

U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report No. 50-322/85-27

Docket No. 50-322

License No. NPF-39

Priority

Category

Licensee: Long Island Lighting Company

P.O. Box 618

Shoreham Nuclear Power Station

Wading River, N.Y. 11792

Facility Name: Shoreham Nuclear Power Station

Inspection At: Wading River, N.Y.

Inspection Conducted: June 28, 1985 - August 2, 1985

Inspectors:

J. A. Berry  
J. A. Berry Senior Resident Inspector, Shoreham

8/23/85  
date

for J. T. Shedlosky  
J. T. Shedlosky, Senior Resident Inspector,  
Millstone 1 and 2

8/23/85  
date

for E. L. Conner  
E. L. Conner, Project Engineer, RPS 1B

8/23/85  
date

Approved by:

J. R. Strosnider  
J. R. Strosnider, Chief, RPS 1B

8/23/85  
date

Inspection Summary: The inspectors observed plant operations, including start-up and testing conducted after the issuance of the 5% license on July 3, 1985. The inspectors reviewed licensee actions regarding the opening of two of 18" primary containment purge valves on July 10, 1985, a reactor scram on low vessel level on July 13, 1985, a safeguards system actuation on July 16, 1985, and an inadvertent reduction in reactor vessel water level on July 26, 1985.

During the inspection period, the inspectors also observed the licensee response to a fuel oil spill on June 28, 1985, a lube oil fire on July 1, 1985, a public demonstration at the Shoreham site on July 5, 1985, and the conduct of licensee emergency response drills on July 24 and July 31, 1985. Inspectors reviewed and followed licensee action regarding problems associated with installation of suppression pool temperature monitoring instrument supports, reactor vessel level instrumentation, condensate booster pump minimum flow valve air lines, radioactive gaseous effluent monitoring, and two Part 21 reports involving coils used in 480v mccs and 4160v Emergency Undervoltage relays.

Two items were opened as a result of this inspection. No violations were identified.

This report involved 204.5 hours of inspection by three inspectors.

## 1.0 Persons Contacted

H. Carter, Operating Engineer (L)  
J. Leonard, Vice President-Nuclear (L)  
J. Scalice, Operating Division Manager (L)  
W. Steiger, Plant Manager (L)  
D. Terry, Maintenance Division Manager (L)  
J. Nataro, QA Division Manager (L)  
G. Rhoades, Compliance (I)  
R. Gutmann, Maintenance Engineer (L)  
R. Rheen, Security Supervisor (L)  
J. Wynne, Planning and Scheduling Engineer (L)

L - Long Island Lighting Company  
I - Impell Corporation

The inspectors also held discussions with other licensee and contractor personnel during the course of the inspection.

## 2.0 Plant Status

On July 3, 1985, Shoreham was licensed to operate up to 5% power. Startup was delayed until July 5 to modify the supports for suppression pool temperature instrumentation (see Section 6.0 for further details). The unit was operated at low power (between 1% and 2%) to perform testing of the Reactor Core Isolation Cooling (RCIC) system, Automatic Depressurization System (ADS), and High Pressure Coolant Injection (HPCI) system. Inspection of systems inside the drywell for leakage, health physics surveys and piping system thermal expansion inspections were also performed. On July 13, the reactor shutdown automatically on low vessel level following closure of the A condensate booster pump minimum flow valve. Low flow through this line, due to low power operation, cause extreme vibration of the valve and the resultant failure of a  $\frac{1}{4}$  inch instrument air line closing off makeup to the reactor. The air lines on these valves were replaced and after other minor repairs, the reactor was returned to operation on July 15. Testing was stopped on July 16 to investigate an eight (8) inch difference between channels in the reactor vessel level indications. This investigation resulted in numerous drywell entries (both at low power and shutdown), level change tests, and reactor shutdowns on July 18 and 25. Air was discovered and purged out of the level reference legs of both the A and B instrument lines. It was finally determined that the A reference leg between the vessel and the condensing chamber did not have the required negative slope and a support was replaced to correct this problem. The reactor returned to operation on July 29 and testing was resumed (see Section 11.0 for more details). The "A" reactor feed pump was first placed in service on August 1, 1985.

