



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS
RELATED TO THE ORDER APPROVING THE DECOMMISSIONING PLAN AND
AUTHORIZING FACILITY DECOMMISSIONING
LONG ISLAND POWER AUTHORITY (LIPA)
SHOREHAM NUCLEAR POWER STATION, UNIT 1
DOCKET NO. 50-322

1.0 INTRODUCTION

This Safety Evaluation Report (SER) has been prepared by the staff of the U.S. Nuclear Regulatory Commission (NRC), primarily from the Office of Nuclear Material Safety and Safeguards (NMSS) (hereafter referred to as "the staff" or "NRC staff"). This SER addresses a proposal to decommission the Shoreham Nuclear Power Station, Unit 1, located in the Town of Brookhaven, Suffolk County, New York, using the Decontamination (DECON) alternative. The purpose of this report is to evaluate the adequacy of the proposed plan to decommission the Shoreham Nuclear Power Station, based on applicable NRC regulations and regulatory guidance.

1.1 Background

The Shoreham Nuclear Power Station, Unit 1, operated intermittently at low power levels during the period July 1985 through June 1987. At the time of the plant's final shutdown, in June 1987, the average fuel burnup was calculated to be approximately two effective full-power days. On February 28, 1989, the State of New York and the Long Island Lighting Company (LILCO) entered into a Settlement Agreement with the Long Island Power Authority (LIPA), under which LILCO agreed not to operate the Shoreham Nuclear Power Station, Unit 1, as a nuclear facility. The Settlement included an agreement to transfer the facility, and specific areas and buildings on the Shoreham Nuclear Power Station site, to LIPA, a corporate and political subdivision of the State of New York. LIPA is required under New York State law to close and decommission Shoreham. This agreement became final on June 28, 1989.

Fuel removal from the reactor was completed in August 1989, and by Confirmatory Order dated March 29, 1990, the Shoreham Nuclear Power Station, Unit 1 license, was modified such that fuel could not be reloaded in the reactor without prior NRC approval, and the license was amended to a possession only license (POL) on July 19, 1991. The transfer of the POL from LILCO to LIPA became effective February 29, 1992. Under terms of the transfer the POL will revert back to LILCO in the event LIPA ceases to exist or is otherwise found to be unqualified to hold the license.

By letter dated December 29, 1990, LIPA submitted, to NRC, the Shoreham Decommissioning Plan (DP) (Ref. 1), and the Supplement to Environmental Report (Decommissioning) (Ref. 2). On January 2, 1991, LILCO requested approval of the Shoreham Decommissioning Plan submitted by LIPA.

The Shoreham Decommissioning Plan, LIPA responses to NRC staff questions (Refs. 3-5), the Supplement to Environmental Report (Decommissioning) and a document separately prepared by the NRC staff, "Environmental Assessment of the Shoreham Nuclear Power Station, Unit 1" (EA) (Ref. 6) related to the licensee's proposed decommissioning, are the bases of this SER.

1.2 Proposed Action

The purpose of the proposed action is to decommission the Shoreham Nuclear Power Station, Unit 1. LIPA's intentions are to dismantle systems and decontaminate structures to the extent necessary to ensure the removal of radioactive materials, and to allow release of the facility and site for unrestricted use.

The contamination and activation levels are low at Shoreham because of the short operating history of the plant. Based on the limited contamination and activation levels at Shoreham, the licensee has determined that it is advantageous to proceed with the DECON (immediate dismantlement) decommissioning alternative. The licensee listed the following reasons for its selection of the DECON decommissioning alternative: 1) maximum flexibility in selection of future near-term use of the site; 2) use of personnel who are knowledgeable about the facility and its operating history; 3) the ability to decommission the facility without significant radiation exposure; 4) the elimination of the need for long-term monitoring, surveillance, and maintenance; and 5) the fact that DECON alternative would cause no significant environmental impact.

The conditions at the Shoreham Nuclear Power Station, Unit 1, as of September 1991, are as follows: a) all fuel assemblies are stored in the Spent Fuel Storage Pool; b) all Source Range Monitor (SRM) and Intermediate Range Monitor (IRM) detectors have been shipped offsite; c) all Local Power Range Monitor (LPRM) detectors are stored in the Spent Fuel Storage Pool; d) all control rods are stored in the Spent Fuel Storage Pool; e) the Antimony-Beryllium initial start-up neutron sources and holders are stored in the Spent Fuel Storage Pool, and the Californium initial start-up neutron sources were shipped to Brookhaven National Laboratory; and f) the Reactor Pressure Vessel (RPV), steam dryer, and moisture (steam) separator remain part of the drained reactor assembly.

The proposed decommissioning is necessary to terminate the license of the Shoreham Nuclear Power Station, Unit 1, in accordance with the requirement of 10 CFR 50.82. LIPA proposes to dismantle and decontaminate plant systems and structures to make the facility and site suitable for unrestricted release.

2.0 DECOMMISSIONING ALTERNATIVES AND DESCRIPTION OF ACTIVITIES AND TASKS

2.1 Decommissioning Alternatives

The licensee chose the DECON decommissioning alternative. It intends to ship Shoreham's irradiated fuel to a domestic reactor for use or storage at that facility. The shipment of the fuel under this option is scheduled to begin in July 1992. If this cannot be done, the licensee intends to ship the irradiated fuel to Europe for reprocessing. Both of the aforementioned options are scheduled for completion by the end of calendar year 1993. As hereinafter detailed, the licensee's selected decommissioning alternative meets the requirements of 10 CFR 50.82(b)(1)(i), and is acceptable.

The staff reviewed the licensee's proposed disposition of fuel. Although fuel disposal is not considered to be a part of the decommissioning, continued fuel storage onsite will have an impact on the DECON decommissioning option selected by the licensee since the fuel will continue to be stored in the pool. The objective of the DECON alternative is to immediately clean up the site and release it for unrestricted use.

The licensee anticipates that irradiated fuel will remain in the Spent Fuel Pool through the end of 1993. During the fuel storage period, considerable activity will be on-going on the refueling floor of the Reactor Building, including the movement of heavy loads. Continued onsite storage of Shoreham's irradiated fuel will affect activities such as the decontamination of the Spent Fuel Storage Pool and the schedule for Liquid Radwaste System dismantlement and decontamination. It will also delay Floor Drain System decontamination and potentially be the cause of an increase in the volume of solid radioactive waste that will be required to be stored onsite.

While fuel is stored onsite in the Spent Fuel Storage Pool appropriate security and surveillance measures will continue to be required, the licensee will be required to adhere to certain appropriate guidelines related to heavy-load controls in NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants" (Ref. 7), and to comply with its Defueled Technical Specification (DTS) related to heavy-load handling.

2.2 Decommissioning Activities and Tasks

The major decommissioning activities and tasks are described in Sections 4.1 and 4.2 of the EA (Ref. 6). The staff evaluated the licensee's systems dismantlement and structural decontamination methods, the licensee's estimated occupational exposures for the major decommissioning activities, and the licensee's basis for its dose-assessment process.

The staff has reviewed the licensee's proposed methods for system dismantlement and methods for removal and disposal of the reactor vessel and its internals, and found them acceptable. The staff used the Decommissioning Handbook (DOE/EV/10128-1) (Ref. 8), and AIF/NESP-036, "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates" (Ref. 9), as guides for acceptable methods for dismantling plant systems and structures.

The Shoreham Nuclear Power Station, Unit 1's, DP (Ref. 1), and licensee responses to staff questions (Refs. 3-5) addressed the major activities and tasks involving work in radiation fields. The licensee provided data in sufficient detail, in the sources previously listed, about its methods to estimate radiation doses during decommissioning, and to address exposure rates (mrem/hr), exposure time (man-hours), and dose (man-rem). The licensee provided the basis for its dose calculations for the major activities and tasks associated with the decommissioning. The licensee based its estimates on methods in NUREG/CR-0672, "Technology, Safety and Costs of Decommissioning a Reference Boiling Water Power Station" (Ref. 10), and on Regulatory Guide 8.19, "Occupational Radiation Dose Assessment in Light-Water Reactor Power Plants Design Stage Man-Rem Estimates" (Ref. 11).

The data provided by the licensee were sufficient for the staff to evaluate work to be performed in radiation fields, and to assess occupational exposure calculations. The survey data provided by the licensee were based on radiological surveys performed in accordance with 10 CFR 20.201.

Based on its evaluation of the data provided by the licensee, the staff found that the lessons learned and available data from actual decommissioning were used (Refs. 8 and 9). The staff concludes that the licensee's decommissioning plan for major decommissioning activities and tasks is acceptable.

2.3 Schedule

The Shoreham DP (Ref. 1) provided a decommissioning schedule. The time required to accomplish the major activities could be affected by the need to accomplish tasks such as removal of the fuel from the site, segmentation of the RPV, and lifts of segmented RPV pieces between the RPV and the cutting and staging areas. The licensee believes it will have only approximately six months before existing offsite disposal facilities are no longer available for waste from New York. Therefore, slippage in the decommissioning schedule will have the effect of requiring a larger volume of radioactive waste to be stored onsite. Additionally, severe slippage in the licensee's schedule for removing the fuel from the site as discussed in Section 4.1 below, will be cause for the decommissioning to stop. Therefore, the staff has determined that an Order authorizing decommissioning must include a condition that in the event that the fuel is not removed from the site within 6 years, the licensee must suspend the decommissioning effort and submit a modified decommissioning plan. See Section 13.0 below. Based on the information provided by the licensee and based on the decommissioning order conditions discussed in Section 13.0 below, the staff finds the licensee's proposed schedule acceptable.

