ENCLOSURE

INITIAL SALP REPORT

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

SALP BOARD REPORT 50-293/89-99

BOSTON EDISON COMPANY

PILGRIM NUCLEAR POWER STATION

ASSESSMENT PERIOD: JULY 1, 1989 - AUGUST 15, 1990

BOARD MEETING DATE: SEPTEMBER 13 AND SEPTEMBER 28, 1990

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I. INTRODUCTION

The Systematic Assessment of Licensee Performance (SALP) is an integrated NRC staff effort to periodically collect observations and data, and to evaluate licensee performance on the basis of this information. The SALP program supplements the normal regulatory processes used to ensure compliance with NRC rules and regulations. SALPs are intended to be sufficiently diagnostic to provide a rational basis for allocating NRC resources and to provide meaningful feedback to licensee management regarding the NRC's assessment of facility performance.

An NRC SALP Board met on September 13 and 28, 1990 to review performance observations and data and to assess licensee performance in accordance with NRC Manual Chapter 0516, "Systematic Assessment of Licensee Performance." The guidance and evaluation criteria are summarized in the Supporting Data and Summaries, Section A.

This report is the NRC assessment of the Boston Edison Company safety performance at the Pilgrim Nuclear Power Station from July 1, 1989 through August 15, 1990.

The SALP Board for Pilgrim Nuclear Power Station was composed of the following:

Board Chairman

R. Wessman, Director, Project Directorate I-3, Office of Nuclear Reactor Regulation (NRR)

Board Members

C. Hehl, Director, Division of Reactor Projects (DRP)
L. Bettenhausen, Acting Chief, Operations Branch, Division of Reactor Safety (DRS)
J. Joyner, Division Project Manager, Division of Radiation Safety and Safeguards (DRSS)
E. McCabe, Acting Chief, Projects Branch No. 3, DRP
J. Rogge, Chief, Reactor Projects Section 3A, DRP
R. Eaton, Project Manager, PD I-3, NRR
J. Macdonald, Senior Resident Inspector, DRP

Other Attendees

C. Carpenter, Resident Inspector
T. Dragoun, Senior Radiation Specialist, DRSS
G. Smith, Senior Physical Security Inspector, DRSS
J. Trapp, Senior Reactor Engineer, DRS
M. Case, Performance and Quality Evaluation Branch, NRR
J. Furia, Radiation Specialist, DRSS
C. Conklin, Senior Emergency Preparedness Specialist, DRSS
D. Kern, Reactor Engineer, DRP
M. Chiramal, Acting Chief, Special Test Programs Section, DRS

II. SUMMARY

II.A. Overall Facility Evaluation

The SALP Board assessment noted continued licensee improvement in the management and operation of the Pilgrim Nuclear Power Station. During the assessment period, the licensee reduced personnel errors and procedural noncompliances which had previously resulted in a high rate of plant transients and scrams as well as system unavailabilities. Overall performance was indicative of a management involvement in plant operations that was comprehensive and oriented toward nuclear safety. Technical competence and management strength were most notable in radiological controls, security, and engineering and technical support.

Several strengths were noted this SALP period. Improved plant operations (which included two successful maintenance and surveillance outages) were attributed to good overall plant management involvement as well as strong departmental management supervision, an excellent training program and generally greater attention to detail. These resulted in a low plant transient rate and a low incidence of personnel errors relative to the previous cycle. Additionally, station management was successful in integrating ALARA awareness and practices into all site activities. Significant reductions in annual site exposures, personnel contamination events, and radwaste generation have been realized as a result of comprehensive management of the radiological controls area.

Maintenance activities were appropriately prioritized, scheduled and performed in accordance with safety significance and Technical Specification requirements. Notwithstanding a generally effective maintenance program, root cause analyses of repetitive maintenance problems was not always adequate. Continued management attention to improve failure mechanism and causal analyses determinations is warranted.

Improvements in licensee performance during the two emergency preparedness exercises conducted during this assessment period demonstrated continued improvement and resulted in strong performance in this area. Improvements in onsite and offsite emergency planning were noted; however, some offsite planning issues remain outstanding.

Security and engineering and technical support, which were previous licensee strengths, continued to exhibit excellent performance. The licensee has begun an upgrade of the security computer system, which will allow the licensee to realize further enhancements in the security area.

The SALP Board noted that improved and continued strong performance in the functional areas above was largely attributable to improved licensee self-assessment. Performance-based quality audits and surveillances, as well as comprehensive departmental self-assessment initiatives have provided the licensee with improved critical assessments. A generally more questioning awareness was evident. Notwithstanding improved self-assessment capability, system engineering expertise was under-utilized in the causal analysis of apparent routine corrective maintenance activities. Additionally, although improved,

the multi-disciplinary review provided by the Operations Review Committee (ORC) was not fully utilized by licensee management in resolution of issues involving licensing bases.

