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U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-293/84-01

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

Inspection At: Plymouth, Massachusetts

Inspection Conducted: January 1, 1984 - February 6, 1984

Inspectors: Jon R Johnson 2/15/84
J. Johnson, Senior Resident Inspector date

Martin McBride 2/15/84
M. McBride, Resident Inspector date

R. Borchardt 2/21/84
R. Borchardt, Reactor Engineer date

Approved by: Robert M. Gallo 2/23/84
R. Gallo, Chief, Reactor Projects Section date
No. 2A, Projects Branch No. 2

Inspection Summary:

Inspection on January 1, 1984 - February 6, 1984 (Report No. 50-293/84-01)

Areas Inspected: Routine unannounced safety inspection of plant operations including an operational safety verification, followup on plant events, a review of surveillance and maintenance activities, a review of chemical decontamination activities, and followup on inspections required by IE Bulletin No. 84-01. The inspection involved 266 inspector-hours by two resident inspectors and one reactor engineer.

Results: No violations were identified. However, concerns regarding the thoroughness of followup to a dropped control rod incident and ineffective feedback of operating experience are described in paragraph 3.

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DETAILS

1. Persons Contacted

   N. Brosee, Chief Maintenance Engineer
   B. Eldredge, Assistant Chief Radiological Engineer
   F. Famulari, ISI Coordinator
   W. Harrington, Sr. Vice President-Nuclear
   P. Mastrangelo, Chief Operating Engineer
   C. Mathis, Station Manager
   L. Oxsen, Director of Nuclear Operations
   K. Roberts, Director of Outage Management
   A. Trudeau, Chief Radiological Engineer

   The inspector also interviewed other members of the health physics, operations, maintenance, security, and technical staffs.

2. Operational Safety Verification

   A. Scope and Acceptance Criteria

   The inspector observed control room operations, reviewed selected logs and records, and held discussions with control room operators. The inspector reviewed the operability of Secondary Containment systems including the Emergency Diesel Generators and Standby Gas Treatment System. Tours of the reactor building, (including all elevations of the drywell), turbine building, station yard, switchgear rooms, SAS, diesel generator rooms, cable spreading room, auxiliary bay, intake structure, radwaste building, and control room (daily) were conducted. Observations included a review of equipment conditions, control room annunciators, potential fire hazards, physical security, housekeeping, radiological controls, and equipment control (tagging); in addition, records of radioactive liquid and gaseous releases from the station were reviewed.

   These reviews were performed in order to verify conformance with the facility Technical Specifications and the licensee's procedures.

   B. Findings

   (1) The inspector reviewed plant conditions and operator actions during this inspection period with regard to the chemical decontamination of portions of the reactor coolant system. This review included verification of the Technical Specification (T.S.) requirements for reactor coolant pressure boundary integrity (heatup and cooldown limits, reactor vessel head flange limits) and secondary containment integrity. No violations were identified. Additional comments regarding chemical decontamination are provided in Paragraph 6 below.

(2) The licensee issued a memo on January 6, 1984 to onsite supervisors which contained guidelines for minimizing unnecessary radiation exposure by prohibiting loitering in the process buildings. The inspector discussed these guidelines with the licensee in response to worker questions.

The licensee stated that some contractors were not always following the guidelines because workers were being told to remain in the process buildings while awaiting work assignments. The licensee subsequently emphasized the importance of the guidelines to contractor management and stated that the following changes had been made:

-- The contractors will no longer discipline workers who leave the process buildings after work is completed.

-- Low dose rate assembly areas for workers outside the process buildings will be designated.

-- The practice of stationing workers in the process building to hold other worker's valuables will be discontinued.

On January 26, 1984, the inspector determined that some workers were still being asked to remain in the process buildings while awaiting work assignments. The licensee representative indicated that they had received similar reports and that all contractor first line supervisors were not complying with the licensee's policy memo.

