UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

NRC STAFF TESTIMONY OF JAMES W. CLIFFORD,
RICHARD J. ECKENRODE AND GEORGE RIVENBARK

(SC CONTENTION 19)

DESIGNATED ORIGINAL

Certified By _____

OUTLINE OF TESTIMONY

Suffolk County alleges that 10 CFR Part 50.40 and 50.57 requirements have not been met because LILCo has not demonstrated that Shoreham's training program and procedures are both consistant and plant specific, that procedures are inadequate to respond to certain events, that human factors implications of responding to emergency procedures have not been adequately checked and that Shoreham's procedures are keyed to annunciators, which may not be optimum for diagnosing and responding to multiple alarms.

The staff, based on its testimony, concludes that (1) there is reasonable assurance that Shoreham's emergency operating procedures are both consistant and plant specific, (2) the human factors implications of responding to specific operating procedures have been adequately checked, (3) annunciators are only used to alert operators to out of normal conditions and not for diagnostic purposes, (4) LILCo has committed to a relocation of controls and displays such that control/display relationships in sequential activities are adequate, and (5) with regard to protective clothing or equipment, the applicant has committed to providing such equipment that will allow the operators to perform control room tasks. This will be verified prior to fuel load. Relative to shift turnover, the staff concludes that, when the applicant implements his procedures, it will meet the requirements of Task Item I.C.2 and will be acceptable. Station blackout is a confirmatory item with the applicant's commitment to Generic Letter 81-04 subject to audit.

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NRC STAFF TESTIMONY OF JAMES W. CLIFFORD,
RICHARD J. ECKENRODE, AND
GEORGE RIVENBARK CONCERNING HUMAN FACTORS --
PROCEDURES ON SC CONTENTION 19 (a), (b), (c) AND (d)

Q. Please state your respective names and positions with the NRC.

A. (JWC) My name is James W. Clifford. I am employed as an Operational Safety Engineer (Nuclear) in the Procedures and Test Review Branch, Division of Human Factors Safety, U. S. Nuclear Regulatory Commission, Washington, D.C. I have held this position since October, 1980.

A (RJE) My name is Richard J. Eckenrode. I am a Senior Human Factors Engineer with the U. S. Nuclear Regulatory Commission assigned to the Office of Nuclear Reactor Regulation, Division of Human Factors Safety, Human Factors Engineering Branch.

A. (GR) My name is George Rivenbark. I am a Senior Management Engineer with the U. S. Nuclear Regulatory Commission assigned to the Office of Nuclear Reactor Regulation, Division of Human Factors Safety, Licensee Qualifications Branch.

Q. Have each of you prepared a statement of professional qualifications?

A. (JWC) Yes. A copy of this statement is attached to this testimony.

A. (RJE) Yes. A copy of this statement is attached to this testimony.

A. (GR) Yes. A copy of this statement is attached to this testimony.

Q. Please state the nature of the responsibilities that each of you have had with respect to the Shoreham Nuclear Power Station.

A. (JWC) I was responsible for the conduct of the Staff review of operating and maintenance procedure programs for Shoreham Nuclear Power Station (SNPS). The review team consisted of four engineers, two Human Factors Psychologists, and one member with education and experience in both fields. The SNPS review was conducted in accordance with TMI Task Action Plan Item I.C.8.

A. (RJE) I was a member of the review team responsible for reviewing the Shoreham Nuclear Power Station Control Room from a human factors engineering standpoint. I am presently the responsible engineer for completing the control room review.

A. (GR) I was a member of the review team responsible for reviewing the organization and management of the application for operation of the Shoreham nuclear plant. I am presently the responsible engineer for completing the organization and management review.

Q. Would you describe the scope of the subject matter addressed in each of your affidavits?

A. (JWC) I have been asked to address issues raised by Suffolk County Contention 19 (a) and (c) in part and all of (d).

A. (RJE) The purpose of my testimony is to respond to Suffolk County Contention 19 (b) and (c) in part.

A. (GR) The purpose of my testimony is to respond to Suffolk County Contention 19 (b) in part.

Q. What is the purpose of this testimony?

A. (JWC, RJE, GR) The purpose of this testimony is to respond to SC Contention 19, which states:

10 CFR 50.40 and 50.57 requirements have not been met because:

(a) LILCo has not demonstrated that Shoreham's training program and procedures are both consistent and plant-specific. For example, fire protection equipment used in the control room is different than that discussed in the training manual and the procedures call for use of equipment different than that available.