### 3.0 Fuel Oil Spill

On June 28, 1985 a spill of approximately 500 gallons of fuel oil occurred at the 50 MW Gas Turbine. This turbine is located outside the plant protected area. The cause of the spill was determined to be inadvertent overfill of the day tank. State, County and NRC officials were notified by the licensee. Cleanup was accomplished over the next day.

There were no unacceptable conditions identified.

### 4.0 Bearing Fire in 50MW Gas Turbine

At approximately 4:00 p.m. on July 1, 1985 a bearing fire was reported in the 50MW Gas Turbine. The turbine was being run for testing subsequent to the oil spill on June 28, 1985. The fire was almost immediately extinguished by licensee personnel but the Wading River Fire Department responded to the scene, and remained until approximately 6:30 p.m..

There were no unacceptable conditions identified.

### 5.0 Public Demonstration at the Shoreham Site

On July 5, 1985, an anti-Shoreham demonstration was held at the Shoreham site by members of the SHAD Alliance. The inspector reviewed the licensee's security plans with the licensee's demonstration task force chairman, and independently reviewed the posting of guards at access points, and the licensee's monitoring of the protected area fence. The inspector noted that LILCo and Suffolk County Police response to potential security problems were well coordinated. The inspector also noted that the licensee implemented effective controls to minimize any potential for unauthorized personnel obtaining access to LILCo property.

The inspector observed the demonstrators congregate at the Shoreham main gate, and observed LILCo security personnel and Suffolk County Police response. No unauthorized personnel gained access to the Shoreham site.

There were no unacceptable conditions identified.

### 6.0 Suppression Pool Temperature Instrument Support Installation

Startup of the reactor, following issuance of the 5% license on July 3rd was delayed until July 8, 1985 due to difficulties involved in the fabrication and installation of supports for two Suppression Pool temperature monitoring instruments.

On June 25, 1985 a Technical Specification Limiting Condition for Operation (LCO) was entered due to two inoperable Suppression Pool temperature instruments with drifting indication. I&C recalibrated the instrument, but the problem continued.

Problems arose because the old Rosemount brand temperature instruments are no longer manufactured. Therefore, the licensee installed a new brand. The new instrument was a different size and shape than the old one, and had to be installed differently. Due to the fact that it was a new instrument, Stone and Webster (S&W) had to do a design change analysis. During the design analysis, it was determined that if a safety relief valve actuation were to occur, the force on the instrument due to the resultant wave might bend the pipe. This is because the new instruments are smaller than the Rosemount brand, and are located about one inch higher. S&W designed a support bracket that was to be installed to correct the problem.

Work on the fabrication was completed on July 5th, and installation was attempted. Problems arose when an attempt was made to drill through the existing wave shield to allow the new support to be attached. The decision was made to weld the support pieces in, however, modifications to the brackets had to be made to facilitate welding them. The pieces were finally welded in place the night of July 6 and Drywell closeout was complete at 2:20 a.m. on July 7.

The inspectors observed the work in the Suppression Pool, and observed some fabrication work being done on the support pieces. An inspector also was present during drywell closeout.

No unacceptable conditions were identified.

#### 7.0 Opening of the 18" Primary Containment Purge Valves

At approximately 7:15 am on July 10, 1985 the Operations Department Manager informed the Senior Resident Inspector that two 18" primary containment purge valves had been open from approximately 4:15 a.m. to 6:50 a.m.. These valves were required to be closed and sealed by Technical Specification 3.6.1.8 in all operational conditions except cold shutdown and refueling. At the time they were opened the plant was in startup condition. The action statement associated with this specification requires the valves to be shut within 4 hours or the plant be placed in Hot Shutdown within the next 12 hours. The valves were open approximately 2.5 hours prior to being discovered open by the Operating Engineer. Therefore, in accordance with Limiting Condition for Operation 3.0.2 of the Shoreham Technical Specifications, this action did not constitute noncompliance with the Technical Specifications. However, based on investigations by LILCo and the NRC into this event, it is apparent that violations of Shoreham's procedures for operation of the Containment Purge System and administration of key control had occurred.

