

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of)	Docket No. 50-322-0L
)	
LONG ISLAND LIGHTING COMPANY)	
)	
(Shoreham Nuclear Power Station,)	
Unit 1)	

AFFIDAVIT OF EDWARD G. GREENMAN
IN RESPONSE TO ALAB-788

I, Edward G. Greenman, do depose and say:

1. I am the Chief, Projects Branch No. 1, within the Division of Project and Resident Programs, Region I, United States Nuclear Regulatory Commission. My professional qualifications are already a matter of record in this proceeding. This affidavit is submitted in response to that portion of ALAB-788 dealing with "housekeeping" at the Shoreham site.

2. As part of my responsibilities in my current position, I manage the inspection activities conducted at the Shoreham Nuclear Power Station. This responsibility included the supervision of the Readiness Assessment Team inspection of the Shoreham facility conducted between January 10-15, 1983.

3. The Readiness Assessment Team inspection was a special unannounced inspection at Shoreham in the areas of construction, preoperational testing,

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operations, plant operational staffing, NRC Staff bulletins and circulars, organizational interfaces, facility tours, housekeeping, physical condition of the plant and LILCO's action on previous inspection findings. Daily tours of the plant were conducted during the inspection. The purpose of the inspection was to determine the operational readiness status for Shoreham. The Readiness Assessment Team inspection, involving 465 inspector hours on-site, was conducted by eight NRC inspectors, the NRR Project Manager and NRC Region I managers including the undersigned.

4. In the area of housekeeping, the Readiness Assessment Team Report listed a number of unacceptable conditions relative to cleanliness and concluded that housekeeping was not acceptable at Shoreham at the time of the inspection. However, it was the judgment of the inspection team that the housekeeping conditions noted were not adverse to quality and did not affect startup activities or adversely affect plant equipment. The apparent cause of the cleanliness problems appeared to stem from LILCO's view that most of the plant cleanup should be performed after construction of a particular area is complete rather than being performed continually as construction progresses. For example, the Readiness Assessment Team inspected the RCIC barometric condenser, and associated system piping internals for cleanliness. This had just been turned over to operations at the time of the inspection. The team concluded that the applicable cleanliness requirements were satisfied.

5. As a result of the continuing concerns of the NRC staff in the area of plant cleanliness, which were reaffirmed by the Readiness Assessment Team inspection, Regional personnel met with LILCO management in January 25, 1983. On January 19, 1983, a Confirmatory Action Letter (CAL No. 83-01) was issued to LILCO by Region I documenting LILCO's commitments to conduct a general cleanup of the plant. The commitments included:

- a. assignment of personnel for full-time housekeeping activities until housekeeping has improved to a satisfactory level;
- b. establishment of specific eating areas in the plant;
- c. additional instruction to plant personnel and all non-manual construction personnel regarding housekeeping policies and procedures;
- d. housekeeping inspections by plant staff and construction engineers;
- e. surveillance and audit of housekeeping by Field Quality Assurance personnel with emphasis on the issuance of "Stop Work" orders for those work areas not meeting cleanliness zone requirements; and

f. review of the above activities by LILCO management.

6. In response to CAL No. 83-01, LILCO reported on February 28, 1983, that the initial phase of general plant cleanup had been completed and that:

- a. an additional fifty-five craft personnel was assigned to full-time housekeeping activities, in addition to the existing twenty-five craft personnel already assigned to housekeeping activities;
- b. specific eating areas were designated by written instructions and posting of signs;
- c. additional instruction was given to all plant and construction personnel regarding housekeeping policies and procedures;
- d. housekeeping inspections were performed and documented twice a week for each building;
- e. field Quality Assurance personnel were instructed to audit housekeeping and issue "Stop Work" orders for those areas not meeting cleanliness zone requirements; and

f. the Manager of Construction and Engineering began formal and documented weekly housekeeping inspection tours of the plant.

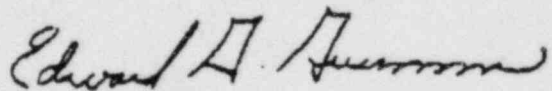
7. The substantial commitments made by LILCO in response to the Readiness Assessment Team inspection and CAL No. 83-01 marked the turning point in the housekeeping conditions and practices by LILCO at Shoreham. These practices have been continually monitored by the resident inspectors since January 1983, to the present during routine tours at the plant. The resident inspectors periodically accompany LILCO's Manager of Construction and Engineering on his weekly tours to assure housekeeping issues are being given proper management attention. Furthermore, Region I staff and managers, who have familiarity with other Region I construction and operation plants, have periodically toured the Shoreham site.

