BOSTON EDISON
Pilgrim Nuclear Power Station
Rocky Hill Road
Plymouth, Massachusetts 02360

**Ralph G. Bird**
Senior Vice President — Nuclear

BECo 90-047
April 2, 1990

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

License DPR-35
Docket 50-293

RESPONSE TO NRC GENERIC LETTER 89-13
SERVICE WATER SYSTEM PROBLEMS AFFECTING
SAFETY-RELATED EQUIPMENT

Boston Edison Company (BECo) hereby submits the response to NRC Generic Letter 89-13. The Generic Letter presented five recommended action items. We reviewed each of the action items in conjunction with the programs and procedures currently in place at Pilgrim Nuclear Power Station. The results of the reviews are discussed in Attachment 1. The reviews concluded the majority of the concerns raised in the Generic Letter have already been addressed. In some areas, additional enhancements have been identified and will be incorporated in our operating programs and procedures. The proposed schedules contained in the attachment will be reflected in the next update of the Long Term Program.

Please contact us if you have any questions or require additional information.

R. G. Bird

RAH/amm/4165

Commonwealth of Massachusetts)
County of Plymouth )

Then personally appeared before me, Ralph G. Bird, who being duly sworn, did state that he is Senior Vice President - Nuclear of Boston Edison Company and that he is duly authorized to execute and file the submittal contained herein in the name and on behalf of Boston Edison Company and that the statements in said submittal are true to the best of his knowledge and belief.

My commission expires: October 5, 1995 Peter M Kahler
DATE NOTARY PUBLIC



A065
1/1

cc: Mr. M. Fairtile, Project Manager
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation
Mail Stop: 14D1
U. S. Nuclear Regulatory Commission
1 White Flint North
11555 Rockville Pike
Rockville, MD 02852

U. S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19406

Senior NRC Resident Inspector
Pilgrim Nuclear Power Station

Response to Recommended Action 1

BECo instituted a biofouling control program in 1982. This program consists of several efforts to control biofouling. The program includes:

- Chlorination of the Salt Service Water System (SSW).
- Routine backwashing of the Reactor Building Closed Cooling Water (RBCCW) heat exchangers. Additional backwashing is performed if the heat exchanger differential pressure increases. The differential pressure is checked daily.
- Horseshoe crab barriers are seasonally installed to restrict the movement of these invertebrates into the intake structure.
- Regular, periodic diver inspection of the intake structure and/or remotely operated vehicle inspection, have been implemented to determine biofouling conditions and the need for thermal backwashes and/or mechanical removal of attached biofouling.
- Periodically divers will remove any buildup of mussels or sand on the apron outboard of the traveling screens and the trash racks.
- An on-line mussel monitoring system consisting of side-stream mussel monitors is being modified to provide indications of the type and degree of fouling at the RBCCW heat exchangers.
- An on-line chlorine monitoring system monitors is being modified. Currently, chlorine levels are checked daily to insure proper biofouling control. Allowable residual chlorine levels are established in the PNPS National Pollutant Discharge Elimination System Permit.
- Daily checks of the screens and screenwash system are conducted to ensure proper operation and to minimize screen carry-over.
- Currently, periodic updates are prepared that address the effectiveness of the program as well as proposed design and operating modifications for additional optimization of biofouling control.

Operational aspects of the Pilgrim Station Chlorination Monitoring and Biofouling Control Program are described in various procedures that are considered acceptable and adequate for biofouling control. The biofouling control program has been effectively implemented at Pilgrim Station and complies with NRC Generic Letter 89-13.

Response to Recommended Action 2

The Service Water System is comprised of the following subsystems:

1. Salt Service Water System (SSW):

   The SSW System provides a heat sink for the Reactor Building Closed Cooling Water (RBCCW) System in all modes of operation, by providing a continuous supply of sea water to the RBCCW heat exchangers.

2. Reactor Building Closed Cooling Water System (RBCCW):

The RBCCW system is an intermediate closed loop cooling system supporting the cooling requirements of safety-related equipment during all modes of operation.

The safety-related heat exchangers associated with the two subsystems are:

RBCCW Heat Exchangers (2)
RHR Heat Exchangers (2)
RHR Pump Seal Coolers (4)
Core Spray Pump Motor Thrust Bearing Coolers (2)
RCIC Pump Area Cooling Coils
HPCI Pump Area Cooling Coils
RCIC Turbine Lube Oil Cooler
HPCI Turbine Lube Oil Cooler

Note: The Fuel Pool Cooling Heat Exchangers are safety-related, but they do not have a safety-related heat transfer function. Adequate performance of the Fuel Pool Cooling Heat Exchangers is demonstrated through normal operation.

Current procedures used to verify the heat transfer capabilities of the above heat exchangers are as follows:

1. RBCCW Heat Exchangers

Periodic testing of the RBCCW heat exchangers is being conducted using a differential pressure method which measures the pressure drop and flow across the heat exchangers. In addition, temperature measurements at inlets and outlets for the tube and shell flow paths are recorded.

These procedures will be modified to incorporate an analytical model to calculate the RBCCW heat exchanger performance at test and design conditions.

2. RHR Heat Exchangers

The RHR heat exchangers are monitored periodically by taking temperature and flow measurements of tube and shell flow paths, and performing calculations to obtain the heat transferred. This procedure will be modified to include an analytical model to calculate RHR heat exchanger performance at test and design conditions.

It is estimated that the modified test procedures for the RBCCW heat exchangers will be available for implementation prior to the end of the next refueling outage (RFO 8). The modified test procedures for the RHR heat exchangers are planned for implementation prior to the end of RFO #9.