2.4 Organization and Responsibilities

The licensee's overall organization is described in Section 4.8 of the EA (Ref. 6) and shown here in Figure 1. The positions that are considered to be the most vital to the conduct of safe decommissioning activities are filled by seven "coemployees," of the New York Power Authority (NYPA), who have nuclear experience gained while working by NYPA. The authority for the co-employment arrangement is derived from a binding agreement between LIPA and NYPA.

The overall control and responsibility onsite for the decommissioning rest with the Resident Manager who is a "coemployee." Five major functions report directly to the Resident Manager: 1) Decommissioning Project Manager, 2) Operations and Maintenance Department Manager, 3) Licensing/Regulatory Compliance Manager, 4) Nuclear Quality Assurance Department Manager, and 5) Radiological Controls Division Manager.

The Radiological Controls Division Manager reports directly to the Operations and Maintenance Manager, but also has direct access to the Executive Vice President - Shoreham Project, if radiological health and safety matters are not satisfactorily addressed through the normal reporting chain.

Management of the LIPA's Shoreham employees will be through LIPA's organizational framework, as documented in the LIPA Shoreham Administrative Manual (Ref. 12). The licensee, LIPA, will maintain the ultimate responsibility for the overall decommissioning effort, including the work performed by contractors.

The licensee's organization provides a clear and logical breakdown of functional responsibilities, and a clear chain of command. The licensee's documentation includes qualification statements (resumes) for the persons designated as "coemployees," that is, Operations and Maintenance Department Manager, Radiological Controls Division Manager, Nuclear Quality Assurance Department Manager, and Decommissioning Project Manager.

Supervision of contractor personnel will be provided by the licensee's onsite management organization. LIPA has indicated that it is aware of, and accepts, as the licensee, full responsibility for all activities carried out under its license, whether performed by LIPA, LILCO, LIPA/NYPA employees, or contractor employees.

The staff's evaluation of the licensee's Decommissioning Organization finds that the licensee's corporate and project organizations are acceptable based on the provisions of NUREG-0800, "Standard Review Plans for the Review of Safety Analysis Reports for Nuclear Power Plants" (Ref. 13), Section 13.1.1 "Management and Technical Support Organization," and Sections 13.1.2 and 13.1.3, "Operating Organization."

2.5 Training Program

The licensee's training program is described in the EA (Ref. 6), in Section 4.9. The licensee's training provides General Employee Training (GET) commensurate with the employee's job duties. The licensee has committed to retaining all elements of the Shoreham Nuclear Power Station, Unit 1's, training program necessary to ensure the safe handling of fuel, and training necessary for the protection of workers and the public's health and safety. The program includes training in the areas of health physics, waste management, and maintenance of radiation surveillance equipment.

The licensee has committed to make use of the existing LILCO training program, modified to meet the requirements of the plant in the defueled configuration, as described in Chapter 13.2 of the Defueled Safety Analysis Report (DSAR)

(Ref. 14). The licensee's radiological safety course required for decommissioning workers includes as low as is reasonably achievable (ALARA) practices; training related to 10 CFR Parts 19 and 20; Regulatory Guide 8.13, "Instruction Concerning Prenatal Radiation Exposure" (Ref. 15), Regulatory Guide 8.15, "Acceptable Programs For Respiratory Protection" (Ref. 16), and fire protection.

The staff's evaluation of the licensee's training program finds that the licensee's program is acceptable based on the applicable sections of NUREG-0800 (Ref. 13), Section 13.2.2, "Training For Non-Licensed Plant Staff."

2.6 Contractor Assistance

The licensee addressed the need for contractor assistance in its decommissioning plan. During the decommissioning the licensee will enlist the aid of the following contractors: 1) NYPA, 2) LILCO, 3) Bechtel, 4) TLG Engineering, Inc., and 5) Power Cutting, Inc. (PCI). NYPA is the prime contractor, and will provide LIPA with technical and management services related to maintenance and decommissioning. LILCO will make available employees to satisfy needs as specified by LIPA. Bechtel will provide Architect/Engineering services. TLG and PCI were hired as subcontractors to Bechtel. For each contracting organization, the licensee described the scope of work to be accomplished, the administrative control system to be used to ensure adequate health and safety protection, and the qualifications and experience of the contractor. The information the licensee provided on contractor assistance is acceptable.

3.0 OCCUPATIONAL AND PUBLIC HEALTH AND SAFETY

3.1 Facility Radiological Status

The staff reviewed the operating history and radiological conditions in the plant, and evaluated the activities and tasks that would be required to be carried out in contaminated areas. The staff relied on Regulatory Guide DG-1005, "Standard Format and Content for Decommissioning Plans for Nuclear Reactors," (Ref. 17) and applicable sections of 10 CFR Parts 20 and 50 for review guidance.

3.1.1 Facility Operating History

A discussion of Shoreham's operating history is provided in Section 2.2 of the EA (Ref. 6). In its DP (Ref. 1), and in responses to staff questions (Refs. 3-5) the licensee addressed conditions, in the plant, that could have an impact on the decommissioning, such as radioactive spills, potential contamination in inaccessible areas, and operating events that had the potential to spread contamination.

The staff reviewed the licensee's data related to spills, and unusual occurrences involving the spread of contamination in and around the facility, equipment, and site. The licensee noted in response to staff questions (Ref. 4) that there were no spills, or unusual occurrences involving the spread of contamination, where significant contamination remained after

cleanup procedures. The absence of contamination was confirmed with the licensee's Site Characterization Program (Ref. 18). Based on the above, the staff finds that the licensee provided sufficient information, and that the information is acceptable and meets the requirements of 10 CFR 50.75(g)(1).

The staff also reviewed information provided by the licensee related to as-built drawings, and records of plant modifications concerning storage areas for radioactive materials, and locations of possible inaccessible contamination. The licensee stated that all plant modifications are made in accordance with approved programs and procedures that are designed to ensure that documents are updated to reflect the as-modified plant configurations. The licensee also noted that there are two potentially contaminated inaccessible areas that could not be surveyed during the Shoreham site characterization. The areas identified are the drains in the Reactor Building and the Spent Fuel Storage Pool. Based on the aforementioned, the staff finds that the licensee provided sufficient information, and the information is acceptable and meets the requirements of 10 CFR 50.75(g)(2).

3.1.2 Radiological Status of the Plant

The radiological conditions at Shoreham are described in Section 2.3 of the Shoreham EA (Ref. 6). The staff evaluated radiation hazards in the plant, based on radionuclide inventories, and existing conditions found in the plant. The largest source of radioactivity at Shoreham is inside the RPV, with dose rates in the range of from 0.5 to 20 mrem/hr (dose rates at the vessel flange after shielding or after removal of activated internals). The unshielded maximum dose rate inside the RPV with activated internals in-place is expected to be 100 mR/hr to 100 R/hr. The dose rates throughout the plant are low when compared with the reference Boiling Water Reactor (BWR) described in NUREG/CR-0672 (Ref. 10). General area doses on the refueling floor of the Reactor Building are less than 0.5 mrem/hr, and the remainder of the Reactor, Turbine, and Control Buildings are less than 0.1 mrem/hr.

The licensee used the Shoreham Site Characterization Program (SSCP) (Ref. 18) as the basis document for characterizing the activation and contamination levels at the Shoreham Nuclear Power Station, Unit 1. The licensee used the SSCP as the basis document for describing how to determine the magnitude of the contamination levels on the surfaces of structures, in the RPV, including its internals, and in systems. The SSCP satisfies 10 CFR 20.201 requirements to survey the facility for radiological hazards. The staff considered the information requirements and measurement procedures in the licensee's SSCP to be reasonable and acceptable.

3.2 Radiation Protection

The staff has reviewed the licensee's radiation protection program, and the licensee's commitment to the protection of workers and the public during decommissioning. The staff based its acceptance criteria on NUREG-0800 (Ref. 13), Sections 12.1 through 12.5, and the original staff review of Chapter 12, as documented in NUREG-0420, "Safety Evaluation Report Related to the Operation of Shoreham Nuclear Power Station, Unit No. 1" (Ref. 19).

3.2.1 Health Physics Program (HPP)

LIPA, as Shoreham's licensee during the decommissioning, has adopted the existing LILCO Shoreham Health Physics Program (HPP), essentially in its entirety. The HPP is described in Chapter 12 of the DSAR (Ref 14). The HPP consists of all actions and measures planned for the protection of workers and the environment. The licensee will use the HPP to implement its ALARA objectives. In addition, the HPP will be used to provide the guidance necessary to monitor radiation and radioactive materials, to control the distribution and release of radioactive materials, and to keep radiation exposure to within the limits of Part 20. In Section 4.7.2.1 of the EA, a description is provided of the licensee's methods used to control radioactive material in various areas during decommissioning.