8. In addition to monitoring the general state of plant cleanliness during routine plant tours, since the Readiness Assessment Team inspection, housekeeping has been specifically inspected and the results documented in Inspection Report Nos. 83-01, 83-03, 83-05, 83-07, 83-08, 83-10, 83-11, 83-15, 83-17, 83-20, 83-23, 83-27, 84-07, 84-16, 84-20, 84-23, 84-29, 84-32, and a steady improvement in housekeeping and cleanliness has been observed.

9. Essentially the entire plant has been inspected for cleanliness, as documented by the above referenced inspection reports. Particular areas inspected for cleanliness include the primary containment drywell, all elevations of the reactor building, the turbine building, the screenwell house, the control building including the TDI diesel generator rooms, the radwaste building and the new Colt diesel generator building currently under construction.

10. It is my conclusion, and I certify to this Board, that LILCO has implemented corrective actions in response to the Readiness Assessment Team inspection and CAL No. 83-01 and that the current housekeeping practices provide acceptable levels of cleanliness at Shoreham. This conclusion and certification is based upon: (1) personal visits to the site, most recently on September 27 and 28, 1984; (2) discussions with other Region I personnel who have recently been to the site; (3) discussions with the NRC resident inspectors who are routinely at the reactor site; and (4) review of the inspections documented in the reports referred to in paragraph 8 of this affidavit.

11. As is always the case, should any significant new construction or quality assurance inadequacy be identified, it will be promptly referred to the Board and parties.



Edward G. Greenman
Chief, Projects Branch 1

Sworn to before me this
7th day of November 1984

Tina B. ...
TINA B. ... Notary Public
State of Vermont

ATTACHMENT 2



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

August 7, 1984

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

NOTE TO ATTACHED SERVICE LIST:

Attached for your information are copies of the following correspondence recently generated by the NRC staff.

1. Memorandum dated July 30, 1984 for Edwin Reis - From A. Schwencer - Subject: Shoreham License Conditions
2. Letter dated July 31, 1984, from NRC staff (R.G. Page) to Long Island Lighting Company (Amendment Extending Expiration date of NRC Materials License No. SM-1857)

With respect to the memorandum identified in Item 1 above, you will note that the "Resolution" portion of item Number 4 on page 2 of the attachment to the Schwencer Memorandum states that "[t]he staff has not yet received a written agreement from LIICO regarding this item."

In the "NRC Staff Response to Order of June 7, 198[4] Allowing Comments on the Application of CLI-84-9" the Staff noted (in the conclusion section on page 7) that

* * * the NRC staff believes the Licensing Board's Partial Initial Decision was generally in conformity to CLI-84-9. however, in view of CLI-84-9, the NRC staff no longer sees any need for the license condition imposed by the [Licensing] Board dealing with the term "important to safety."

At this time the Licensing Board's Initial Decision requiring a condition in regard to "important to safety" remains in effect.

Sincerely,

Bernard M. Bordenick

Bernard M. Bordenick
Counsel for NRC Staff

Enclosures: As Stated

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING APPEAL BOARD

In the Matter of

LONG ISLAND LIGHTING COMPANY
(Shoreham Nuclear Power Station,
Unit 1)

}
} Docket No. 50-322-1
} (OL)
}

CERTIFICATE OF SERVICE

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

JUL 30 1984

MEMORANDUM FOR: Edwin Reis, Assistant Chief
Hearing Counsel
Office of the Executive Legal Director

FROM: A. Schwencer, Chief
Licensing Branch #2
Division of Licensing

SUBJECT: SHOREHAM LICENSE CONDITIONS

As part of the Shoreham PID of 9/21/83, the ASLB specified several conditions which were to be made part of the Shoreham operating license (see PID, p. 1394-1396). Because of the delay in licensing the plant due to TDI EDG problems, several of these items have been resolved, for various reasons. The enclosure to this memo is a status list of the PID license conditions, and details NRR's intended course of action for each one. I request that you forward this status report to the Shoreham Licensing Board.

RE Martin
for A. Schwencer, Chief
Licensing Branch #2
Division of Licensing

Enclosure:
As stated

~~84-08060330~~

SHOREHAM PID LICENSE CONDITIONS

1. By July 1, 1983, LILCO shall submit to the Staff a description and schedule for hardware modifications to the Shoreham reactor vessel water level measurement system to eliminate dependence on early operator action during events involving an instrument line failure (leak or break) and a single additional component failure, in accordance with the second recommendation in the BWR Owners' Group Report SLI-8211 (July 1982). The proposed modifications and schedule must be acceptable to the Staff and installation must be acceptable to the Staff and installation must be completed no later than the end of the second refueling outage. (Agreement at 7-8, § II.B.1). (NOTE: The proposed modifications will be installed as soon as practicable, but in no event later than the end of the second refueling outage.) (Agreement at 8, § II.B.3).
2. LILCO shall implement any Staff requirements regarding additional instrumentation for detection of inadequate core cooling which may result from the Staff's review of the BWR Owners' Group Report on this subject in conjunction with LILCO documentation addressing the subject. (Agreement at 16-17, § III.B.3).