The licensee stated that the importance of the memo was re-emphasized to the contractors' management. The adequacy of licensee control over loitering in the process buildings will be reviewed during routine inspections of the facility.

The licensee's administrative limits for external radiation exposure were reviewed in response to a worker's question and found consistent with station procedures.

(3) During a review of licensee respiratory protection training, it was noted that the licensee was not explicitly instructing workers on all the precautions concerning relief from respirator use contained in 10 CFR 20.103(c)(3). Instead, the licensee's training contained general caution statements about respirator relief. Following discussions with the inspector, the licensee stated that the specific precautions contained in 10 CFR 20.103(c)(3) had been inserted into training handouts and would be routinely discussed during class.

On January 2, 1984, two workers became dizzy and disoriented while using a gas cutting torch in a temporary plastic tent on the 91 foot elevation of the Reactor Building. The workers were wearing filter respirators when they became dizzy and promptly left the tent and removed their respirators. The airborne activity levels in the tent were less than 0.3 times the concentrations listed in 10 CFR 20 Appendix B Table 1, column 1. The tent was not equipped with ventilation blower units.

In response to the incident, the licensee installed a ventilation unit on the tent and discussed the importance of proper ventilation during meetings with licensee managers, contractor managers, and worker representatives.

In a related incident, the licensee received reports that excessive smoke was noticed in the torus during welding. Auxiliary ventilation units were subsequently installed in the torus to help control smoke buildup.

No violations were identified. Radiological work conditions will continue to be reviewed during routine inspections.

(4) On January 12, 1984, the inspector reviewed conditions inside the drywell at all elevations. The following observations were made:

- personnel were following radiation work permit requirements,
- partially disassembled Main Steam Isolation Valves were maintained in an orderly manner,
- piping insulation storage was marginally acceptable from both a housekeeping and personnel safety hazard basis, and
- various objects (including vicegrips, pocket dosimeter, flashlights, and trash) were visible in the drywell-to-torus vent headers from the drywell side.

On January 19, 1984, the licensee's representative in charge of the drywell stated that the following actions were planned:

- the piping insulation will be removed from the drywell after chemical decontamination, and
- the drywell-to-torus downcomers will be cleaned and inspected at the completion of the outage and prior to plant startup.

The inspector had no further questions at this time.

(5) On January 20, 1984, the inspector held discussions with the licensee's fire protection officer concerning implementation of fire prevention actions during the outage. The licensee has established additional staff positions for both the personal injury and fire prevention areas. These personnel are on shift work and provide 24 hour per day coverage.

The inspector expressed concern that in one case a welder was preparing to conduct hot work in the reactor building without a fire watch who had a fire extinguisher. The contractor foreman counselled the individual involved.

The inspector reviewed the results of a fire incident report. On January 16, 1984, sparks from a cutting operation on a feedwater heater in the condenser bay ignited paper and rubber gloves on a lower level. The fire watch immediately extinguished the fire. The corrective actions included adding a second fire watch on the lower level and keeping the area clean of combustible material.

The licensee's actions were determined to be adequate. No violations were identified.

(6) On January 19, 1984, control room operators were draining the non-fueled reactor vessel in preparation for injection of the chemical decontamination fluid. The water inside the core shroud was expected to stop at about the 2/3 core height (elevation of jet pump suction inlet chamber) while draining of the downcomer annulus via the recirculation loops. It did not stop, and operators observed vessel level indication and recorder charts that showed a drop equivalent to approximately 90 gpm.

The licensee's investigation revealed that the leakage was through the jet pump throat-to-diffuser joints (slip joints), and that this was in accordance with the jet pump design and safety analysis report. The inspector reviewed section 3.3 of the Pilgrim FSAR and verified that up to 225 gpm jet pump joint leakage is assumed and that the core standby cooling system reflooding capacity was designed to accommodate this leakage. No unacceptable conditions were identified.