Based on a review of the licensee's decommissioning plans (Ref. 1), the licensee's responses to questions (Refs. 3-5), the Shoreham DSAR (Ref. 14), and on the NRC staff's original acceptance of the Shoreham radiation protection program as documented in NUREG-0420 (Ref. 19), the staff finds the licensee's adoption of the existing HPP acceptable.

3.2.2 Dose Commitment

A discussion of the licensee's dose estimates, and of the potential radiological impact on the public and workers, is provided in Sections 5.1.1 and 5.1.2 of the EA (Ref. 6). The licensee estimates that the total occupational dose will be approximately 190 person-rem for the entire decommissioning. The licensee based its occupational dose estimates on methods described in Regulatory Guide 8.19 (Ref. 11), and NUREG/CR-0672 (Ref. 10). The staff finds that the licensee's methods are bound by the NRC staff's evaluation documented in NUREG-0420 (Ref. 19), and are reasonable and acceptable.

3.3 Industrial Safety

The proposed decommissioning activities at the Shoreham Nuclear Power Station, Unit 1, will involve a number of industrial safety hazards that are the subject of regulation by other Federal agencies. The staff's review did not include reviewing the licensee's decommissioning plan for compliance with regulations under the control of other Federal or State regulatory agencies. The staff's review was limited to radiological hazards. However, the staff has noted the presence of the hazards listed below.

3.3.1 Asbestos

LIPA has noted the presence of asbestos-containing materials (ACMs), primarily limited to gaskets, seals, and pump and valve packing. During the decommissioning, when generation of waste containing asbestos occurs, the waste will be handled in accordance with Shoreham's Industrial Safety Program. LIPA has adopted the Shoreham Industrial Safety Manual (Ref. 20), to govern industrial safety during decommissioning. This document contains the procedures that

describe the actions required by the Occupational Safety and Health Act, Federal Clean Air Act, Hazardous Material Transportation Act, New York State Labor Law, and New York State Environmental Conservation Law.

3.3.2 Heavy Lifting

Heavy lifts will be performed during the segmentation of the RPV, and are discussed in Section 4.2 of the EA (Ref. 6). The lifts will be made using the polar crane, auxiliary crane, and jib cranes. The licensee has committed to follow certain appropriate guidelines of NUREG-0612 (Ref. 7), regarding heavy load-handling limits and safe load paths. The guidelines in NUREG-0612 and the requirements of the DTS are intended to preclude the movement of heavy loads over the Spent Fuel Storage Pool while fuel is in the pool. The DTS are included in the POL. The NRC staff considers the DTS adequate for controlling heavy loads, and the licensee's procedures are acceptable for handling heavy loads in the Reactor Building with fuel in the Spent Fuel Storage Pool.

4.0 RADIOACTIVE WASTE MANAGEMENT

The radioactive waste management program at Shoreham is described in Section 4.3 of the EA (Ref. 6). The decommissioning of the Shoreham Nuclear Power Station will generate an estimated 79,300 cubic feet of solid radioactive waste. The Low-Level Radioactive Waste Policy Amendments Act of 1985 allows States or compacts with operating low-level waste disposal facilities to restrict access to those disposal sites for waste generated outside the State or compacts. The Shoreham decommissioning will not be completed before January 1, 1993, and the State of New York will not have a disposal site available by that date. Consequently, on January 1, 1993, Shoreham may not be permitted to dispose of low-level radioactive waste in existing low-level waste disposal facilities, and its radioactive waste will have to be stored onsite until disposal capacity is available.

The staff asked the licensee to perform an analysis of onsite interim solid radioactive waste storage capacity for interim waste storage in accordance with the guidance in Generic Letter 81-38 and NUREG-0800, Appendix 11.4-A. As a bounding condition for the analysis, the licensee assumed that the entire volume of waste expected to be generated during the decommissioning (79,300 cubic feet) would be stored onsite. As a result of its analysis, the licensee determined that the entire 79,300 cubic feet of waste could be stored in an acceptable manner in the Radwaste Building. The staff relied on the applicable Sections of NUREG-0800 (Ref. 13) (Sections 11.2 through 11.5), and the documented staff evaluation in Chapter 11 of NUREG-0420 (Ref. 15) for guidance during its review of the licensee's information on radioactive waste management during the decommissioning. See Section 4.4. below.

4.1 Fuel Disposal

The licensee submitted a DECON decommissioning plan that calls for complete dismantlement of contaminated and activated plant systems, and the decontamination of facility structures to releasable levels. The staff's review of the Shoreham Nuclear Power Station, Unit 1 decommissioning is based on the assumption that fuel will be removed from the site within the six years

referenced in NUREG-0586, "Final Generic Environmental Impact Statement on Decommissioning Nuclear Facilities" (Ref 21). If the fuel is not moved offsite within six years, the licensee must submit, for NRC review, a modified decommissioning plan. See Section 2.3 above and Section 13.0 below. Since fuel issues are not part of the decommissioning alternative, the staff's review did not include a review of any of the necessary requirements that the license must meet to carry out its irradiated fuel disposal options.

The licensee has proposed two methods for disposal of Shoreham's irradiated fuel. The licensee will either ship the irradiated fuel to another utility for storage or use by that utility, or the licensee will ship the irradiated fuel to Europe for reprocessing. Appropriate reviews of the selected method will be performed once the option for fuel disposal is selected.

The DTS will be used as the controls for movement of heavy loads over the Spent Fuel Storage Pool, during decommissioning. Based on the aforementioned, the staff finds the licensee's plan for fuel disposal acceptable.

4.2 Liquid Radwaste Systems

A description of the liquid radwaste system is provided in the Section 4.3.1.2 of the EA (Ref. 6). The information in the licensee's DP (Ref. 1) on the method for processing liquid radioactive waste, was superseded by the licensee's responses to NRC staff questions (Ref. 3).

The licensee subsequently committed to use the installed liquid radioactive waste-treatment system to process waste water generated during decommissioning. The following equipment is expected to be used: Spent Resin Tanks, Regenerant Liquid and Evaporator Feed Tanks, the Floor Drain Filter, the Radwaste Demineralizers, the Recovery Sample Tanks, the Radwaste Filters, and the Waste Collector Tanks. The NRC staff found the liquid radioactive waste-treatment system acceptable; its evaluation is documented in NUREG-0420 (Ref. 19).

During cutting operations, water in the RPV and Wet Cutting Station (WCS) will be processed and clarified with an underwater skid-mounted filter and demineralizer system that is described in Section 4.3.1.2 of the EA (Ref. 6). Upon completion of segmentation of material and components in the RPV and WCS, water from these sources will be drained through the floor drain system for collection and processing in the liquid radioactive waste-treatment system.

The liquid radioactive waste-treatment system installed at Shoreham contains the process equipment and instrumentation necessary to collect, process, monitor, and recycle or release radioactive liquid waste. The staff reviewed the licensee's proposed operation of the liquid radioactive waste-treatment system, the radionuclide concentrations expected, and the release procedures that will be used. The staff finds that the licensee's liquid radioactive waste treatment method is acceptable. The staff based its acceptance on the licensee's description of its proposed treatment method and on the documented staff evaluation of the liquid radioactive waste treatment system in NUREG-0420 (Ref. 19).

The licensee described a temporary liquid waste treatment system in its decommissioning plan. The licensee did not provide sufficient details about the proposed temporary system; therefore, use of this system would be unacceptable until such time as the licensee provides additional details and receives NRC approval. Therefore, the staff has determined that an Order authorizing decommissioning should include a condition that the licensee submit sufficient design information for a temporary liquid waste treatment system and receive NRC approval of the design prior to dismantling the installed liquid radwaste system. This design submittal and approval would only be required if the licensee intends to use a temporary system for decontamination efforts. See Section 13.0 below.

4.3 Building Air Filtration and Ventilation Systems

A discussion of Shoreham's gaseous radioactive waste treatment system is provided in Section 4.3.1.1 of the EA (Ref. 6). Short-lived fission products have decayed to insignificant levels since operations were terminated at Shoreham in June 1987. Therefore, during decommissioning, the plant's gaseous waste processing systems will not have to be used. The plant's ventilation system, as described in the Shoreham Updated Safety Analysis Report (USAR) (Ref. 22), and DSAR (Ref. 14), will be used to prevent the release of airborne particulate material during the decommissioning. The plant's ventilation system is augmented by installed portable equipment with high efficiency particulate air (HEPA) filters; and this equipment is described in Section 4.3.1.1 of the EA (Ref. 6).

During decommissioning, the releases of materials via the plant's ventilation system will be measured in accordance with methods used by LILCO, and described in the Shoreham DSAR (Ref. 14). In addition, during the operation of the WCS and Dry Cutting Station (DCS), continuous air monitors (CAMs) and portable alarming area-radiation detectors will be used, when these facilities are in operation.

The instrumentation, set-points, and calculation methods specified in the Shoreham Offsite Dose Calculation Manual (ODCM) (Ref. 23) will be used to ensure that the limits of Part 20 are not exceeded, and that operability and use of the instrumentation are consistent with the requirements of General Design Criteria 60, 63, and 64.

