

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

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

TESTIMONY OF RAYMOND E. FORTIER AND
MICHAEL L. MIELE
FOR THE LONG ISLAND LIGHTING COMPANY
ON SUFFOLK COUNTY CONTENTION 26 --
ALARA RADIATION EXPOSURE

Purpose

This testimony establishes that LILCO meets the requirements of 10 CFR 20.1(c) at Shoreham by maintaining occupational radiation exposure as low as is reasonably achievable (ALARA). ALARA has been considered in plant and equipment layout and arrangement to minimize exposure time during maintenance; components have been separated or isolated where compatible with design functions for protection during maintenance; low-cobalt materials generally have been used throughout the plant, reducing the source of radiation, and systems have been installed to reduce cobalt accumulation; provisions have been made for flushing or decontaminating areas; and the number of condenser

shell connections used is below the average. In addition, procedures have been developed to limit iron-cobalt buildup in the primary water system, minimize exposure during work in radiological areas of the plant, and monitor and control individual and plant total annual occupational radiation doses. These provisions demonstrate LILCO's commitment to achieving radiation doses as low as is reasonably achievable.

Exhibits

| | | |
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| I. | SP 12.012.01 | Radiation Work Permits |
| II. | SP 61.071.01 | ALARA Job Review |
| III. | SP 61.071.05 | ALARA Review of Station Procedures and Design Modification |
| IV. | SP 23.103.01 | Condensate |
| V. | SP 22.001.01 | Start-Up Cold Shutdown to 20% |
| VI. | ARP 4103 | Feedwater Conductivity High |
| VII. | ARP 4104 | Feedwater pH High--Low |
| VIII. | ARP 4076 | Condensate Polishing Ion Exchanger DE-2A Effluent Conductivity High |
| IX. | ARP 4077 | Condensate Polishing Ion Exchanger DE-2B Effluent Conductivity High |
| X. | ARP 4078 | Condensate Polishing Ion Exchanger DE-2C Effluent Conductivity High |
| XI. | ARP 4079 | Condensate Polishing Ion Exchanger DE-2D Effluent Conductivity High |
| XII. | ARP 4080 | Condensate Polishing Resin Trap Differential Pressure High |
| XIII. | ARP 4081 | Condensate Polishing System Influent Conductivity High |

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| XIV. | ARP 4082 | Condensate Polishing Ion Exchanger DE-2E Effluent Conductivity High |
| XV. | ARP 4083 | Condensate Polishing Ion Exchanger DE-2F Effluent Conductivity High |
| XVI. | ARP 4084 | Condensate Polishing Ion Exchanger DE-2G Effluent Conductivity High |
| XVII. | ARP 4085 | Condensate Polishing Ion Exchanger DE-2H Effluent Conductivity High |
| XVIII. | ARP 0451 | Condensate Pumps Discharge Conductivity High--High/High |
| XIX. | ARP 0452 | Condensate Pumps Discharge Sample Conductivity High--High/High |
| XX. | ARP 0452 | Condenser Tube Troughs Conductivity High--High/High |
| XXI. | ARP 0454 | Condenser Sample Conductivity High--High/High |
| XXII. | ARP 0455 | Hotwell Conductivity High--High/High |
| XXIII. | ARP 0253 | Condensate Oxygen Content High |
| XXIV. | ARP 0254 | Condensate Oxygen Content Low |
| XXV. | SP 29.008.01 | Fuel Cladding Failure |
| XXVI. | SP 29.011.01 | Hotwell Salt Water Intrusion |
| XXVII. | SP 61.012.01 | Radiation Dose Limits and Guides |
| XXVIII. | SP 61.012.05 | Authorization to Exceed Dose Guides |
| XXIX. | SP 61.012.07 | Investigation of Unauthorized Exceeding of Administrative Dose Guides or NRC Limits |
| XXX. | SP 61.016.03 | Minimizing Exposure to External Radiation |
| XXXI. | SP 62.004.01 | Station Personnel Monitoring Program |

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| XXXII. | SP 61.070.01 | ALARA Review Committee |
| XXXIII. | SP 61.071.03 | ALARA Goals and Measurements |

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1. Q. Please state your names and business addresses.