3. Followup on Events Occurring During the Inspection

A. Scope

The inspector reviewed the licensee's actions associated with the events described below in order to determine whether appropriate evaluation and corrective actions were being implemented and also in order to determine whether generic implications were involved.

B. Findings

(1) On January 4, 1984 at 6:20 pm, a control rod blade was dropped into the reactor vessel during a routine blade change out. No fuel was in the reactor vessel at the time the blade was dropped. The blade was initially lifted on one side of the spent fuel pool using a control rod blade grapple attached to a frame mounted hoist. The blade was then moved over the spent fuel racks, through a transfer canal, and into the reactor vessel cavity. As it was being positioned over the reactor vessel, the blade became disengaged from the grapple and dropped onto the upper core grid plate.

A visual inspection of the reactor using a video camera indicated that no permanent vessel components were damaged. One control rod blade guide handle was bent slightly.

The dropped blade was removed from the vessel and will not be used further. The licensee conducted an evaluation and inserted a caution statement (recommended by General Electric Service Information Letter (SIL) 342) into procedure 3.M.4-12.1, "Changeout of Control Rod Blades and Fuel Support Removal", before continuing with the blade shuffle.

A review of the incident identified the following concerns:

-- The licensee received a Service Information Letter (SIL) 342 from the General Electric Company in January, 1981 which described a blade-drop incident similar to the January 4, 1984 incident and recommended preventative actions. The SIL was not forwarded to the Operations Department and the preventative actions were not incorporated into station procedures until after the incident.

A supplement to SIL 342, "Typical Control Rod Grapple Modification", was received in June, 1982. The supplement described a simple equipment modification which may have prevented the January 4, 1984 incident. The licensee's control rod grapple was not modified as suggested in the supplement. The supplement was also coded by General Electric as Category I.

The licensee stated that the grapple would be modified as recommended in the supplement to SIL 342, prior to reinstalling the blades after the recirculation piping work had been completed.

-- Two Limited Senior Reactor Operators (LSROs) associated with the blade changeout work were briefed on SIL 342 by a General Electric Company representative, prior to the blade-drop incident. However, the LSROs did not alert the Operations Department staff and did not recommend insertion of the appropriate precautions into station procedures.

-- The licensee did not incorporate a requirement into procedure No. 3.M.4-12.1 to manually test the grapple engagement until after the inspector reviewed the incident and noted the deficiency. This test was conducted improperly just prior to the incident. Operations personnel were instructed on the test by a General Electric Co. representative after the incident, prior to moving additional blades. The importance of the test is emphasized in SIL 342.

As a result of the findings regarding SIL 342, the inspector performed a review of the licensee's program for feedback of operating experience in general. Findings are discussed below.

(2) The licensee established a program to evaluate operating experiences from external sources by issuing procedure 1.3.33, "Assessment/Feedback of Operating Experience" on December 31, 1980. However, operating experiences reviewed in this program since initial implementation in March, 1981 (NRC Report 81-07) were not always transmitted to the plant and implemented. In addition, some documents containing operating experiences, e.g. General Electric SILs, were not included in the review program, but were handled informally and resulted in incomplete reviews. Proper review, feedback, and implementation of GE SILs may have prevented the dropped blade incident on January 4, 1984.

NRC correspondence including I.E. Bulletins, Circulars, and Information Notices were evaluated in a separate program in the corporate offices.

The licensee revised procedure 1.3.33 in October, 1982 and established the POEAC (plant operating experience assessment committee) onsite. While procedure 1.3.33 states that the POEAC's review will include LERs from sister plants, pertinent NRC information, and industry assessments of operating experiences (including SILs), almost all of the committee's time was actually spent reviewing a backlog of INPO reports. Other aspects of procedure 1.3.33 were also not implemented, including tracking items to closeout by the licensee's Information Resources Management Group.

The POEAC last met in August 1983. Since then, a licensee technical group has informally reviewed offsite operating experiences. The licensee stated in a meeting with NRC Region I management in November 1983 that the POEAC system was ineffective and had been disbanded.