Status

By letter dated July 29, 1983, from J. L. Smith (LILCO) to H. R. Denton (NRC), the applicant documented these proposed changes and agreed to have them installed and functional prior to the return to service following the second refueling outage. The staff has reviewed the proposed modifications and has determined that the Shoreham instrumentation conforms to the recommendations of SLI-8211 and SLI-8218, and therefore the above license conditions need not be imposed. The staff therefore intends to not include the above two license conditions in the Shoreham license. The results of the staff's evaluation of this item will be part of SSER 7.

3. LILCO will also revise SP 23.425.01 to include the license condition that an operator will be dedicated to the containment isolation valve controls whenever operation of the system is required and to instruct the operator to close these valves if a high-radiation containment alarm should occur. The license condition will be deleted when the automatic high-radiation isolation signal is installed. (Agreement at 11, § II.B.4(c)). The signal will be installed and operable by December 31, 1983. (Agreement at 12, § II.B.4(d)).

Status

By letter dated May 1, 1984, the applicant reported that the automatic high-radiation isolation signal has been installed and tested, and is functional. The staff therefore intends to not include this condition in the Shoreham license.

4. Pursuant to a written agreement to be executed by LILCO as a precondition to the issuance of a license, the definition of the term "important to safety" includes but is larger than the term "safety-related," insofar as the classification and qualification of structures, systems and components are concerned. Use of the term "important to safety" in other contexts is not affected by this condition.

Resolution

The staff has not yet received a written agreement from LILCO regarding this item.

5. LILCO is required to comply with the requirements for qualification of post-accident monitoring equipment pursuant to 10 C.F.R. §50.49(b)(3) and the other provisions of 10 C.F.R. § 50.49 as such additional equipment is installed.
6. As required by 10 C.F.R. § 50.49(b)(2) and (d), as interpreted by the Licensing Board Partial Initial Decision, all "important to safety" equipment falling within the Section 50.49(b)(2) category shall be identified prior to fuel load and shall be either fully qualified or be justified for interim operation pursuant to Section 50.49(i). The identification of Section 50.49 (b)(2) equipment shall include equipment whose failure under postulated environmental conditions could mislead the operator and could thereby prevent satisfactory accomplishment of those safety functions specified in 10 C.F.R. §§ 50.49(b)(1)(i) through (iii) by the safety-related equipment.
7. All equipment falling within the scope of 10 C.F.R. § 50.49 for which LILCO is relying on justifications for interim operation pursuant to Section 50.49(1), shall be fully qualified to the requirements of Section 50.49(b), (d), (e) and (f) by startup after the first refueling outage, but in no event later than November 30, 1985.

Status

Item 6 above has been resolved by the applicant to the satisfaction of the NRC staff. This item will be closed out in section 3.11 of SSER 7.

Item 5 and 7 above have been changed in accordance with the February 22, 1983 final rule covering environmental qualification of electrical equipment important to safety. Items 5 and 7 now read "The applicant shall environmentally qualify all electrical equipment within the scope of 10 CFR 50.49 in accordance with the implementation requirements of 10 CFR 50.49(g), (by March 31, 1985).

JUL 31 1984

FCUP:NK
70-2884
SNM-1857, Amendment No. 2

Long Island Lighting Company
Shoreham Nuclear Power Station
P.O. Box 618
North Country Road
Wading River, New York 11792

Gentlemen:

In accordance with your application dated April 17, 1984, and pursuant to Title 10, Code of Federal Regulations, Part 70, Item 4 of NRC Materials License No. SNM-1857 for the Shoreham Nuclear Power Station is hereby amended to read as follows:

4. Expiration date: December 31, 1985, or upon conversion of Construction Permit No. CPPR-95 to an operating license, whichever is earlier.

All other conditions of this license shall remain the same.