A. My name is Raymond E. Fortier; my business address is
Stone & Webster Engineering Corporation, 245 Summer
Street, Boston, Massachusetts.

My name is Michael L. Miele; my business address is
Long Island Lighting Company, P.O. Box 628, Wading
River, New York.

2. Q. By whom and in what capacity are you employed?

A. (Fortier) I am employed by the Stone & Webster Engineering Corporation (SWEC) as a Lead Power Engineer and have held this position since December 1979. In this capacity, I am responsible for overall technical and administrative activities in the Power discipline on the Shoreham Project.

(Miele) I am employed by the Long Island Lighting Company as the Health Physics Engineer at the Shoreham Nuclear Power Station (Shoreham). In this capacity, I am responsible for the formulation and implementation of LILCO's ALARA policy and program for radiation protection.

3. Q. Please state your professional qualifications.

A. (Fortier) The attached resume summarizes my professional qualifications. My familiarity with the ALARA issue stems from my assignments on Shoreham as a systems engineer, principal engineer, and lead power engineer. As a systems engineer and principal engineer, I was responsible for the ALARA considerations included in the Shoreham system design and equipment layout. As lead power engineer, I have personally been involved in a complete walkdown of the reactor building secondary containment to address ALARA

considerations concerning wall and floor penetrations, and I have been directly involved with the Shoreham ALARA Task Force.

(Miele) The attached resume summarizes my professional qualifications. My familiarity with the ALARA issue stems from my nine years of experience working as a radiation protection professional in university, national laboratory and power reactor radiological environments. I have primary responsibility for development and implementation of the ALARA program at Shoreham. In addition, I serve as a member of the Edison Electric Institute's Task Force on Occupational Exposure Standards. The Task Force provides detailed feedback on proposed standards and regulations concerning ALARA and occupational exposure.

4. Q. Are you familiar with Suffolk County Contention 26?

A. (Fortier and Miele) Yes.

5. Q. What issue is presented in that contention?

A. (Fortier) Suffolk County contends that LILCO has not developed plant and equipment designs and procedures to minimize occupational radiation exposure at Shoreham.

6. Q. What does the acronym ALARA stand for?

A. (Miele) ALARA means "as low as reasonably achievable." The ALARA program takes into account the state of technology and the cost of improving that technology in relation to the benefits those improvements might provide to the worker. LILCO's ALARA program is designed to minimize the risk of radiation exposure while optimizing the benefits to be gained from the nuclear technology.

7. Q. How does LILCO minimize occupational radiation doses at Shoreham?

A. (Fortier) LILCO has used plant and equipment design criteria and appropriate procedures to ensure that occupational radiation doses are ALARA.

8. Q. Suffolk County claims in its contention that there are several areas where LILCO is deficient in maintaining doses ALARA at Shoreham. Would you please describe each of these areas?

A. (Fortier) Suffolk County alleges that five areas of plant equipment and design are deficient: (1) equipment layout and arrangement, (2) separation and isolation of components and piping systems, (3) selection

of low-cobalt materials, (4) provisions for flushing or decontaminating systems and portions of systems, and (5) a condenser design using a minimum number of shell connections.

(Miele) In addition, Suffolk County lists three areas where it claims procedures have not been established to maintain doses ALARA: (1) limiting iron-cobalt buildup in the primary system through water chemistry control, (2) monitoring and controlling individual and plant total annual occupational radiation doses, and (3) taking actions to reduce radiation levels or exposures if the in-plant total doses significantly exceed U.S. plant averages.

9. Q. Taking these items as you've listed them, would you please first describe how equipment layout and arrangement at Shoreham maintain doses ALARA during maintenance?

A. (Fortier) Pre-determined and pre-designed walkways and equipment removal aisles along with equipment removal and laydown areas have been provided in the Shoreham design to minimize exposure time for access to and removal of equipment for maintenance. Heavy equipment that may require maintenance has been reviewed to

ensure that appropriate attachments such as overhead monorails, floor tracks, lifting beams and lugs, platforms and ladders (both permanent and portable) are installed for removing equipment if necessary.

Permanently installed manual or motorized lifting devices such as overhead cranes, hoists, and pulleys are often used to speed up and simplify maintenance.

