

U. S. NUCLEAR REGULATORY COMMISSION
REGION I

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Licensee: Boston Edison Company
800 Boylston Street
Boston, Massachusetts 02199
Facility: Pilgrim Nuclear Power Station
Location: Plymouth, Massachusetts
Dates: February 4 - March 16, 1992
Inspectors: J. Macdonald, Senior Resident Inspector
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Approved by:



J. Rogge, Chief, Reactor Projects Section 3A

4/6/92
Date

Inspection Summary:

Areas Inspected: Safety inspection of plant operations, radiological controls, maintenance and surveillance, security, safety assessment and quality verification, and engineering and technical support.

Results: Inspection results are summarized in the Executive Summary.

EXECUTIVE SUMMARY

Pilgrim Inspection Report 50-293/92-03

Plant Operations: A maintenance activity placed the auxiliary bay water tight door in an abnormal condition which was contrary to the station Final Safety Analysis Report (FSAR). A nuclear plant reactor operator (NPRO), performing a routine tour of the turbine building, questioned how the degraded status of the watertight door impacted loop separation criteria for the salt service water and reactor building closed cooling water systems and informed the Nuclear Watch Engineer (NWE) of the condition. The NPRO was alert and displayed an outstanding questioning attitude. Actions taken by the NWE and NPRO were timely and demonstrated an excellent knowledge of FSAR requirements. The licensee critique of this event was prompt, thorough and developed appropriate corrective action recommendations.

Radiological Controls: On March 1, 1992, the licensee implemented a major revision to the Radiation Work Permit (RWP) procedure. This revision eliminated the use of the continuing RWP category which had contributed to previously experienced confusion regarding entry into areas posted "RWP required for entry." In addition, the General RWP category was created to permit personnel to enter areas of moderate dose rate/contamination levels following a self briefing of RWP requirements in place of a radiological protection technician briefing. These changes were determined to be positive improvements to the RWP program. Overall, licensee training was appropriate to support a smooth transition to the new RWP system.

Maintenance and Surveillance: Several corrective maintenance activities were completed during a planned Station Blackout diesel generator (SBO DG) outage. Planning and coordination to effect numerous repairs during this one outage was efficient thereby minimizing unavailability of the SBO DG. Previous implementation of plant design change (PDC) 89-44 was a positive initiative which supported increased flexibility to perform SBO DG load testing while at power.

However, response and followup actions to an abnormal condition experienced during post work testing were not well controlled. Subsequent corrective actions implemented to address control of maintenance activities were appropriate and were implemented in an effective manner. Additional training and licensee review of SBO DG related procedures to assure proper procedural clarification demonstrated a sound safety perspective.

Implementation of the licensee "Emergency Diesel Generator (EDG) Reliability Program" was a positive initiative to optimize EDG availability. A resultant accelerated test plan to demonstrate reliability of the "B" EDG was successfully completed.

Security: The inspector reviewed various aspects of the licensee Fitness For Duty (FFD) testing program including the random selection process, testing facilities and selected documentation of test results. The random selection process, and maintenance of test facilities and equipment were appropriate to support the collection of accurate test results.

Executive Summary

Selected documentation was reviewed including test results and program followup for several instances of individual FFD test failure. Documentation, followup and reporting were determined to be performed in accordance with the licensee FFD program and 10 CFR 26.73 reporting criteria.

Safety Assessment and Quality Verification: Corrective actions revising the drywell head installation procedure were thorough and appropriate.

Engineering and Technical Support: Unintentional energization of reactor building isolation system contacts during performance of a surveillance procedure resulted in an inadvertent engineered safety feature (ESF) actuation. System engineers performed a detailed review of this event, specifically addressing the component logic and functional verification accomplished during the surveillance. Corrective actions including elimination of redundant portions of related surveillance procedures demonstrated a thorough knowledge of associated logic circuitry. Corrective action initiated by system engineers was effective.

