October 6, 1982

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In the Matter of
Long Island Lighting Company
(Shoreham Nuclear Power Station, Unit 1)
Docket No. 50-322 (OL)

Dear Administrative Judges:

On September 14, 1982 (Tr. 10,044-10,047), Judge Morris addressed several questions to the NRC Staff, based upon the Staff's June 29, 1982 response to earlier Board information requests. The Staff responses to Judge Morris's questions are as follows:

Unresolved Safety Issue

1. A-44 Station Blackout

As explained in Appendix B to the original Safety Evaluation Report (SER), interim emergency procedures are required for Shoreham pending resolution of Task A-44. This pre-fuel load requirement has been carried forward in the review as SER Open Item #60. In the Staff's June 29, 1982 Status Report on SER Open Items, it was indicated that LILCO would have the emergency procedures completed by July 1982. LILCO did submit those procedures in SNRC-723, J. L. Smith to H. R. Denton, June 29, 1982. The procedures are currently being revised by LILCO and, when completed, will be reviewed by the Staff.

2. A-46 Seismic Qualification

The Task A-46 review of LILCO's program for seismic qualification of equipment corresponds to SER Open Item #8. This subject is also the topic of deferred hearing contention SOC 19(i). As indicated in the Staff's September 3, 1982 update of the status of this review, the second seismic

qualification audit was conducted at the Shoreham site from August 31 to September 3, 1982. A Staff trip report will be completed shortly. The Staff will continue to update the status of this review along with the other open items related to deferred contentions in this proceeding. (See the status report dated today, under separate cover.)

3. A-42 Safety Implications of Control Systems

In Appendix B to the original SER the Staff indicated that the resolution of this generic issue would be discussed in a supplement to the SER. The issue was also discussed in § 7.7 of the SER and was carried forward for resolution as SER Open Item #47 (Control System Failures). Further discussions and updates of the review of Open Item #47 have since been included in § 7.7 to SER Supplement 1 and the Staff's June 29, 1982 Status Report on SER Open Items. In Supplement 1 the Staff noted that LILCO had committed to conduct a review of power sources and sensors that supply power to resolve the open item. In the June Status Report it was noted that LILCO was expecting to provide the results of the study to the Staff by the end of July, 1982. LILCO has provided that information in SNRC-761, J. L. Smith to H. R. Denton, August 27, 1982. The submittal is currently under Staff review. The Staff will require that any problems identified by corrected prior to full power operation. The review will be written-up in a future SER supplement.

4. A-24 Environmental Qualification of Safety Equipment

The resolution for Shoreham of this generic issue is to be included in § 3.11 of the SER. The review remains open and is carried forward in the SER as Open Item #9. This issue is also the subject of deferred hearing contentions SC 8/SOC 19(h) and SC 32/SOC 19(f). Accordingly, the Staff has attempted to provide the Board with periodic updates of the status of the review. These updates supercede the status listed in the SER supplements. (For the most recent status of Open Item #9, see the September 3, 1982 update and the update dated today.)

SER Open Item

1. Item #I.A.1.1 Shift Technical Advisor

Ad indicated in the June 29, 1982 Status Report on SER Open Items, the Staff considers this TMI-related item resolved with the condition that the Staff will review the qualifications for Shift Technical Advisor (STA) candidates. The criteria for reviewing those qualifications are somewhat subjective, as criteria for reviewing any personnel qualifications must be. Essentially, however, the Staff review will be based on the language and spirit of NUREG-0737, Item #I.A.1.1 and the underlying documents on STA's. The first such document is the generic letter to all operating plants, dated October 30, 1979, referred to in NUREG-0737. (The relevant pages of the letter are included for the Board's information as Attachment 1.) The letter sets out the educational prerequisites for an STA and defines the principle

duties for which the candidate will have to be judged qualified. The second document that will be relied upon is Enclosure 2 to a letter dated September 13, 1979, from D. Eisenhut to all operating reactor licensees (Attachment 2). This document sheds more light on the intent behind the STA requirement, and the training necessary to perform the STA duties.

2. Item #63 Independent Design Verification

In order to meet the Staff's requirements on this item LILCO had contracted with Teledyne Engineering Services to undertake a limited independent design verification for Shoreham. As noted in the June 29, 1982 Status Report, LILCO submitted SNRC-708, J. L. Smith to H. R. Denton, May 26, 1982, describing the program to be conducted by Teledyne. The Staff is currently expecting a report from LILCO on the results of the Teledyne review by mid-November, 1982.