II.B. Facility Performance

Functional Area	Category/Trend Last Period*	Category This Period**	Trend
1. Plant Operations	2	2	Improving
2. Radiological Controls	2	1	
3. Maintenance/Surveillance	2	2	
4. Emergency Preparedness	2/Improving	2	Improving
5. Security and Safeguards	1	1	
6. Engineering and Technical Support	1	1	
7. Safety Assessment/Quality Verification	2	2	

* May 16, 1988 to June 30, 1989
** July 1, 1989 to August 15, 1990

III. PERFORMANCE ANALYSIS

III.A. Plant Operations (2577 hours/38.4%)

III.A.1. Analysis

The previous SALP report rated plant operations as Category 2, with an overall conclusion that the operations staff exhibited professionalism and conservatism toward plant operations and testing. The assessment noted weaknesses in attention to detail and procedural compliance.

Plant activities during the PATP, routine power operations, and during scheduled and forced outages were reviewed during this assessment period. The licensee demonstrated continued improvement in control of plant operations by plant management and shift supervisors including communications, attention to detail, and adherence to license conditions and operating procedures and practices. Improvements in these areas were particularly evident during the latter portion of the assessment period and resulted in a substantial decrease in personnel error induced plant transients and challenges to safety systems. A total of three automatic reactor scrams and thirteen safety system actuations were experienced this period. Additionally, no reactor scrams which occurred during the assessment period were attributed to operator error. In contrast during the previous assessment period, there were eight reactor scrams, five of which were attributable to operator error, and twenty-two safety system actuations.

Operators demonstrated a sound overall understanding of plant systems and responded effectively to equipment issues that involved technical specification limiting conditions for operations. The Operations staff displayed professionalism and noteworthy expertise during both phases of the shutdown outside the control room (SDOCR) demonstration as well as during response to actual plant transients. Of particular recognition was immediate operator response to a turbine stop valve closure event which averted an automatic reactor scram. Additionally, the Operations section proposed the use of closed circuit television in selected high radiation plant areas to reduce operator exposure during routine plant rounds. This initiative has been implemented and the licensee estimated a potential projected dose saving of 39 rem per year.

Attention to operations and active involvement in the oversight of plant issues were evident in frequent Operations section and plant management tours of the control room and plant. Immediate management involvement in response to non-routine events was consistently noted. Executive management maintained an active site presence during non-routine operational and outage related evolutions, as evidenced by frequent plant tours and attendance at planning and status meetings.

Personnel changes enacted during the previous SALP period have provided improved operational expertise within Operations section management. Additionally, selected senior plant management personnel, including the deputy maintenance section

manager, the deputy plant manager, and the plant manager have successfully completed licensee-sponsored four-month senior reactor operator (SRO) certification training programs. Certification of these individuals and increased expertise in the Operations section have served to improve the quality of communications between Operations, upper management, and other plant disciplines.

Operator alertness was routinely observed by inspectors during day shift and backshifts. Control room distractions were neither allowed nor observed. Communications were clear, succinct, and professional. Observation area boundaries were properly respected. Shift turnovers were typically thorough and effective and were attended by all shift disciplines. Pre-evolution briefings were detailed and comprehensive and provided interaction among performing members. Control room access was well controlled during power operations. In contrast, control room foot traffic during outages, specifically during day shifts, presented a potential distraction to operations personnel. Several Nuclear Watch Engineers (NWE) were observed to have exhibited strong command and control authority by directing the control room to be cleared when it appeared peripheral activity presented distraction. Overall, the control room environment was conducive to safe operation of the facility. An ongoing modification to the control room annex to alleviate outage-related traffic is a positive initiative to further improve the control room environment.

Licensee efforts in recent years resulted in improved licensed and non-licensed operator staffing levels. At the conclusion of the SALP cycle, Operations staffed 24 SROs, 14 ROs, and 27 non-licensed operators. A fully staffed six shift rotation was maintained. Additionally, each shift was staffed with a third SRO during this assessment period. Overtime was controlled within administrative limits.

There was good morale among the operators, and an improved sense of cooperation and support from other plant disciplines was evident. Plant management continued to stress to all departments the need to provide full support to Operations. As a result, the respect and stature of the Nuclear Watch Engineer position has been improved. Ten newly licensed SROs were assigned to Nuclear Operating Supervisor (NOS) positions. The individuals have provided positive enhancements to shift performance.

