STATEMENT OF MATERIAL FACTS AS TO WHICH THERE IS NO GENUINE ISSUE TO BE HEARD ON PHASE II LOW POWER TESTING

The following is the Statement of Material Facts as to which LILCO contends there is no genuine issue to be heard concerning Phase II low power testing:3/

1. Phase II of low power testing includes cold criticality testing of the plant at essentially ambient temperature and atmospheric pressure. Rao, et al., Tr. 285-86; Sherwood Affidavit at ¶ 14; Hodges Affidavit at ¶ 15.

2. Phase II testing involves a specified control rod withdrawal sequence that results in achieving reactor criticality at extremely low power levels, in the range of 0.0001% to 0.001% of rated thermal power. During this phase, reactor operators withdraw each of the 137 control rods and 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, that is, the effectiveness of each rod in controlling reactivity." Gunther, Tr. 204-06; Notaro Affidavit at ¶ 8; Hodges Affidavit at ¶ 5.

3/ These facts appear in the record in the affidavits filed with LILCO's Supplemental Motion for Low Power License dated March 20 and in the testimony of the seven witnesses who testified on April 24 and 25 before the Licensing Board. Since these documents are readily available, copies have not been attached. Facts also appear in an affidavit of Wayne W. Hodges, dated April 4, 1984, which is attached.

3. Cold criticality testing requires plant maintenance personnel to install vessel internals in accordance with station procedure and with all refuel floor constraints in place. Expansion and vibration instrumentation is also installed. Cold baseline data are obtained to determine pipe movement as heatup occurs later in the low power test program. Gunther, Tr. 205; Notaro Affidavit at ¶ 8.

4. The primary purpose of Phase II testing is to verify shutdown margin calculations. The shutdown margin is measured by withdrawing the analytically strongest rod or the equivalent and one or more additional rods until criticality is reached. This procedure is completed and the necessary data obtained within 5 minutes after going critical. After the conclusion of the procedure, the control rods are reinserted into the core, thereby stopping the reaction and returning the core to subcritical status. Gunther, Tr. 205-06.

5. Under the plant conditions present in Phase II, many events analyzed in FSAR Chapter 15 could not occur or would be very unlikely. Even the possible Chapter 15 events would have no impact on public health and safety regardless of the availability of the TDI diesels. Rao, et al., Tr. 286-89, 295; Sherwood Affidavit at ¶¶ 15-17, 22; Hodges Affidavit at ¶ 6.

6. Of the 23 possible Chapter 15 events reviewed, 20 do not require the assumption of loss or unavailability of off-site AC

power. Therefore, the consequences of these events are unaffected by the unavailability of the TDI diesels. Rao, et al., Tr. 291; Sherwood Affidavit at ¶ 18.

7. The three events that do assume loss or the unavailability of off-site AC power are: pipe breaks inside the primary containment, feedwater system pipe break, and the loss of AC power event. Rao, et al., Tr. 292; Sherwood Affidavit at ¶ 19.

8. Because of the extremely low power levels reached during Phase II testing, fission product inventory in the core will be only a small fraction of that assumed for the Chapter 15 analysis. The FSAR assumes operation at 100% power for 1,000 days in calculating fission product inventory; inventory during Phase II low power testing will be less than 1/100,000 (0.00001) of the fission product inventory assumed in the FSAR. Rao, et al., Tr. 295; Sherwood Affidavit at ¶ 17.

9. If a LOCA did occur during the cold criticality testing phase (Phase II), there would be time on the order of months available to restore make-up water for core cooling. At the power levels achieved during Phase II, fission product inventory is very low. At most, the average power output will be a fraction of a watt-per-rod, with no single rod exceeding approximately two watts. With these low decay heat levels, the fuel cladding temperature would not exceed the limits of 10 C.F.R. § 50.46 even after months without restoring coolant and without a source of AC

power. Thus, there is no need to rely on the TDI diesel generators, or any source of AC power. Rao, et al., Tr. 292-94; Sherwood Affidavit at ¶ 19; Hodges Affidavit at ¶ 8.

10. During Phase II cold criticality testing conditions, there is no reliance on the diesel generators for mitigation of the loss of AC power event or the feedwater system piping break event. For these events, no loss of coolant occurs and the decay heat is minimal. Core cooling can be achieved for unlimited periods of time without AC power using the existing core water inventory and heat losses to ambient. Rao, et al., Tr. 293-94; Sherwood Affidavit at ¶ 20; Hodges Affidavit at ¶ 6.

