U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-293/82-23

Docket No. 50-293

License No. DPR-35 Priority -- Category C

Licensee: Boston Edison Company

800 Boylston Street

Boston, Massachusetts 02199

Facility Name: Pilgrim Nuclear Power Station, Unit 1

Inspection At: Plymouth, MA.

Inspection Conducted: August 17-20, 1982

Inspectors: L H Bettenhausen for 9/9/82
C. D. Petrone, Reactor Inspector date

Approved by: L H Bettenhausen 9/9/82
L. H. Bettenhausen, PHd, Chief, date
Test Program Section

Inspection Summary: Inspection Report No. 50-293/82-23
Areas Inspected: Routine, unannounced inspection of licensee action on a previous inspection finding; Followup on IEB 81-01 Surveillance of Mechanical Snubbers; and Cycle VI post refueling startup tests. The inspection involved 24 inspector hours on site and 8 inspector hours in the regional office by one region-based inspector.
Results: No items of noncompliance were identified.

DETAILS

1.0 Persons Contacted

BECO

* C. Mathis, Deputy Nuclear Operations Manager
* J. P. Aboltin, Sr. Reactor Engineer
* G. James, Reactor Engineer
* P. Kahler, Licensing Engineer
  K. Roberts, Chief, Maintenance Engineer
* P. Brixey, MSG Plant Engineer
* P. Giardiello, Sr., Compliance Engineer
  E. J. Ziemianski, Mgt. Services Group Leader

The inspector also interviewed other licensee employees during the inspection.

NRC

J. R. Johnson, Sr., Reactor Inspector

*denotes those present at the exit meeting on August 20, 1982.

2.0 Licensee Action on Previous Inspection Findings

(Closed) Noncompliance (50-293/81-25-01): All members not present at pre-refueling Operations Review Committee (ORC) meeting as required by TS 6.5.A.2 and PNPS Procedure 4.3. The inspector reviewed Procedure 4.3 and noted that the pre-fuel movement checkoff sheet 4.3F-1 OPER 10, revision 17 had been changed to remind those making the verification signoff that all ORC members are required to be present at the pre-refueling ORC meeting. This item is closed.

3.0 IEB 81-01 Surveillance of Mechanical Snubbers

The inspector reviewed the actions taken by the licensee in response to IEB 81-01, Surveillance of Mechanical Snubbers. The licensee's response to each of the action items is summarized below.

Action Items 1 and 2 apply to International Nuclear Safeguards Company (INC) snubbers only. The licensee determined that no INC snubbers were installed and no action was required.

To comply with action Item 3 the licensee:

- Performed visual inspection and manual stroke tests of all installed mechanical snubbers during the fall 1981 refueling outage,

- Submitted technical specification amendments to list the installed mechanical snubbers and establish surveillance requirements,

- Issued Procedure 3.M.4-28, Revision 10, which includes instructions for inspection of mechanical shock arrestors (snubbers), and

- Issued Procedure 3.M.4-48, which provides instructions for functional testing of mechanical snubbers.

To comply with Item 4, the licensee submitted a report to the NRC documenting the results of the visual examinations and functional tests performed. This was provided in a letter from A. V. Morisi (BECO) to R. C. Haynes (RI) dated June 10, 1982.

The inspector reviewed the following to verify that the licensee had completed the actions proposed in their response to the Bulletin:

- TP-81-4, Rev. 2, May 1981, Test Procedure for On-Site Testing of Mechanical Snubbers which has since been included in Maintenance Procedure 3.M.4-48. This procedure was used to perform functional testing of a 10% sample (4) of the 34 installed Pacific Scientific PSA-10 mechanical snubbers. Functional testing, similar to that required for hydraulic snubbers, is now required by the licensee's amended technical specifications. The inspector reviewed the procedure for technical adequacy and conformance to technical specifications. The results of the functional tests were provided by a contractor (John Henry Associates Inc.) to the licensee in report JHA-81-168, On-Site Tests of Mechanical Snubbers. The inspector reviewed these test results and noted that: personnel who performed the tests were qualified, test equipment was calibrated, all test results were within specified tolerances, and all verifications were signed off.

- Maintenance Procedure 3.M.4-28, Inspection of Hydraulic Shock Suppressors (Snubbers), Mechanical Shock Arrestors, Pipe Hangers and Restraints, Rev. 10, dated March 20, 1982. The inspector reviewed this procedure for technical adequacy and verified it included the inspections and testing specified in IEB 81-01.

- A. V. Morisi (BECO) letter to R. Haynes (RI) dated June 10, 1982 is a summary of the results of the testing and inspections performed on the mechanical snubbers. This letter transmitted the tests and inspection results required by action Item 4 of IEB 81-01. The inspector reviewed this letter and found that it accurately summarizes the tests and inspections.

Based on this review it appears that all IEB 81-01 action items have been completed by the licensee. Outstanding Item 81-BU-01 is closed.