The staff has evaluated the licensee's DP (Ref. 1) and responses to questions (Ref. 3-5) and determined that the gaseous waste management system continues to meet the requirements of 10 CFR Part 50.34a; General Design Criteria 60, 63, and 64; and 10 CFR Part 50, Appendix I, as documented in NUREG-0420 (Ref. 19). Therefore, the staff finds the gaseous waste management system acceptable.

4.4 Solid Radioactive Waste

A discussion of the solid radioactive waste expected to be generated at Shoreham during decommissioning is provided in Section 4.3.1.3 of the EA (Ref. 6). The solid radioactive waste that will be generated during decommissioning will be due to dismantlement of contaminated plant systems and the RPV

and its internals, process waste generated as a result of processing water generated during decommissioning, and dry active waste. Contaminated resins and filters will be put into high integrity containers and dewatered. Contaminated piping and components will be packaged in boxes and cargo containers for shipment and disposal, or storage onsite.

The staff anticipates that a significant amount of Shoreham's decommissioning waste may require onsite interim storage, because of the pending closure of the two available disposal facilities, because of the requirements of the Low-Level Waste Policy Amendments Act of 1985. Because of the probable loss of access to the available offsite disposal sites for low-level radioactive waste generated during the decommissioning of Shoreham, the staff required the licensee to bound the interim storage requirements by assuming that the entire 79,300 cubic feet of waste containing approximately 600 curies will be stored onsite. Based on its analysis of interim onsite storage, the licensee determined that the entire volume of waste generated during decommissioning could be stored in the radwaste building.

Design values for the maximum floor loading were used to limit the number of containers that could be stored in each identified location in the radwaste building. To accommodate waste storage in areas that currently contain storage tanks would require removal of those tanks. Most of the waste containers would be distributed in available areas on the 15-ft and 50-ft 6-inch elevations of the Radwaste Building.

Ventilation will be provided to the Radwaste Building in order to make the environment safe for personnel and to control air flow. No permanent radiation monitors will be used; air sampling requirements will be satisfied by periodic surveillance using portable air samplers. A fire detection system will be wired to the Radwaste Control Room on elevation 37-ft 6-inches of the Radwaste Building to detect heat and smoke in all areas of the buildings.

Guidance related to the design of an onsite storage facility for low-level radioactive waste is incorporated in NUREG-0800, Appendix 11.4-A (Ref. 13); the Radwaste Building exceeds these design requirements. If onsite storage is required for a period exceeding five years, the licensee must apply for a license amendment, pursuant to 10 CFR Part 30. Storage of low-level radioactive waste generated during the decommissioning in the Shoreham Radwaste building is acceptable. See Section 4.3.3.9 of (Ref. 6). The staff has determined, however, that an Order authorizing decommissioning should include a condition requiring the licensee to apply for a license amendment pursuant to 10 CFR Part 30 in the event that onsite storage of solid low-level radioactive waste exceeds 5 years. See Section 13.0 below.

4.5 Process and Effluent Radiological Monitoring Systems

The ODCM (Ref. 23) will continue to be used during decommissioning, to control releases of radioactive materials through liquid and gaseous/airborne pathways. Instrumentation, set-points, and calculation methodologies specified in the ODCM are intended to ensure that the concentration limits of Appendix B, Table II, Column 2, to Part 20 (25 FR 10914, November 17, 1960) are not exceeded, and that the operability and use of the instrumentation is

consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10 CFR Part 50. The annual dose or dose commitment to an individual in an unrestricted area from radioactive material in liquid and gaseous effluents meet the design objectives of Appendix A Part 50. The staff finds the methods used to monitor releases from Shoreham during decommissioning acceptable.

4.6 Waste Handling and Packaging

A description of the licensee's intended methods for handling radioactive waste is provided in Section 4.3.2 of the EA (Ref. 6). The staff has reviewed the licensee's analysis, and estimates of the radioactivity associated with the RPV (including its internals), plant systems, plant structures, and soil (within a 1000-ft radius of the center-line of the Reactor Building) to determine waste classification and packaging requirements. A description of the waste expected to be generated during decommissioning, the volume, the expected container types used, the type of packages to be used in shipping waste, the approximate number of such containers needed, and approximate number of shipments is provided in Table 1. Table 9 in the EA (Ref. 6) summarizes the estimated radioactive waste data provided in Table 1 below, and provides waste class information.

Table 1
Shoreham Waste Volume

<u>Description</u>	<u>Volume Basis (ft³)</u>	<u>Typical Container Type</u>	<u>Container Quantity</u>	<u>Truck Shipments</u>
FACILITIES				
Primary Containment Floor Drains & Floor Drain Sumps	30	55-Gal	4	
Radwaste Laydown Area	206	B-25	2	
	15	55-Gal	2	
REACTOR VESSEL				
Shell	2,060	None	Coating & Pallets	30
Internals:				
Type A LSA Core Shroud Top Guide Plate SRM/IRM Dry Tubes	1,898	Nominal 120 ft Liners	³ 13	13
Type A LSA Core Support Plate Jet Pumps Control Rod Drive Guide Tubes	711	Nominal 195 ft Liners	³ 3	3
Surface Contaminated All Remaining LSA	5459	B-25	53	5
Internal Components	8416	Cargo Container	6	3

Table 1 (Cont'd)
Shoreham Waste Volume

SYSTEMS				
Control Rod Drive	515	B-25	5	1
Core Spray	1,545	B-25	15	2
Residual Heat Removal	15,141	B-25	147	17
Reactor Water Cleanup	9,167	B-25	89	10
Fuel Pool Cleanup Condensate	2,472	B-25	24	3
Demineralizer	1,957	B-25	19	2
Reactor Recirc	5,974	B-25	53	7
Liquid Radwaste	5,974	B-25	58	7
Sampling	309	B-25	3	
MISCELLANEOUS				
Demineralizer Resins/ Filters	3,212	HIC	22	8
Fuel Racks & Appurtenances	8,258	Cargo Container	25	14
Process Waste and DAW	7,725	B-25	75	4

The staff has reviewed the licensee's plans for waste handling and packaging and concludes that they are consistent with the applicable provisions of 10 CFR Parts 20, 61, 71, Department of Transportation Requirements, and the staff's "Technical Positions on Waste Form" (Ref. 24), and are acceptable.

4.7 Waste Transportation and Disposal

The licensee's plans for the transportation and disposal of radioactive waste are described in Section 4.3.3 of the EA (Ref. 6). The staff has reviewed the licensee's plans for waste transportation and disposal and has concluded that removable contamination on systems and components, building surfaces, and structures. The licensee further plans to employ, as a criterion, an exposure rate of 5 uR/hr (Regulatory Guide 1.86) above background for gamma-emitting radioisotopes, measured at a distance of 1 meter. The staff considers these criteria reasonable and acceptable.

5.0 Final Radiation Survey Plan

The licensee prepared its final radiation survey plan based on the guidance provided in NUREG/CR-2082, "Monitoring for Compliance with Decommissioning Termination Survey Criteria" (Ref. 26), Regulatory Guide 1.86 (Ref. 25), and NUREG/CR-2241, "Technology and Cost of Termination Surveys Associated with Decommissioning of Nuclear Facilities" (Ref. 27).

The plan contains an outline for the final survey report, a comprehensive list of areas in the plant, that are currently contaminated, and a list of areas with the potential for becoming contaminated during decommissioning. The instruments to be used for the final survey are adequate to access

contamination at levels below the average limits in Regulatory Guide 1.86 (Ref. 25). The proposed sampling frequency is adequate to provide assurance that the reported survey results represent the actual average contamination level of the areas being measured. The staff has reviewed the licensee's final termination plan, and it meets the requirement of 10 CFR 50.82(b)(3); based on that review, the staff finds the plan reasonable and acceptable.

6.0 Organization and Responsibility

The overall control and responsibility for the decommissioning of Shoreham Nuclear Generating Station rest with LIPA. Seven individuals from New York Power Authority (NYPA) with nuclear experience are to fill "LIPA/NYPA Coemployees" positions. These positions are considered the most vital for the conduct of a safe and effective decommissioning.

The Resident Manager is the senior onsite LIPA manager and, as such, this individual has the ultimate onsite authority. There are five principal management functions that report directly to the Resident Manager. The functions are as follows:

- Decommissioning Project Management
- Operations, Maintenance, and Radiological Control
- Licensing and Regulatory Compliance
- Station Services
- Financial and Administrative Services.

Figure 1 provides an organization chart for the decommissioning effort.

6.1 LIPA Executive Director

The Executive Director of LIPA is responsible for the day-to-day direction and administration of LIPA, including all matters involving asset transfer, license transfer, maintenance, and decommissioning of the Shoreham plant.

6.2 Executive Vice President-Shoreham Project

The Executive Vice President-Shoreham Project, reports directly to LIPA's Executive Director and is responsible for the overall direction, radiological and industrial safety, cost, and schedule for the project. He is the corporate officer responsible for Quality Assurance (QA) program implementation and review, protection of occupational and public safety, and coordination with regulatory agencies.