Enclosed for your information is a copy of our Safety Evaluation Report.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Original Signed by
Ralph G. Page

R. G. Page, Chief
Uranium Fuel Licensing Branch
Division of Fuel Cycle and
Material Safety, NMSS

Enclosure: As stated

* JUL 31 1984

DOCKET NO.: 70-2884
APPLICANT: Long Island Lighting Company
FACILITY: Shoreham Nuclear Power Station
SUBJECT: SAFETY EVALUATION REPORT, LICENSE AMENDMENT
APPLICATION DATED APRIL 17, 1984

Background

Long Island Lighting Company (LILCO) is licensed under NRC Materials License No. SNM-1857 for the receipt, possession, inspection and storage of fuel assemblies for eventual use at the Shoreham Nuclear Power Station. By application dated April 17, 1984, LILCO requested that the license expiration date be extended to December 31, 1984.

Discussion

The need for extension of the license expiration date is due to delays and uncertainties surrounding issuance of an Operating License for the Shoreham Nuclear Power Station. Since it does not appear the Operating License will be issued by December 31, 1984, the date by which LILCO expects to have an Operating License, it is recommended the expiration date be extended to December 31, 1985. Extending the license expiration date does not affect the radiological safety, nuclear safety, or other parameters on which the issuance of the license was based. Moreover, there is no requested change to the environmental protection requirements of the facilities. None are required since the authorized plant operations remain unchanged. In accordance with 10 CFR 51.22 (10)(ii), an environmental assessment or an environmental impact statement is not necessary for this proposed action.

Recommendation

On the basis of the above, I recommend that the license extension, as requested by the licensee, be approved.

Norman Ketzlach
Uranium Process Licensing Section
Uranium Fuel Licensing Branch
Division of Fuel Cycle and
Material Safety, NMSS

ATTACHMENT 3



LONG ISLAND LIGHTING COMPANY

SHOREHAM NUCLEAR POWER STATION

P.O. BOX 618, NORTH COUNTRY ROAD • WADING RIVER, N.Y. 11792

Direct Dial Number

June 24, 1983

SNRC-911

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Environmental Qualification
Shoreham Nuclear Power Station - Unit 1
Docket No. 50-322

Dear Mr. Denton:

On January 21, 1983, the final rule on environmental qualification of electric equipment important to safety for nuclear power plants, 10CFR § 50.49, was published in the Federal Register (48F.R.2729). Shortly thereafter, on January 26, 27 and 31, 1983, issues relating to environmental qualification at Shoreham were litigated before the Atomic Safety and Licensing Board. At that time, LILCO witnesses stated that, in their view, the entire scope of equipment covered by 10CFR § 50.49 had either been included in the Shoreham environmental qualification program or been suitably isolated from the performance of safety functions so as not to require environmental qualification. LILCO witnesses also stated that they intended to perform a further review of their conclusion as of that time. This letter reports on the results of that further review which confirms the conclusions expressed in January.

The final Environmental Qualification rule established a new licensing requirement of identifying and qualifying a category of equipment important to safety which includes "nonsafety-related electric equipment whose failure under postulated environmental conditions could prevent satisfactory accomplishment of safety functions specified in subparagraphs (i) through (iii) of paragraph (b) (1) of this section by the safety-related equipment." LILCO evaluated this specific requirement of the rule, as discussed in Enclosure 1 and verified that there is no equipment at Shoreham that satisfies this condition. Therefore, there is no equipment installed at Shoreham that falls into this category (i.e., 10CFR 50.49 (b) (2)). In addition, electric equipment important to safety covered by this rule includes "certain post accident monitoring equipment" in accordance with

SNRC-911
June 24, 1983
Page 2

the specific guidance provided in Regulatory Guide 1.97, Rev. 2. LILCO included this electric equipment in our Equipment Qualification Program as described in our submittal dated April 14, 1983, SNRC-863, Attachment C. We wish to point out that (a) these nonsafety-related electric equipment were included in the program to ensure compliance with the commission's regulations and (b) these same nonsafety-related equipment were evaluated to ensure that their failure under postulated accident conditions could not prevent safety-related electrical equipment from performing their intended function.

Should you have any questions regarding this matter, do not hesitate to contact this office.

Very truly yours,

Original signed by

G. L. Smith
Manager, Special Projects
Shoreham Nuclear Power Station

GJG/law
Enclosures

cc: J. Higgins
J. F. Etzweiler
All Parties Listed in Attachment 1

June 24, 1983
SNRC-911
Page 3

(w/o attach)

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ATTACHMENT 1

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Enclosure 1
Summary of LILCO's Evaluation
On Environmental Qualification
10CFR50.49
Shoreham Nuclear Power Station
Long Island Lighting Company

The LILCO program for environmental qualification of electrical equipment important to safety has been reviewed against the requirements of 10CFR50.49 (Enclosure 2). It has been concluded that the existing program for Shoreham equipment qualification complies with the intent and scope of 10CFR50.49.