(b) In addition, Shoreham's procedures are inadequate (i) to respond to station blackout, shift turnover, and operation in protective clothing or equipment, and (ii) to assure knowledge of shutdown system operability.

(c) Further, the human factors implications of responding to emergency procedures have not been adequately checked. For example, locations of emergency equipment controls have not been checked for sequential activities to assure proximity of controls or instruments used sequentially and to assure operators or supervisors are not overloaded.

(d) Also, Shoreham's procedures are keyed to annunciators, and this method may not be optimum in diagnosing accidents to determine the appropriate response when multiple alarms occur.

Q. Please describe the areas each of you will address in your testimony.

A. (JWC) My testimony addresses Suffolk County Contention 19 (a), dealing with Emergency Operating Procedures, which states:

"LILCo has not demonstrated that Shoreham's... procedures are both consistent and plant specific.",

Contention 19 (c) which states:

"... the human factors implications of responding to emergency procedures has not been adequately checked. For example, locations of emergency equipment controls have not been checked for sequential activities to ... assure operators or supervisors are not overloaded.",

and Contention 19 (d), which states:

"... Shoreham's procedures are keyed to annunciators, and this method may not be optimum in diagnosing accidents to determine the appropriate response when multiple alarms occur."

A. (RJE) My testimony addresses the part of Suffolk County Contention SC 19 (b) which states that Shoreham's procedures are inadequate to respond to operation in protective clothing and the part of Suffolk County Contention SC19 (c) which states that locations of emergency equipment controls have not been checked for sequential activities to assure proximity of controls or instruments used sequentially and to assure operators or supervisors are not overloaded.

A. (GR) My testimony addresses the part of Suffolk County Contention SC 19 (b) which states that Shoreham's procedures are inadequate to respond to shift turnover.

Q. We will first address the questions raised in SC 19 (a), which state that "LILCo has not demonstrated that Shoreham's procedures are both consistent and plant specific", SC 19 (c) which states "... the human factors implications of responding to emergency procedures has not been adequately checked, and SC 19 (d) which states "... Shoreham's procedures are keyed to annunciators, and this method may not be optimum in diagnosing accidents to determine the appropriate response when multiple alarms occur." Describe your evaluation of how plant-specific the Shoreham Emergency Operating Procedures are, and how you arrived at your conclusion.

A. (JWC) A review team consisting of NRC staff personnel and personnel from Battelle Pacific Northwest Laboratories reviewed the Shoreham emergency operating procedures that were based on the symptom-oriented guidelines developed by the General Electric Owner's Group. These were Level Control,

Cooldown, Containment Control, Level Restoration, Rapid RPV Depressurization, Reactor Pressure Vessel Flooding, and Transient with Failure to Scram.

Although these procedures are not all of the emergency operating procedures at Shoreham, these procedures will allow the operators to respond to any post-reactor-trip condition, and ensure core containment integrity. During our review, we compared the equipment referenced in the procedures with the information in the Final Safety Analysis Report for plant-specific safety related equipment, and included in our discussions with Shoreham's operations personnel additional non-safety related equipment specific to Shoreham that could be used as multiple backups to the safety related equipment. During our control room walk through of these emergency operating procedures, we further verified that the equipment called for in the procedures was the same as the equipment installed at Shoreham. We thus have reasonable assurance that Shoreham's emergency operating procedures are both consistent and plant specific.

Q. Have the human factors implications of responding to emergency procedures been adequately checked?

A. (JWC) The human factors implications of responding to the specific emergency operating procedures listed above have been adequately checked. The specifics of the review we conducted, which included an evaluation of the interaction between operators and supervisors, as well as whether operators or supervisors were overloaded, is included in Section 13.5.2.C of Supplement No. 2 to the Shoreham Safety Evaluation Report (SSER #2), February, 1982.

Q. Describe the method used by Shoreham's operators in diagnosing accidents, including the use of annunciators and their relationship to procedures.

A. (JWC) To allow Shoreham's operators to respond to a wide range of abnormal plant conditions, three levels of emergency operating procedures are used. These are Alarm Response procedures, Operating Procedures (Off-Normal), and Operating Procedures (Emergency). Alarm Response procedures are used to respond to individual annunciators. In general, they are used to direct the operator to a system operating procedure to restore an abnormality in a single system. Operating Procedures (Off-Normal) and Operating Procedures (Emergency) are used in response to plant transients or accidents. Their use in the control room is indicated by control room instrumentation, multiple annunciators, the alarm printer, indications of a reactor trip, or some combination of these. After being made aware of an abnormal plant condition, the operator uses his control room instrumentation to perform diagnosis of what is occuring. In this vein, the annunciators only provide the operator with a positive indication of an out of normal condition, not with any trending information necessary for accident diagnosis.