The recently completed SRO class marked the third consecutive initial SRO license class to attain a 100% pass rate on the NRC administered license examination. The current requalification training program for licensed operators was determined to be satisfactory by application of an NRC administered examination to eleven SROs and nine ROs during this assessment period. Three individuals and one crew who failed portions of the requalification examination were reexamined later in the assessment period with satisfactory results. The most notable programmatic strength was the use of in-depth job performance measures. Notwithstanding acceptable requalification program performance, a weakness was noted in the lack of SRO participation in the requalification examination material preparation process. The licensee has since taken action to correct this weakness. The licensee is currently cross training the Shift Technical Advisor and Nuclear Operations Supervisor positions to provide greater on-shift expertise and flexibilty.

The outage organization performed well. Pre-outage planning meetings were attended by the appropriate levels of management and resulted in the generation of realistic critical path schedules. During outages the planning and outage department maintained around the clock coverage of the outage control center. Scheduling and status meetings were held, as a minimum, twice daily and were attended by all key management and personnel. Dialogue was clear and concise. Control room personnel remained cognizant of plant conditions and maintained appropriate communications throughout major evolutions. The licensee's ability to minimize activity conflicts was indicative of good organizational communications and proper management oversight. This trait was especially evident during the resolution of major emergent work issues during the spring 1990 outage. Outage planning and execution, specifically the spring outage, were effective as evidenced by the lack of unanticipated safety system actuations, off normal occurrences, and event notifications.

The fire protection program continued to receive good management support during this assessment period. System upgrades and generally improved maintenance practices reduced the use of compensatory measures. However, the NRC concluded that repetitive failures of the diesel fire pump starting system had not been effectively addressed. The licensee subsequently developed a conservative diesel fire pump operability criterion and enlisted vendor expertise to overhaul the diesel engine and control systems.

One Unusual Event was declared during this assessment period involving the July 3, 1990 Technical Specification required shutdown for recirculation loop inoperability. Plant staff, operators, and management performed appropriately during event identification, classification, emergency plan implementation, and shutdown activities.

The Operations section conducted two in-depth self assessment reviews during this SALP period and effectively applied lessons learned. Additionally, audits and surveillances performed by the quality assurance section provided performance based observations of operational activities. The Operations Review Committee (ORC) effectively discharged its responsibilities and typically provided recommendations to the Station Director that reflected a strong orientation toward nuclear safety.

Notwithstanding generally improving performance in the plant operations area, several instances of inadequate procedure implementation, personnel error and inattention to detail were experienced during the assessment period. For example, implementation of an inadequate steam jet air ejector procedure resulted in the initiation of a manual reactor scram due to degradation of main condenser vacuum. Also, personnel error and inattention to detail during a condensate pump fill and vent evolution resulted in overpressurization and physical damage to the pump strainer box and expansion joint. During the October 1989 outage, the NRC identified a greater than 50% information omission rate in the administration of the tagging and lifted lead programs. The omissions were typically line item entries which were reflective of a lack of attention to detail. In addition, a physically altered tagging boundary which was not documented in the feedwater system prior to startup from the October 1989 outage resulted in a Group 1 primary

containment isolation system actuation. Such events occurred at a much reduced frequency and were of less consequence than similar events during previous SALP periods.

The above events occurred early in this SALP period. Increased oversight throughout the management chain was assessed as the primary reason for the reduced incidence of inattention to detail events during the latter portion of the assessment period. Additionally, completion of the procedure upgrade program for the operating procedures which established standardized formatting, human factoring, and technical adequacy reviews also served to reduce events initiated by procedural deficiencies.

In summary, the licensee continued to demonstrate improvement in plant operations. This resulted from good management oversight and involvement, responsiveness to safety concerns, and an appropriate orientation toward reactor safety. Reactor scrams, safety system actuations and the incidence of personnel errors were substantially lower than the previous assessment period. Licensed operator staffing levels were improved and plans are in place to ensure acceptable staffing levels are maintained. The operator training program provided excellent support to operations. Proposed licensing of STAs is a positive initiative. Overall management of scheduled and forced outages was a licensee strength. However, notwithstanding generally improving performance, several instances of inadequate procedure implementation, personnel error and inattention to detail were experienced during the assessment period.

III.A.2 Performance Rating: Category 2, Improving.

III.B. Radiological Controls (552 hours/8.2%)

III.B.1 Analysis

The previous SALP report rated radiological controls as Category 2. Weaknesses identified during the last assessment period were lack of progress on the long term ALARA and radwaste improvement projects and failure to identify Iron-55 in radwaste shipments.

In the current period there were two radiation protection inspections in support of the Restart Inspection Team and one regional specialist inspection in each of the areas of radiation protection, environmental protection, laboratory confirmatory measurements and radwaste processing and shipping. One violation was cited for a repeat failure to control a locked high radiation area and a problem was observed regarding a routine liquid discharge.