The licensee stated that a revised program was being developed and should be in place by March 1984. This program will be reviewed during a future inspection (84-01-01).

(3) The licensee informed the inspector that radioactive material shipments with improper shipping papers or placard had been received from the following sources:

-- Southwest Research Institue, San Antonio, Tx, received on December 12, 1983

-- J. A. Jones Applied Research Services Co., Charlotte, NC, received on December 15, 1983

-- General Electric Company, Vallecitos, CA, received on January 15, 1984.

The inspector forwarded the associated information to NRC:Region I specialists for additional review and had no further questions at this time.

(4) On January 11, 1984 the inspector reviewed the licensee's ALARA planning for disassembling an unusually radioactive control rod drive (80 r/hr contact dose rate). The planning appeared adequate, and included prework discussions with workers, use of long-handled tools and water shielding during drive disassembly, and establishing worker exposure time limits.

On January 18, 1984 an individual received an unanticipated extremity dose while attempting to survey small metal chips in the control rod drive repair room. Subsequently, a Confirmatory Action Letter 84-03 was issued by Region I to the licensee and a special inspection (50-293/84-03) was conducted to review this incident. Findings will be issued in separate correspondence.

(5) At 7:00 p.m. on January 23, 1984, with the reactor vessel defueled, a temporary hose blew off a connection to the 'A' Recirculation loop during pre-operational testing of the Chemical Decontamination equipment. About 7000 gallons of water (mixture of primary coolant system water and demineralized water) blew out of the recirculation loop which was pressurized to 35 psig of nitrogen. Licensed operators immediately isolated the "A" and "B" recirculation loops by closing the suction and discharge valves. This water collected in the drywell equipment and drain sumps. No personnel contamination or equipment damage resulted.

The licensee's review indicated that the hose clamp design was inadequate. The licensee's prime contractor (General Electric Co.) and the decontamination vendor (I.T. Corporation) replaced two hoses with a different design, and hydro tested the system to 125 psig. No violations were identified.

(6) At 9:00 am on January 24, 1984, access was temporarily restricted to the reactor building as a precautionary measure while radiation surveys were being taken following the failure of an instrument air hose connection. The inspector reviewed the air sampling data and the control room log book.

There was no entry in the control room log book and the Nuclear Operating Supervisor was not aware of the event. Following discussions with the inspector, the licensee's management counselled the on shift health physics technician to keep the control room supervisor informed.

The inspector later verified that a late entry was made in the log describing this event. No violations were identified.

(7) At 9:30 pm on January 25, 1984 a rubber hose supplying a regulated 35 psig nitrogen blanket through the reactor vessel head slipped off the triple banded flange connection.

The licensee was continuing with preoperational testing of the chemical decontamination equipment with the reactor vessel defueled.

The water in the recirculation loops was at 250°F at the time of depressurization. Licensee operators immediately injected cooler water to prevent boiling and steam release to the refueling floor, and isolated the reactor building and started the Standby Gas Treatment System. Precautions were also taken for possible oxygen deficient atmosphere.

Records of reactor vessel cooldown rates, reactor building airborne radionuclides and effluent release rates were reviewed by the resident inspectors. No abnormal conditions were noted.

The licensee decided to replace all flexible rubber hoses connected to the reactor coolant system with stainless steel braided hoses.

By 8:30 am January 27, 1984, the licensee had reflooded up the reactor vessel, removed the head shield blocks, replaced the nitrogen hose, and was in the process of draining the reactor vessel to recommence preoperational testing of the chemical decontamination system. No violations were identified. The licensee's decontamination activities will continue to be reviewed by the inspector during routine inspections.

4. Surveillance Activities

A. The inspector reviewed the licensee's actions associated with surveillance testing in order to verify that the testing was performed in accordance with approved station procedures and the facility Technical Specifications.