Sincerely

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Enclosures: As Stated

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

October 30, 1979

(TO ALL OPERATING NUCLEAR POWER PLANTS)

Gentlemen:

SUBJECT: DISCUSSION OF LESSONS LEARNED SHORT TERM REQUIREMENTS

On September 13, 1979, a letter was issued to each power reactor licensee which defined a set of "short term" requirements resulting from the NRC staff investigations of the TMI accident. Since the letter was issued, the staff has attempted to further define these requirements. During the week of September 24, 1979, seminars were held in four regions of the country to encourage industry feedback and dialogue on each short term requirement. As a result of these discussions, four topical meetings were held in Bethesda to discuss certain issues in further detail.

Enclosure 1 provides additional clarification of the NRC staff requirements. It should be noted that the intent of these requirements have not changed throughout this process and are restated in Enclosure 1.

Enclosure 2 is a chart of the NUREG-0578 items and their corresponding implementation schedules. The chart indicates which of the items require prior NRC review and approval and those for which post implementation NRC review is acceptable.

For those items requiring prior NRC approval, your design details should be submitted in a timely manner so that this approval and your implementation of the item can be completed by the required date. For those items which do not require prior NRC approval, you must document your method of implementation by the required completion date. These schedules assume that your methods are in complete agreement with the staff's requirements as previously documented in NUREG-0578, our September 13, 1979 letter, and clarified herein. Where your methods are not in complete agreement with the staff's requirements, a detailed description of your proposed methods along with justification for the differences, is required. Please provide this description and justification as soon as possible but no later than 15 days following receipt of this letter.

Attachment 1

SHIFT TECHNICAL ADVISOR (Section 2.2.1.b)

POSITION

Each licensee shall provide an on-shift technical advisor to the shift supervisor. The shift technical advisor may serve more than one unit at a multi-unit site if qualified to perform the advisor function for the various units.

The Shift Technical Advisor shall have a bachelor's degree or equivalent in a scientific or engineering discipline and have received specific training in the response and analysis of the plant for transients and accidents. The Shift Technical Advisor shall also receive training in plant design and layout, including the capabilities of instrumentation and controls in the control room. The licensee shall assign normal duties to the Shift Technical Advisors that pertain to the engineering aspects of assuring safe operations of the plant, including the review and evaluation of operating experience.

DISCUSSION

The NRC Lessons Learned Task Force has recommended the use of Shift Technical Adviors (STA) as a method of immediately improving the plant operating staff's capabilities for response to off-normal conditions and for evaluating operating experience.

In defining the characteristics of the STA, we have used the two essential functions to be provided by the STA. These are accident assessment and operating experience assessment.

1. Accident Assessment

   The STA serving the accident assessment function must be dedicated to concern for the safety of the plant. The STA's duties will be to diagnose off-normal events and advise the shift supervisor. The duties of the STA should not include the manipulatin of controls or supervision of operators. The STA must be available, in the control room, within 10 minutes of being summoned.

   The qualifications of the STA should include college level education in engineering and science subjects as well as training in reactor operations both normal and off-normal. Details regarding these qualifications are provided in paragraphs A.1, 2 and 3 of Enclosure 2 to our September 13, 1979 letter. In addition, the STA serving the accident assessment function must be cognizant of the evaluations performed as part of the operating experience assessment function.

2. Operating Experience Assessment

The persons serving the opeating experience assessment function must be dedicated to concern for the safety of tne plant. Their function will be to evaluate plant operations from a safety point of view and should include such assignments as listed on pages A-50 and A-51 of NUREG-0578. Their qualifications are identical to those described previously under accident assessment and collectively this group should provide competence in all technical areas important to safety. It is desirable that this function be performed by onsite personnel.

CLARIFICATION

1. Due to the similarity in the requirements for dedication to safety, training and onsite location and the desire that the accident assessment function be performed by someone whose normal duties involve review of operating experiences, our preferred position is that the same people perform the accident and operating experience assessment functions. The performance of these two functions may be split if it can be demonstrated the persons assigned the accident assessment role are aware, on a current basis, of the work being done by those reviewing operating experience.