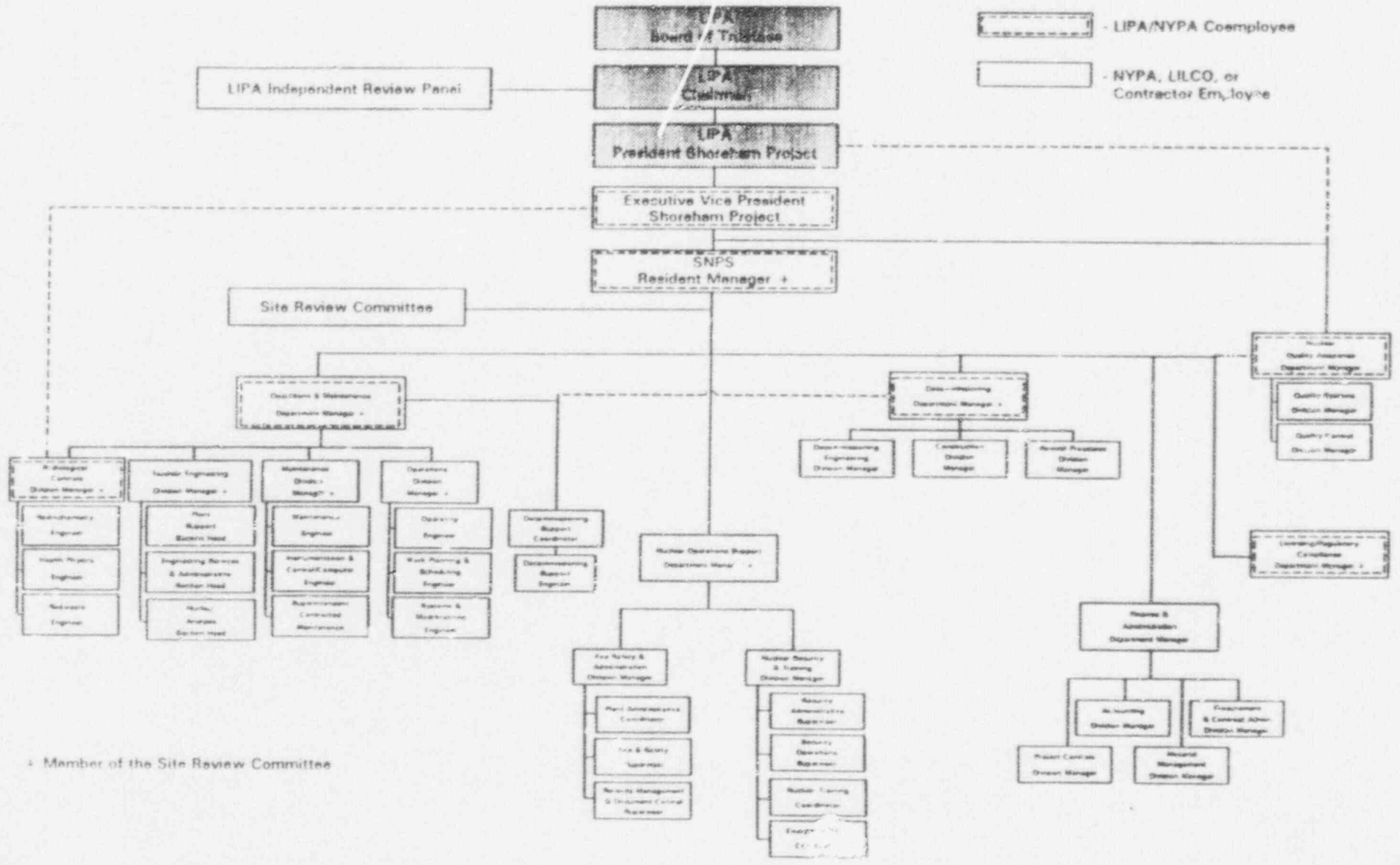
6.3 Resident Manager

The Resident Manager reports directly to the Executive Vice President-Shoreham Project. The Resident Manager has overall responsibility for day-to-day management of decommissioning activities. Through his subordinates, he directs the technical, administrative, and regulatory functions, to accomplish all task activities comprising the decommissioning project.

LIPA Shoreham Plant Organization Chart

KEY:

- LIPA
- LIPA/NYPA Coemployee
- NYPA, LILCO, or Contractor Employee



+ Member of the Site Review Committee

Figure 1

6.4 Operations and Maintenance Department Manager

The Operations and Maintenance Department manager reports directly to the Resident Manager and is responsible for the operations, maintenance, radiological controls, and plant engineering support for the project. He ensures that adequate staffing, procedures, and controls are established to safely support decommissioning activities, without interruptions or delays to the project.

6.5 Decommissioning Department Manager

The Decommissioning Department Manager reports directly to the Resident Manager and is responsible for the management of Shoreham's direct decommissioning activities, including project engineering, coordination and direction of the decommissioning contractors, and work planning/scheduling.

6.6 Nuclear Quality Assurance (NQA) Department Manager

The NQA Department Manager reports directly to the Executive Vice President-Shoreham Project, and is responsible to the Resident Manager for the development and administration of the Decommissioning QA program.

6.7 Licensing/Regulatory Compliance Department Manager

The Licensing/Regulatory Compliance Department Manager reports to the Resident Manager and is responsible for the management of all licensing and regulatory matters relating to the decommissioning of the Shoreham plant. The Licensing/Regulatory Compliance Department Manager is also responsible for coordinating site activities that are necessary to ensure conformance with all applicable regulations and license requirements.

6.8 Finance and Administrative Department Manager

The Finance and Administrative Department Manager reports to the Resident Manager and is responsible for all financial functions related to the decommissioning. Such functions include the coordination and management of procurement activities, inventory and material control, budget management, and cost control and strategic planning/scheduling.

6.9 Nuclear Operations Support Department Manager

The Nuclear Operation Support Department Manager reports to the Resident Manager and is responsible for managing station support services, including plant security, fire protection and safety, training and miscellaneous site administrative services (clerks, typists, etc.).

6.10 Operations Division Manager

The Operations Division Manager reports to the Operations and Maintenance Department Manager and is responsible for staffing the operations engineers

and plant operations on each shift. In addition, the Operations Division Manager will provide for day-to-day planning/scheduling for operations and maintenance activities.

6.11 Maintenance Division Manager

The Maintenance Division Manager reports to the Operations and Maintenance Department Manager and is responsible for maintenance of all plant mechanical and electrical equipment, instrumentation and control systems, and building and site services.

6.12 Radiological Controls Division Manager

The Radiological Controls Division Manager reports to the Operations and Maintenance Department manager and is responsible for health physics, radiological health and safety of the workers and the public, radiochemistry, radiological engineering, and radioactive waste handling and disposal.

6.13 Nuclear Engineering Division Manager

The Nuclear Engineering Division Manager reports to the Operations and Maintenance Department Manager and is responsible for providing technical support and engineering services in areas related to the maintenance of the Shoreham plant. The Nuclear Engineering Division Manager will also be responsible for technical interface with the Decommissioning Department engineering personnel, to ensure that decommissioning engineering plans and activities are compatible with the existing Shoreham plant design. In addition, the Nuclear Engineering Division Manager will be responsible for maintaining Shoreham's engineering administrative infrastructure (document control, engineering/design procedures, etc.).

6.14 Nuclear Security and Training Division Manager

The Nuclear Security and Training Division Manager reports to the Nuclear Operations Support Department Manager and is responsible for the physical security of the site and environs. He will be responsible for establishing procedures and standards for controlling access to the site for staff and contractor personnel, as well as vehicle access control.

6.15 Fire Safety and Administration Division Manager

The Fire Safety and Administration Division Manager reports to the Nuclear Operations Support Department Manager and is responsible for the fire protection and safety division. This includes reviewing and approving fire protection and safety procedures and reporting all fire protection matters related to plant maintenance and decommissioning activities to the Nuclear Operations Support Department Manager.

6.16 Decommissioning Engineering and Planning

In 1990 LIPA hired Bechtel to provide Architect/Engineering services for the Shoreham decommissioning project. Bechtel's experience as the prime con-

tractor for the TMI 2 recovery effort can be directly applied to the Shoreham decommissioning project. LIPA will continue to evaluate the need to acquire the services of contractors to help with the decommissioning effort. LIPA has identified the need for specific contractor support in the following three areas (1) Radwaste Management, (2) Decommissioning Specialist, and (3) Radiation Protection. Contractor services are listed below:

- (1) Radwaste Management
 - Packaging and handling
 - Shipping cask and container suppliers
 - Transportation
 - Disposal
 - Liquid waste processing
- (2) Decommissioning Specialist
 - Planning engineering
 - Decontamination
 - Dismantling
 - Heavy rigging/handling
- (3) Radiation Protection
 - Engineering
 - Radiation protection staff augmentation
 - Analytical laboratory services
 - Dosimetry
 - Radiation surveys

7.0 TECHNICAL AND ENVIRONMENTAL SPECIFICATIONS IN PLACE DURING DECOMMISSIONING

The staff reviewed the licensee's summary of its Technical and Environmental Specifications that would be in place during decommissioning. The Technical Specifications and Environmental Protection Plan are incorporated in Amendment No. 7 of the facility's POL (effective July 19, 1991), and will be in place during decommissioning.

