremely low power levels (not above .001% of rated power). The effectiveness of the 137 control rods in controlling reactivity was measured. Plant operators were able to perform reactivity control manipulations, install vessel instruments under operating constraints, and install instrumentation for later measurement of pipe expansion and vibration upon heatup.

Over 5000 man-hours of valuable training were accumulated during Phases I and II. The plant itself did not become significantly radioactive outside the reactor core. However, as is described more fully in ¶ 17 below, the reactor fuel itself became sufficiently radioactive during Phase II that it no longer has any commercial value at any plant other than Shoreham as a practical if not theoretical matter. The same is true of reactor vessel internals (control rods, radiation monitors, etc.).

B. Phases III and IV: Heatup and Low Power Testing to Rated Pressure/Temperature Conditions (1% of Rated Power) (Authorized but not yet commenced); and Low Power Testing (1% to 5% of Rated Power) (Authorized but not yet commenced) (Notaro-Gunther Affidavit, ¶¶ 13-24): Phase III involves plant heatup and pressurization in progressive steps to rated pressure and temperature at 1% of rated power. Each of the six steps in this process includes the performance of a number of tests relating to thermal expansion of piping and training of reactor crews in integrated systems operation under actual operating conditions.

In Phase IV, the reactor is taken initially to 5% of rated power at rated temperature and pressure, tested and then taken through its first cooldown to ambient conditions. The plant is then heated up a second time to rated temperature and pressure; RCIC, HPCI and reactor feed pumps and associated balance-of-plant equipment are tested; and an endurance run on HPCI and RCIC is conducted. The plant is then cooled again to ambient conditions. Data are taken on nuclear steam supply system thermal expansion during each heatup and cooldown.

III. HARM FROM DELAY

11. A delay in undertaking Phases III and IV, if brief, would delay their completion at least day for day. A longer delay would have much longer than day-for-day consequences because of inevitable need to replace neutron calibration sources in the

reactor core. Such a delay could also jeopardize permanent and temporary plant staffing and training. Any delay imposes out-of-pocket costs.

12. Delay in Completing Low Power Operation: If plant startup were allowed to proceed now without any restraint and if no equipment malfunctions or administrative shortcomings are detected, it is conceivable that Phases III and IV could be completed in as short a period as 42 days. However, a basic purpose of initial plant startup is to detect problems and correct them before the plant enters commercial operation at full power, and risks increase and shutdowns become extremely expensive. If a problem is encountered with a safety-related system, correction can be very time-consuming because of the rigid substantive, documentary and quality assurance requirements covering design, procurement and installation of such systems. While it is not expected that problems requiring major delays in the ability to proceed between 5% and 100% of rated power will be encountered in Phases III and IV, the possibility cannot be ignored. It is conceivable that a malfunction in a safety-related system, however unlikely, could require a year to assess, remedy, and receive approval for in the licensing process. For example, the failure of the TDI emergency diesel generators, which gave rise to the exemption proceeding now under review, occurred in July 1983. The results of the repairs to them are still being litigated over 18 months later. While the likelihood of occurrence of this type of

problem is, in my judgment, extremely low, other, smaller problems with a presently uncertain potential for delay ranging from several days to several weeks will almost inevitably be detected. In addition, a problem that would affect Shoreham's completion of low power testing need not even originate at Shoreham; it could originate at any other plant that was similar in relevant aspects. For example, the difficulties experienced at Shoreham with its TDI diesels affected other plants, including Mississippi Power & Light Company's Grand Gulf plant, then in low power testing, for months.

My policy as Vice President-Nuclear has been, and will remain, to detect problems early and correct them systematically and without unnecessary haste. It is the purpose of plant startup to detect problems and correct them at the earliest possible time. A stay of low power testing at Phases III and IV of low power testing would both impair LILCO's ability to execute this sound policy and would enhance the risk that low power testing could delay commercial operation.