2. To provide assurance that the STA will be dedicated to concern for the safety of the plant, our position has been that STA's must have a clear measure of independence from duties associated with the commercial operation of the plant. This would minimize possible distractions from safety judgements by the demands of commercial operations. We have determined that, while desirable, independence from the operations staff of the plant is not necessary to provide this assurance. It is necessary, however, to clearly emphasize the dedication to safety associated with the STA position both in the STA job description and in the personnel filling this position. It is not acceptable to assign a person, who is normally the immediate supervisor of the shift supervisor to STA duties as defined herein.

3. It is our position that the STA should be available within 10 minutes of being summoned and therefore should be onsite. The onsite STA may be in a duty status for periods of time longer than one shift, and therefore asleep at some times, if the ten minute availability is assured. It is preferable to locate those doing the operating experience assessment onsite. The desired exposure to the operating plant and contact with the STA (if these functions are to be split) may be able to be accomplished by a group, normally stationed offsite, with frequent onsite presence. We do not intend, at this time, to specify or advocate a minimum time onsite.

4. The implementation schedule for the STA requirements is to have the STA on duty by January 1, 1980, and to have STAs, who have all completed training requirements, on duty by January 1, 1981. While minimum training requirements have not been specified for January 1, 1980, the STAs on duty by that time should enhance the accident and operating experience assessment function at the plant.

ENCLOSURE 2 From Sept 13, 1979 letter from Eisenhut to Operating Plants

ALTERNATIVES TO SHIFT TECHNICAL ADVISORS

The recommendation by the Lessons Learned Task Force that an on-shift Technical Advisor be required at operating nuclear power plants has received much comment and attention by the ACRS and industry representatives since NUREG-0578 was published. Several alternative approaches have been suggested. The ACRS has advised and the Director of NRR has decided that alternatives be considered and approved if found by the staff to satisfactorily accomplish the functions described by the Task Force for the Shift Technical Advisor. As an aid to evaluating alternatives, a more comprehensive discussion of the purpose and basis of the Task Force recommendation is provided below. The discussion is in terms of the two principal functions intended to be accomplished and the characteristics thought to be necessary to effectively accomplish these functions. It is intended that the licensing review staff make use of this discussion in evaluating alternatives proposed by licensees and license applicants.

Introduction

As stated in NUREG-0578, the Lessons Learned Task Force has concluded that the need for improved operations is the most important lesson learned from the accident at TMI-2. One key element so far identified is the need to improve the capability in the control room to recognize and diagnose unusual events. Over the next several years, improvements in the capability of the reactor operations staff to respond to unusual events can and will be sought through improvements in plant design, operating procedures and the qualification and training of operators. Improvements in plant design are expected to include improvements in the area of human factors, especially improvements in display

Attachment 2

and diagnostic systems available to aid operators. For example, the Task Force made a short term recommendation for improvement of the means of assessing inadequate core cooling. The Task Force also made short term recommendations for improvements in emergency procedures and preparations by the plant operations organization. The purpose of these recommendations is to assure that the operators and the onsite operational and technical support personnel are organized both administratively and physically in an effective manner. In addition, improvements in the licensing requirements for operators have been recommended to the Commission. Over the coming months, it is likely that further increases in qualification and training requirements for operators will be developed by the industry's recently announced Nuclear Operations Institute for implementation over the next several years. Because these changes are necessary but difficult to achieve rapidly, the Lessons Learned Task Force has recommended the use of Shift Technical Advisors as a method of immediately improving the operating staff capabilities for response to off normal conditions and for evaluating operating experience.

The consensus of the Task Force is that there are two necessary improvements in the capability to assess the status of a plant during unusual conditions such as a transient or an accident, to realize the significance of the available information such as instrument readings, and to take appropriate action. First, there should be an accident assessment capability based on a comprehensive education in engineering and science subjects related to nuclear power plant design and on training and experience in the dynamic response of the specific plant. This capability must be rapidly available in the control room in the event of an accident. Second, there should be a capability to maintain and upgrade safe plant operations through the cognizance and evaluation of applicable operating experience by an engineering group with diverse technical knowledge, experience, and perspective in relevant areas such as electrical, mechanical and

fluid systems and human factors. The addition of Shift Technical Advisors to the plant operating staff is an acceptable means of supplying both of these functions. Alternative manning and organizational schemes will be considered and will be evaluated for satisfaction of the qualifications, training and duty assignment criteria discussed below.