The initial test program to demonstrate the RBCCW and RHR heat exchanger capabilities will utilize the modified test procedures and is scheduled to occur after RFO 8 and RFO 9, respectively. Subsequent monitoring and trending of the heat exchanger capabilities will utilize the modified test procedures.

A regular maintenance/test program will be developed to assure adequate heat transfer capability of the remaining heat exchangers by RFO 9.

These heat exchangers are part of the closed loop RBCCW system. They are chemically treated with a corrosion inhibitor that forms a protective film against corrosion. This program has been in effect since plant startup.

Sampling and analysis of the RBCCW water for residual nitrite, chloride, pH, turbidity, gross gamma radiation, and isotopic analysis occur weekly unless required otherwise. The effectiveness of the chemical treatment program was demonstrated when the RHR heat exchangers were visually inspected and successfully passed hydrostatic testing.

The program outlined in this response complies with the recommendations in Generic Letter 89-13.

Response to Recommended Action 3

BECo's routine inspection and maintenance programs can be categorized into the following four areas:

1. Piping

   The SSW piping system will be monitored during each refueling outage by conducting an ultrasonic inspection of the accessible piping.

   During the inspection of 1987, an ultrasonic inspection of portions of the above ground piping was performed to determine wall thickness. A remote visual examination of portions of the buried piping was performed. Repairs and/or replacements of piping sections were conducted based on the results of the inspections and tests.

   Further maintenance activities have been identified and are included in BECo's Long Term Program (LTP):

| LTP | Description |
|---|---|
| 255 | Replace SSW Piping (as required) |
| 287 | Define Inspection Criteria for SSW Piping |
| 288 | Identify Improved Material for SSW Piping |

2. Valves

   Check, manual and motor operated valves receive scheduled inspection and maintenance in accordance with station procedures and vendor's recommendations.

3. Service Water Intake Structure

   The service water intake structure inspection and maintenance program is described in the Response to Recommended Action 1. In addition, a quarterly preventive maintenance is conducted on the traveling screens.

4. Service Water Pumps

   The Inservice Test and Inspection Program and routine maintenance for the service water pumps are performed in accordance with plant procedures.

In summary, the inspection and maintenance programs at PNPS complies with NRC Generic Letter 89-13.

Response to Recommended Action 4

A review of the Service Water System design to confirm the system will perform its intended function in accordance with the licensing basis of the plant is currently in progress.

A Single Failure Analysis (SFA) was performed for the PNPS SSW subsystem. This consisted of a failure modes and effects analysis. This analysis confirmed a single failure of an active component in the SSW subsystem will not preclude the performance of the required safety functions.

A SFA is scheduled for the RBCCW subsystem. This analysis is expected to be completed by RFO 8.

Response to Recommended Action 5

1. Maintenance Practices

The maintenance program at PNPS consists of preventive and corrective maintenance, controlled by formal procedures and Maintenance Work Plans. Maintenance procedures are periodically reviewed for improvement and are currently undergoing a complete upgrade program.

Quality workmanship and proper maintenance practices are assured by effective supervision and adherence to a formal, accredited training program. Only personnel qualified by the accreditation program to perform specific tasks may be assigned to independently perform a task.

Preventive maintenance is conducted for the following equipment:

a. Pumps: PNPS uses two primary methods to maintain the equipment in an operable state: 1) routine maintenance per the vendor manual as described in the maintenance procedure; and 2) periodic equipment testing. Testing is conducted to determine both the equipment performance and identify the need for further maintenance.

b. Valves: PNPS uses two primary methods available to maintain the valves in an operable state: 1) routine maintenance per the vendor manual as described in the maintenance procedure; and 2) periodic valve testing to verify acceptable operation.

c. Heat Exchangers: PNPS primarily uses periodic preventive maintenance based on functional tests on a monthly basis. Maintenance is conducted per the vendor manual.

d. Intake Structure: The intake structure has a preventive maintenance program that includes routine scheduled inspections. Upon determination that maintenance is required, station procedures are used to perform repairs, cleaning, and refinishing.

PNPS maintenance work is initiated, controlled and administered by a formal maintenance management process. A maintenance schedule is used to coordinate plant maintenance.

The PNPS Quality Control Group prepares an Inspection Report upon the completion of safety-related maintenance.

2. Operating and Emergency Procedures

Normal, abnormal, emergency and testing procedures are in place. Procedures are developed by the responsible division, with the assistance of a procedures group. The procedures group provides consistency in format, content, human factors and procedure development. Procedure writers' activities are controlled and guided by a procedure development process manual, and a procedure writing project manual.

BECo is currently implementing a procedure upgrade program. This is an ongoing effort.

3. Training

A. Licensed Operators

The training module is designated O-RO-02-02-02 "Salt Service Water System" which consists of an instructor's guide, student guide and an on-the-job performance guide. The on-the-job performance guide is currently being upgraded to include the task of simulating implementation of a loss of all Service Water Procedure 5.3.3. This is scheduled to be completed by RFO 8.

B. Non-Licensed Operators

Non-licensed operators are given training similar to that outlined in O-RO-02-02-02 titled "Salt Service Water System". This module consists of one instructor's guide, a student guide, and an on-the-job training guide. This training module is acceptable for the training of non-licensed operators.

In summary, the maintenance practices for the service water system at PNPS complies with NRC Generic Letter 89-13. The operation and emergency procedures, and the licensed operator training module will be upgraded to comply with the Generic Letter 89-13 by RFO 8.