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DETAILS

1.0 SUMMARY OF FACILITY ACTIVITIES

At the start of the report period Pilgrim Nuclear Power Station was operating at approximately 100% of rated power.

The Station Blackout Diesel Generator (SBO DG) was taken out of service for a planned maintenance outage on February 9. Several maintenance repair activities were completed during the outage and post maintenance testing was satisfactorily completed on February 14.

On February 27, an inadvertent partial actuation of the reactor building isolation system (RBIS) occurred during performance of surveillance testing. The licensee promptly reset RBIS circuitry, reopened the affected reactor building ventilation dampers and returned the standby gas treatment system to normal standby status. The NRC was properly notified of the event in accordance with 10 CFR 50.72 requirements.

On March 10, the "B" EDG successfully completed a seven week accelerated test program for reliability and the monthly testing periodicity was resumed.

The licensee continued to track unidentified drywell leakage through the end of the reporting period. Unidentified drywell leakage remained below the Technical Specification limit of 5.0 gpm and was stable at approximately 2.5 gpm. At the conclusion of the report period, the station was operating at approximately 100 percent power.

2.0 PLANT OPERATIONS (71707, 71710, 40500, 90712)

2.1 Plant Operations Review

The inspector observed plant operations during regular and backshift hours of the following areas:

Control Room	Fence Line
Reactor Building	(Protected Area)
Diesel Generator Building	Turbine Building
Switchgear Rooms	Screen House
Security Facilities	

Control room instruments were observed for correlation between channels, proper functioning and conformance with Technical Specifications. Alarms received in the control room were reviewed and discussed with the operators. Operator awareness and response to these conditions were reviewed. Operators were found cognizant of board and plant conditions. Control room and shift manning were compared with Technical Specification requirements. Posting and control of radiation, contamination and high radiation areas were inspected. Use of and compliance with radiation work permits and use of required personnel monitoring devices were checked. Plant housekeeping controls, including control of flammable and other hazardous

materials, were observed. During plant tours, logs and records were reviewed to ensure compliance with station procedures, to determine if entries were correctly made and to verify correct communication of equipment status. These records included various operating logs, turnover sheets, tagout and lifted lead and jumper logs. Inspections were performed on backshifts including February 4-6, 11, 12, 18-21, 26, 27 and March 3, 4 and 9-12. Deep backshift inspection was performed on March 12 (4:15-5:00 am).

Pre-evolution briefings were noted to be thorough with appropriate questions and answers. The operators appeared to have good knowledge of plant conditions. No unauthorized reading material was observed. Food, beverages and hard hats were kept away from control panels.

2.2 Evaluation of Auxiliary Bay Watertight Door

The salt service water (SSW) system provides cooling water to the safety-related reactor building closed cooling water (RBCCW) system. During construction of Pilgrim Station the NRC questioned the adequacy of design regarding a major pipe break in the SSW system. The licensee responded by upgrading the SSW design to Seismic Class 1, installation of an auxiliary bay watertight door to provide train separation, and installation of a rapid drain path to the torus compartment. The NRC determined this to be acceptable. The station Final Safety Analysis Report (FSAR) section 10.7 further stated that a major pipe break will not result in loss of the RBCCW system because redundant portions are separated by a watertight barrier.

On February 19, 1992, a nuclear plant reactor operator (NPRO) noted the auxiliary bay watertight door to be in an abnormal condition during his routine tour of the turbine building. Maintenance personnel had disassembled the dogging (closure) mechanisms for the door in order to repair the door handle (F&MR 90-134). The door remained on its hinges. The NPRO questioned how the degraded status of the watertight door impacted loop separation criteria for the SSW and RBCCW systems and informed the Nuclear Watch Engineer (NWE) of the condition. The NWE stopped the maintenance work and raised the issue to Operations Section management attention. Operations promptly directed that the door be restored to a watertight condition and initiated a critique. The NPRO was alert and displayed an appropriate questioning attitude. Actions taken by the NWE and NPRO were timely and demonstrated an excellent knowledge of FSAR requirements.