The final rule establishes a new licensing requirement of identifying and qualifying a category of equipment important to safety which includes "nonsafety-related electric equipment whose failure under postulated environmental conditions could prevent satisfactory accomplishment of safety functions..." (paragraph (b) (2), 10CFR50.49). LILCO's conclusion is that the Shoreham plant design is such that there is no equipment in this category.

Equipment for Shoreham has been classified as either "safety-related" or "nonsafety-related". Safety-related structures, systems and components must be designed to ensure accomplishment of the three basic safety functions:

1. the integrity of the reactor coolant pressure boundary,
2. the capability to shut down the reactor and maintain it in a safe shutdown condition, or
3. the capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the guideline exposures of (10CFR Part 100).

Thus, in accordance with 10CFR50.49, a structure, system, or component at Shoreham is "safety-related" if required to assure one of these three safety-related functions. Conversely, any structure, system, or component that is not required to assure any of these safety-related functions is classified as "nonsafety-related".

Throughout the design and classification process, equipment which had the potential for affecting any of these safety functions was either classified as safety-related or isolated in such a manner as to assure no unacceptable interaction with respect to the safety functions listed above. When evaluating the design from the standpoint of proper isolation postulated failure mechanisms of the nonsafety-related equipment were considered.

Recently, Shoreham has conducted certain system interaction studies as required by the NRC which reconfirmed (for the scope of

these studies) that the classification system provided proper isolation and separation between safety and nonsafety equipment. Two studies in particular are important in that respect. The Control Systems Failure (SCF) study and the High Energy Line Break/Control System Failure Analysis (HELB/CSFA) study examine the consequences of failure of nonsafety-related equipment.

The CSF study examined those control grade (nonsafety) systems with the potential to affect reactor pressure, water level, or power. Two possible failure mechanisms which could affect multiple control grade systems were postulated; failure of a common power supply or failure of a common impulse line. The study confirmed that, for all cases examined, previously defined transient and accident limits (Chapter 15 of the Shoreham FSAR) are bounding. The HELB/CSFA study addresses this concern even more directly. This study determined the hypothetical effect on nonsafety control systems resulting from postulated high energy line breaks. Once again it was concluded that previously defined accident and transient limits are bounding. Both of these studies envelope postulated failures resulting from adverse environmental conditions and further support LILCO's position on this issue.

The electrical isolation design philosophy at Shoreham provides an additional assurance that nonsafety-related electrical equipment cannot fail in such a manner as to prevent accomplishment of the above referenced safety functions. This design assurance also takes into consideration the single failure of a safety-related component. Shoreham's compliance with the electrical separation requirements of Regulatory Guide 1.75, Revision 1 and IEEE standard 384-1975 is detailed in the FSAR, specifically, in answer to NRC requests 223.12 and 223.67. These FSAR references demonstrate that the electrical separation design for the safety-related power circuits and control circuits is such that no single failure can prevent operation of an engineered safeguard function. Therefore, there is no single credible event which is capable of disabling sufficient equipment to prevent accomplishment of the three basic safety functions described above.

ENCLOSURE 2

Review of Final EQ Rule

10CFR50.49 SECTION

SHOREHAM EQ PROGRAM

a. Applicant for a license shall establish an EQ Program for paragraph (b) equipment.

The Qualification Program is established.

b. Electric equipment important to safety must be addressed and includes:

(b) (1) Qualify safety-related electric equipment relied on to remain functional during and after design basis events to ensure:

Shoreham EQ Program identified safety-related equipment and assigned operability codes "A", "B", "C" and "D" as per NUREG-0588, Appendix E, for LOCA and PBOC.

- (i) integrity of pressure boundary
- (ii) shutdown plant
- (iii) limit offsite exposure

(b) (2) Qualify nonsafety-related equipment whose failure, under postulated environmental conditions, could prevent satisfactory accomplishment of safety functions (i), (ii), and (iii) in (b) (1).

Shoreham design precludes nonsafety-related equipment preventing the accomplishment of the three basic safety functions.

(b) (3) Qualify post-accident monitoring equipment.

Equipment required for implementation of Reg. Guide 1.97, Rev. 2, is designated in LILCO submittal dated April 14, 1983, SNRC-863, Attachment C and qualification commitments are stated therein.

c. Requirements for (i) dynamic and seismic qualification, (ii) protection against "other" phenomena, and (iii) mild environment qualification not included in the scope of the final rule.

No new requirements defined in this rule.