Also, various system design considerations are taken into account. These include (1) radioactive fluid processing, (2) the volume of radioactive sources in an area, (3) redundancy of equipment, (4) maintenance requirements, (5) method of operation (continuous or intermittent), (6) ability to flush or decontaminate components or portions of systems, (7) isolation and separation of components, and (8) temporary and permanent shielding. Various combinations of these system-design considerations have been utilized in the equipment layout and arrangements at Shoreham. Two examples follow:

- (1) In some instances, low maintenance items like the Reactor Water Cleanup (RWCU) series heat exchangers, which can be flushed or decontaminated and are in systems that can be operated on an

intermittent basis, are located within the same cubicle.

- (2) Pumps are sometimes located within the same cubicle where the system design has provided for maintenance purposes redundant components that can be operated on an intermittent basis, such as the Fuel Pool Cleanup pumps and some Radwaste pumps.

10. Q. How do separation and isolation of components and piping systems contribute to maintaining doses ALARA during maintenance?

A. Separation and isolation of components are part of the overall equipment layout and arrangement considerations at Shoreham to achieve ALARA. Separation and isolation reduce the potential radiological exposure from one component or piping system while maintenance is being performed on the other.

11. Q. Has Shoreham considered in its design the separation and isolation of components and piping systems that contain radioactive fluid?

A. Yes, to the maximum extent practical.

12. Q. What do you mean by "to the maximum extent practical"?

A. There are other system design requirements, such as safety considerations or system functionability, that take precedence over separation and isolation of components and piping systems. For example:

- (1) Components and piping systems within the drywell are designed to satisfy their safety function.
- (2) System design evolution involves making physical modifications to the original system design. These modifications sometimes are limited by certain existing physical structures, thereby limiting the ability to separate and isolate components and piping systems.
- (3) In some cases, components are deliberately designed to be in close proximity to one another. An example is the Post Accident Sampling Facility, where most of the air-operated valves, pumps, and instruments are packaged on a single skid. This design concept reduces operational exposure by minimizing the amount of radioactive fluid in the piping between components. Maintenance exposure is minimized by providing flush capability, rather than by isolating and separating components.

Of course, the way the equipment is handled and the maintenance performed also serves to maintain doses ALARA.

13. Q. Mr. Miele, how do maintenance procedures followed at Shoreham contribute to maintaining doses ALARA?

A. (Miele) Shoreham's Health Physics program and procedures facilitate work and minimize exposure within the radiological areas of the plant. Prior to beginning work in a radiological area, the level of ALARA review of maintenance and operations procedures necessary for that area is determined. Those Station Procedures that govern the planning for and conduct of work in a radiological area are SP 12.012.C1, Radiation Work Permits (Exhibit I), SP 61.071.01, ALARA Job Review (Exhibit II), and SP 61.071.05, ALARA Review of Station Procedures and Design Modification (Exhibit III). A qualified Radiological Engineer reviews the procedures and suggests methods for reducing doses resulting from the work in the radiological area. These methods may include installation of additional shielding, removal of the component from the area, flushing or decontamination of the area, or use of special tools. A pre-planning meeting or briefing

with the workers performing the job is then held to ensure that all equipment needed to perform the job is ready and that the workers are made aware of the radiological conditions in the work area. At the conclusion of the job, a debriefing of workers by the job supervisor is performed and suggested improvements are incorporated into the procedure or work plan to be used the next time the job is performed.

14. Q. Mr. Fortier, how have low-cobalt materials been used in the Shoreham design to minimize doses ALARA?

A. (Fortier) Generally, low-cobalt materials are used throughout the plant to reduce the potential for radiation exposure during maintenance. Exceptions occur where stellite materials are used, such as in the rollers and pins in the upper end of the control blades, and in the valve seats. The primary reason for using stellite is its superior wear resistance which provides reliable and maintenance-free service, thereby minimizing the need for maintenance on components and thus reducing the potential for radiation exposure.