Event critique 92-06 was initiated immediately. System and Safety Analysis (S&SA) Division evaluation 88-129 "EQ Zone Flood Levels" had previously determined that the worst case rupture of the SSW system would not exceed the capacity of the existing floor drains. The auxiliary bay door was not needed for protection from internal flooding. Subsequently S&SA evaluation 90-55 recategorized the auxiliary bay door as "Non-Q" quality. The resultant auxiliary bay door work package reflected S&SA evaluation 90-55 which determined that the door was not required for flooding protection.

The critique team recommended several corrective actions including (1) revision of "Non-Q" evaluation process to update design documents, (2) review of previous "Non-Q" evaluations to identify and resolve potential discrepancies, (3) update of the FSAR regarding auxiliary bay door requirements and (4) institute related training for maintenance staffers, planners and reviewers. The critique was prompt, thorough and developed appropriate corrective action recommendations. Several of the above corrective actions were forwarded by the team for resolution under the recommendation for improvement/investigation process. Licensee resolution of proposed corrective actions was in progress at the conclusion of this reporting period.

3.0 RADIOLOGICAL CONTROLS (71707)

3.1 Revised Radiation Work Permit (RWP) Implementation

The RWP program was established to ensure personnel understood and were provided adequate protection for radiological conditions present in the work area. Of specific applicability were work activities conducted in the presence of significant levels of radiation exposure, radioactive contamination, or airborne radioactivity concentrations. Each RWP specifically stated the boundaries of the physical location to which it applied. Previously the licensee had three categories of RWPs; Continuing, Job Specific, and System Breach. Continuing RWPs were utilized as a tool to track personnel exposure for routine activities such as management tours and inspections in areas of low dose rate/contamination levels. Areas of relatively higher dose rate or contamination levels were appropriately posted with signs that included the term "RWP required for entry." In the past some workers experienced occasional confusion regarding the term and had entered areas requiring job specific RWPs for entry, when they were signed in on a continuing RWP. While each individual's total radiation exposure was accounted for, the potential existed that the individual may not have received proper authorization to enter the area, may not have been wearing proper protective clothing, and the exposure attributed to specific jobs could become inaccurate. The licensee recently modified the RWP program to address this problem.

On March 1, 1992, the licensee implemented a major revision to procedure 6.1-022, "Issue, Use, and Termination of Radiation Work Permits." This revision eliminated the use of the continuing RWP category. A "dose tracker" mechanism was established to track exposure for personnel performing activities such as inspections or supervisory tours. The dose tracker authorizes access to similar areas as were authorized by the old continuing RWP. The inspector determined that the RWP procedure revision provided proper instruction to clarify previous misconceptions regarding personnel access to areas posted "RWP required for entry."

In addition the new RWP procedure created one new category of RWP, the General RWP. The general category permits personnel to enter areas of moderate dose rate/contamination levels following a self briefing of RWP requirements. Previously, a briefing by a radiological protection (RP) technician was required. The licensee conducted several forms of training for station personnel on the new RWP procedure prior to implementation. The inspector monitored a training session attended by 23 personnel of various disciplines. Major changes in the new

RWP program were presented. Areas for improvement regarding the observed training session were discussed with RP management. The inspector subsequently attended a later session and found that training to be thorough and concise. Varied RWP scenarios were discussed in an easy to understand manner. Overall, licensee training was appropriate to support a smooth transition to the new RWP system.

4.0 MAINTENANCE AND SURVEILLANCE (61726, 62703)

4.1 Station Blackout Diesel Generator Repair and Post Maintenance Testing

A concentrated effort by system engineering and the maintenance department was recently undertaken to improve the overall material condition of the Station Blackout Diesel Generator (SBO DG). The SBO DG was taken out of service for a planned maintenance outage on February 9, 1992. The SBO DG is not governed by the station Technical Specifications but is a component of the station Safety Enhancement Program (SEP). As a SEP component the SBO DG was administratively controlled in a high quality manner. Several Maintenance Requests (MR) including installation of a new fuel injector and fuel pump on cylinder 2L and a new speed potentiometer were completed during the outage. Coordination to effect numerous MR repairs during this outage was efficient and thereby minimized unavailability of the SBO DG.