CFR50.49 SECTION

- d) Prepare list of important to safety equipment identified in (b) (1), (b) (2), and (b) (3).
 - (d) (1) Performance specifications under conditions during and following design basis accidents.
 - (d) (2) Electrical characteristics to meet performance requirements of (d) (1).
 - (d) (3) Environmental conditions defined.
- e) Qualification program shall include assessment of electric equipment to temperature, pressure, humidity, chemical effects, radiation, aging, submergence, synergistic effects, and margins.
- f) Qualification methods defined for electric equipment.
- g) Holder of an operating license shall identify equipment important to safety with schedule for qualification b, May 20, 1983.
- h) Notification to NRC of significant problems to meet EQ schedule.
- i) Applicant for licenses shall submit interim justifications for equipment not qualified prior to fuel load.
- j) Record qualification shall be maintained in an auditable form.

SHOREHAM EQ PROGRAM

This is Appendix F of the Shoreham environmental Qualification Report.

Shoreham includes these requirements in equipment documentation files.

Shoreham includes these characteristics in equipment documentation files.

Environmental conditions are defined by zone for equipment items.

Shoreham EQ program complies.

Shoreham EQ program complies.

All equipment will be qualified by the first refueling outage in accordance with this rule.

Shoreham will comply as required.

This is Appendix H of the Shoreham Environmental Qualification Report.

Qualification document packages are included in Shoreham's document control system.

10CFR50.49 SECTION

SHOREHAM EQ PROGRAM

- k) No requirement to requalify if NUREG 0588 was the previous basis for qualification.
- l) Replacement equipment is required to be qualified to final rule unless sound reasons to contrary exist.

Shoreham EQ program complies.

Shoreham EQ program complies.

ATTACHMENT 4

NUREG-0420
Supplement No. 7

Safety Evaluation Report

related to the operation of
Shoreham Nuclear Power Station,
Unit No. 1

Docket No. 50-322

Long Island Lighting Company

United States Nuclear Regulatory
Commission

Office of Nuclear Reactor Regulation

September 1984



cabinets and internals, auxiliary pump skids, and SDV vent and drain valves before the plant exceeds 5% power operation. The applicant must also complete the qualification for SDV solenoid valves before full power range testing during the power ascension program. Finally, qualification of the invessel rack must be complete before the first refueling outage.

The applicant will continue to provide a monthly updated equipment qualification summary list until this equipment has been qualified.

3.11 Environmental Qualification of Electrical and Mechanical Equipment

3.11.1 Background

SSER 3 identified several issues relating to justifications for interim operation with equipment that is not fully qualified and to qualification of the GE 200 series electrical penetrations that required resolution before an operating license is issued. On February 22, 1983, a new rule, 10 CFR 50.49, became effective that defined requirements for the environmental qualification of electrical equipment important to safety; this rule imposed several new requirements that applicants must address before licensing. The following paragraphs describe the staff evaluation of the applicant's responses to these outstanding items and to the new rule, and describe the staff's bases for concluding that the applicant has demonstrated conformance with 10 CFR 50.49.

3.11.2 Outstanding Items from SSER 3

3.11.2.1 Justification for Interim Operation

SSER 3 identified a number of open items relating to the justifications for interim operation (JIOs) with equipment that is not fully qualified. Many of these were requests for backup documentation used to support statements made in the JIOs or other minor clarifications. These have been resolved as a result of information in a letter from the applicant dated February 18, 1983 (SNRC-838), with the exception of the Anaconda flex conduit.

The applicant indicated that this item had been "successfully tested to the applicable service conditions." In a meeting with the applicant on July 29, 1983, the staff reviewed the qualification file for this item. Although a test report was available, the test was inadequate because only the electrical continuity of an assembly consisting of a junction box, conduit, and terminal blocks was measured during exposure to steam. The insulation resistance of the assembly, which could be reduced to unacceptable values for some instruments by failure of the plastic sleeve on the flexible conduit, was not measured. The applicant had performed additional analysis to demonstrate that the conduit construction is adequate for preventing moisture intrusion during a pipe break outside containment. The staff finds this acceptable only for justifying interim operation until additional type testing can be completed.

The applicant's original justification for interim operation was unacceptable because nonconservative handbook temperature ratings for the plastic sleeve of the conduit were used. As a result, the staff required that the applicant review all JIOs to determine if similar practices were utilized on other equipment items. The few cases where this method was utilized were found to be acceptable by the applicant and were so verified by the staff.

3.11.2.2 Interim Operation

The staff also requested that the applicant define the periods of interim operation with mechanical equipment not fully qualified, as identified in a letter dated November 19, 1982. In SNRC-838 dated February 18, 1983, the applicant indicated that full qualification would be accomplished by the end of the first refueling outage. The staff finds this schedule acceptable.