The following tests were reviewed/observed:

- Logging of reactor coolant system parameters (reactor vessel shell and flange temperatures; recirculation loop temperatures; and reactor vessel pressure) every 15 minutes while heating up, cooling down, and while the vessel was not vented and $\leq$ 220°F (as required by T.S. 4.6.A.1 and 4.6.A.2).
- Routine calibration of 'B' intermediate range neutron monitoring (IRM) system on January 5, 1984.

B. Findings

The inspector determined that one of three pieces of test instrumentation set up in the control room in preparation for calibrating the 'B' IRM was out of calibration. A timer-counter (serial no. 532A, control no. 134) had a sticker which indicated that the calibration due date was December 22, 1984, but the calibration data sheet (also attached to the instrument) indicated the correct calibration due date as December 22, 1983.

The licensee's I&C supervisor immediately verified that the instrument in question had not been used and removed the instrument from the control room and segregated it for recalibration. The licensee described planned improvements for the control of measuring and test equipment which include incorporation into a computerized PM program.

No violations were identified. Proper calibration of test instrumentation will continue to be reviewed during routine inspections.

5. Maintenance/Modification Activities

A. Scope

The inspector reviewed the licensee's actions associated with maintenance and modification activities in order to verify that they were conducted in accordance with station procedures and the facility Technical Specifications. The inspector verified for selected items, that the activity was properly authorized and that the appropriate radiological controls, equipment control tagging, and fire protection were being implemented.

The items/documents reviewed included the following:

- Maintenance Request (M.R.) No's. 83-3-32, 83-3-127, 83-3-128, 83-3-49, 83-3-69, and 83-3-150; remove, rebuild, and re-install control rod drive hydraulic units
- M.R. 83-3-11; replace packing on valve No. 111 for control rod drive No. 10-11
- M.R. 84-10-2, and 84-10-4; replace oil in the 'B' core spray and 'D' RHR pumps
- M.R. 84-12-1; install a 1½ inch tap for piping decontamination
- Plant Design Change Request (PDCR) No. 83-15; installation of a Halon 1301 Fire Extinquishing System in the cable spreading room

B. Findings

(1) On January 3, 1984, the licensee indicated that 18 control rod drive piston tube lock nuts were found to be loose during CRD inspections. These nuts should be torqued to 40 ft/lbs. The licensee has always installed new CRDs from General Electric Co. and does not normally receipt inspect the lock nuts. The licensee stated that a preliminary General Electric Co. evaluation indicated that loose lock nuts do not have any nuclear safety significance. This item is unresolved pending the completion of the licensee's evaluation (84-01-02).

(2) Findings with regards to the quality of record keeping for CRD removal, rebuilding, and reinstallation are described separately in NRC Report No. 84-03.

(3) On January 12, 1984, the inspector met with the licensee's recirculation piping replacement project manager to discuss procedure review and approval for contractor work in the drywell. The licensee's Onsite Review Committee (ORC) approved TP 84-10, Approval and Control of Temporary Changes by G.E., Revision 0, January 11, 1984. This procedure gives G.E. the authority to make temporary changes to plant systems except those specifically listed in TP 84-10. M.R. 84-12-1 gave approval to cut into and weld a pipe connection to a safety related section of the cleanup system with a G.E. procedure (PNPS-SP Rev. 0) that was not reviewed nor approved by the ORC.

The licensee representative stated that the welding procedures specified in PNPS-SP had been reviewed and approved by ORC, and that the section of cleanup system piping cut into was going to be replaced during the outage.

The inspector had no further questions at this time. Administrative controls for equipment removal and reinstallation will be reviewed during future routine inspections.

(4) The inspector reviewed the status of the Halon system installation for the cable spreading room (PDCR 83-15). The system has been installed and tested once but it failed to achieve the required 10 second concentrations in all areas. The equipment supplier (Automatic Sprinkler Corp.) has been requested to propose a solution.