Post maintenance testing of the SBO DG was conducted on February 14, 1992, in accordance with procedure 8.9.16.1 (rev. 2) "Manually Start and Load Blackout Diesel Via the Shutdown Transformer." The procedure had recently been revised following completion of Plant Design Change (PDC) 89-44. This PDC permitted the SBO DG to be paralleled with the shutdown transformer and to be loaded from the off-site 23 KV system. Prior to this PDC the load test surveillance could only be performed with the reactor in a shutdown condition. The increased flexibility to perform load testing while at power was a positive initiative to improve SBO DG reliability.

Inspector review of the surveillance procedure with the nuclear watch engineer (NWE) and the systems engineer identified some areas for clarification. The procedure required the as found mechanical governor speed setting and speed and voltage potentiometer settings to be recorded during pre-startup checks. However, no reference settings for these parameters were listed to aid the operator in determining whether the as found settings were appropriate. Clarification of reference values was properly addressed in a resultant procedure change submittal. In addition, the NWE had issued a Senior Reactor Operator (SRO) change to the approved surveillance test procedure in accordance with the criteria established in procedure 1.3.4-3, "SRO Revisions." As a followup action a permanent change to procedure 8.9.16.1 was submitted to reflect the SRO change. The basis for the SRO change was discussed and determined to be well founded. The preevolution brief was professional and well detailed.

An abnormal component response was noted during performance of the SBO DG prestartup checks. The procedure directed the operator to manually trip and then reset the overspeed trip device. The overspeed trip shutdown device and alarm annunciator did not reset when the

operator attempted to clear the overspeed trip signal. Following several minutes of investigation, the overspeed trip signal did reset, but the cause of the delay was not understood. The surveillance was halted and the abnormal overspeed trip device response was reported to the NWE for resolution. Following discussion with the system engineer and a review of technical documentation, the NWE determined that the SBO DG remained operable and directed personnel to continue the surveillance. While the ability of the trip device to reset was in question, the protective action of the overspeed trip was determined to be reliable. A work request ticket (WRT) was initiated to resolve the abnormal trip reset response and the surveillance was continued. Excellent communications were maintained throughout performance of the surveillance by use of hand held two way radios. The surveillance was completed according to procedure with satisfactory results.

The inspector reviewed the completed surveillance documentation and observed that the abnormal overspeed trip device response which had not been fully understood was not noted as a discrepancy. In addition, on March 3, 1992, maintenance being performed per the WRT resulted in an SBO DG lockout condition which had not been anticipated by the onshift NWE or Nuclear Operations Supervisor (NOS) who had authorized the work. These oversights were not consistent with the otherwise outstanding coordination of work activities conducted during this reporting period. The inspector discussed the identification of surveillance discrepancies, WRT and maintenance request classification and control of maintenance activities with Operations Section management. Night orders were issued and shift training was conducted to reemphasize management expectations regarding the identification of surveillance discrepancies and the control of maintenance activities. These corrective actions were appropriate and were implemented in an effective manner.

Maintenance activities associated with the WRT determined that the SBO DG overspeed trip device had functioned correctly during the surveillance. Detailed review of technical documentation and of operator activities during the surveillance identified operator error as the cause of the overspeed trip device reset delay. Reset of the infrequently operated SBO DG overspeed trip device was found to require different operator actions than those required for the more routinely operated station emergency diesel generators. Operators had not been fully familiar with the proper method to reset SBO DG alarms. Operations department training was conducted and a revision to procedure 8.9.16.1 was initiated to clarify the method to reset SBO DG alarm conditions. An operations standing order was issued to address resetting of SBO DG alarms, pending station approval of the associated procedure revision. In addition, the licensee commenced a broad review of SBO DG related procedures to ensure proper procedural clarification was present. Licensee corrective actions were prompt, inclusive, and demonstrated a sound safety perspective with regard to the scope of the resultant procedure review.