13. Replacement of Calibration Sources: Neutron sources of significant radioactivity must be in the reactor from initial fuel loading on, at any time when there is fuel in the reactor, in order to provide background levels of radiation in the core against which to calibrate reactor instrumentation. Five sets of these sources were installed at Shoreham in late December 1984 as part of fuel loading. These sources have a radioactive half-life of approximately 60 days, and will decay unless regenerated by

other activity in the reactor. When the reactor attains 5% power, the level of radioactivity in the reactor core is sufficient to substantially delay further decay of the sources; at higher power levels (upwards of about 15%), the sources are regenerated by activity in the core. If Shoreham does not start Phases III and IV by March, new power sources will have to be ordered at an out-of-pocket cost of $250,000, because of the long lead time for their fabrication and shipment. If Shoreham is prevented from commencing Phases III and IV by the end of June, the sources will have to be replaced. This would mean an unavoidable delay of at least 60 to 70 days in commencing low power testing. This is because in order to replace the sources the containment must be disassembled, the reactor vessel head unbolted and removed, and various fuel assemblies removed in order to access and replace the neutron sources. New sources would have to be ordered, shipped and replaced, and the reactor reassembled. The reactor would then require hydrostatic and leak rate testing as well as repetition of other types of testing already performed once in Phases I and II. My staff has estimated that this work can be accomplished in 40 days, using 50% of the plant's maintenance force working 3 shifts around the clock seven days per week. In the meantime, all of the ordinary maintenance these personnel would otherwise perform must be set aside. Deferral of maintenance not only is bad practice; it has cumulative effects. We have estimated an additional 20 to 30 days to catch up on this work. If unforeseeable complications develop (as can easily happen in round-the-clock work) further delays would result. Replacement of the sources would thus entail a delay in resuming Phases III and IV of at least 60 to 70 days and major diversion of personnel resources, in addition to the out-of-pocket monetary cost.

14. A stay which delayed the conduct of Phases III and IV of low power testing would also seriously impair the operational training of the Shoreham reactor crews and could even jeopardize LILCO's ability to retain them, as well as forcing LILCO to incur out-of-pocket costs ranging between $300,000 and about $800,000 per month, according to estimates prepared by my staff. LILCO's philosophy for low power operation has been to provide substantially more training of its reactor crews during Phases I-IV of low power testing than is minimally available or required in low power testing. In Phases I and II the aggregate amount of training totaled about 5000 man-hours. During Phases III and IV it is intended that training will total about 6000 man-hours. This will include repeated startups and heatups to rated pressure and temperature in Phase IV to give <u>each</u> operating crew an opportunity to experience plant response. Altogether in Phase IV, the Shoreham plant staff will be required to place in service, operate, test and maintain 54 plant systems. Notaro-Gunther Affidavit, ¶¶ 12, 24. Delay in Phases III and IV would jeopardize LILCO's ability to see to this training and would force LILCO to make wasted out-of-pocket expenses, in three respects: (A)

retention of access to expert personnel from other organizations, now on site to advise and assist in LILCO's low power and power ascension program; (B) out-of-pocket expenses to retain access to the expert advisors; and (C) training and retention of plant staff and related personnel.

A. Pursuant to technical specifications in its low power license from the NRC, LILCO has retained eight experienced advisors, including employees of other utilities and independent consultants, to act as shift operation advisors during low power testing anticipated to take place in early 1985 and in initial operation thereafter. These shift advisors have sufficient experience in operating nuclear reactors to assist LILCO in the low power testing program and to train LILCO's personnel. The cost to LILCO averages approximately $100,000 per year per advisor, including the cost of their employment and training. If completion of Phases III and IV of the low power testing program is delayed, LILCO will incur out-of-pocket losses for their salaries at the rate of about $70,000 per month.

Four of these advisors are on loan from other utilities. Each of the four has completed or is in the process of completing an eight-week-site-specific training program culminating in examinations to assure familarity with the Shoreham plant. Because these advisors are on loan from other utilities, they cannot remain indefinitely at Shoreham. LILCO has already been advised that at least one such advisor, on loan from Carolina

Power & Light Company, must return to that utility in May. I anticipate that there will be similar requests from the other utilities if a delay is experienced in Phases III and IV, in order that these personnel can remain qualified at their "home" nuclear facilities and advance their own careers. Each time LILCO needs to obtain a different advisor to assist in this process, it must conduct the eight-week site-specific training program before the new advisor can apply his knowledge. Thus delay, in addition to being costly, induces turnovers which involve further delay.

B. Also at the Shoreham site are 28 experienced personnel furnished by General Electric Company and 30 furnished by Stone & Webster Engineering Corporation to assist LILCO with its startup and power ascension program assumed to commence in early 1985. The primary purpose of these personnel is to advise LILCO personnel during the low power testing and startup program based on these organizations' previous operating experience at other nuclear facilities. Twenty-five of these personnel are scheduled to leave at the completion of Phase IV low power testing; the remaining 33 are scheduled to remain through various stages of power ascension. Delay in completion of low power testing imposes two direct costs on LILCO: out-of-pocket costs, and risk of loss of access.