11. The LOCA and the feedwater system piping break postulate the double-ended ruptures of a piping system. Because the reactor will be at essentially ambient temperature and atmospheric pressure during Phase II, it is extremely unlikely that such a pipe break would ever occur. The NRC Staff does not require double-ended ruptures to be postulated for low temperature and low pressure systems in safety analyses. Rao, et al., Tr. 294; Sherwood Affidavit at ¶ 21; Hodges Affidavit at ¶ 7.

12. None of the events analysed in Chapter 15 could result in a release of radioactivity during cold criticality testing that would endanger the public health and safety. Rao, et al., Tr. 305; Sherwood Affidavit at ¶ 17.

13. Even if AC power were not available for extended periods of time, fuel design limits and design conditions of the reactor coolant pressure boundary would not be approached or exceeded as a result of anticipated operational occurrences, and the core would be adequately cooled in the unlikely event of a postulated accident. Rao, et al., Tr. 295-96; Sherwood Affidavit at ¶ 22.

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 MARVIN W. HODGES CONCERNING THE SUPPLEMENTAL MOTION FOR LOW POWER OPERATION, PHASE I AND II, AT SHOREHAM

I, Marvin W. (Wayne) Hodges, being duly sworn, state as follows:

1. I am a Section Leader in the Reactor Systems Branch of the Office of Nuclear Reactor Regulation. A copy of my professional qualifications is attached.

2. Long Island Lighting Company (LILCO) filed a Supplemental Motion for Low Power Operating License dated March 20, 1984. In that motion, LILCO proposed a phased program for low power operation at Shoreham. The four phases proposed are:
   a) Phase I: fuel load and precriticality testing,
   b) Phase II: cold criticality testing,
   c) Phase III: heatup and low power testing to rated pressure/temperature conditions (approximately 1% rated power); and
   d) Phase IV: low power testing (1-5% rated power)

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The purpose of tnis affidavit is to address the impact on the health and safety of the public of operation in Phases I and II.

3. In Phase I, fuel loading and precriticality testing, the reactor will not be taken critical. There will be no heat generation in the core. There will be no fission products. Because there will have been no power generation and, consequently, no decay heat, there will be no need for cooling systems to remove decay heat.

4. In its supplemental motion, LILCO examined the 38 accident and transient events addressed in Chapter 15 of the FSAR. I have reviewed the 38 transients and accidents listed and I agree with LILCO that many of the events could not occur because of the operating conditions of the plant (e.g., a turbine trip or a load rejection transient cannot occur when the turbine is not in operation and there is no load on the generator). Of the events that could occur (e.g., loss of AC power), there are no safety concerns because of the absence of power generation.

5. Phase II, cold criticality testing, will involve testing in the power range of .0001% to .001% of rated power at essentially ambient temperature and atmospheric pressure. Because of the low power level and the limited duration of testing, fission product inventory and decay heat will be very low.

6. As for Phase I, many of the Phase II transients and accident analyzed in Chapter 15 of the FSAR cannot occur. For those transients and accident which can occur, other than a loss-of-coolant accident, core cooling can be achieved, even without AC power, using the existing core water inventory and passive heat loss to the environment. Therefore, there would be no threat to the health and safety of the public.

7. Because of the low pressure conditions, it is not reasonable to postulate a loss-of-coolant accident during Phases I and II operation. The NRC normally postulates breaks only in high energy lines; for Phases I and II, there are no high energy lines. However, even if a loss-of-coolant accident should occur during Phase II operation, there is plenty of time available for restoring offsite power should onsite power not be available.

8. If a loss-of-coolant accident should occur during Phase II testing, LILCO states that there would be time on the order of months available to restore make-up water for core cooling. At the decay heat levels which would exist under these conditions, heat transfer to the environment would remove a significant fraction of the decay heat. However, even if no heat transfer from the fuel rods is assumed and equilibrium fission products are assumed (i.e.,

inifinite operation at .001% power), then more than 9 days are available to restore cooling prior to exceeding a temperature of 2200°F. Therefore, even assuming the unavailability of onsite power sources, there is a high probability of restoring AC power and cooling the core.

Marvin W. Hodges

Marvin W. (Wayne) Hodges

Subscribed and sworn to before me this 3rd day of April, 1984.

Claire A. Harrison

Notary Public

My Commission Expires: July 1, 1986

Marvin W. (Wayne) Hodges

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. I am a registered Professional Engineer in the state of Maryland (#13446).

In my present work assignment at the NRC, I supervise the work of 6 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.

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.

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 Motion for Prompt Responses to Summary Disposition Motions, Motion for Summary Disposition on Phase I Low Power Testing and Motion for Summary Disposition on Phase II Low Power Testing were served this date upon the following by first-class mail, postage prepaid, or by Federal Express, as indicated by as asterisk:

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DATED: May 22, 1984