Discussion

In developing the recommendation for the Shift Technical Advisor, the Task Force concentrated on the two functions that needed to be provided, namely, an accident assessment function and an operating experience assessment function. The proper performance of these functions requires the provision of certain characteristics described in the following paragraphs.

A. Accident Assessment Function

1. General Technical Education

The technical education of at least one person in the control room under off normal conditions should include basic subjects in engineering and science. The purpose of this education is to aid the operator in assessing unusual situations not explicitly covered in the current operator training. The following is a tentative list of areas of knowledge that are considered to be desirable:

Mathematics, including elementary calculus

Reactor physics, chemistry and materials

Reactor thermodynamics, fluid mechanics, and heat transfer

Electrical engineering, including reactor control theory

These areas of knowledge should be taught at the college level and would be equivalent to about 60 semester hours. Although a college graduate engineer would have many of these subjects and more that would not be essential, some engineers might be deficient in a few of these specific areas, e.g., reactor

physics. Although the time to teach these subjects to a licensed senior reactor operator could be as short as two years, depending on the scope and content of the subjects, the selection of a graduate engineer would likely be a more rapid means of fulfilling this characteristic.

2. Reactor Operations Training

All persons assigned to duties in the control room should be trained in the details of the design, function, arrangement and operation of the plant systems. This training is necessary to assure that the meaning and significance of instrument readings and the effect of control actions are known. A licensed operator or supervisor of an operator would not be required to have further training in order to fulfill this characteristic. A graduate engineer not previously licensed or trained as an operator or senior operator would require additional training in order to fulfill this characteristic.

3. Transient and Accident REsponse Training

In addition to the training in normal operations, anticipated transients, and accidents presently required of operators and senior operators, one person in the control room under off normal conditions should be trained to recognize and react to a wide range of unusual situations including multiple equipment failures and operator errors. This training should not be limited to written procedures or specific accident scenarios, but should include the recognition of symptoms of accident conditions such as complex transient responses or inadequate core cooling and possible corrective actions. The purpose of this training is to broaden the ability for prompt recognition of and response to unusual events, not to modify the instinctive, rapid procedural response to transients and accidents provided by reactor operators. The training is required in recognition of the fact that real accidents inherently are initiated and accompanied by unusual and unexpected events. The training is also to emphasize

need to focus on the essential parameters that indicate the status of the core and the primary coolant boundary. This additional training would take up to a year to accomplish for a person not already experienced in nuclear plant transient and accident analysis or evaluation. Both inexperienced graduate engineers and currently licensed operators would require additional training to fulfill this characteristic.

4. Detachment from Operations

The plant response assessment function requires a measure of detachment from the manipulation of controls or immediate supervision of operators. This is intended to provide the perspective and the time for assessing plant conditions and advising on appropriate operator actions. It has been called a safety monitor characteristic. Currently only three operators would normally be in the control room at the time an unusual event occurred, and it is allowed that at times there would be fewer. This number is only enough to satisfy the demands for prompt control and supervisory actions under off normal conditions. The time necessary to make a considered assessment and permit independent monitoring of plant safety require one more person in the form of the Shift Technical Advisor or some alternative in the control room.

5. Independence from Operations

In order to provide both perspective in assessment of plant conditions and dedication to the safety of the plant, this function should have a clear measure of independence from duties associated with the commercial operation of the plant. In an accident situation where command authority should not be diluted, complete independence is not desirable and is not necessary to the safety assessment function.

6. Availability

This capability should be readily available in the control room, preferably immediately at all times, but at most within ten minutes. Having this capability on duty for each shift is the best approach.

B. Operating Experience Assessment Function

1. Independence from Operations

A measure of independence is required to provide for effective safety monitoring of operating experience at the individual plant and at plants of like design. The assessment of operating experience at the assigned plant and other similar plants and the routine monitoring of the safety of plant operations is usually compatible with and necessary for efficient operations. However, the demands of commercial operation can sometimes distract from or appear to override safety judgments. An independent monitoring of the safety of plant operations is intended to counter-balance the immediate and pressing needs of commercial operation.