These contractor personnel are charged to LILCO at a rate equivalent to about $12,000 per man-month. For the approximately 25 of these personnel who are scheduled to depart after the conclusion of low power testing, delay in its commencement represents a direct out-of-pocket cost to LILCO of approximately $300,000 per month. For the other 33 or so whose contracts run through the end of power ascension, full attribution of their costs (about $396,000 per month) directly to delay in Phases III and IV is less clear-cut than with those scheduled to leave at the end of low power testing, but the cost is real.

The second type of cost involves access to valuable experts. When no testing is taking place, these personnel are relegated primarily to paperwork. It has been my experience that unless such personnel are actively engaged in supervisory activities for which they were employed, their principals soon transfer them to other jobs where progress is being made and where the personnel can employ their skills. Accordingly, I anticipate that LILCO will lose the benefit of these personnel if low power testing is delayed. While such personnel may ultimately be able to return to Shoreham, scheduling difficulties make it likely that delays in the power ascension program would be necessitated.

C. Shoreham's Plant Staff, including reactor crews, supervisory personnel and staff support, would be adversely affected by a stay. These personnel, who number about 300, are highly trained and much in demand throughout the nuclear industry. While they are, individually and collectively, highly motivated and loyal to LILCO, they cannot be expected to ignore their own self-interest. Shoreham's completion and operation have been delayed time and again for a variety of reasons. The plant staff have endured, just in the past year, a reduction in force and pay cuts brought about by LILCO's financial difficulties, and a strike. They are at Shoreham for one purpose: to operate the plant. Delays and attendant frustration have cost LILCO valuable people in the past. With the heightened frustration of being unable to operate a plant which is physically complete and has been licensed by the NRC to operate, I fear the loss of knowledgeable, valuable, hard-to-replace personnel. Based on my naval experience as a nuclear submarine commanding officer and as the New York State Power Authority's first resident manager of the Fitzpatrick Nuclear Power Plant, I am convinced that personnel who have gone through the construction period of a plant or ship and the associated preoperational test programs have experience that directly influences safe reactor operation. It is common knowledge among naval commanding officers that the commissioning crew will probably be the most knowledgeable crew the ship ever has.

D. In addition to the Shoreham Plant Staff, there are approximately 300 additional employees, most of them professional or technical, who work in areas totally or primarily devoted to the support of Shoreham: the Nuclear Engineering Department, the Nuclear Operations Support Division, and the Nuclear Quality Assurance Department. Like the Plant Staff, these employees are highly trained and motivated; like the Plant Staff, they are highly sought after and highly mobile; like the Plant Staff, they have endured economic and other privations. I fear their loss by attrition if startup is delayed.

15. The effect of delay in the conduct of Phases III and IV of low power testing, whether from the stay requested here or other causes, cannot be stated precisely for all circumstances. However, the following things are clear. First, the out-of-pocket cost of expert utility and contractor personnel now onsite for low power testing and, in some cases, power ascension, is over $820,000 per month. At least $300,000 per month is directly attributable, day for day, to any delay in Phases III and IV. Second, purely from an operational standpoint, if we cannot predict before the end of June that low power testing will be complete by September 1, we will have to install new neutron sources, at an additional delay of at least 60 to 70 days. After that, the low power testing which could not be completed before September 1 will have to be done again, covering another 42 days or more. In short, a delay preventing the undertaking of Phases III and IV of low power testing beyond early June will, in all likelihood, delay completion of that testing until about the start of November, even if all goes smoothly. A delay beyond that time would retard completion of low power testing by at least 110 to 120 days beyond the end of the initial delay. If personnel -- advisors, plant staff or supporting personnel -- were affected in the meantime, the effect of delay would be increased by an unquantifiable but potentially long period.

16. Delay of Phases III and IV of low power testing would also lead to delays in LILCO's ability to generate power to its grid once a full power license is issued. LILCO has designed its ascension test program so that about 60% of the testing activities will be completed by the end of Phases III and IV of low power testing. This is a significantly larger amount of the overall program than is usually completed by the end of testing at 5% power. As a result, when a full power license is issued, LILCO will be in a position quickly to generate power directly to the grid, beginning at approximately 15 to 20% of rated power. Normally, the power ascension program requires the plant to frequently cease power generation to the grid in order to test its reaction to various transients. LILCO will test Shoreham's reaction to the maximum possible number of these transients during Phases III and IV of low power testing, a time when no power generation to the grid will take place. Accordingly, there will be a considerably reduced need to interrupt its power generation to the grid once a full power license is issued.