Q. As to Suffolk County Contention 19 (b), the part which deals with the use of protective clothing by operators, can the Shoreham control room operators function (i.e., perform required actions) while wearing protective equipment?

A. (RJE) The Shoreham control room operator's protective equipment consists of emergency breathing apparatus with face mask. This equipment was not available for evaluation during the HFEB site visit of March 30-April 3,

1981. It will be available prior to loading fuel and will be evaluated by the NRC to ensure that the operators can perform control room tasks required by emergency procedures and can communicate effectively with other operators.

Q. With respect to SC 19 (c) regarding locations of emergency equipment controls and sequential activities to assure proximity of controls and instruments, have emergency equipment controls and displays been reviewed for adequacy of the control/display relationship for sequential activities?

A. (RJE) As part of the control room design review conducted by the HFEB March 30-April 3, 1981 an audit was performed on a panel-by-panel basis to determine the proximity of controls and their associated displays. In addition, walk throughs were conducted on two Emergency Operating Procedures to determine the adequacy of control/display relationships in sequential activities. As a result of this review, LILCo has committed to the relocation of controls and displays as specified in Section 7 of Appendix C, NUREG-0420, Supplement No. 1. These modifications will be accomplished prior to loading fuel. Further, as part of the Detailed Control Room Design Review to be conducted in the future using the guidance of NUREG-0700, control/display integration will be examined in depth.

Q. Suffolk County Contention 19 (b) states that Shoreham's procedures are inadequate to respond to shift turnover. Did you review and assess the applicant's procedures for shift turnover as part of the NRC Staff's safety evaluation?

A. (GR) Yes. This review and assessment was performed in conjunction with the preparation of input to the Staff's Safety Evaluation Report, Supplement No. 1, NUREG-0420 (September 1981). It was based on the information submitted by the applicant in response to TMI-2 Task Action Item I.C.2 of NUREG-0737 "Clarification of TMI Action Plan Requirements (November 1980) in its July 31, 1981 letter to the NRC.

Q. Did you conclude that the applicant's procedures for shift turnover were acceptable at the time of the review?

A. (GR) No. At the time of our review development of procedures committed to by the applicant in its July 31, 1981 letter were not complete. We concluded that, when the applicant completes and implements these procedures into the Shoreham Administrative Procedures, for shift turnover, it will meet the requirements of Task Action Item I.C.2 and the procedures will be acceptable.

Q. How will you determine when these commitments are acceptably implemented in the Shoreham Administrative Procedures?

A. (GR) The NRC will inspect the procedures to assure that they are prepared as described in the applicant's July 31, 1981 response to Item I.C.2.

The staff considers station blackout (part of 19 (b) (i)) a resolved item pending confirmation (SSER #2). The applicant has committed to the procedures described in Generic Letter 81-104 (attached) subject to an NRC audit to be performed prior to fuel load.

PROFESSIONAL QUALIFICATIONS

JAMES WILLIAM CLIFFORD

My name is James William Clifford. I am employed as an Operational Safety Engineer (Nuclear) in the Procedures and Test Review Branch, Division of Human Factors Safety, U. S. Nuclear Regulatory Commission, Washington, D.C. I have held this position since October, 1980. The Procedures and Test Review Branch reviews and evaluates licensee programs for nuclear power plant operating and maintenance procedures. I have been assigned to this Branch since October, 1980. From July 1978 to October 1980 I was a Naval Officer qualified the equivalent of a shift supervisor at the Naval nuclear power prototype at Windsor, Connecticut, where my responsibilities included supervision of plant operations, training of new personnel, and ensuring the continued expertise of experienced personnel. From March, 1976 to July,1978, I was a Naval Officer assigned to a nuclear powered ship where my responsibilities included safe operation of the ship's nuclear power plant.

I earned a BS degree in Systems Engineering from the U.S. Naval Academy in 1974. During my naval service and my employment with the NRC, I have attended several courses, varying from one week to six months in duration, on plant engineering and operations. I have also qualified as Engineer Officer for Naval Nuclear Propulsion Plants.