Radiation Protection

The improvements noted during the previous assessment continued as a result of excellent management involvement in assuring quality at all levels. Excellent preplanning, assignment of priorities, and control of activities were demonstrated during the Spring 1990 mid-cycle outage. A management team used an outage control

center to effectively coordinate all outage work, and radiological work in particular, according to a detailed plan. A high level of interdepartmental cooperation contributed to the minimization of unnecessary worker radiation exposures.

Work on procedure upgrades continued through this period with completion scheduled for September 1990. This effort is to provide procedures which give step-by-step instructions requiring verbatim compliance as opposed to procedures, more general in nature, which allow the technician to have some flexibility in task performance. Draft procedures were significantly improved but progress was impacted by limited availability of personnel during the outages.

Management involvement and control in assuring quality were consistently excellent throughout this period. For example, early in the period a persistent weakness regarding control of locked high radiation areas continued from the last period. Management was able to effectively improve control by the end of the period using, among other techniques, a new type of warning sign. An unauthorized entry into a roped radiation area resulted in a site-wide questionnaire to all radiation workers. The questionnaire results identified areas of widespread misunderstanding regarding radiological controls. Training to correct identified areas of misunderstanding was provided by site Radiation Protection (RP) personnel with retesting that verified the knowledge of site personnel.

The licensee approach and timeliness in the resolution of technical issues significantly improved throughout the period. A good capability was also demonstrated in response to a radioactive spill in the radwaste building which occurred as a result of equipment malfunctions. Good radiological housekeeping and control of in-plant contamination resulted in an exceptionally low number of personnel contamination events. During the Spring 1990 outage, only five personnel contaminations were reported. All were less than 10K dpm and none resulted from drywell work activities.

The RP department remained fully staffed with permanent BECO employees during this period. This stability contributed to a maturing of the organization, which had experienced frequent personnel changes in the previous periods. Staffing was excellent this period as reflected by the need to hire only 9 contracted RP technicians to support the mid-cycle outage.

The continuing training of RP technicians had a positive effect on performance as well as on the morale of the group. A dedicated offsite training facility and comprehensive subject material reflect an excellent management commitment to and support of training.

ALARA performance was excellent and continued to improve through the power ascension period and the mid-cycle outage. The 1989 total exposure of 207 mrem ranked Pilgrim among the best domestic BWR plants as delineated in NUREG-0713. The projected year end 1990 exposure goal is 210 mrem. This achievement was attributed to the strong awareness and involvement by all departments and all levels of management. Contributions by the Planning Department were particularly noteworthy. Exposures associated with routine work continued to remain low while special work such as the Reactor Water Clean-Up (RWCU) heat exchanger

repairs were completed at 1/3 the previous exposures. Additional station initiatives which have contributed to improved radiological controls and ALARA performance include the implementation of a digital alarming dosimetry system and of the process building access control program. The digital dosimetry increased exposure savings by providing personnel instantaneous awareness of accumulated dose and presence in a high dose field. The process building access control program increased accountability of personnel and equipment entering and exiting by reducing the number of access points from fourteen to three.

Attention to long term projects, a weakness last period, also improved. Control rod blades, a major source of cobalt-60, have been scheduled to be replaced in phases with a cobalt-free design beginning during the 1991 refueling outage. The source term reduction program was formalized and initiated. Selected reactor building floor drain dose rates were reduced from 60-300 mrem/hour to 5-20 mrem/hour following high pressure hydrolazing. Portions of radwaste systems previously retired in place were dismantled and removed. A hot spot identification program with discrimination toward Co-60 sources was initiated. Additionally, a change in policy also was implemented to limit the maximum worker exposure to 750 mrem per quarter and 1500 mrem per year. This is well below both current NRC limits and reflects a conservative management philosophy.

Effluents, Radiological Environmental Monitoring, Transportation and Radwaste

During the previous assessment period, the need for attention to long-term projects in the radwaste area was noted. During the current assessment period, inspections of the effluents and Radiological Environmental Monitoring Program (REMP), and the radwaste and transportation programs were conducted.

The licensee program for Quality Assurance and Quality Control in these areas continued to be a strength. The scope and technical depth of in-plant audits continued to be excellent, especially in the radwaste, effluents, and REMP areas. However, the frequency of surveillances in the radwaste area needed to be increased as none were conducted during the first three months of 1990.

The licensee Radwaste and Chemistry section, which was created near the end of the previous assessment period, has been proactive. The section manager reports directly to the Plant Manager, providing high level visibility to this area. The program for upgrading the radwaste functional area was notable, with technically sound and thorough approaches applied to all areas. For example, the licensee successfully reduced the number of onsite storage containers containing contaminated tools and materials, decontaminated and removed the culvert storage area, and significantly reduced the areas of contamination within the radwaste truck lock. A task force was created to identify methods for waste reduction. Additionally, the licensee has undertaken a review of all procedures associated with radwaste processing and shipment, as well as a revision of the training program for radwaste workers.