IV. INCREMENTAL EFFECTS OF PROCEEDING TO PHASES III AND IV

17. The February 12, 1985 Affidavit of Messrs. Bridenbaugh and Minor compares various costs of permitting Phases III and IV of low power operation (assuming that Shoreham never enters commercial operation), with those of halting operation after Phases I and II. Their principal estimated cost element, $120 million for

fuel, is incorrect in all respects. The actual initial cost to LILCO of Shoreham's core was approximately $40 million, and its value for any plant other than Shoreham was effectively reduced to zero when it was irradiated in Phase II. Thus the incremental fuel-related cost of proceeding to Phases III and IV is not $120 million but essentially zero. This and the other, smaller cost elements estimated by Messrs. Bridenbaugh and Minor are discussed more specifically below.

A. Nuclear Fuel: The Bridenbaugh-Minor Affidavit overestimates the value of Shoreham's core, before irradiation, to any other reactor. The $120 million cost estimated by Messrs. Bridenbaugh and Minor to purchase the fuel in the Shoreham reactor is incorrect; the actual figure paid was approximately $40 million, though it would be somewhat higher (on the order of $60 to $65 million) now. However, its resale value for any reactor other than Shoreham, even before irradiation in Phase II initial criticality, would have been substantially lower than its value to Shoreham since there is no ready market for the core. Nuclear reactor cores are custom-designed specifically for (1) the type of reactor (in this case, a BWR Mark 4) and (2) its stage of life (in this case, the first core). LILCO is not aware of, and believes that there are not, any other BWR Mark 4 reactors which have neither entered commercial operation yet nor had their first core already fabricated. Thus in order to be utilized economically and safely in any other reactor, Shoreham's core would have to be redesigned and refabricated. Each of the nearly 35,000 fuel rods in Shoreham's core would have to be separated individually from the others within its fuel bundle. Virtually every, if not every, rod would have to be opened and its nearly 300 individual fuel pellets (of varying degrees of uranium enrichment) and fuel spacing devices removed, evaluated and repacked, rod by rod, in different configurations, on the basis of engineering calculations performed for the other core. The resale value -- more accurately, salvage value -- of Shoreham's core, unirradiated, would reflect the cost of this costly and cumbersome process of removing, sorting and repacking the usable portion of some 10 million fuel pellets.

B. The Bridenbaugh-Minor Affidavit claims that the resale value of the fuel in the Shoreham reactor will not be substantially affected by irradiation before operation at Phases III and IV, with the implication that proceeding to Phases III and IV will incur a $120 million cost (Affidavit, ¶ 20, esp. ¶ 20(b)). That assertion is simply wrong; the cost, whatever it is, was already incurred in Phase II, when the fuel was initially irradiated. Though the degree of irradiation is not as high as at full power (or even 5%) operation, the fuel must now be treated for regulatory and commercial purposes as irradiated fuel. Thus the processes necessary to make this core usable at any other plant cannot physically be performed anymore without shielding against radiation. In addition, the core could not be removed from the reactor or shipped without shielding in accordance with NRC and DOT regulations. The amount of shielding required for its handling would not render such operations technically impossible. It would, however, render them commercially infeasible, especially in the current market, where neither raw uranium nor enrichment nor fabrication capacity are in short supply. Thus as of completion of Phase II activities, the salvage value of the Shoreham fuel for any reactor other than Shoreham is essentially zero. There are no further costs associated with the fuel in Phases III and IV.

C. Petitioners claim that proceeding to Phases III and IV will result in other areas of contamination which would not have occurred at Phases I and II: to control rods, radiation monitors and other reactor interals. (See Affidavit, ¶ 20(c)). They evaluate this cost at between $1 and $2 million. This assertion is also wrong. These components are as radioactive as Shoreham's fuel and whatever costs may be associated with their irradiation are already sunk.

D. Petitioners also claim that proceeding to Phases III and IV, without later commercial operation, would entail a cost for defueling, decontamination, decommissioning and disposal which they do not quantify but which, they assert, could be "tens of millions of dollars." (Affidavit, ¶ 20(d)). LILCO has estimated this cost at about $13 million.