2. Dedication

Personnel should be dedicated to the function of safety monitoring of operating experience as their primary responsibility and duty. Although reactor operating personnel have a commitment to safety that derives from self interest as well as regulatory requirements, it is only one of two primary responsibilities, the other being the continuous production of power. The assignment of safety evaluation of operating experience as a primary responsibility for certain specified individuals will reduce potential conflicts and assure adequate time to discharge the duties.

3. Diversity of Technical Knowledge

The technical knowledge of those assessing operating experience should be diverse and encompass all technical areas important to safety. The types of problems that can affect safety include all areas related to the design and operation of nuclear power plants; e.g., mechanical, electrical and fluid systems and reactor physics, chemistry and metallurgy. Recognition and understanding of a problem and its significance requires some knowledge in the relevant technical specialities and cannot depend solely on the descriptions and judgements of the persons identifying and reporting the problem. Because of the broad scope of possible technical areas and the possible interactions of components, equipment and systems, the people engaged in operating experience review should have experience in areas usually designated as systems engineering. They should also be graduate engineers, or equivalent. In addition, because of the importance of operator actions in the safety of plant operations, familiarity with or routine access to persons with the principles of human engineering or human factors should be provided.

Alternatives

As discussed in NUREG-0578, several alternative means of providing the accident assessment function were considered by the Lessons Learned Task Force. They were:

1. Upgrade the requirements for reactor operators and senior reactor operators to include more engineering and plant response training.
2. Provide additional on-shift personnel with science or engineering training and specific traning in plant design and response.
3. Provide on-call assistance to the control room by identified personnel in the plant engineering organization having the training described in alternative 2.

Although the Task Force initially assumed that the accident assessment function would be combined with the operating experience assessment function, it is possible that the two functions could be separated. Some have suggested that people with the education, training, and experience required for both the operating experience assessment function and the safety monitoring function would be more easily obtained and retained if not required to work on shift. Others believe that such people can be retained if sufficient incentives are provided. The advantages and disadvantages of these alternatives are discussed below. Although no alternative other than a group of dedicated Shift Technical Advisors has so far been found acceptable, it is possible that innovative improvements in the other alternatives could be found acceptable.

Discussion of Alternatives

1. Upgrade the training and qualifications of the senior reactor operator. This alternative would require no change in the present number or organization of control room operators. The debilitating feature of this alternative is that the senior operator would be busy directing the reactor operators or taking actions himself during an accident and not have sufficient time or perspective to make the desired assessment of plant conditions; i.e., perform the safety monitor function. This arrangement would also not provide a clear independence from commercial operation. However, the capability would be readily available when needed. It is unrealistic to expect the senior operator to fulfill the operating experience assessment function. A separate group could be established to accomplish that function on the day shift when interaction with offsite experts and utility management would be enhanced. If schemes are proposed to accomplish the two functions separately, then they should include mechanisms

for sufficient coupling of the two to assure continuous feedback of and ready access to the knowledge being acquired in operating experience evaluation.

2. Additional on-shift personnel

This alternative would require the addition of one person to the on-shift control room staff. If the person is to be a Shift Technical Advisor, no license would be required, thus making the position easier to fill quickly. However, detachment from first-line commercial operations decisions can be attained by either a line or advisory position. For example, instead of the Shift Technical Advisor proposed by the Task Force, there may be acceptable methods of using a Shift Engineer, who normally has authority over a Shift Supervisor, to perform the accident assessment function. Either approach would utilize people on shift so they would be readily available. Since the Shift Engineer would have normal duties other than operating experience assessment, a separate day shift group would be required to fulfill that function if the shift engineer was found to be an acceptable source of the accident assessment (safety monitor) function.

3. On-call assistance

This alternative would require no additional on-shift personnel. Others have suggested that provision of the recommended technical education and training would be most easily accomplished with this alternative since degreed engineers with intimate knowledge of the plant design basis and accident response characteristics are available in the utility technical staff. Since these personnel would be remote from the control room, a requirement to be licensed does not appear to be consistent. Knowledge of accident response might also be more easily found among vendor personnel who have extensive experience in accident analysis and systems design. This alternative also provides detachment from actual operation and some independence from commercial operation. However, these people would

not be readily available when needed. The use of utility or vendor personnel not at the site would increase the difficulties of communication. Although there is need for backup assistance from these other organizations, it is doubtful that they would be able to provide for the prompt response needs of the accident assessment function and they do not have sufficient plant unique experience and familiarity to satisfy the operating experience assessment function.