I review and evaluate licensee programs for nuclear power plant operating and maintenance procedures and was responsible for the conduct of the staff review of operating and maintenance procedure programs for the Shoreham Nuclear Power Station.

I also have five years of experience in actual operation of nuclear power plants. Approximately two years of that time I was qualified the equivalent of a Shift Supervisor with additional responsibility for training of new operating personnel, and upgrading the training of experienced operating personnel, on an assigned shift. Operations I was involved with included response to a wide variety of actual and simulated emergency conditions on an operating nuclear reactor. Since the beginning of my employment at the Nuclear Regulatory Commission, I have been one of the principal developers of the NRC staff's program for developing upgraded emergency operating procedures. As part of this program, we have conducted a pilot monitoring program of emergency operating procedures for operating license applicants, which includes observation of plant operators responding to abnormal plant conditions. I have been involved in five (5) of these pilot monitoring reviews, including the Shoreham review.

ATTACHMENT

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

February 25, 1981

TO ALL LICENSEES OF OPERATING NUCLEAR POWER REACTORS AND APPLICANTS FOR OPERATING LICENSES (EXCEPT FOR ST. LUCIE UNIT NOS. 1 & 2)

SUBJECT: EMERGENCY PROCEDURES AND TRAINING FOR STATION BLACKOUT EVENTS (Generic Letter 81-04)

A recent decision by the Atomic Safety and Licensing Appeal Board (ALAB-603) concluded that station blackout (i.e., loss of all offsite and onsite AC power) should be considered a design basis event for St. Lucie Unit No. 2. An amendment to the Construction Permit for St. Lucie Unit No. 2 was subsequently issued on September 18, 1980. The NRC staff is currently assessing station blackout events on a generic basis (Unresolved Safety Issue A-44). The results of this study, which is scheduled to be completed in 1982, will identify the extent to which design provisions should be included to reduce the potential for or consequences of a station blackout event.

However, the Board has recommended that more immediate measures be taken to ensure that station blackout events can be accommodated while task A-44 is being conducted. Although we believe that, qualitatively, there appears to be sufficient time available following a station blackout event to restore AC power, we are not sure if licensees have adequately prepared their operators to act during a station blackout event.

Consequently, we request that you review your current plant operations to determine your capability to mitigate a station blackout event and promptly implement, as necessary, emergency procedures and a training program for station blackout events. Your review of procedures and training should consider, but not be limited to:

a. The actions necessary and equipment available to maintain the reactor coolant inventory and heat removal with only DC power available, including consideration of the unavailability of auxiliary systems such as ventilation and component cooling.

b. The estimated time available to restore AC power and its basis.

c. The actions for restoring offsite AC power in the event of a loss of the grid.

d. The actions for restoring offsite AC power when its loss is due to postulated onsite equipment failures.

e. The actions necessary to restore emergency onsite AC power. The actions required to restart diesel generators should include consideration of loading sequence and the unavailability of AC power.

f. Consideration of the availability of emergency lighting, and any actions required to provide such lighting, in equipment areas where operator or maintenance actions may be necessary.

g. Precautions to prevent equipment damage during the return to normal operating conditions following restoration of AC power. For example, the limitations and operating sequence requirements which must be followed to restart the reactor coolant pumps following an extended loss of seal injection water should be considered in the recovery procedures.

The annual requalification training program should consider the emergency procedures and include simulator exercises involving the postulated loss of all AC power with decay heat removal being accomplished by natural circulation and the steam-driven auxiliary feedwater system for PWR plants, and by the steam-driven RCIC and/or HPCI and the safety-relief valves in BWR plants.

We conclude that the actions described above should be completed as soon as they reasonably can be (i.e., within 6 months). In addition, so that we may determine whether your license should be amended to incorporate this requirement, you are requested, pursuant to §50.54(f), to furnish within ninty (90) days of receipt of this letter, an assessment of your existing or planned facility procedures and training programs with respect to the matters described above. Please refer to this letter in your response. In the event that completion within 6 months can not be met, please propose a revised date and justification for the delay.

This request for information was approved by GAO under a blanket clearance number R0072 which expires November 30, 1983. Comments on burden and duplication may be directed to the U.S. General Accounting Office, Regulatory Reports Review, Room 5106, 441 G Street, NW., Washington, D.C. 20548.

Sincerely,

Darrell G. Eisenhut, Director
Division of Licensing
Office of Nuclear Reactor Regulation