E. Even if one assumes that Shoreham never reaches commercial operation, the incremental cost of proceeding to Phases

III and IV is only $13 million, not the $120 million plus $2 million plus uncounted "tens of millions" as postulated by Messrs. Bridenbaugh and Minor. If Shoreham is assumed to ultimately reach commercial operation, the incremental cost of proceeding to Phases III and IV is zero.

State of New York :
: to-wit:
County of Suffolk :

John D. Leonard, Jr.

John D. Leonard, Jr.

Subscribed to and sworn before me this 20th day of February, 1985.

LINDA A. CRATTY
NOTARY PUBLIC, State of New York
No. 4816267
Qualified in Suffolk County
Commission Expires March 30, 1986

Linda A. Cratty

Notary Public

My Commission expires: March 30, 1986

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

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

AFFIDAVIT OF JACK A. NOTARO
AND WILLIAM E. GUNTHER, JR.

Jack A. Notaro and William E. Gunther, Jr., being duly sworn, depose and state as follows:

(1) My name is Jack A. Notaro and I have been the Chief Operating Engineer for the Shoreham Nuclear Power Station (SNPS) since April 1983. Prior to that time, from July 1978 through April 1983, I was assigned as Operating Engineer for Shoreham. During March-April 1981, I was assigned to the Operations Section of the Millstone Nuclear Power Station for the completion of a refueling outage and power operation training at greater than 20% power. My duties and responsibilities as Chief Operating Engineer of Shoreham include the formulation and implementation of the training programs for all station personnel, direction of the day-to-day operation of the unit, including startup operation and shutdown of all station equipment and development and review of the Operation Section of the Station Operation Manual and the overall management of the Operations, Training and Security sections of the station.

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(2) I have a Bachelor of Mechanical Engineering degree (1970) and a Master of Business Administration degree (1974). I completed the General Electric BWR simulator program in July 1976 and obtained certification at the RO and SRO levels. In November 1982, I obtained a Senior Reactor Operator license on Shoreham.

(3) My name is William E. Gunther, Jr. and I have been the Operating Engineer for Shoreham since April 1983. My duties and responsibilities include the direction of the day-to-day operation and shutdown of all station equipment, final verification of all operating procedures, participation in initial requalification and replacement training programs for licensed and unlicensed operators and the establishment and maintenance of system operability to support fuel load.

(4) I have a Bachelor of Science degree in Electrical Engineering (1970) and a Master of Science degree in Electrical Engineering (1971). I earned a Senior Operator Certification from the General Electric Company on the Brunswick Unit 2 BWR in 1975 and I completed the General Physics Company BWR simulator program in December 1981 and obtained certification at the RO and SRO levels. In November 1982, I obtained a Senior Reactor Operator license on Shoreham.

(5) The purpose of this affidavit is to describe the steps involved in the following phases:

<u>Phase I</u>:	Fuel Loading and Precriticality Testing
<u>Phase II</u>:	Cold Criticality Testing
<u>Phase III</u>:	Heatup and Low Power Testing to Rated Pressure/Temperature Conditions (approximately 1% rated power)
<u>Phase IV</u>:	Low Power Testing (1-5% rated power)

These various phases will be described below, with a brief explanation of the testing and operations to be conducted during each phase.

<u>Phase I: Fuel Loading and Precriticality Testing</u>

(6) Fuel loading and precriticality testing involve placing fuel in the vessel and conducting various tests of reactor systems and support systems. Initial core loading involves the placement of 560 fuel bundles in specified locations within the reactor vessel. This major step requires significant testing as fuel loading progresses, and it takes at least 288 hours. The following testing is associated with initial core loading:

(A) Water chemistry surveillance testing. This testing must be performed prior to, during and after the fuel loading operation. The purpose of water chemistry surveillance testing is to ensure clarity of the water so that the fuel loading process can proceed and to minimize the amount of the corrosion products in the primary system.

(B) Control rod drive stroke time and friction tests. These tests are performed during the fuel loading step to ensure that the reactor shutdown capability is maintained at all times and to ensure the control rod drive mechanisms are performing as designed.

(C) Installation, calibration and utilization of special startup neutron instrumentation. This instrumentation is required for core loading activities to ensure proper monitoring of core conditions by the Operating, Reactor Engineering and Instrumentation and Control personnel. Source range monitor testing and alignment tests calibrate the neutron monitoring instrumentation and verify proper final alignment of this vital equipment.

