U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-293/92-10

Docket No. 50-293

License No. DPR-35

Licensee: Boston Edison Company
RFD #1 Rocky Hill Road
Plymouth, Massachusetts 02360

Facility Name: Pilgrim Nuclear Power Station

Inspection At: Plymouth, Massachusetts and Braintree, Massachusetts

Inspector: _____ 6/8/92
J. E. Tarraseo, Reactor Engineer, date
Materials Section, EB, DRS

Approved by: _____ 6/8/92
Edwin H.Gray, Chief, Materials date
EB, DRS

Inspection Summary: Inspection on May 11-15, 1992

Areas Inspected: A safety inspection was conducted to determine the status of activities related to the replacement of the Salt Service Water piping for Pilgrim Nuclear Station. The inspection included a review of the quality assurance for the proposed titanium piping and accessories, walkdown of the excavation adjacent to the Intake Structure, review of a sample of supporting calculations, and present construction status.

Results: Based on the present inspection, it was concluded that the licensee has a good control over the preparations for the fabrication of the titanium pipe, flanges, bolts and nuts, with the understanding that the licensee's level III nondestructive examination (NDE) person will be closely involved in the process of fabrication and installation of the titanium pipe. Drawings were found adequate and acceptable displaying good general notes outlining the sequence of construction, construction requirements, excavation steps, and general tolerances. It was concluded that the selected sample calculation and others were acceptable and well prepared. The licensee has good flow of communication among themselves and the contractors involved in the project. In addition, during these technical discussions to resolve engineering issues, the licensee displayed adequate engineering know-how and the management involvement was evident.

## 1.0 BACKGROUND

The licensee inspected the Salt Service Water System (SSW) piping during the Refueling Outage Number (RFO) # 8. This inspection by the licensee concluded that the rubber lining of the carbon steel piping in the SSW System was near the end of its service life. The licensee has elected to replace the existing buried portion of the Salt Service Water (SSW) Intake piping with corrosion resistant titanium piping. This buried portion runs between the Intake Structure and the Auxiliary Bay Structures. The replacement will take place during RFO # 8, a Mid-Cycle Mini-Outage, and prior to and during RFO # 9.

## 2.0 ENGINEERING SCOPE FOR THE SALT SERVICE WATER PIPING REPLACEMENT

The licensee provided an overview of the entire project and explained that because of the complexity of this project, the engineering scope was divided into several self-contained Plant Design Changes (PDCs). These PDCs are part of a series of modification packages to replace the buried SSW inlet piping and a portion of the discharge piping between the Intake Structure and the Reactor Auxiliary Bay. These PDCs are listed and briefly described below:

PDC 91-10A is the first of the series of PDCs that encompass the entire project, this PDC is in the process of being implemented and is scheduled to be completed prior to the Mid-Cycle Outage, 1992. This PDC consists of the following: rerouting existing mechanical and electrical interferences running through the area to be excavated during construction of the concrete vault, excavation and shoring of the concrete vault area adjacent to the south wall of the Intake Structure and investigation of the use of sheet piles for excavation.

PDC 91-10B being the second of the series is scheduled to be implemented during the 1992 Mid-Cycle Outage. This PDC consists of the following: Construction of the concrete vault around the existing SSW piping at the south side of the Intake Structure and construction of permanent access four feet by four feet blockout in the intake structure south wall, adjacent to the SSW piping penetration.

PDC 91-10C is scheduled to be implemented during the 1992 Mid-Cycle Outage. This PDC outlined the replacement of the two rubber lined carbon steel penetration spools at the Intake Structure south wall with titanium spools.

PDC 91-10D to be implemented during the Spring and Summer of 1992, consists of the following: laying the two proposed new titanium inlet loops parallel to the existing loops from the Intake Structure Vault to the Reactor Auxiliary Bay west wall, including portions of the new titanium discharge loops that share the same excavation.

PDC 91-10E to be implemented during RFO # 9, consists of the following: tie in of the two new titanium inlet loops at the Intake Structure Vault and Reactor Auxiliary Bay west wall.

## 3.0 PURPOSE OF THE INSPECTION

The purpose of this inspection was to verify that during the implementation of these PDCs continuing safe plant operation will not be compromised and that the existing underground installations such as mechanical piping, appendix "R" ductbanks and other safety related or important to safety items will not be disturbed, until proper planning and evaluation is complete.

In addition to the excavation and construction of the concrete vault (PDCs 91-10A and 91-10B), some aspects of the subsequent PDC were reviewed (e.g. commercial grade dedication for the titanium pipe).

The inspector has fulfilled the purpose of the inspection, described above, by:

a. Determining by direct observation and independent evaluation whether the licensee's work and inspection performance related to the excavation and interference reroute for the construction of the intake structure SSW piping and the concrete construction of the vault itself are being accomplished in accordance with current engineering, construction practices, licensee requirements and pertinent design engineering specifications, including the facility FSAR.

b. By determining (through interviews with project management personnel and reviews of selected documentation) whether the design of the concrete vault was reviewed and understood by the licensee, in order to oversee the activities performed by the lead-contractor responsible for the execution of the project.

c. By determining whether quality assurance (QA) plans, instructions and procedures for the soil excavation and installation of the concrete vault, have been established in the quality assurance manual, and whether these documents conform to the QA program as described in facility's FSAR.