During the assessment period, the licensee experienced few problems in the effluents, radwaste, and transportation of REMP areas. The notable exception was during one liquid radwaste discharge. The licensee incorrectly calculated

the amount of radioactive material being discharged. Subsequent investigation by both the licensee and the NRC clearly demonstrated that the release was in fact well below the regulatory limits. Corrective actions taken by the licensee to prevent recurrence were both prompt and thorough.

Staffing within the Radwaste and Chemistry section was assessed as very good, with all key positions filled by experienced, highly qualified personnel.

A confirmatory measurements inspection was conducted late in the period. Licensee results on split samples for radioactivity analysis were excellent, with all gamma analytical results in agreement with NRC measurements. Performance on NRC-supplied chemistry standards was good, with 39 of 45 results in agreement or qualified agreement. The licensee subsequently resolved the disagreements appropriately. Licensee QA audits of this area were thorough and of good technical depth, resulting in the licensee taking steps to strengthen the laboratory QA/QC program to address concerns identified in the audit.

Summary

Excellent performance was demonstrated in the radiological controls area. Station ALARA performance was outstanding. Long term management commitment to this area was evidenced by dosimetry upgrades, improved control of RCA accessibility, and initiation of the source term reduction program. Establishment of the Radwaste and Chemistry section provided effective visibility and discipline managment which resulted in notable program upgrades. Training was effectively implemented. Additionally, performance based quality audits and surveillances were technically sound and the licensee was responsive to identified concerns.

III.B.2. Performance Rating: Category 1.

III.C. Maintenance/Surveillance (1207 hours/18.0%)

III.C.1. Analysis

The previous SALP report rated performance in the Maintenance/Surveillance area as Category 2. Licensee management had given high priority in continuing to address the identified weaknesses in maintenance. This resulted in aggressive implementation of major program improvements, increased staffing levels and improved interdepartmental communications. However, continued close licensee oversight of the newly implemented programs was required until additional experience was gained. In the surveillance area, management attention was evident in improvements of the Master Surveillance Tracking Plan (MSTP), technical adequacy of procedures and Inservice Testing (IST) program improvements. However, weaknesses continued to exist in attention-to-detail and procedural compliance.

Maintenance activities during routine power operations, short notice and two planned maintenance and surveillances outages in the fall of 1989 and spring 1990 were reviewed during this assessment period. Maintenance activities were appropriately prioritized, scheduled and performed in accordance with safety significance and Technical Specification requirements. Throughout the assessment period, the licensee completed scheduled activities in a quality manner, and demonstrated the ability to effectively integrate several major emergent work activities into established schedules and to accomplish these activities with a high degree of quality. Following the failure of one safety-related 480V circuit breaker to properly open, the licensee appropriately revised critical path schedules and performed comprehensive engineering evaluations and troubleshooting to support inspection of all remaining 480V breakers. Similarly, extensive reactive repairs to the four valves which failed local leak rate testing during the Spring 1990 outage were smoothly integrated into outage schedules. Good external and interdepartmental communications were observed during complex activities as evidenced by the minimization of system unavailabilities, schedular conflicts, and activity induced safety system actuations.

Notwithstanding a generally effective maintenance program for pre-scheduled and short-notice outages, root cause analyses of repetitive maintenance problems were not always adequate. This was illustrated by the repair of repetitive leakage problems experienced with the Residual Heat Removal (RHR) "B" loop injection valves and the loop injection check valve, repetitive problems with the reactor feed pump auxiliary oil pumps, and repetitive problems with the RCIC vacuum pump discharge check valve which failed post work testing three times.

The quality of maintenance and surveillance procedures is improving. Ongoing review improved human factors and nomenclature considerations and the level of detail in many of the procedures. The licensee has committed to complete the procedure upgrade program for maintenance procedures by December 31, 1991. Maintenance program goals were established and generally understood. However, meeting the licensee goal of strict adherence to procedures continued to be a problem. This goal was not met in several instances, including maintenance on the "D" Salt Service Water pump and overtorquing of pump/motor holddown bolts.

There were two planned short duration outages during the period. During outages, frequent meetings were held with the various departments to ensure maintenance and surveillance activities were well coordinated. Outage activities were well coordinated and controlled from a special conference room which was staffed around-the-clock with knowledgeable and proficient personnel, including the outage management director or his designee. Activities were prioritized and scheduled consistent with safety significance and license requirements. Maintenance, operations, health physics, chemistry and services departments understood the function of the office and supported its activities with sound advice and work status feedback. The outages were conducted with a minimum of contractor support. First line mechanical, electrical and I&C supervisors were observed to be very knowledgeable about the work activities for which they were responsible. Preventive and corrective maintenance of safety-related components was generally well planned and organized. However, due to the number and diversity of equipment requiring corrective maintenance, the licensee was occasionally

delayed in performing elective maintenance. The backlog of outstanding maintenance items was appropriately managed. Due to an increasing instrumentation and controls (I&C) backlog of maintenance requests, the licensee initiated preemptive recruitment of additional technicians.