(D) Core verification instrument operability check. These checks are performed to verify that the equipment utilized to determine that the core has been loaded correctly is operable. Final core verification checks are completed at this time.

The tests listed in (A) through (D) above involve valuable supplemental training and experience for personnel assigned to the Reactor Engineering Section, Radiochemistry Section, Operating Section, Maintenance Section and Instrumentation and Control Section. The training described in steps (B), (C) and (D) can be fully accomplished only during the fuel load operation.

(7) Following placement of the fuel in the vessel, a number of tests must be performed to verify the operability of systems prior to going critical in the reactor. This phase of startup testing takes approximately 150 hours and includes the following:

(A) Local Power Range Monitor (LPRM) sensitivity data. During this test, the 31 local power range monitor strings are calibrated and verified to be operable. Instrumentation and control technicians will perform this testing, and obtain training in the use of calibration procedures and special test equipment.

(B) Zero power radiation survey for background readings. Various locations in the plant are surveyed by health physics technicians to determine background radiation levels with fuel in the vessel.

(C) Recirculation system instrument calibration checks. Operation of the recirculating pumps with fuel in the vessel is conducted to determine core internal pressure drops and to verify system performance. Operation of the system above minimum speeds with the vessel internals installed can be accomplished only with fuel in the reactor.

(D) Control rod drive scram time testing. Following fuel load, each control rod drive mechanism is scrammed from its full withdrawn position following control rod coupling surveillance testing to verify that rod insertion can be accomplished within the prescribed time.

(E) Cold MSIV timing. This functional test of the main steam isolation valves verifies that their opening and closing times are within technical specification acceptance criteria.

Again, the testing and activities described in (A) through (D) above can be accomplished only after fuel has been placed in the vessel. The experience and training gained from these activities will be an invaluable Shoreham-specific augmentation to the years of extensive preoperational training that the reactor operators have previously undergone.

Phase II: Cold Criticality Testing

(8) This phase involves a specified control rod withdrawal sequence that results in achieving reactor criticality at extremely low power levels (.0001% to .001% of rated thermal power). In addition, this step involves shutdown of the reactor by inserting all control rods in reverse order. While withdrawing each rod, reactor operators monitor the effect of its withdrawal in terms of neutron flux. By analysis and calculation, Reactor Engineering personnel are able to assign a "worth" to each control rod, i.e., the effectiveness of each rod in controlling reactivity. Important operator hands-on experience is gained during this step. Reactor operators must annually perform a minimum of ten reactivity control

manipulations. This experience provides additional training for reactor operators in the use of appropriate instrumentation and equipment to determine when criticality is achieved during the withdrawal of control rods. This important experience on the Shoreham reactor can be gained only after fuel has been placed in the vessel. Similarly, Reactor Engineering personnel obtain valuable training and experience during this closely monitored activity. LILCO plans to repeat the operations during this phase of low power testing to offer each operating shift crew this valuable BWR experience.

(9) Cold criticality testing requires plant maintenance personnel to install vessel internals in accordance with station procedures and with all refuel floor constraints in place. Maintenance personnel gain experience with the operation of the refuel bridge and reactor building crane.

(10) Also performed at this time is the installation of the expansion and vibration instrumentation. Cold baseline data are obtained at this point to determine pipe movement as heatup occurs later in the low power test program. The data provide a benchmark against which subsequent test results can be assessed.

(11) During the course of fuel loading, precriticality testing, and cold criticality testing, the plant staff must place in service, operate, test, and maintain 41 systems. These reactor systems and support systems include the following:

Control Rod Drive System (CRD)
Core Spray System
Diesel Generator
4160 V System
480 V System
120 V AC Instrument Bus
120 V AC Reactor Protection System (RPS)
120 V AC Ininterrupted Power Supply
125 V DC System
24 V DC System
Low Pressure Coolant Injection (LPCI)
HVAC-Drywell Cooling
Reactor Building Closed Loop Cooling Water System (RBCLCW)
Reactor Building Normal Ventilation System (RBNVS)
Residual Heat Removal System (RHR)
Reactor Recirculation System
Service Water
Reactor Building Standby Ventilation System (RBSVS)
Standby Liquid Control System
Condensate System
Feedwater System
HVAC - Control Room
HVAC - Turbine Building
Reactor Water Cleanup System
Station Air System
Turbine Building Closed Loop Cooling System
Containment Area Leakage Detection System
RBSVS & CRAC Chilled Water Systems
Neutron Monitoring Instrumentation
Reactor Manual Control
Radwaste Liquid Collection and Processing
Circulating Water
Demineralized Water
Well Water and Domestic Water System
Normal Station Service Transformer and 138 KV System
Reserve Station Service Transformer and 69 KV System