8.0 QUALITY ASSURANCE (QA)

The licensee's Quality Assurance Program (QAP) is described in Section 4.10 of the EA (Ref. 6). The licensee's (LIPA's) QAP is designed to meet the requirements of 10 CFR Part 50, Appendix B. The QAP is described in the DSAR (Ref. 14) Section 17.2, "Quality Assurance During the Operational Phase." Section 17.2 of the Shoreham DSAR (Ref. 14) has been modified for use during the decommissioning. Application of the modified QAP as it applies to LIPA as the licensee is documented in the response to NRC staff question number 47, "Quality Assurance During the Decommissioning Phase" (Ref. 4). The licensee's organization is addressed in the Shoreham DP (Ref. 1).

The Executive Vice President-Shoreham Project is the corporate officer responsible for implementation of the QAP. The Nuclear Quality Assurance (NQA) Department Manager reports directly to the Executive Vice President, and has

direct access to the LIPA President of Shoreham Project. The Manager, NQA Department, is responsible for the development and implementation of the overall QAP during decommissioning.

The QAP is designed to ensure that activities such as design, procurement, fabrication, shop inspection and testing, shipping, storage, construction, erection, cleaning, installation, fuel-handling activities, equipment and system operation, maintenance, repair and modification of materials, structures, system, components, and services are accomplished in accordance with the criteria of Part 50, Appendix B.

The staff's evaluation of the licensee's QA provisions during decommissioning concludes that the licensee's program is acceptable, based on meeting the applicable sections of NUREG-0800 (Ref. 13) Section 17.2, "Quality Assurance during the Operations Phase."

9.0 POSTULATED ACCIDENTS

Accident analyses are addressed in Section 5.1.4 of the EA (Ref. 6). The licensee's accident analyses are consistent with the approaches used for postulated accidents during decommissioning in NUREG/CR-0672 (Ref. 10) for the reference boiling water reactor (BWR). In its analysis, the licensee compared calculated whole body doses and organ doses to individuals, at the Exclusion Area Boundary (EAB), that would result from the postulated accidents, to the Environmental Protection Agency's (EPA's) Protective Action Guidelines (PAG's) (Ref. 28) limits. The worst-case fuel damage accident was calculated based on all 560 fuel-element assemblies being damaged, and the release of all their fission gases, with no credit taken for containment isolation and filtration of fission products. The Fuel Damage Accident is described in Chapter 15 of the Shoreham DSAR (Ref. 13). The other Shoreham decommissioning accident scenarios and assumptions are based on NUREG/CR-0672 (Ref. 10) scenarios and assumptions (Appendix N).

The maximum potential dose is due to the worst-case fuel damage accident as described in Chapter 15 of the Shoreham DSAR (Ref. 14), and incorporated in the Shoreham POL, Amendment No. 7, License No. NPF-82. The potential dose for this postulated accident is 1.08 mrem dose to the whole-body of an individual at the EAB.

The staff has reviewed the licensee's postulated accident scenarios and found that none of the accidents has potential consequences (radiation doses) in excess of the PAG levels recommended by the EPA "A Manual of Protective Actions for Nuclear Incidents," 1991 (Ref. 28).

10.0 FINANCIAL ASSURANCE

Under an agreement between LILCO and LIPA, LILCO is to pay all costs associated with decommissioning Shoreham. The estimated cost to decommission the Shoreham Nuclear Power Station, Unit 1 is \$186,292,000 in 1991 dollars. On November 22, 1991, the NRC issued an exemption to LILCO, exempting LILCO from the conditional requirements for the use of a surety method as financial assurance, as specified in 10 CFR 50.75(e)(iii)(A), (B), and (C). The

exemption was granted under the conditions that: 1) LILCO provide funds to an external account sufficient to cover, at all times, three months of projected decommissioning cost, as specified in the January 24, 1990 Site Agreement; 2) LILCO maintains a \$10-million external fund for emergency decommissioning costs; 3) notice be given to NRC at least 90 days in advance, in the event of cancellation or alteration of the \$300-million line of credit; and 4) LILCO maintains and commits an amount of its unused line of credit, during decommissioning of Shoreham, sufficient to cover estimated, and yet-to-be-incurred, decommissioning costs.

The staff reviewed Shoreham's detailed cost estimates for the DECON decommissioning alternative, and analyzed the following elements related to the cost of decommissioning Shoreham: 1) cost assumptions used, 2) major decommissioning activities and tasks, 3) inventories of plant equipment and structures, 4) unit factors, 5) calculated equipment and structural dismantlement and decontamination costs, 6) calculated waste disposal costs, and 7) calculated activity-dependent costs.

The review of the cost estimates for decommissioning Shoreham was based on independent estimates and comparisons of several activities conducted at the facility to similar activities at other facilities. It included an evaluation of the volumes of radioactive waste to be removed, burial costs, transportation costs, equipment costs, and labor rates. The basis for the evaluation was the use of similar information provided in the Pathfinder decommissioning cost estimates; the Fort St. Vrain decommissioning cost estimates, the "1992 Means Building Construction Cost Data" (Ref. 29), the "Dodge Manual for Building Construction Cost Data 1984" (Ref. 30), and NUREG/CR-130, "Technology, Safety, and Costs of Decommissioning a Reference Pressurized Water Reactor Power Station" (Ref. 31). All cost information was escalated to 1991 dollars using an inflation rate of 5 percent. The estimated cost of \$186,292,000 represent a conservative estimate of the decommissioning costs for Shoreham.

The conservatism built into the Shoreham cost estimates can be shown by way of an example. Take the case of the removal of contaminated pumps (1,000 - 10,000 lbs.) at Shoreham, and the similar activity at Pathfinder. For the pump removal activity, the estimated duration to complete this activity was identical for both facilities, an estimated 6.1 hours. The Shoreham estimate used higher factors to adjust for time estimates to complete this activity. Pathfinder increased the actual estimate to complete this activity by an additional 103 percent to allow for access adjustment, respirator-protection adjustment, ALARA adjustment, protective-clothing adjustment, and work breaks. In addition to using the same adjustment to the time estimates, Shoreham added an additional site-specific labor adjustment factor of 100 percent, based on regional work experience with the labor unions. This resulted in an adjustment to the estimated time to complete this activity to 220 percent, compared to the 103 percent duration for the same activity at Pathfinder.

Using these adjustment factors, the estimated time to complete the identical activities at Shoreham is 23.3 hours versus 10.6 hours for Pathfinder. Based on the adjusted labor rates for the Long Island, New York, area, and the much more conservative time estimate, the cost to remove the contaminated pump at

Shoreham was several times higher than at Pathfinder. A number of similar activities were compared at the two facilities, and the basic difference was that Shoreham used a higher adjustment for time estimates, and added the site-specific labor-adjustment factor.

The Shoreham labor rates were compared to the labor rates for Pathfinder and escalated at 5 percent per year to 1991 dollars, and compared to cost in "1992 Means Building Construction Cost Data" (Ref. 29), using the City Cost Indexes. Based on the cost comparisons referenced, the Shoreham costs were found to be reasonable. The staff finds that the Shoreham low level waste disposal costs of \$240 per cubic foot to be conservative. The staff finds, in general, that the Shoreham decommissioning costs are conservative, and acceptable.

11.0 NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

The Commission has provided standards for determining whether a significant hazards consideration exists as stated in 10 CFR 50.92. A proposed amendment to an operating license for a facility involves no significant hazards consideration if operation of the facility in accordance with a proposed amendment would not (1) involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety. A discussion of these standards as they relate to this order follows:

The Long Island Power Authority provided in letter of January 22, 1992, the following analysis of No Significant Hazards Consideration to support its request for authorization to decommission Shoreham:

1. The Proposed Change Does Not Involve a Significant Increase in the Probability or Consequences of an Accident Previously Evaluated

This proposed amendment will do nothing more than authorize decommissioning of Shoreham in accordance with the NRC approved Shoreham Decommissioning Plan. The Decommissioning Plan contains accident analyses which already have been reviewed by the NRC. This amendment will in no way alter the probability or consequences of the accidents previously analyzed in the Decommissioning Plan, but will simply authorize that those decommissioning activities be performed according to the Plan.

The fuel will not be further irradiated. The non-operating, defueled condition of the reactor further reduces the probability of an operational accident. The potential accident consequences for the low burn-up fuel in the spent fuel pool have been analyzed by the previous licensee assuming a fuel damage accident. Further, the analysis conservatively assumed maximum fission product release (release of all fuel gap activity). All of the postulated decommissioning accident analyses demonstrate that accident consequences would be substantially lower than the previous Updated Safety Analysis Report (USAR) accident analyses results and well within regulatory limits.

The fuel, radioactive waste and material will not be handled or treated in a different manner than assumed in previous safety analyses and evaluations. The small amounts of radioactive waste and materials at Shoreham are contained in systems and components specifically designed for their control. Fuel handling will be performed by certified personnel, with approved equipment and approved procedures. The low burn-up fuel is stored in the spent fuel pool. Storage of the fuel in any onsite location other than the spent fuel pool would require a license amendment.