4.0 Control Rod Scram Time Evaluation

Control Rod Scram Time Evaluation tests were performed by the licensee on February 14, 1982 using Procedure No. 9.9. The inspector reviewed the completed data sheets for this test and for the 16-week surveillance performed July 18, 1982. The following results were noted:

Percent Inserted from Fully Withdrawn	Maximum Allowed Insertion Time (average for all rods	Startup Test Results (sec) 2/14/82	16 Week Surveillance Test Results (sec) 7/18/82
10%	.51	.46	.43
30%	1.235	.99	.99
50%	1.99	1.57	1.72
90%	3.61	2.75	2.77

In addition no single control rod exceeded the T.S. 3.3.C.3 maximum insertion time of 7 seconds However, several RE-9C data sheets for the tests performed on February 14, 1982 had not been signed approved by the reactor engineer. The data appeared to be correct and all other signoffs were completed on these data sheets and on the data sheets for the tests performed on July 18, 1982. On August 19, 1982 the reactor engineer reviewed the data sheets and performed the approval verification. The inspection determined this to be an isolated error and had no further questions in this area.

5.0 Reactor Core Fuel Verification for Cycle VI

The licensee performed a verification of the location and orientation of each fuel assembly in the core in accordance with Procedure 4.0 on November 21-23, 1982. The verification was performed independently by the Reactor Engineer and the Senior Reactor Engineer. In addition the verification videotapes were reviewed and verified independently by two other licensee representatives.

The inspector reviewed the data sheets and noted that the verification signoffs had been completed satisfactorily. In addition, the inspector viewed selected portions of the verification videotapes and identified no discrepancies between the actual core location (videotape), the core location specified in the verification procedure No. 4.0, and the core location specified in the Cycle VI Management report. This sample review included about 20% of the fuel assemblies in the core. The inspector had no further questions in this area.

6.0 Full Power Physics Testing

6.1 Core Thermal Limits

The operating strategy for Cycle VI is to optimize the power output at the end of cycle (EOC) by shifting the neutron spectrum during the beginning of cycle (BCC). The excess power shift to the bottom of the core would result in thermal hydraulic conditions relatively close to limits in this region at BOC, but would extend core life.

The inspector reviewed the process computer OD-6 printouts for July 24-31 and August 2, 3, 5, 9-13, and 18, 1982 and verified that the Minimum Critical Power Ration (MCPR) and Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) were within expected limits.

The inspector noted that the licensee has been maintaining a plot of Maximum Fraction of Limiting Power Density (MFLPD) verses Exposure (MWD/T). The Cycle VI Core Management Report predicted a maximum MFLPD of .98 at approximately 2000 MWD/T when the first rod exchange was scheduled to take place. The licensee actually observed a MFLPD of .94 before shutting down the plant at approximately 1700 MWD/T for other reasons. The rod exchange was performed at this time, reducing the MFLPD to .87. The MFLPD is predicted to peak again at .98 when the exposure reaches approximately 3500 MWD/T.

The inspector had no further questions in this area.

6.2 Backup Core Limit Evaluation (BUCLE)

The licensee uses Procedure 9.4, BUCLE Operating Instructions to provide a backup for the process computer core evaluations. BUCLE is a program designed for use on a time-share system remote computer. The BUCLE program is used monthly for routine exposure update, for routine exposure update following LPRM calibrations, and as a backup for the process computer by performing the calculations necessary to complete the core parameter surveillances required by Technical Specifications.

The licensee updated the BUCLE program on June 18, 1982 following an LPRM calibration performed on June 17, 1982. The inspector compared the results computed by BUCLE against those printed out in P-1 and OD-6 by the process computer and verified that the data from both sources was nearly identical. The data was taken with the reactor operating at 98.8% power. Data compared included:

- Highest Regional Fraction of Limiting Power Density (MFLPD) and Corresponding Overall Peaking Factor (PKFL),
- Regional Maximum Fraction of Limiting Critical Power Ratios (MFLCPR's) and Corresponding Bundle Peaking Factors (PKF),
- The 12 8X8 Bundles Closest to CPR Limits, and
- The 12 highest ratios of a bundle MAPLHGR to its limiting LHGR for all bundles in the core.

No discrepancies were identified.

6.3 APRM Calibration

The inspector verified by a review of Procedure No. 9.1, APRM Calibration and a review of the OD-3 computer printout(s) dated August 2, 3, 5, 1982 that APRM's were calibrated against Reactor Core Thermal Power. All data entries and signoffs were completed satisfactorily.

6.4 Core Thermal Power (CTP)

Procedure 9.3, Core Thermal Power Evaluation, Revision 8, June 2, 1982 established several methods of evaluating the core thermal power. They are:

(a) Nuclear Steam Supply system (NSSS) heat balance by computer using computer edit OD-3;

(b) Balance of Plant (BOP) heat balance by computer;

(c) Long Form (RE4) and short form manual heat balances and,

(d) Nomographs from the figures "CTP versus Feedwater Flow" and "CTP versus Gross MWe".

Generally the core thermal power is determined from the values being calculated by the process computer. The short form heat balance and monograms are used by operating personnel for quick power checks when the computer is not available. The long form heat balance is used by Reactor Engineering when the process computer is not available or to make periodic checks (at least every 14 days) to verify the accuracy of the computer.

The inspector reviewed the CTP evaluations performed on the following dates and verified that the results obtained by method (a) agree with the results obtained by method (c) within the 3% tolerance specified in procedure [illegible].3.

Date	CTP from Long Form REM CMWt	CTP from OD-3 Opt 2 CMWt	Percent Difference
7/7/82	2003.59	1979.84	1.190
7/15/82	2042.65	1983.50	2.900
7/29/82	2027.00	1980.20	2.309
8/6/82	2021.41	1961.30	2.974

No discrepancies were identified.

7.0 Exit Meeting

At an exit meeting on August 20, 1982 the inspector presented the scope and findings of the inspection to those persons identified in paragraph 1.0.