3.11.2.3 GE Series 200 Penetrations

The staff identified two outstanding items relating to the qualification of the GE series 200 electrical penetrations. The applicant addressed these items in a letter dated January 21, 1983 (SNRC-821) as follows:

- Surveillance testing: The staff requested that the applicant commit to a program for periodically monitoring the electrical integrity of these penetrations so significant age-related degradation can be detected and appropriate corrective action taken before failures occur. In SNRC-821, the applicant described an acceptable program to be utilized for this purpose.
- I²R heating: The applicant provided information to show that the I²R heating during qualification testing was greater than the heating effect that could be experienced in service. The response is acceptable.

3.11.3 Conformance with 10 CFR 50.49

10 CFR 50.49 contains several provisions not previously addressed by the applicant in the NUREG-0588 qualification program. In letters dated June 24, August 3 and 15, and September 9, 1983, the applicant discussed the effect of the rule on the existing environmental qualification program. The staff evaluated this response for those areas where a change to the program could occur. The staff's evaluation follows.

3.11.3.1 Scope of Equipment

10 CFR 50.49(b) and (c) define the scope of equipment to be included in the environmental qualification program. 10 CFR 50.49(c) limits the scope of equipment to that located in the harsh environments produced by design-basis events (DBEs) that is, therefore, susceptible to common mode failures.

Thus, a large portion of the electrical equipment important to safety is not covered by the rule and is not evaluated in this report. Conformance with existing requirements--such as the General Design Criteria (GDC, in Appendix A to 10 CFR 50), Appendix B to 10 CFR 50 (particularly Section III, "Design Control") and Regulatory Guide (RG) 1.33, Revision 2 ("Quality Assurance Program Requirements (Operation)") and other regulatory guides--is sufficient to ensure that electrical equipment located in mild environments performs adequately. The staff evaluation of this equipment is a part of the overall evaluation performed in accordance with the Standard Review plan (SRP, NUREG-0800).

10 CFR 50.49(b)(1) requires that safety-related equipment* be included in the program. The definition of safety-related is consistent with that used in the environmental qualification program.

Safety-related equipment that is not required to function to mitigate an event that produces a harsh environment need not be qualified for that harsh environment, as stated and implied in 10 CFR 50.49(d)(1), (e)(1), and (e)(4), provided that failure of that equipment has no impact on plant safety. This requirement agrees with that defined in the equipment classifications of NUREG-0588, Appendix E, Items 2a, 2b, and 2c. These classifications were used in the development of the Shoreham environmental qualification program, with the exception of a broader scope of DBEs to be evaluated, as discussed later in this report.

10 CFR 50.49(b)(2) requires qualification of nonsafety-related equipment whose failure could prevent the satisfactory accomplishment of safety functions by the safety-related equipment. The applicant has indicated that no Shoreham equipment is in this category. The applicant has referenced the control systems failure study, the high energy line break/control system failure analysis, and the electrical isolation design philosophy at Shoreham, which comply with RG 1.75, Revision 1.

The review of the first two areas is discussed in SER Section 7.7. The staff review has now been completed, and all issues have been satisfactorily resolved.

Position C.4 RG 1.75, Revision 1 states

Associated circuits installed in accordance with Section 4.5.1 [of IEEE Standard 384-1974] should be subject to all requirements placed on Class 1E circuits such as cable derating, environmental qualification (emphasis added), flame retardance, splicing restrictions, and raceway fill unless it can be demonstrated that the absence of such requirements could not significantly reduce the availability of Class 1E circuits.

Associated circuits are defined as non-Class 1E circuits (i.e., nonsafety-related circuits) that share power supplies, enclosures, etc., with Class 1E circuits or that are not physically separated from Class 1E circuits. Other non-Class 1E circuits are not connected to Class 1E power supplies or are electrically isolated from Class 1E supplies to prevent malfunctions in one section of a circuit from causing unacceptable influences in other sections of the circuit.

The staff finds that conformance with this standard is sufficient to demonstrate compliance with 10 CFR 50.49(b)(2). Other interactions between safety-related and nonsafety-related equipment are covered in parts of the SRP, including Sections 3.5.1, 3.5.2 (missiles), 9.5.1 (fires), and 3.6.1 (pipe breaks).

Operating plants licensed in accordance with safety classification criteria less definitive than those applied to recently licensed plants may contain improperly classified equipment that would be covered by 10 CFR 50.49(b)(2). However, the staff review of the classification of structures, systems, and

*Safety-related equipment is defined as equipment that is relied on to remain functional during and following design-basis events to ensure certain safety functions.

components in Section 3.2.1 of the Shoreham Final Safety Analysis Report (FSAR) provides reasonable assurance that the equipment at Shoreham has been classified using the proper criteria.