Therefore, the proposed amendment to NPF-82 does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. The Proposed Change Will Not Create The Possibility of a New or Different Kind of Accident From Any Accident Previously Evaluated

The proposed amendment ask only for permission to conduct activities in accordance with the Shoreham Decommissioning Plan. Section 3.4 of the Decommissioning Plan contains a description of postulated accidents and presents their analyzed effects and consequences. The set of accidents contained in Decommissioning Plan Section 3.4 have either been previously evaluated directly in approved Shoreham licensing basis documents, or are considered to be subsets of accidents previously evaluated in approved Shoreham licensing basis documents.

Accidents identified in the Decommissioning Plan which have previously been directly evaluated in approved Shoreham licensing basis documents include the following:

- ° The Fuel Damage Accident (Decommissioning Plan Section 3.4.1.8) is previously evaluated in Defueled Safety Analysis Report (DSAR) Section 15.1.36.
- ° The Effects of Natural Catastrophes (Decommissioning Plan Section 3.4.1.9) are previously evaluated in DSAR/USAR Section 3.3 (wind and tornado loading), 3.4 (floods), 3.5 (tornado missiles) and 3.7 (seismic).
- ° The Breach of Physical Security Measures (Decommissioning Plan Section 3.4.1.10) is previously evaluated in the SNPS Safeguards Contingency Plan.

Accidents identified in the Decommissioning Plan which are considered to be subsets of accidents previously evaluated in Shoreham licensing basis documents include the following:

- ° The Combustible Waste Fire (Decommissioning Plan Section 3.4.1.2), the Contaminated Sweeping Compound Fire (Decommissioning Plan Section 3.4.1.3), Oxyacetylene Explosion (Decommissioning Plan

Section 3.4.1.5) and Explosion of Liquid Propane Gas Leaked From A Front End Loader (Decommissioning Plan Section 3.4.1.6) are subsets of events that were previously evaluated in the SNPS Fire Hazards Analysis Report (FHAR).

The FHAR primarily focused on the effects of postulated fires on the plant's ability to achieve and maintain safe shutdown. In Section 2 of the FHAR, however, it is stated under the paragraph titled "General" that:

"In addition to assessing their impact on safe shutdown capability, fire hazards throughout the plant were reviewed with regard to the potential for a fire to cause an unacceptable radioactive release. The review determined that there is no single postulated fire within the plant which could cause an unacceptable release of radioactivity. No release identified would exceed a small fraction of the guidelines set forth in 10 CFR 100."

The above conclusions remain valid for the fire and explosion events presented in the Decommissioning Plan. Further, the hazards associated with the storage and use oxygen-acetylene fuel gas systems were also addressed in the FHAR under Section 1, item G, "Special Protection Guidelines." While no specific event is evaluated in this FHAR section, it is indicated that such hazards were explicitly considered, resulting in the development of a permit system at Shoreham to control the use of these materials. This permit system will continue to be in effect at Shoreham to control the use and quantities of any combustible or potentially explosive materials during decommissioning.

The Waste Container Drop (Decommissioning Plan Section 3.4.1.1), the Vacuum Filter-Bag Rupture (Decommissioning Plan Section 3.4.1.4) and the Contamination Control Envelope Rupture (Decommissioning Plan Section 3.4.1.7) are subsets of events that were previously evaluated in the USAR. Specifically, USAR Section 15.1.29 "Miscellaneous Small Releases Outside Primary Containment" indicates that releases other than pipe breaks that could occur outside primary containment include small spills and leaks of radioactive materials inside structures that house process equipment. This USAR section further states that the offsite dose resulting from any small spill that could occur outside the primary containment will be negligible in comparison to the dose resulting from postulated leakages that have been assumed and evaluated in USAR Section 11.2 and 11.3 under routine plant releases. The three Decommissioning Plan events noted above are considered to be a subset of the small spills and leaks addressed in USAR Section 15.1.29 because they can also be associated with routine activities that are typically conducted at operating nuclear power plants. The offsite doses from these events as analyzed in the Decommissioning Plan are also negligible in comparison to the doses from postulated leakages that are evaluated in USAR Sections 11.2 and 11.3 under routine plant releases. With respect to the present Shoreham licensing basis, such doses remain bounded by the

routine plant releases authorized by license Amendment No. 7, issued June 14, 1991, and are negligible in comparison to the radiologically bounding fuel damage accident.

Therefore, this order does not create the possibility of a new or different kind of accident from any accident previously evaluated by the NRC.

3. The Proposed Change Does Not Involve a Significant Reduction in a Margin of Safety

The proposed amendment does not involve a reduction in any margin of safety. As noted the amendment will permit decommissioning to occur as planned and approved and will be consistent with the Commission's regulations and orders. The margin of safety reflected in the analyses presented in the Decommissioning Plan are unaltered by this Order.

The fuel handling and radioactive waste storage accidents were reanalyzed for the low burn-up, decay heat, and radioactive inventory conditions of Shoreham in the Decommissioning Plan. These analyses confirmed a significant increase in the margin of safety from those analyzed for long-term, full power operations in the USAR. Further, the Defueled Technical Specifications and Environmental Protection Plan provide acceptable assurance to protect the public health and safety for the defueled condition. As indicated in the Decommissioning Plan, decommissioning activities will be conducted in accordance with the requirements of these documents.

Therefore, the proposed amendment does not involve a significant reduction in the margin of safety.

The staff has reviewed the licensee's accident analyses and concludes that the accidents analyzed in the Decommissioning Plan are enveloped by accidents already reviewed by the NRC. Therefore, based on the above discussions, the staff finds that this order does not involve a significant hazards consideration.

12.0 CONCERNS RAISED IN INTERVENTION PETITIONS

On December 23, 1991, the Commission published in the Federal Register a notice of consideration of issuance of an order approving the decommissioning plan and solicited public comment on it (56 FR 66459). On January 22, 1992, counsel for the Shoreham-Wading River Central School District (School District); and Scientists and Engineers for Secure Energy, Inc. (SE²); (jointly "Petitioners") filed with the Commission, petitions to intervene and requests for a prior hearing concerning the proposed issuance of an order authorizing decommissioning. On June 3, 1992, the Petitioners filed a joint pleading

withdrawing their intervention petitions. Because the two petitions were almost identical, except for the identification of each petitioner, the aspects raised in Petitioners' January 22, 1992, filings are listed below with references to SE²'s petition:

- (a) The proposed order would foreclose the possibility or increase the cost of returning the plant to operation. (SE² Petition at 9)
- (b) The DECON proposal will cause unnecessary radiological exposures to the petitioners. (SE² Petition at 16)
- (c) There is no adequate financial assurance of funds to decommission Shoreham. There is no assurance of the capability of LIPA to conduct decommissioning. (SE² Petition at 16)
- (d) The proposed order requires an Environmental Assessment prior to issuance. This assessment must consider the effects on the air quality, tax bases, local employment, and cultural resources; and the impacts of debris disposal, traffic, and noise. (SE² Petition at 26 and 29)
- (e) NEPA and other regulations require the licensee to maintain all plant systems in a readiness status of full power operation. (SE² Petition at 28)
- (f) The proposed order cannot be issued prior to publishing an EIS. (SE² Petition at 28)
- (g) The staff committed to preparing an EIS, as opposed to an EA, in its letter dated July 20, 1989. (SE² Petition at 29)

The staff has addressed each of these aspects in the corresponding items below:

- (a) In its Memorandum and Order of October 17, 1990, CLI-90-08, as affirmed on February 22, 1991, in CLI-91-02, the Commission found, among other things, that resumed operations need not be considered as an alternative to decommissioning. Thus, concerns regarding operation are not relevant to approval of decommissioning.
- (b) The proposal to decommission Shoreham via the DECON alternative will yield radiation exposure to the general public at doses greater than the SAFSTOR or ENTOMB options; however, the exposures will not be significant. The radiation exposure to the public occurs primarily from the shipment of radioactive waste to disposal sites and was estimated using methods described in NUREG/CR-0692, SAFETY AND COSTS OF DECOMMISSIONING A REFERENCE BOILING WATER REACTOR POWER STATION. The estimated cumulative dose to the public from all expected radioactive waste shipments is .7 man-rem. This dose includes .4 man-rem to 800 onlookers (approx. .05 mrem per person) spending 3 minutes next to the shipments, and .3 man-rem to approximately 25 million persons in route (approx. .012 micro rem per person). The shipment of this waste would be in certified containers and in accordance with NRC and DOT regulations. The resulting doses to the

public are well within the environmental impacts analyzed in 10 CFR 51.52, Summary Table S-4 - Environmental Impact of Transportation of Fuel and Waste to and From One Light-Water-Cooled Nuclear Power Reactor. Therefore, radiation exposure to the public and petitioners is acceptably low.

- (c) The decommissioning funding issue was evaluated in connection with the issuance of an exemption to the licensee, on November 22, 1991 (56 FR 61265), concerning financial assurance for decommissioning. In that exemption, the staff determined that the licensee's financial assurance plan adequately assures that the decommissioning funds of \$186 million are available to decommission Shoreham, meets the intent of the decommissioning regulations, and ensures protection of the public health and safety.