The compensatory fire watch patrol will continue to patrol the 'A' and 'B' 4160v. switchgear rooms and the cable spreading rooms until the Halon system is declared operable and the CO_2 system is realigned to the switchgear rooms.

The completion of this modification will be reviewed in a future inspection of the facility.

(5) Following a presentation of licensed operator certificates at the Pilgrim Training Center on January 31, 1984, NRC:Region I management questioned the licensee's management regarding the status and progress of outage activities. Radiation exposure results, piping decontamination, housekeeping, and fire protection items were discussed. No inadequacies were identified during this meeting.

6. Chemical Decontamination

A. Scope

The inspector reviewed the licensee's activities associated with chemical decontamination of sections of the reactor coolant pressure boundary including portions of the recirculation, core spray, and residual heat removal systems. The licensee contracted General Electric Co. and I.T. Corporation to provide equipment and services so as to reduce radiation levels in the drywell prior to the piping replacement project.

The inspector's review included the following areas:

- Procedures for preoperational testing including hot functional and pressure tests of temporary systems
- Procedures for installing temporary reactor vessel level instrumentation and raising and lowering vessel water level
- Procedures for chemical decontamination
- Safety Evaluation No. 84-4
- Observation of equipment operations, and
- Discussions with personnel and review of logs and records.

B. Findings

(1) The licensee's safety evaluation included a review of material compatability, breach of process barriers, overflow or spillage inside the reactor building truck lock and failure of the cask onsite. Included in this review was a General Electric Co. safety evaluation dated December, 1983 which concluded that the NS-1 decontamination process has no significant effect on the safety of the plant. The licensee also conducted a review of reactor vessel minimum pressurization temperatures with 30% vessel stud preloading.

No inadequacies were identified in the review of this safety evaluation.

(2) Following a review of draft procedures, the inspector questioned the licensee regarding two items: 1) hydrostatic testing temporary connections and 2) requirements for logging temperatures every 15 minutes with the reactor vessel not vented and metal temperature $\angle 220^{\circ}$F. The licensee acknowledged this inspector's concerns and incorporated the provisions into the appropriate procedures.

(3) In general, the licensee's control of activities and corrective actions following many preoperational test failures was acceptable. Evolutions were conducted with caution. As an example, while draining the reactor vessel and expected water levels were not observed, the operations staff stopped, reviewed the situation and consulted the FSAR to verify that jet pump slip joint leakage was within the bounds of the plant analyses.

No violations were identified during this review.

Post decontamination surveys and exposure reduction evaluations will be reviewed during future inspections.

7. Followup on NRC Inspection and Enforcement Bulletin (IEB)

On February 3, 1984, at 6:20 pm, the inspector notified the licensee's on-watch Watch Engineer of the identification of a problem at another similar facility involving the torus vent header. At 8:35 pm on February 3, 1984, the licensee received a telecopied version of IEB 84-01, Cracks in Boiling Water Reactor Mark I Containment Vent Headers.

The Watch Engineer and two other station engineers conducted an inspection of the vent header from the internal catwalk. No problems were identified. The licensee reported the results of this inspection to the NRC Duty Officer at 10:30 pm on February 3, 1984. Also on February 4, 1984, an additional inspection was performed by the licensee's inservice inspection personnel. All vent header surfaces and welds able to be seen from the catwalk were examined and found acceptable.

The results of these inspections were presented to the NRC:NRR in a joint utility group meeting on February 6, 1984.

The inspector had no further questions at this time. No inadequacies were identified.

8. Unresolved Items

Areas for which more information is required to determine acceptability are considered unresolved. An unresolved item is discussed in Paragraph 5.B(1).

9. Management Meetings

During the period of the inspection, licensee management was periodically notified of the preliminary findings by the resident inspectors. A summary was also provided at the conclusion of the inspection and prior to report issuance. At no time during this inspection was written material provided to the licensee by the inspector.