15. Q. What is the most likely source for radiation exposure at the plant?

A. (Fortier) Most maintenance is performed during station shutdown. The source for radiation exposure during station shutdown is from longer-lived activated corrosion and erosion products. Of these, Cobalt 60 (Co-60) is the major contributor to the average radiation exposure experienced at a plant during shutdown. However, during normal operation, the carry-over of Co-60 from primary reactor water to reactor steam is less than 0.01%. Therefore, deposition of activated corrosion and erosion products occurs mostly on surfaces in contact with primary system water. These surfaces include the reactor pressure vessel, the main recirculation system, and the RWCU system, where the accumulated activated corrosion and erosion products become the principal radiation sources during shutdown.

16. Q. What design features limit the buildup of corrosion and erosion products, contributing to maintaining doses ALARA?

- A. (Fortier) To minimize the potential for corrosion and erosion products to be activated and deposited on surfaces in contact with the primary system water, Shoreham first processes all feedwater flow to the reactor pressure vessel through the full-flow condensate demineralizers. Further, a high degree of purity in the primary system water is maintained by continually processing the primary system water through the RWCU filter/demineralizer. There activated corrosion and erosion products can be collected and processed properly by providing the necessary shielding, remote valve operation, separation and isolation of equipment, and flushing and decontamination connections in the basic system design.

Additionally, the Reactor Pressure Vessel (RPV) is shielded by the biological shield wall to minimize radiation exposure from the RPV during maintenance. The main recirculation system, located in the drywell, inherently resists potential deposits of activated corrosion and erosion products due to system continuous fluid-flow operation. Shoreham has eliminated the stagnant bypass line and valves in the recirculation system where activated corrosion and erosion products can accumulate, thereby minimizing the potential for radiation exposure.

17. Q. How are operating procedures used to limit the buildup of corrosion and erosion products?

A. (Miele) Proper controls of the chemical environment can minimize the corrosion rate. These controls are contained in procedures already developed at Shoreham.

As Mr. Fortier explained, corrosion occurs during shutdown due to the presence of dissolved oxygen in process systems. Therefore, start-up of the plant after shutdown is a critical time for properly controlling iron and cobalt. The procedures for system operation during start-up include filtration/demineralization of the condenser, condensate, feedwater and reactor systems.

Station Procedure 23.103.01, Condensate (Exhibit IV), provides for recirculation of the hotwell contents through condensate demineralizers and back to the hotwell to remove cobalt from the system by deoxygenation, filtration and demineralization prior to permitting water into the feedwater system. During this time a vacuum is established in the condenser to encourage deoxygenation of this water. When the condensate is valved into the feedwater system, it will be recirculated through the feedwater heater train,

back to the condenser, and through the condensate demineralizers. This process permits filtering/demineralization and further deoxygenation before the condensate and feedwater systems are valved to the reactor.

Station Procedure 23.103.01 also calls for heating of the hotwell contents when steam is available to the steam coils to further encourage removal of dissolved oxygen in the presence of the existing condenser vacuum. At the same time, the reactor is heated gradually under conditions that permit oxygen removal from the coolant before temperatures reach 200±F, in accordance with Station Procedure 22.001.01, Start-Up Cold Shutdown to 20% (Exhibit V). This avoids an environment which encourages iron-cobalt transport. The Reactor Water Cleanup system is run, as an operating policy, at the maximum flow possible during plant start-up to permit removal of corrosion products in the reactor.

18. Q. You've talked about control of the chemical environment during start-up. How are corrosion products limited during operation of the plant?

A. (Miele) During normal operation, extensive on-line sampling and analysis equipment is used to monitor condensate and reactor-water chemistry continuously. Interpretation of these readings along with additional sampling and chemical analyses by a Radiochemistry Technician are used to minimize iron-cobalt transport. Optimum use of the Reactor Water Cleanup System and the Condensate Demineralizer System is described in the applicable procedures. For example, Station Procedure 23.103.01, Condensate (Exhibit IV), calls for maintaining flow rates through the condensate demineralizers at optimum values for filtration and demineralization, requiring valving demineralizers in and out of service as condensate system flow rates increase or decrease. This combination of control of the systems chemistry environment and good filtration/demineralization will limit iron-cobalt transport.

Additionally, should a system upset occur, ranging from out-of-specification chemistry conditions to a more serious emergency, preplanned actions are dictated by procedures already written. The Alarm Response Procedures associated with the various systems I've mentioned (Exhibits VI through XXIV) and the Emergency

Operating Station Procedures (Exhibits XXV and XXVI) detail actions appropriate to avoid corrosive environments in systems while maintaining the plant in a safe configuration.