## 4.0 SCOPE OF THE INSPECTION

The inspector selected the first two PDCs of the series. These are: PDC 91-10A in the process of being implemented and PDC 91-10B to be implemented in 1992 prior to the Mid-Cycle Outage. In addition to these PDCs, certain engineering and quality assurance aspects of PDC 91-10C and PDC 91-10D were reviewed and inspected. However, in subsequent inspections, the NRC will review additional PDCs to complete the series of PDC reviews for this modification.

## 5.0 FINDINGS

### 5.1 Quality Assurance for the Proposed Titanium Piping and Accessories

The inspector reviewed the licensee's commercial grade dedication for the titanium pipe.

The inspector found that the licensee has conducted a number of inspections of the titanium pipe fabricator's facility to ensure that the eighteen criteria contained in Appendix B of 10 CFR Part 50 are properly applied to the fabrication of the piping and accessories. The licensee's commercial item dedication process involves the engineering evaluation of critical characteristics of the piping, flanges, bolts and nuts. After the review of licensee's document No. 596 which outlined the engineering survey requirement and the acceptance criteria for each characteristic, the inspector concluded that the licensee's commercial grade engineering evaluation for shop fabricated titanium pipe and fittings should result in properly fabricated components in accordance with the code and specifications.

The inspector attended a meeting between the pipe spool fabricator and its specialty subcontractor and observed good communications in between both organizations in resolving project issues.

The inspector concluded that the licensee has a good control over the preparations for the fabrication of the titanium pipe, flanges, bolts and nuts, with the understanding that the licensee's level III nondestructive examination (NDE) person will be closely involved in the NDE activities during the process of fabrication and installation of the titanium pipe.

### 5.2 Walkdown of the Excavation Adjacent to the Intake Structure and Drawing Review

The inspector reviewed the composite drawing SKM-91-10D-004, Revision A, related to PDC 91-10A and 91-10B. This drawing shows the existing mechanical and electrical interferences running through the area that has begun to be excavated for the construction of the concrete vault. During the walkdown, the inspector and the licensee's Structural Chief Engineer discussed the civil and structural implications of the excavation and shoring of the concrete vault area adjacent to the south wall of the intake structure, and the excavation to install the piers to seismically support the appendix "R" ductbanks. Based on the walkdown and the discussion of the civil/structural details, the inspector determined that the licensee is cognizant of the safety significance of the excavation.

At the corporate office, the inspector reviewed additional drawings that illustrate the different stages of the excavation, shoring, bracing and seismically qualified temporary supports for the appendix R ductbanks. These drawings were found adequate. The drawings contained good general notes outlining the sequence of construction, construction requirements, excavation steps, and general tolerances.

### 5.3 Review of Sample of Supporting Calculation

The licensee has a qualified contractor to develop a series of well documented calculations to support the final drawing and sizing of structural members to be used in the design of the shoring and temporary supports to remain functional during plant shutdown and plant operation. The inspector reviewed the shoring calculation as a sample to verify that the loads and load combinations, which includes tornado and seismic loads in addition to the conventional dead-loads (DL), live-loads (LL), construction live-loads (CL), earth-pressure static loads (H), and hydrostatic pressure loads (F), were properly applied in accordance to the design criteria established for the SSW piping replacement (DC-1). The inspector noticed that several conservative assumptions were made, specially by assuming that the ground water table is higher that it actually is. This assumption makes the design of the piers conservative. In addition, to the loads and the load combinations, the inspector reviewed the analytical approach used to develop the calculation. The inspector found this calculation acceptable and well prepared.

### 5.4 Construction Observation

Upon performing the initial excavation, the licensee noted that the appendix R ductbanks are topped by lean concrete of several feet in depth. This concrete constitutes a substantial load contributor. To overcome this obstacle the licensee has decided to use mechanical cutting tools to cut and remove the blocks the excavation, rather than revise the calculations for the piers and beams. The inspector emphasized the need to minimize the possible vibrations induced by the lean concrete cutting process. Licensee personnel stated that the ductbanks will be resting in compacted soil which will be capable of absorbing and bearing some of the possible vibration induced by the mechanical cutting of the concrete.

The inspector discussed some aspects regarding the under pinning of the Auxiliary Reactor Bay building. This under pinning will be performed to prevent deflections of the base of the Auxiliary Reactor Bay during the excavation of the vaults adjacent to this building.

The inspector observed good communications between the licensee and the different contractors involved in the project. In addition, during technical discussions to resolve engineering issues, the licensee displayed adequate engineering know-how.

## 6.0 MANAGEMENT MEETINGS

Licensee management was informed of the scope and purpose of the inspection at the beginning of the inspection. The findings of the inspection were discussed with the licensee representative during the course of the inspection and presented to the licensee management at the May 15, 1992 exit meeting. See Attachment 1 for attendance.

## ATTACHMENT 1

## PERSONS CONTACTED

BOSTON EDISON COMPANY

*E. J. Wagner, Vice President Nuclear Engineering
*P. Antonopoulos, Design Section Manager
*J. G. Dyckman, Civil/Structural Division Manager
*J. Calfa, Senior Compliance Engineer
*J. L. Jerz, Project Manager
*L. J. Oliver Deputy Nuclear Engineering Manager
*T. M. Hauskie, Senior Mechanical Engineer
*J. Keyes, Licensing Division Manager

U.S. NUCLEAR REGULATORY COMMISSION

*T. Cerne, Resident Inspector

Asterisk (*) denotes those present at the exit meeting.