Fire Protection System
Fire Suppression System
Reactor Vessel Water Level
Radiation Monitoring System
Heat Tracing System

The operation of these systems provides valuable training and experience to operating plant personnel, including licensed operators. LILCO plans to repeat certain of the activities in this phase of low power testing to provide additional, valuable BWR operating experience. It is estimated that there will be 5000 total manhours of training accomplished and achieved during fuel loading, precriticality testing, and cold criticality testing described above.

Phase III: Heatup and Low Power Testing to Rated Pressure/Temperature Conditions (Approximately 1% Rated Power)

(12) During this phase of low power testing, reactor heatup and pressurization commences and the power level is taken in progressive steps to 1% of rated power. Along the way, the heatup and pressurization of the reactor vessel and associated piping systems enables the plant staff to perform important tests relating to thermal expansion of piping and integrated system operation under actual operating conditions. The principal steps associated with this phase of low power testing are described below.

(13) Rod withdrawal sequences are followed to achieve criticality and system heatup from ambient conditions to 150 psig. During this step, the following tests and training are accomplished:

(A) Conduct Source Range Monitor (SRM) response testing to verify source range monitoring calibration and response;

(B) Establish condenser vacuum following establishment of steam seals and other main turbine auxiliary systems;

(C) Obtain initial baseline readings for Nuclear Steam Supply (NSS) system thermal expansion;

(D) Place steam jet air ejectors in service on main steam;

(E) Achieve warmup of the High Pressure Coolant Injection (HPCI) and Reactor Core Isolation Cooling (RCIC) systems;

(F) Achieve controlled warmup of reactor feed pump turbines and integrated operations of the condensate and feedwater systems;

(G) Obtain Intermediate Range Monitor/Source Range Monitor (IRM/SRM) overlap data;

(H) Obtain Intermediate Range Monitor (IRM) range 6-7 overlap data; and

(I) Perform an Average Power Range Monitor (APRM) calibration while heating up.

Operating personnel and instrumentation and control technicians receive valuable training and experience in the course of these steps.

(14) With the reactor at 150 psig and during the continued heatup from 150 to 250 psig, the following system tests are performed:

(A) Drywell inspection;

(B) Data gathering for Nuclear Steam Supply (NSS) system thermal expansion;

(C) Data gathering for Balance of Plant (BOP) system thermal expansion;

(D) Operation of Main Turbine Electro-Hydraulic Control (EHC) System;

(E) Data gathering for Reactor Building Closed Loop Cooling Water (RBCLCW) steady state performance;

(F) RCIC initial operability demonstration with manual start and hot quickstart, condensate storage tank (CST) to CST recirculation;

(G) Motor Operated Valve (MOV) dynamic testing on Residual Heat Removal (RHR) system;

(H) HPCI initial operability demonstration with manual starts and hot quickstarts, CST to CST recirculation;

(I) Maintenance of suppression pool within technical specifications using RHR suppression pool cooling;

(J) Operation of steam seal evaporator, radwaste evaporator and main condenser deaerating system;

(K) Verification of capability to shut down the reactor from outside the control room utilizing the Remote Shutdown Panel.

(15) With the reactor at 250 psig and during the continued heatup from 250 psig to 350 psig, the following testing is performed:

(A) Maintain EHC pressure setpoint at 250 psig and withdraw control rods to open turbine bypass valves (BPV) for Safety Relief Valve (SRV) testing;

(B) Functionally test the Safety Relief Valves (SRV) manually opening one SRV at a time;

(C) Obtain drywell piping vibration data while performing the SRV tests;

(D) Gather data for system thermal expansion tests.

(16) With the reactor coolant system pressure between 350 psig and 550 psig, the following testing is performed:

(A) Place one reactor feedwater pump and the low flow feedwater controller in service and monitor their operation to ensure that they perform their function of supplying water to the reactor vessel at the appropriate flow rate;

(B) Gather data for system thermal expansion tests;

(C) Perform Average Power Range Monitor (APRM) heatup rate calibration;

(D) Verify loose parts monitoring system operability.