The last type of equipment to be included in the environmental qualification program is the Category 1 and 2 instrumentation addressed in RG 1.97, Revision 2. The applicant has identified installed equipment in this category and provided justifications for interim operation with unqualified equipment. The staff has reviewed the identified items in the same way that other equipment in the program has been identified.

3.11.3.2 Scope of Design-Basis Events

10 CFR 50.49 requires that equipment be qualified for DBEs that produce a harsh environment, subject to certain limitations specified in 10 CFR 50.49(c). In accordance with Commission directives, the applicant based the Shoreham program on LOCAs and pipe breaks inside and outside containment only. The applicant also has reviewed additional events and their impact on the program, and described the results to the staff. Some events create environments that are different from normal plant operating conditions but that are not "significantly more severe" than the normal environment. Qualification in accordance with the new rule is not required because a harsh environment is not created. One event, control rod drop, results in a 6-month integrated gamma dose in the steam tunnel of 3.4×10^5 rems. Equipment required to mitigate this event and achieve shutdown is either (1) included in the applicant's existing environmental qualification program with operability required at significantly high radiation levels, or (2) located in a mild environment.

On the basis of its review, the staff does not require the applicant to change the harsh environment qualification program.

Instrument line breaks in the secondary containment have also been considered as a result of the rule, but these are enveloped by the breaks postulated in FSAR Appendix 3C.

3.11.3.3 List of Equipment

10 CFR 50.49(d) directs applicants to prepare a list of equipment covered by the rule. The applicant provided this list to the staff, and the latest revision (in the applicant's June 27, 1983 letter (SNRC-917)) is acceptable.

3.11.3.4 Completion of Qualification

Previous staff evaluations indicated that a license condition would be imposed requiring full qualification by the end of the first refueling outage. However, because 10 CFR 50.49(g) does not specify schedule requirements for holders of operating licenses, the following license condition will be imposed on the applicant and will supersede the previous commitment:

The applicant shall environmentally qualify all electrical equipment within the scope of 10 CFR 50.49 in accordance with the implementation requirements of 10 CFR 50.49(g).

All other requirements in the rule are bounded by the existing qualification program. The staff, therefore, finds that the applicant conforms with 10 CFR 50.49.

3.12 Reactor Building Internal Flooding

The staff has completed its review of the internal flooding analysis in the Shoreham probabilistic risk assessment (PRA) study and the Shoreham flooding submittal dated December 2, 1982.* The applicant had found the Shoreham core vulnerable frequency initiated by flooding to be about 4×10^{-6} per reactor-year.

For the most part, the staff found the assumptions and methodology used by the applicant to be reasonable. However, in its review, the staff used more recent licensee event report (LER) data and used a different model in re-evaluating the flood-initiating frequency. The staff model used a Markov process model to determine the frequency of flood precursor events, and used time-phased event trees to account for the effects of flooding to different levels.

The staff recognizes that there are many uncertainties in the analysis, particularly the human error in initiating a flood and in not taking proper corrective actions during a flood. Therefore, the staff has performed an uncertainty analysis using the SAMPLE program (NUREG-75/014). The staff estimates that the mean value of the core vulnerable frequency of accidents initiated by flooding in the reactor building at Shoreham is 2×10^{-5} per reactor-year, and the 95% upper limit is 7.5×10^{-5} per reactor-year. The core vulnerable frequency as a result of maintenance-induced flooding has a mean value of 7×10^{-6} per reactor-year, while the corresponding value for pipe break-induced flooding is 1.3×10^{-5} per reactor-year.

The staff's complete evaluation is in Appendix A of this report, which includes the evaluation of the applicant's PRA study on flooding performed by personnel at Brookhaven National Laboratory (BNL).

On the basis of its review, the staff concludes that although there are discrepancies between the applicant's core vulnerable frequencies and those determined by the staff, this item is satisfactorily resolved. The staff review has determined that this issue provides no basis for further investigation or for the denial of an operating license.

3.13 Long-Term Operability of Deep Draft Pumps

Bulletin IE 79-15 (dated July 1979), issued by the NRC office of Inspection and Enforcement (IE) (IEB 79-15), identified problems with deep draft pumps in operating facilities. These vertical turbine pumps are usually 30 to 60 feet long with impellers in casing bowls at the lowest elevation of the pump and the motor (driver) at the highest elevation; the discharge is just below the motor. This configuration has experienced excessive vibration and bearing wear, which have been attributed to

*See Appendix A.

ATTACHMENT 5