19. Q. What provisions have been made at Shoreham for flushing and decontaminating systems?
- A. (Fortier) Various design provisions facilitate flushing and decontaminating equipment and systems that come in contact with primary reactor water. That portion of the RHR system that processes primary reactor water and is used during the normal reactor cooldown mode can be flushed with demineralized water after plant start-up to maintain potential occupational radiation exposure ALARA. The RWCU system, which processes primary reactor water during normal plant operation, is provided with flushing and decontamination connections around equipment such as the main recirculation pumps, heat exchangers, and filter/demineralizers. The main recirculation system is also provided with flushing and decontamination connections around the recirculation pumps. The fuel pool cleanup system has flushing and decontamination connections around the demineralizers and filters.

Liquid radwaste pumps have flushing and decontamination connections on each side of the pump.

20. Q. Regarding condenser design using limited shell connections, how do limited connections help achieve ALARA levels?

A. (Fortier) Condenser shell connections consist of the pressure and level instrument taps, heater vents, and condensate pump recirculation lines. The number of condenser shell connections is generally unrelated to expected radiation doses during maintenance. The number of shell connections at Shoreham is slightly less than the industry average and far less than the highest (400).

The number of connections is determined by the basic turbine plant design. Combining these lines upstream in a collection tank where design would allow will not necessarily reduce air in-leakage and may increase the amount of air in-leakage. This fact is based on two conditions: first, the condenser is maintained at a vacuum and will draw air inward whether the connection is directly on the condenser shell or on the piping upstream; second, the amount of welding (where leakage is most likely to occur) along with the larger

manifold headers or collection tank would arguably be increased for this more complex design.

However, doses ALARA during maintenance operations have been considered in the condenser design.

Re-tubing and tube plugging are the most common condenser maintenance operations. Since condenser maintenance is only planned to take place during plant shutdown, doses received by these operations are usually insignificant due to appropriate radiation protection measures such as flushing and use of breathing apparatuses. Titanium condenser tubes are being used at considerably increased expense at Shoreham to minimize corrosion and leaking tubes, thereby reducing potential radiation exposures and maintenance.

21. Q. You mentioned the County's assertion that LILCO does not have procedures to monitor individual and plant total annual occupational radiation doses. What are the applicable dose levels and how are those levels achieved at Shoreham?

A. (Miele) Contrary to the County's assertion in the contention, 5 rem per year is not a legal limit for individuals with radiation exposure histories. Title 10 CFR 20.101 establishes 3 rem per quarter (rem/qtr)

as the limit. In addition, Station Procedure 61.012.01, Radiation Dose Limits and Guides (Exhibit XXVII), Sec. 8.2, lists 3 rem/qtr as the maximum whole body dose, and Sec. 8.3 states a 1 rem/qtr administrative guide to be used at Shoreham. To exceed this guide requires management approval as stated in Station Procedure 61.012.05, Authorization to Exceed Dose Guides (Exhibit XXVIII), Sec. 8.3.

Shoreham has developed a variety of procedures to monitor radiation doses. In addition to those I've referred to above, the following procedures are also used in monitoring and controlling personnel doses:

SP 61.012.07, Investigation of Unauthorized Exceeding of Administrative Dose Guides or NRC Limits (Exhibit XXIX);

SP 61.016.03, Minimizing Exposure to External Radiation (Exhibit XXX);

SP 62.004.01, Station Personnel Monitoring Program (Exhibit XXXI);

SP 61.070.01, ALARA Review Committee (Exhibit XXXII); and

SP 61.071.03, ALARA Goals and Measurements (Exhibit XXXIII).

22. Q. How will doses be monitored and recorded?

A. (Miele) The computerized Dose Record System used at

Shoreham will maintain the recording of doses as required by the other procedures. Individuals will wear direct-reading dosimeters and thermoluminescent dosimeters. The Dose Record System will tabulate personnel doses and collective doses for specific jobs on a daily basis. Computerized flagging for personnel approaching the Shoreham administrative dose limits will ensure that personnel do not exceed administrative exposure limits without proper authorization. Computerized flagging for jobs where collective doses are approaching or have exceeded the estimated dose for the job will signal the radiation protection staff that additional measures may be needed to maintain doses ALARA. In addition, daily printouts of personnel doses will provide individuals and their supervisors with their current doses for the quarter.