Overall, the maintenance organization was staffed with qualified personnel, and the level of staffing was adequate to support required maintenance, with the above noted intention to increase I&C staffing. A defined training program was effectively implemented for the maintenance staff. Two deputy section manager positions were established and filled with experienced personnel. A new senior supervisor position was filled for each division in the maintenance department producing an increased ratio of supervisor to craft personnel which has resulted in an increase in plant supervisory presence.

During power operation, plant housekeeping was generally good with the noted exception of the middle of the assessment period, which the licensee adequately addressed. During outages, however, housekeeping was less effective. Excessive amounts of tape, paper towels, buckets, tools and plastic bags were observed in radiologically controlled areas. Typically, plant areas were returned to the usually observed high standards of housekeeping prior to startup. One noted exception was the inadequate drywell housekeeping status prior to plant startup from the July 3, 1990 forced outage. Licensee management has initiated corrective actions which are intended to establish integrated housekeeping procedures into all outage activities.

The corrective action program in place for trending, evaluating and making repairs or replacing valves, as part of the Valve Betterment Program, was effective. In contrast to previous leakage tests, repairs made to improve leak tightness and integrity of main steam isolation valves (MSIVs) under this program resulted in all eight MSIVs successfully passing the as-found local leak rate testing during this assessment period.

Several initiatives were undertaken during this period to further strengthen the maintenance program. These included: use of a work control group to improve communications interface between Maintenance and Operations, development of a manual for the Control of Work and Testing, procurement of a new vibration analysis monitoring system and utilization of technology such as infrared thermography.

Surveillance activities inspected this assessment period included routine, power ascension and local leak rate testing.

Administrative control and implementation of the Master Surveillance Tracking Program (MSTP) was effective and well controlled, generally ensuring that surveillance tests were performed as scheduled. The personnel overseeing the MSTP were very knowledgeable and professional in the conduct of their work. Good communications were exhibited by both test personnel and control room personnel, especially during PATP surveillance testing. During several of these tests, performance demonstrated improved attention to detail. However, several technical specification required surveillances were identified as not having not been accomplished. The causes of these events were diverse in nature and

indicated a need to integrate these issues into the procedure upgrade program and the long-term Technical Specification improvement program. There were several challenges to safety systems caused by personnel errors during surveillance testing; all were actuations of engineered safety systems. Two of these were caused by jumpering incorrect relays. However, these were separate and isolated incidents not indicative of programmatic weaknesses in the surveillance area.

The local leak rate test (LLRT) program is a generally improving program. The use of a local leak rate test failure analysis team to investigate each LLRT failure and to provide root cause determinations and corrective action recommendations was noteworthy. The trending and evaluation of these valves for repair or replacement was generally effective. Root cause analysis of valve failures was previously inadequate, as illustrated by the repetitive LLRT failure of the two "B" loop RHR valves and failure of two instrument line excess flow check valves. Increased management attention to improve root cause analysis of LLRT valve failures was observed at the end of the assessment period.

Surveillance procedures were generally technically adequate and provided sufficient instruction to help assure proper performance. Quality records were properly maintained, accessible and complete. Personnel performing surveillances were knowledgeable. The licensee continued to improve the technical adequacy of surveillance test procedures by including human factors, nomenclature and technical validation. Procedures were validated prior to first use. Approximately 10% of procedures have been upgraded by the conclusion of the assessment period, with completion scheduled for December 1991. Procedures for special tests conducted during the power ascension test program were of good quality. Onshift test coordinators were in the field managing the tests.

In summary, the maintenance program continued to be properly implemented with satisfactory results achieved. The maintenance organization demonstrated the ability to effectively integrate several major emergent work activities and accomplish these activities in a quality manner. Root cause analysis of repetitive maintenance problems and failures was not always adequate in that corrective actions tended to address symptons rather than root causes. The backlog of maintenance requests, while generally well controlled was indicative of a need for increased staffing in the I&C area. Overall, the surveillance program was adequate to support plant operation. Although several technical specification required surveillance tests were identified as having been missed, these were diverse in nature and not indicative of a decline in programmatic performance. The local leak rate test program continued to improve. Although improving, root cause analysis of repetitive LLRT failures warrants continued management attention.

III.C.2. Performance Rating: Category 2.