(17) With the reactor coolant system pressure between 550 psig and 800 psig, the following testing is performed:

(A) Conduct a drywell temperature inspection and gather data for system thermal expansion tests;

(B) Obtain Reactor Building Closed Loop Cooling Water System (RBCLCW) performance data;

(C) Scram selected control rods to obtain scram time data.

(18) With the reactor coolant system pressure at 800 psig and heatup to 920 psig, the following occurs:

(A) Scram selected control rods for scram time data;

(B) Obtain system thermal expansion data for nuclear steam supply systems and balance of plant systems.

Phase IV: Low Power Testing (1-5%)

(19) During this phase of low power testing, the power level is taken in progressive steps from 1% to 5% of rated thermal power. With the reactor coolant system at rated temperature and pressure, the operator will withdraw rods and open one Main Turbine bypass valve to establish a steam flow such that core thermal power is less than 5% rated thermal power. Once this condition is established, the following tests are performed:

(A) Demonstrate RCIC operability;

(B) Demonstrate HPCI operability;

(C) Perform dynamic motor operated valve tests, inservice leak tests and hot hanger sets on plant systems;

(D) Align Traversing Incore Probe (TIP);

(E) Calibrate the bottom reactor pressure vessel head drain line flow indicator and perform main steam isolation valve functional tests;

(F) Perform RCIC and HPCI controller tests (CST to CST recirculation); and

(G) Perform IRM/APRM overlap calibration.

(20) After the completion of the tests just listed, the first cooldown to ambient conditions will commence. During this cooldown, the following activities take place:

(A) Perform source range monitor/intermediate range monitor overlap calibration;

(B) Position one turbine bypass valve so that core thermal power is less than 5% and maximum steam flow is available for HPCI;

(C) Perform a HPCI/RCIC stability test to demonstrate the stability of the controller setting from the 1000 psig test;

(D) Perform a drywell and reactor building inspection of system thermal expansion instruments.

(21) Then comes a second heatup to rated conditions. During this heatup, the key activities include:

> (A) Demonstration of the source range and intermediate range monitor response to control rod withdrawal;
>
> (B) Gathering of system thermal expansion data;
>
> (C) Calibration of the average power range monitors.

(22) When the plant is at rated temperature and pressure, the plant staff verifies that core thermal power is less than 5% rated thermal power by performing a heat balance. After the verification of core thermal power is complete, a RCIC cold quickstart and endurance run are performed.

(23) Subsequent to the completion of the second test period at 920 psig, the plant will be cooled down to ambient conditions. During this cooldown, the plant will obtain nuclear steam supply system thermal expansion data for the second time. When ambient conditions are reached, the low power tests are concluded. Repeated startups and heatups to rated conditions will be performed at Shoreham, however, so that <u>each</u> operating crew can be given the opportunity to experience plant response to the tests and activities presented above.

(24) In order to support and perform all of the functions and tests performed during Phases III and IV described above, the plant staff will be required to place in service, operate, test and maintain 54 plant systems. In addition to the reactor systems and support systems listed in paragraph 12 above, these are as follows:

Automatic Depressurization System (ADS)
HPCI
Offgas System
RCIC
Generator Seal Oil System
Main Steam System
Turbine Generator
Turbine EHC
Turbine Lube Oil System
Steam Seal System
Area Leakage Detection
Reactor Vessel Pressure and Temperature Systems
Remote Shutdown System

It is important to emphasize once more that the operation of these systems and the various functions and tests performed during Phases III and IV of low power testing, as with the activities during Phases I and II, will provide valuable training and experience to operating plant personnel, including licensed operators. As noted in this affidavit LILCO intends to expand the fuel load and precriticality testing, cold criticality testing and low power testing activities to provide Shoreham's operating personnel with additional operating experience above that which would result from a conventional fuel load and low power testing program. It is estimated that 6000 manhours of training will occur during Phases III and IV, in addition to the 5000 manhours during Phases I and II.

Jack A. Notaro

Jack A. Notaro

William E. Gunther, Jr.

William E. Gunther, Jr.

STATE OF NEW YORK)
) To-wit:
COUNTY OF SUFFOLK)

Subscribed and sworn to before me this 30 day of March, 1984.

My commission expires: March 30, 1985.

Connie Maria Pardo

Notary Public

CONNIE-MARIA PARDO
NOTARY PUBLIC, State of New York
No. 52-4615810
Qualified in Suffolk County
Commission Expires March 30, 1985