Details of this event are as follows:

A drywell entry was planned during the midnight to 8:00 a.m. shift on July 10, 1985 to perform maintenance work on the inner seal of the personnel airlock. Prior to permitting entry, Health Physics personnel sampled the drywell atmosphere to ensure it was safe. The sample indicated approximately 75ppm carbon monoxide levels. The Watch Engineer was advised

that personnel should not be permitted to enter until the carbon monoxide levels were reduced.

The Watch Engineer, Watch Supervisor and Shift Advisor determined that a purge of the drywell atmosphere was required. The Nuclear Station Operator (NSO) was directed to purge the drywell in accordance with procedure SP 23.418.01, HVAC-Reactor Building. The NSO directed the Nuclear Assistant Station Operator (NASO) to purge the drywell.

At this point in the sequence of events, the first violation of procedure occurred. Shoreham procedure SP 21.007.01, Control of Operations Section Locks and Keys, Section 8.2.3, Key Control, States; "Keys shall be issued by the Watch Engineer/Watch Supervisor to qualified personnel for a specific job. The issuance and return of a controlled key shall be documented in a composition type book. This book will be considered the Key Control Log". Contrary to this procedure, the Watch Supervisor (WS) did not issue the specific keys required for operation of the 4 and 6 inch purge valves, which were the only ones permitted to be opened while in the start-up condition. Rather, the watch supervisor gave the NASO his key for the key locker, and allowed him to get the keys he desired. This action allowed the NASO to remove the keys for the 4, 6 and 18 inch purge valves without the watch supervisor being aware of it.

The NASO then opened the 4, 6 and 18 inch purge valves for the drywell. This was in violation of procedure SP 23.418.01 which, in Section 3.5 and Step 8.1.7.3, states that the 18 valves may only be opened during cold shutdown or refueling.

These valves remained open until approximately 6:50 a.m., when the Operating Engineer discovered them open during his morning tour of the control room. He ordered them immediately shut. The Operating Department Manager was informed immediately upon his arrival on site, and the Senior Resident Inspector was informed at approximately 7:15 a.m., when he entered the control room for his morning tour.

The licensee's corrective action, both immediate and long term were prompt and effective. The NASO and watch supervisor were both removed from shift and given additional training in procedural adherence. The valves were tagged shut, and a permanent warning sign was ordered to be placed at the valve controls. All operations personnel were briefed on the event both verbally, and by memo from the Plant Manager. The licensee has initiated changes to both the procedure and training department lesson plans to emphasize the fact that these valves cannot be operated. The NASO and watch supervisor were also counseled by the Operating Department Manager and Plant Manager regarding this event. The licensee is reviewing their key control system, with the intent of preventing another event of this type.



In accordance with 10 CFR 2, Appendix B, Section V.A., Enforcement Actions, no Notice of Violation is being issued for this event because (1) it was identified by the licensee, (2) it fits into Severity Level IV or V, (3) it was reported, (4) it was corrected immediately including measures to prevent reoccurrence, and (5) it was not a violation that could reasonably be expected to have been prevented by the licensee's correction action for a previous violation.

#### 8.0 Reactor Scram on Low Water Level

At 10:09 a.m. on July 13, 1985 a reactor scram on low vessel water level occurred. The low level was the result of the loss of the Condensate booster pump supplying feedwater to the reactor vessel due to closure of the pumps "A" minimum flow valve. The valve closed when a 1/4" copper tube air line broke. The air controls the valve position. The cause of the line break was determined to be excessive vibration of the valve due to the low flow conditions that the valve was operating under. The water level was restored in a few minutes, and the reactor was restarted at 4:39 a.m. on July 14, 1985. This type of failure had occurred on previous occasions, and occurred again at later times, although this event was the only one that resulted in a reactor scram. The cause of these repeated failures was the operation of these valves under low flow conditions, a situation which is peculiar to low power testing conditions. The air lines that failed are part of a non-safety related systems. The licensee made some modifications to the airlines (i.e. stainless steel fittings and more flexible tubing runs) to help decrease the likelihood of their failure. However, these fixes were not totally effective and subsequent failures did occur. The importance of continued efforts to avoid such failures and minimize challenges to safety systems was emphasized to the licensee by the inspector.