4.2 Emergency Diesel Generator Reliability Program

The licensee implemented procedure 1.5.16 "Emergency Diesel Generator (EDG) Reliability Program" on December 18, 1991. The program was established consistent with the guidance of NUMARC 87-00, revision 1 "Guidelines and Technical Bases for NUMARC Initiatives

Addressing Station Blackout (SBO) at Light Water Reactors." The licensee previously committed to an EDG target reliability of 97.5 percent for complying with the requirements of the SBO Rule. The program established several associated reliability criteria for EDG "start" and "load-run" characteristics. System engineers manage the implementation of procedure 1.5.16 and monitor EDG performance on a continuing basis.

On January 28, 1992, the "B" EDG failed to load properly during the performance of procedure 8.9.1, revision 33 "Emergency Diesel Generator Surveillance." Reactive load oscillations of between 100 and 500 KVAR had developed during initial loading of the EDG. The "B" EDG was immediately secured and corrective maintenance begun. The cause of the load oscillations was attributed to the motor operated potentiometer for the voltage regulator. Repairs and post maintenance surveillance testing were conducted expeditiously. The "B" EDG was declared operable on January 29, 1992. Troubleshooting and corrective maintenance activities were well coordinated and resulted in the prompt return to service of this safety-related component.

In accordance with procedure 1.5.16, the January 28 load-run failure resulted in the "B" EDG being classified as a "Problem EDG." This classification was the result of the "B" EDG experiencing a failure during 4 out of its last 25 demands. Categorization as a Problem EDG resulted in a detailed historical review of previous test failures and corrective maintenance. The root cause of several previous load test failures had been attributed to the EDG voltage regulator. Corrective action regarding previous EDG failures was determined to be appropriate.

Following completion of corrective actions, an accelerated test plan was established to demonstrate restored reliability of the "B" EDG. The acceptance criteria was the successful completion of procedure 8.9.1 at weekly intervals for seven consecutive weeks. Test results were monitored closely by system engineers during the seven week period of accelerated testing. On March 10, 1992, the "B" EDG successfully completed the accelerated test plan and routine monthly testing periodicity was resumed. The inspector considered the establishment of the EDG reliability program to be a positive step to assure optimized availability and reliability of this safety-related equipment.

5.0 SECURITY (71707)

5.1 Fitness For Duty

The inspector reviewed various aspects of the licensee Fitness for Duty (FFD) testing program including the random selection process, testing facilities and selected documentation of test results. Personnel subject to 10 CFR 26 FFD program requirements were separated into two discrete groups (licensee employees and contractors) for the random testing selection process. The selection criteria, frequency, and notification process were determined to be appropriate to ensure the intent of random unannounced personnel selection and testing was properly implemented. Testing facilities and equipment were well maintained and controlled to support the collection of accurate test results.

Selected documentation was reviewed including test results and program followup for several individuals who failed random FFD tests. Documentation of "random" and "for cause" test results were maintained in an auditable manner. Followup action in response to random test failures was performed in accordance with the licensee FFD program. Reporting of FFD test failures reviewed by the inspector was completed in accordance with 10 CFR 26.73 reporting criteria.

6.0 SAFETY ASSESSMENT AND QUALITY VERIFICATION (92701)

6.1 Followup of Previously Identified Items

6.1.1 (Closed) Notice of Violation (NOV) 91-17-01, Inadequate Drywell Head Installation Procedure

Inadequacy of procedure 3.M.4-48, "Opening and Closing of the Reactor Pressure Vessel" to specify proper orientation of drywell head washers during installation, and to proceduralize a final torque check following completion of the planned drywell head torque sequence resulted in issuance of a severity level IV violation. The resultant failure of drywell washers and a containment integrated leak rate test (ILRT) were previously documented in LER 91-23. By letter dated November 27, 1991 and LER 91-23, the licensee committed to specific corrective actions to be taken. The inspector determined these corrective actions to be thorough and to appropriately address the safety concern. This item is closed.