III.C.3. Board Recommendation:

The licensee should evaluate effectiveness of failure mechanism and causal analysis determinations.

III.D. Emergency Preparedness (434 hours/6.5%)

III.D.1. Analysis

The previous SALP report rated the emergency preparedness area as Category 2, improving. This rating was based upon extensive resources committed to onsite and offsite emergency preparedness, strong management support of the emergency preparedness program and very good exercise performance. The only detraction was lack of demonstration of offsite response in a full-participation exercise.

During this assessment period, a full-participation exercise and a partial-participation exercise were observed, a routine inspection was conducted, and changes to the emergency plan and implementing procedures were reviewed.

During the October 12, 1989 full-participation exercise, the licensee demonstrated several strengths including: prompt and conservative classifications; excellent interface with Massachusetts representatives; and well-reasoned, conservative protective action recommendations. During the June 12, 1990 partial-participation exercise, the licensee demonstrated several strengths including: correct and timely classifications; timely staffing of the TSC; and accurate calculations of source term and release path. No NRC-identified licensee exercise weaknesses were observed during performance of the two exercises.

Management involvement and control in assuring emergency preparedness program quality was assessed effective and extensive. Managers maintained Emergency Response Organization (ERO) position qualification, reviewed and approved emergency plan and implementing procedure changes, participated in drills and exercises, and resolved audit issues. An extensive licensee audit was conducted to review the quality of the emergency preparedness program including the offsite interfaces. The results were widely distributed (including to senior management and offsite emergency preparedness officials) and indicated that the program was being effectively maintained.

Management support of offsite activities was also evident. Staff were permanently assigned to interact with offsite agencies and frequent meetings were held with these agencies to discuss and resolve issues. The licensee committed extensive resources in the form of materials, equipment, facilities, facility renovations, and the funding of emergency preparedness positions within the towns. The licensee also provided support for the training of offsite emergency workers and responders. The effectiveness of this training was demonstrated by successful Commonwealth and local official participation during the full-participation exercise conducted on October 12, 1989. Two exercise objective deficiencies involving command and control and emergency broadcast system messages were identified by FEMA at the Commonwealth Emergency Operations Center. The licensee fully supported the Commonwealth in correcting these deficiencies, and these activities were successfully demonstrated in a remedial exercise conducted on May 25, 1990. The licensee is continuing to meet with Commonwealth and local officials to address planning issues remaining for closure. Although the licensee has made a substantive effort in the area of offsite EP, it is not clear that sufficient action has been taken to resolve incomplete and longstanding offsite issues.

Equipment issues, procedural issues and concerns involving schools and special needs remain open. Differing views remain between BECo and local communities regarding resolution of issues. Local communities have not reached closure regarding portions of some planning/procedural documents such that they can be forwarded to FEMA in final form.

Subsequent to the SALP period, the final FEMA report, issued August 31, 1990, noted progress in offsite planning but stated that due to the incomplete status of some plans, certification to NUREG-0654/FEMA REP 1 criteria would not be issued.

Licensee resolution of technical issues and NRC concerns continued to be very good. In response to Information Notice 90-08, "Krypton-85 Hazards from Decayed Fuel," which involved emergency action level adequacy and protective action recommendations for onsite personnel, the licensee conducted a detailed review and determined that existing procedures adequately addressed this issue. The licensee developed a methodology to validate, verify and document emergency preparedness computer codes. This methodology is proceduralized, has been performed on all computer codes currently in use for emergency preparedness, and is to be used on any new programs or revisions to existing programs. Additionally, the licensee obtained four, four-wheel drive vehicles dedicated to field monitoring. These vehicles are assigned on a weekly, rotating basis to the duty Emergency Offsite Manager to help ensure vehicle operability.

The licensee responded to one operational event during the period which required implementation of the emergency plan. A Notification of Unusual Event was declared due to a technical specification required shutdown as a result of a recirculation loop being inoperable for greater than twenty-four hours. The classification was proper, received management support, and demonstrated the licensee's ability to recognize and respond to operational events. Associated notifications were correct and timely.

Staffing of the emergency preparedness program continued to be strong. The Emergency Preparedness Department is essentially fully staffed with 17 of 18 positions filled, and this staff has been stable. The licensee is actively striving to fill the remaining vacancy. The ERO is fully staffed with four individuals qualified at most positions. In response to a potential labor action, the licensee trained necessary management personnel to ensure the ERO had two individuals qualified for each position.

The licensee maintained an excellent training program. Licensee staff response was very good as evidenced by licensee performance in the both the partial-participation and full-participation exercises, in which there were no identified exercise weaknesses. The basis for training was clearly defined, and actual training consisted of a combination of classroom and hands-on training.