No unacceptable conditions were identified.

#### 9.0 Radioactive Gaseous Effluent Monitoring

The noble gas activity from the condenser air ejectors is monitored prior to input into the gas holdup system and again as effluent from that system. That effluent is diluted with station ventilation exhaust and monitored again with exhaust monitors. The air-ejector exhaust monitors are designated 1011-R15-12A and -12B; the off-gas treatment system effluent monitors are -65A and -65B, and the station ventilation exhaust particulate, noble gas and iodine monitors are designated -041, -042 and -043, respectively.

At 5:10 p.m., July 15 the licensee determined that the daily channel checks of the condenser air ejector exhaust radiation monitors (1011-R15-12A and -12B) had not been properly performed as required by Technical Specification 4.3.7.11, Table 4.3.7.11-1 section 4.a. A minimum of one of the two channels is required to be operable during operation of the main condenser steam jet air ejectors (reference Technical Specification 3.3.7.11 Table

3.3.7.11-1 section 4.a). The control room operators had been performing a channel check of radiation monitors by using the computer operated supervisory system in the control room. However, this system was not receiving an input from the monitors in use.

The licensee had experienced a problem with the installed channels 12A and 12B in that instrument spikes, possibly due to induced voltages picked up by cables connecting the detectors in the turbine building with the electronic package in the control room back panel. This was reflected on an equipment information tag Number 83-12-0018, dated December 28, 1983 referencing MWR 83-7521. Prior to final resolution, interim action was taken in the form of a temporary modification, TM 85-03-001, dated March 2, 1985. That modification installed two (2) Eberline Model RM-16 radiation monitors at the off-gas discharge of re-combiners to the hold-up system. Ion chambers of these monitors were installed adjacent to the original ion chambers of channels 12A and 12B. The high and down-scale alarms were wired to the control room annunciators at PNL 601 A-3 and C-6. Since the instruments were located in chambers close to their detector there was little opportunity to induce a noise spike in the detector signal.

However, the licensee failed to modify station procedures to reflect this change in the daily channel checks of radiation monitors since these instruments were not tied into the computer based radiation monitoring system. These procedures were changed following the July 15 finding. However, the condenser air ejector system was in operation July 8 through 13 and July 16 and 17. During the licensee's investigation into this event, it was found that the down-scale alarm would not occur if the RM-16 was switched off or de-energized. Because this did not meet the Technical Specification Table 4.3.7.11-1 Notation (1), Addition to Channel Function Testing, a technician was stationed at the instruments to ensure that they remained in operation. The instruments were then modified to replace the normally de-energized down-scale trip rely with one normally energized. The down-scale alarm then became a down-scale or instrument inoperative alarm.

The inspectors found that the RM-16's were entered into a surveillance program for functional testing and calibration. And that, instrument alarm set points were determined in accordance with the methodology of the ODCM to meet Technical Specification 4.11.2.1.N.

Because this event has identified a weakness in the implementation of a station modification, other modifications will be reviewed for similar errors during a future inspection. In this case the licensee had failed to change all station procedures relative to the original monitor and had failed to demonstrate that the completed modification had fulfilled the existing Technical Specification. Because the licensee had identified the error and had taken corrective action the provisions of 10 CFR Part 2 Appendix C.V.A apply and no violation is issued. An open item, 50-322/85-27-01, will be used to track the inspector's review of other modifications.

## 10.0 Safeguards System Actuation

The plant experienced an inadvertent isolation of the reactor water clean-up system (RWCS) at 8:35 a.m., July 16. This appeared to be a spurious isolation because the instrumentation which monitors initiation parameters for this protective feature appeared to be normal. The reactor was at approximately 0.2 percent of rated power. The reactor pressure was 85 psig and temperature 325 degrees F.

The inspector observed the control room operators actions which included the investigation of plant parameters to isolate the initiating event.

This safeguards system actuation was reported to the NRC via the Emergency Notification System. The RWCUS remained isolated while the licensee investigated to determine the cause. Failing to find any abnormality the RWCS was placed in service at 6:40 p.m., July 16, 1985.