7.0 ENGINEERING AND TECHNICAL SUPPORT (71707)

7.1 Inadvertent Actuation of the Reactor Building Isolation System (RBIS) During Surveillance Testing

On February 27, 1992, an inadvertent engineered safety feature (ESF) actuation occurred during performance of surveillance test procedure 8.M.2-1.5.8.1, revision 17, "High Drywell Pressure, Low Water Level & High Radiation Logic System A - Inboard Functional Test." Instrument and Control technicians were utilizing a special jumper tool to jumper across two contacts in an area of limited physical access. While doing so, they unintentionally energized the RBIS channel "A" RPWA relay which resulted in the automatic closure of secondary containment system/reactor building train "A" supply and exhaust dampers and the automatic start of train "A" of the standby gas treatment (SBGT) system. The licensee promptly reset RBIS circuitry, reopened the affected reactor building ventilation dampers and returned SBGT to normal standby status. The NRC was properly notified of the event in accordance with 10 CFR 50.72 requirements.

A licensee critique of the event identified two similar ESF actuations experienced during previous performances of procedure 8.M.2-1.5.8.1. The difficult physical access to desired electrical contacts was a causal factor for each event. A modification (FRN 90-02-13) to relocate the RPWA relay contact terminals had been prepared prior to this event. However, implementation was postponed until the upcoming midcycle outage due to concern for potential impact on the plant during power operations.

System engineers performed a detailed review of this event, specifically addressing the component logic and functional verification accomplished by procedure 8.M.2-1.5.8.1. Review of related surveillances determined that the actuation of logic for the RPWA relay was also tested by overlap of procedures (8.M.2-1.5.8.3 and 8.M.2-1.5.9). The licensee determined logic testing accomplished in those procedures precluded the need to jumper the difficult to access relay contacts. As corrective action, the steps which initiated reactor building isolation and SGBT system relays (RPWA & RPWA1) and tested the seal-in function were deleted from procedures 8.M.2-1.5.8.1 and 8.M.2-1.5.8.2 (for Logic System B). In addition, a reassessment of FRN 90-02-13 was initiated to determine whether it may be canceled. System engineers demonstrated a thorough knowledge of associated logic circuitry. Corrective action initiated by system engineers was effective.

8.0 NRC MANAGEMENT MEETINGS AND OTHER ACTIVITIES (30702)

8.1 Routine Meetings

At periodic intervals during this inspection, meetings were held with senior plant management to discuss licensee activities and areas of concern to the inspectors. At the conclusion of the reporting period the resident inspector staff conducted an exit meeting with licensee management summarizing inspection activity and findings for this report period. No proprietary information was identified as being included in the report.

8.2 Management Meetings

On February 27, the Chief, Reactor Projects Branch 3, NRC: Region I toured PNPS and met with licensee management to discuss current licensee performance.

8.3 Other NRC Activities

On February 18-21, two Region I Radiation Specialists conducted an inspection of licensee occupational radiation exposure programs. Results of the inspection will be documented in Inspection Report 50-293/92-02.

On February 27, the Chief, Reactor Projects Branch 3, NRC: Region I presented NRC operator license certificates to nine licensee personnel in recognition of their recent accomplishment.

On March 9-13, a team of Region I specialists conducted a phase I review of the licensee Safety-Related Motor-Operated Valve Testing and Surveillance (GL 89-10) program. Results of the inspection will be documented in Inspection Report 50-293/92-80.

On March 13, the Chief, Reactor Projects Branch 3, NRC: Region I toured PNPS and attended the licensee exit meeting for the MOV Team inspection.