Additionally, the staff has previously evaluated LIPA's management and technical qualifications in its review of the LILCO/LIPA license transfer request. The staff determined that LIPA has the management and technical qualifications to hold the Shoreham license. The staff has also found that the licensee is qualified to carry out the proposed decommissioning activities. Moreover, the February 29, 1992 (57 FR 8158, March 6, 1992), order transferring the Shoreham license to LIPA requires that LILCO retain the capability to assume the license in the event that LIPA ceases to exist or is otherwise found to be unqualified to hold the Shoreham license.

- (d) The staff has prepared an Environmental Assessment (EA) related to the Order authorizing decommissioning of Shoreham. This EA included the consideration of radiological impacts to the public as well as non-radiological impacts such as socio-economic (local employment and unemployment), air-quality, traffic, noise, cultural resources, land and water use, and other impacts the Commission deemed appropriate under the Atomic Energy Act. The EA concluded that the DECON alternative will have no significant environmental impact on the quality of the human environment (57 FR 24832).
- (e) In its Memorandum and Order of October 17, 1990, (CLI-90-08), as affirmed on February 22, 1991, (CLI-91-02), the Commission found, among other things, that resumed operations need not be considered in connection with a NEPA review of a proposal to decommission. Additionally, in CLI-90-08 and CLI-91-01 (dated January 24, 1991), the Commission concluded that the licensee was obligated to maintain plant systems required for plant safety in the defueled mode and could not take any actions that would foreclose alternative ways to conduct decommissioning or that would substantially increase the cost of decommissioning, prior to approval of a decommissioning plan. Therefore, the Commission found that neither NEPA or its regulations require that plant systems be maintained in a readiness status for full power operation.

- (f) There is no requirement that an Environmental Impact Statement be prepared for decommissioning. In promulgating the Final Decommissioning Rule on June 27, 1988, (53 FR 24039), the Commission stated:

The Commission's primary reason for eliminating a mandatory EIS for decommissioning is that the impacts have been considered generically in a GEIS.... If the impacts for a particular plant are significantly different from those studied generically because of site-specific considerations, the environmental assessment would discover those and lay the foundation for the preparation of an EIS. If the impacts for a particular plant are not significantly different, a Finding of No Significant Impact would be prepared.

In the staff's Environmental Assessment concerning the order to decommission Shoreham, the staff has determined that the impacts of the Shoreham decommissioning are bounded by the GEIS, and therefore, has prepared a Finding of No Significant Impact (57 FR 24832). Thus, no EIS is required.

- (g) Although the July 20, 1989, letter from Dr. Murley to James E. McGranery, Jr., Esquire, stated that the decommissioning of a facility necessitates the preparation of an EIS; Dr. Murley also stated that an "environmental review will be performed in accordance with the Commission's regulations." As noted above, the Commission's decommissioning rule does not require the preparation of an EIS since those impacts have been considered generically in the GEIS. No EIS is required unless there are site specific considerations that result in environmental impacts that differ significantly from those studied in the GEIS and an EA concludes that the proposed decommissioning will have a significant impact on the quality of the human environment. Further, the July 20, 1989, letter and SECY-89-247 (which initially recommended that an EIS be prepared for the decommissioning of Shoreham) have both been superseded by specific Commission guidance in CLI-90-08 and other decisions. In CLI-90-08, the Commission stated and reaffirmed in CLI-91-02, that it had not determined that an EIS is necessary. In addition, in DD-90-8, dated December 20, 1990, Dr. Murley informed the petitioners and their counsel, Mr. McGranery, that the NRC staff "will prepare an environmental impact statement or environmental assessment" regarding the Shoreham decommissioning. Moreover, as noted above, the staff has prepared an EA on the proposed decommissioning and concluded that the impacts of decommissioning Shoreham are bounded by the GEIS and that the DECON alternative will not have a significant environmental impact.

Based on the above discussion, the staff has concluded that nothing in the submissions of the Petitioners affects the No Significant Hazards Consideration Determination.

13.0 CONDITIONS OF A DECOMMISSIONING ORDER

The staff has determined in this Safety Evaluation that although the Decommissioning Plan is acceptable, conditions must be added to an order approving the decommissioning of the Shoreham facility to address matters which might exceed the conditions which have been evaluated. The bases for these conditions are discussed in the previous sections of this Safety Evaluation and relate to the impact of fuel disposal on the decommissioning schedule (Section 2.3), the storage of onsite low-level radioactive waste (Section 4.4), and the use of a temporary liquid radioactive waste treatment system (Section 4.2). Therefore, the staff has established the following conditions for an order authorizing decommissioning of the Shoreham facility:

- (1) Should the licensee fail to remove all fuel from the 10 CFR Part 50 reactor site within 6 years from the date of this Order, the licensee is required to:
 - a) suspend the on-going decommissioning; and
 - b) within 30 days from the end of the 6 year period, request NRC approval of a modified decommissioning plan.
- (2) If the licensee is unable to ship all solid radioactive waste offsite within 5 years of the date of this Order, the licensee shall apply for a license amendment, pursuant to 10 CFR Part 30, within 30 days from the end of the 5 year period that addresses storage of low-level radioactive waste.
- (3) In the event the licensee intends to utilize a temporary liquid radwaste system to complete the decontamination efforts, the licensee shall submit sufficient system design information to the NRC and receive NRC approval of the design prior to dismantlement of the installed liquid radwaste system.

The staff also included a provision in the order that in the event the licensee desires to deviate from the NRC accepted Decommissioning Plan, the licensee can make changes provided that:

- (1) Such changes are approved in writing by the licensee's onsite review committee;
- (2) The Director, Office of Nuclear Material Safety and Safeguards is notified of such changes in writing, and is provided with a copy of the written approval by the onsite review committee, not less than 30 days before such changes are implemented; and
- (3) Such changes do not result in an unreviewed safety question or result in environmental impacts different from and exceeding those set forth in the licensee's Supplement to Environmental Report December 1990.

Changes not meeting the criteria of (1), (2), and (3) above must be submitted by the licensee to the Director, Office of Nuclear Material Safety and Safeguards, for prior NRC review and approval before they may be implemented.

The staff has concluded that the above change procedure includes sufficient administrative and technical controls so that assurance of adequate protection of public health and safety and protection of the environment will be maintained throughout the decommissioning.

14.0 CONCLUSIONS

The Commission has concluded, based on the considerations already discussed that: 1) there is reasonable assurance that the health and safety of the public will not be endangered by the decommissioning option selected by the licensee; 2) the major activities and tasks during the decommissioning will be conducted in compliance with the Commission's regulations; and 3) the issuance of an order to implement the decommissioning plan will not be inimical to the common defense and security or to the health and safety of the public.

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Attachment: Reference List

Date: June 11, 1992

REFERENCES

1. Shoreham Nuclear Power Station Decommissioning Plan.
2. Shoreham Nuclear Power Station Supplement to Environmental Report (Decommissioning).
3. Additional Information in Support of the Decommissioning Plan for Shoreham Nuclear Power Station-Unit 1. (Working Meeting November 7-8, 1991), November 27, 1991.
4. Response to Request for Additional Information for Shoreham Decommissioning Plan, August 26, 1991.
5. Additional Information in Support of the Decommissioning Plan for Shoreham, dated December 6, 1991.
6. Shoreham Environmental Assessment Related to the Order Authorizing Facility Decommissioning.
7. NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants."
8. DOE/EV/10128-1, Decommissioning Handbook.
9. AIF/NESP-036 Vol. 1 and Vol. 2, "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates."
10. NUREG/CR-0672, "Technology, Safety and Cost of Decommissioning a Reference Boiling Water Power Station."
11. Regulatory Guide 8.19, "Occupational Radiation Dose Assessment in Light-Water Reactor Power Plants Design Stage Man-Rem Estimates."
12. LIPA Shoreham Administrative Manual.
13. NUREG-0800 "Standard Review for the Review of Safety Analysis Reports for Nuclear Power Plants."
14. Defueled Safety Analysis Report (DSAR).
15. Regulatory Guide 8.13, "Instruction Concerning Prenatal Radiation Exposure."
16. Regulatory Guide 8.15, "Acceptable Programs for Respiratory Protection."
17. Regulatory Guide DG-1005, "Standard Format and Content for Decommissioning Plans for Nuclear Reactors."
18. Shoreham Site Characterization Program (SSCP).

19. NUREG-0420, "Safety Evaluation Report Related to the Operation of Shoreham Nuclear Power Station, Unit No. 1."
20. Shoreham Industrial Safety Manual.
21. NUREG-0586, "Final Generic Environmental Impact Statement on Decommissioning Nuclear Facilities."
22. Shoreham Updated Safety Analysis Report (USAR).
23. Shoreham Offsite Dose Calculation Manual (ODCM).
24. Technical Positions on Waste Form.
25. Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Power Reactors."
26. NUREG/CR-2082, "Monitoring for Compliance with Decommissioning Termination Survey Criteria."
27. NUREG/CR-2241, "Technology and Cost of Termination Surveys Associated with Decommissioning of Nuclear Facilities."
28. EPA 520/1-75-001, "A Manual of Protective Action for Nuclear Incidents," January 1991.
29. 1992 Means Building Construction Cost Data.
30. Dodge Manual for Building Construction Cost Data.
31. NUREG/GR-130 "Technology, Safety, and Costs of Decommissioning a Reference Pressurized Water Reactor Power Station."