There were no unacceptable conditions identified.

## 11.0 Vessel Level A Reference Log

As mentioned in Section 2.0, problems were experienced between July 16 and 29, 1985 with the A reference leg causing indication problems with the associated instrumentation control room narrow range level channels A and C. The A and C level instruments showed level to be about 8 inches higher than the B level instrument following reactor startup on July 16. While the plant was shutdown, the instrument lines were blown down and checked for leaks, and transmitters were checked out by licensee, GE and Stone & Webster (S&W) instrument technicians and engineers. Following restart on July 23, the level indications continued to show about 8 inches difference. During a drywell entry on July 24, the A reference leg was moved slightly and the level difference showed only a 4 inch variance. A simple level evaluation indicated that the required negative slope from the condensing pot to the vessel penetration may not exist at all points along the line. This was confirmed by level transient readings taken hot (300F) on July 25 and cold (135F) on July 26. At both conditions, a 3 foot run straight out from the vessel to a 90° elbow had a slight dip at a support about 2 feet out from the vessel; the approximate 9 foot run from the elbow to the condensing pot appeared to have adequate slope. The problem was corrected by replacing the support on the vessel side of the elbow in the A reference line. Control room narrow range level indications now agree within a couple of inches.

The inspector attended parts of several meetings chartered to resolve this problem, reviewed drawings and other design data, and physically observed the A reference line in the drywell with the surveying team. The licensee, with assistance from GE and S&W, applied significant resources to resolve this problem. Their approach was very conservative with respect to safe operation and personnel safety.

No unacceptable conditions were identified.



## 12.0 Vessel Level Drop Event

At 06:43 on July 26, 1985, with the reactor in cold shutdown for level instrument error correction, a scram signal was generated due to low reactor water level. RHR loops A and B were lined up for shutdown cooling with loop B operating. In the process of realigning loop A for LPCI standby mode, the suppression pool suction valve (32C) was opened before the alternate shutdown cooling suction valve (32A) was completely closed. This resulted in draining approximately 7,000 gallons of water from the RCS to the suppression pool via the RHR loop A suction line. The reactor vessel level decreased to about 40 inches on the wide range (-10 inches on the normal range); level was restored to normal in approximately 10 minutes.

The inspector observed a portion of the licensee's investigation of this event. The operating shift on duty during the event was held over for debriefing while the event was fresh in their minds. The overall handling of the event, including timely notification of the NRC via the ENS, was thorough and complete.

Follow-up of this event determined that the cause of the event was inattentiveness by the operator who was realigning the RHR system. The operator had opened the normal RHR suction valve from the Suppression Pool prior to assuring that the Shutdown Cooling Alternative Suction valve was fully closed. In separate discussions with the Operations Manager and Senior Resident Inspector, the operator stated that he was aware of the need to ensure that these valves not be open at the same time. He felt that he may have looked at the wrong valves' position indication. The inspector determined that the event was an inadvertent error that was not attributable to lack of training or systems unfamiliarity by the operator.

The inspector then reviewed the licensee response to I&E Information Notice 84-81, which discussed the potential for this type of event. The inspector determined that the licensee had adequately reviewed this notice, and that the information had been properly disseminated to all operations personnel, and was incorporated into the licensee's training program. Additionally, the licensee, in response to I&E Notice 84-81 had begun the administrative process necessary to change the RHR Operating Procedure to insert an additional precaution in the body of the procedure to key operators to the potential for this type of event. This procedural change had not been completed at the time the event occurred.

The inspector had no further questions, and this matter is considered closed.

No unacceptable conditions were identified.

### 13.0 10 CFR Part 21 Report - MCC Contractors

By telephone call on July 19, 1985, LILCo notified Region I of a problem with procurement and installation of coils and starters used in 480 volt MCCs for safety equipment. This subject was addressed in licensee letter SNRC-1197, dated July 23, 1985.