23. Q. Are there any other ALARA procedures or programs used by LILCO at Shoreham?

A. (Miele) Yes. Other ALARA efforts that are being implemented include system walkdowns to identify potential exposure problems, to determine if corrective action is necessary and to assign responsibilities for the corrective action. Two groups, the

Maintainability Task Force and the ALARA Task Force, are engaged in a system-by-system review of plant components. Both groups are composed of LILCO, Stone & Webster and outside consultant personnel knowledgeable in their area of review. The ALARA Task Force utilizes a specific ALARA design-features checklist that aids in identifying potential exposure problems. In addition, each section head at Shoreham is required to establish a goal for low exposure, and the Company sponsors an ALARA Suggestion Program, awarding employees who suggest methods to reduce radiation exposure on the job.

Given the numerous actions taken at Shoreham to reduce radiation levels and exposures, LILCO has no plans at present to monitor whether in-plant totals at Shoreham "significantly exceed U.S. plant averages", nor is such monitoring required. Shoreham will meet the applicable regulatory requirements regarding doses ALARA, and will continue to attempt to meet doses even lower than those allowed by the regulations.

24. Q. Mr. Fortier, please summarize your testimony regarding the plant and equipment design criteria used at Shoreham to ensure that occupational radiation exposure ALARA is maintained.

- A. (Fortier) The Shoreham equipment layout and arrangement, separation and isolation of components, use of low-cobalt materials, provisions for flushing and decontaminating systems, and use of minimum condenser shell connections all contribute to maintaining radiation doses as low as reasonably achievable at Shoreham.
25. Q. Mr. Miele, please summarize your testimony on the operating procedures to be used at Shoreham to maintain doses ALARA.
- A. (Miele) The numerous procedures discussed throughout my testimony will allow Shoreham to maintain doses ALARA by (1) limiting cobalt buildup in the primary system through water-chemistry control, (2) minimizing exposure during work in radiological areas of the plant, and (3) controlling individual and plant total annual occupational radiation doses.

PROFESSIONAL QUALIFICATIONS

Raymond E. Fortier

Senior Power Engineer/Power Division

Stone and Webster Engineering Corporation

My name is Raymond Fortier. My business address is 245 Summer Street, Boston, Massachusetts 02107. I am employed by Stone & Webster Engineering Corporation (SWEC) as a Lead Power Engineer and have held this position since December 1979. In this capacity, I am responsible for overall technical and administrative activities in the Power discipline on the Long Island Lighting Company (LILCO) Shoreham Nuclear Power Station Unit 1 (Shoreham).

In 1963 I received a Bachelor of Science degree in mechanical engineering from the University of Rhode Island. Since 1974 through the present, I have completed graduate courses at Northeastern University in nuclear engineering, power plant design and economics, computer systems and engineering management. In addition, I have participated in Stone & Webster's Continuing Education Department course offerings in technical and management subjects.

My engineering career began with Rohm and Haas Company, Bristol, Pennsylvania (1963-1968). As Field Engineer, I supervised construction of plastics plants in Pennsylvania and

England. As Project Engineer, I was responsible for design, estimating, development, purchasing and construction of various projects. I also was assigned to the planning, estimating and designing of a blown film and plastic manufacturing facility.

Later with Cryogenic Technology, Inc. (CTI), Waltham, Massachusetts (1968-1970), I was a Product Engineering Manager responsible for the design and manufacture of miscellaneous cryogenic (extremely low temperature) laboratory equipment. I was also the Program Manager responsible for the design and development of the Model 1400 helium refrigerator, liquefier and purification system.

In November 1970, I joined Stone & Webster as an Engineer in the Process Projects Division, responsible for the design of chemical plants and later transferred to the Power Division in November 1971. I was assigned to the Wisconsin Electric Power Company, Point Beach Nuclear Plants (December 1970 - October 1973), with responsibility for the design and engineering of a liquid and gaseous radioactive waste treatment and disposal system. My duties included preparation of addenda to the Final Safety Analysis Report (FSAR). I also prepared flow diagrams, equipment and bidder lists, process equipment and pipe sizing calculations, system descriptions, preoperational instructions and miscellaneous specifications for the installation of a blowdown and waste evaporator, a gas stripper and a cryogenic noble gas separation system.