Coils to be used in safety related MCCs must be qualified to operate down to 77.5% of normal voltage. The vendor catalogue coils are only rated for 85% voltage operation, so safety related coils must be a special order. The licensee discovered in March that replacement coils for safety related size 1 starters had different part numbers from the same size installed coils. Investigation revealed the LILCo materials and stock numbers for these coils incorrectly listed the standard vendor catalogue number, the purchase order for the replacement coils specified the standard coils, and the vendor supplied thirteen (13) standard coils/ starters although certification documents for the proper replacement coils were received. Three (3) of these coils were installed in the reactor water cleanup and reactor building closed cooling water systems; each one has been replaced with coils rated for 77.5% voltage operation.

The licensee is taking the following steps to rectify this situation.

- LILCo M&S numbers for these coils and contactors have been revised to reflect the utilization of the lower rated voltage coils.
- The QA Department will verify that the incorrect coils that were received and that are now in storage have been downgraded to non-safety related and transferred to the non-safety related stock.
- Applicable programs and controls were in effect such that confidence exists that all improper installed coils have been identified and replaced. In spite of this, LILCo will perform an inspection of an appropriately sized sample of installed coils to ensure that the correct coil is installed.
- Procurement procedures shall be revised to ensure that manufacturer/vendor correspondence, relative to ordering description changes for safety related material and equipment, will be directed to Nuclear Engineering Department for review, and subsequent incorporation into the applicable procurement documents as appropriate.
- Modified procurement documents shall provide the necessary traceability and auditable control.

The first step has been completed. The licensee will be completing the other steps in the next few months and will notify the resident inspector when complete. This subject remains open for further inspection (50-322/85-27-02).

#### 14.0 10 CFR Part 21 Report - 4160V Emergency Undervoltage Relays

By letter dated July 22, 1985, Stone & Webster Engineering Corporation (S&W) made a 10 CFR Part 21 notification concerning Type RIS PR-2035 undervoltage relays. These relays, manufactured by Rochester Instrument Systems, are installed in the 4160V emergency switchgear for degraded voltage protection. The relays have demonstrated a tendency to drift from their calibrated setpoints and recalibration attempts revealed continued drifting and loss of the specified dead band values. The relays are connected two in series to each bus to provide a one out of two logic, and the problems have been exhibited in one relay for bus 101 and two relays for bus 103. Failure of these relays to initiate isolation of emergency busses 101, 102 and 103 from the normal supply at the 91.7% voltage level could effect the start sequence of the diesel generators.

LILCo replaced the subject three relays during a recent outage with enhanced performance relays from the same manufacturer. The inspector reviewed the correspondence on this subject and concluded adequate repair were made.

#### Emergency Preparedness Drill

On July 24, 1985 and July 31, 1985, inspectors observed, practice emergency drills. The drill scenarios had been prepared by Impell Corporation. The inspectors found the drill training for observers (held the day before), the scenario, and the participation of the licensee's staff acceptable. This drill will be repeated on August 7, 1985 to provide practice for other personnel.

#### 15.0 Site Tours

The inspectors conducted periodic tours of accessible areas in the plant, in the Colt Diesel Generator Building, and around the site. During these tours the following specific items were evaluated.

- Fire Equipment - Operability and evidence of periodic inspection of fire suppression equipment;
- Housekeeping - Maintenance of required cleanliness levels;
- Equipment Preservation - Maintenance of special precautionary measures for installed equipment, as applicable;

- QA/QC Surveillance - Pertinent construction activities were being surveilled on a sampling basis by qualified QA/QC personnel;
- Component Tagging - Implementation of appropriate equipment tagging for safety, equipment protection, and jurisdiction.
- Personnel adherence to Radiological Controlled Area rules.

All items observed during these tours were satisfactory.

#### 16.0 Unresolved Items

Areas for which more information is required to determine acceptability are considered unresolved. Unresolved items are contained in paragraphs 9.0 and 13.0.

#### 17.0 Management Meetings

At periodic intervals during the course of this inspection, meetings were held with licensed management to discuss the scope and findings of this inspection. At no time during this inspection was written material provided to the licensee by the inspectors.

Based on NRC Region I review of this report and discussions held with licensee representatives it was determined that this report does not contain information subject to 10 CFR 2.790 restrictions.

The inspectors also attended entrance and exit interviews for inspections conducted by region-based inspectors during the period.