I have been associated with Long Island Lighting Company projects since March 1973. Initially (March 1973 - May 1974) as an Engineer, I was assigned to the Jamesport Nuclear Power Plant Project and was responsible for the emergency core cooling system (ECCS), containment isolation, chemical and volume control, and reactor coolant systems. I also functioned as nuclear steam supply system (NSSS) coordinator and prepared sections of the Environmental Report and Preliminary Safety Analysis Report.

In June 1974, I was reassigned to the Shoreham Nuclear Power Station Unit 1 Project. My experience on Shoreham covers a broad spectrum spanning eight years. Formerly, I was involved in the day-to-day detail engineering and design decisions coincident to a project of this scope. I was appointed Principal Nuclear Engineer in January 1978 with responsibility for overall coordination with NSSS supplier and technical responsibility for nuclear and radwaste portions of the plant. Currently, I have overall responsibility for manpower, budget, planning, scheduling and sequencing of engineering and design efforts, including Three Mile Island-related items, for all power discipline groups. This results from my appointment as Lead Power Engineer in December 1979. In addition, I have overall responsibility for all Power discipline activities being performed at the Site Engineering Office and coordination of Hydraulic, Environmental and Nuclear Technology Division activities relating to Shoreham.

I am a registered Professional Engineer in New York and Massachusetts.

As Engineer on the Shoreham Project, I prepared the Design Specification Report entitled, "Thermal and Pressure Transients of ASME III, Class 1 Piping Systems."

PROFESSIONAL QUALIFICATIONS

Michael L. Miele

Health Physics Engineer

Long Island Lighting Company

My name is Michael Miele. My business address is Long Island Lighting Company, P.O. Box 628, Wading River, New York. I am employed by Long Island Lighting Company (LILCO) as the Health Physics Engineer at the Shoreham Nuclear Power Station (Shoreham). I have been employed by LILCO since 1970.

I received the Bachelors Degree in Mechanical Engineering from City College of New York in 1970; the Masters of Science Degree, specializing in Radiological Health, from the University of Michigan in 1974; and the Masters of Business Administration from Adelphi University in 1977.

As the Health Physics Engineer of Shoreham, I am responsible for the supervision of engineers, consultants, foremen, and technicians as part of the overall direction of the Station's Health Physics activities, including the radiological safeguarding of plant personnel and the public, planning and implementing the ALARA program, detecting and controlling radiation for plant surveillance, operations and maintenance functions, and shipping, receiving, controlling and procuring licenses for

all radioactive materials. My duties include directing radiation protection training programs for Health Physics personnel as well as other plant and temporary people, administering records and reports on personnel exposure, and supervising radiological surveys, respiratory protection and bioassay. Other tasks include controlling the selection and set-up of laboratory and counting room facilities, portable survey equipment, and area and process monitors; formulating, developing and implementing Health Physics programs and procedures to insure regulatory compliance; and overseeing the Industrial Hygiene program of occupational and environmental testing, surveys, and inspections for noise levels, toxic materials and other hazards.

Over the years I have been involved in a variety of training assignments, including positions at Iowa Electric's Duane Arnold Energy Center, James A. Fitzpatrick Nuclear Station, Nine Mile Point Nuclear Station, and the Savannah River Plant. These assignments gave me valuable practical experience in staffing, training, and qualifying personnel; coordinating ALARA programs; using dose control, dosimetry and whole body counting; supervising personnel decontamination; implementing radiation shielding startup testing and chemistry and radiochemistry startup testing; and coordinating radwaste operations and disposal.

I am past president of the Greater New York Chapter of the Health Physics Society, and hold a guest engineer appointment from Brookhaven National Laboratory. I am a member of the National Health Physics Society, the EEI Health Physics Committee, the EEI Standards Task Force, the American Industrial Hygiene Association, and the New England Health Physicists.

I was certified by the American Board of Health Physics in 1980.