In summary, the licensee maintains a strong and effective emergency preparedness program. Management is involved with the program and committed to quality. The ERO is fully qualified and able to respond to emergencies. Training was excellent as demonstrated by the partial-participation and full-participation

exercise performances. The licensee committed extensive resources to support offsite emergency preparedness and actively strives to maintain the interface with the Commonwealth and local governments. However, FEMA has noted that an incomplete status remains for some plans.

III.D.2. Performance Rating: Category 2, Improving.

III.D.3 Board Recommendation:

The Board recognizes the improvements made in onsite and offsite emergency planning; however, outstanding offsite planning issues remain. The licensee should continue effort to work with the Commonwealth and local governments to resolve outstanding offsite emergency planning issues.

III.E. Security and Safeguards (321 hours/4.8%)

III.E.1. Analysis

The previous SALP report rated the security and safeguards area as Category 1, based on a significantly improved and effectively implemented performance-based security program.

During this period, there were two routine physical security inspections performed by region-based inspectors and continual program review by the resident inspectors. No violations were identified.

The licensee continued to implement a highly effective program during this assessment period. This sustained performance is attributed to strong management involvement and support, as evidenced by: (1) a well-planned and implemented security program with well-trained personnel; (2) an excellent security support staff; and (3) continued attention to the upgrades of security systems and equipment.

The licensee's plant and corporate staff were actively involved in all site security program activities and conducted program reviews and surveillances of the security force contractor and security force personnel. Security management personnel also remained active in the Region I Nuclear Security Association and other organizations engaged in nuclear plant matters. This demonstrated a high degree of program support from upper level licensee management.

The licensee's training program was administered by five full-time instructors, with full administrative support. In addition to NRC-required training, the program included technical courses in plant systems, first aid, and individual and team-tactical training. The training program was well-structured, maintained current and effective, as evidenced by minimal personnel errors and a good enforcement history. The facilities for training were also very good. The commitment of resources and support for the training program was further evidence of management's desire to implement an effective security program.

Audits of the security program conducted by the licensee's Quality Assurance Group were found to be comprehensive and thorough. Findings from audits and surveillances tended to be directed toward improving the program as opposed to being compliance oriented. Corrective actions were prompt and effective with aggressive follow-up to ensure implementation.

Maintenance support for security systems and equipment was generally prompt and effective, however, the time taken to repair assessment aids was excessive at times. Further, a need for additional maintenance support, particularly in the areas of preventive maintenance and surveillance testing, was identified toward the end of the period by the NRC. The licensee promptly responded to these observations by implementing effective short-term corrective actions where possible but, more importantly, by developing sound long-term solutions during which other potential problem areas were resolved. The licensee's actions, with specific attention directed at identifying root causes for security equipment problems, demonstrated a clear understanding of the security program performance objectives and the basic elements of an effective security program. The NRC observed weakness in maintenance support did not cause any excessive use of overtime.

During this assessment period, the licensee began a proactive upgrade of the security computer system. The new computer system will, among other things, provide faster access to equipment throughout the plant. A new security support facility is being constructed on site. NRC review of the facility plans indicated that it will provide a significantly improved environment for the system operators and supervisors.

Staffing of the security force was consistent with program needs as evidenced by the minimal use of overtime. Members of the security force exhibited a very professional demeanor and were very knowledgeable of their duties. The NRC also observed that the security force and other plant employees appeared to have a very good working relationship. The turnover rate for contract security force was less than 5 percent, indicating good stability.

During this assessment period, the licensee submitted three changes to the security program plans under 10 CFR 50.54(p). Additionally, one Security Event Report was issued this assessment period which documented the identification of a handgun at a security gate prior to entry into the protected area. The plan revisions and event report were technically sound and generally demonstrated a thorough knowledge and understanding of NRC requirements and objectives.

In summary, the licensee continued to maintain a very effective and performance-oriented security program. The licensee was very responsive to security concerns and the approach to resolution of technical security issues was excellent and very prompt. Management attention to and support for the program were clearly evident in all aspects of program implementation. The efforts that the licensee expended to maintain and upgrade the program demonstrated continued emphasis on a high quality, effective program.

III.E.2. Performance Rating: Category 1.

III.F. Engineering and Technical Support (697 hours/10.4%)

III.F.1. Analysis

In the prior SALP, Engineering and Technical Support was rated as Category 1. Positive factors were noted in the following areas: modification process, Safety Enhancement Program, safety evaluation quality, root cause analysis, System Engineering Division, and a motivated and highly qualified engineering staff. However, the board noted such weaknesses as inadequate support of maintenance activities, implementation of the Detailed Control Room Design Review (DCRDR) program, and lack of design basis information.

The following evaluation is based on assessments of engineering support activities from routine and special inspections performed during this assessment period. Several inspections emphasized the review and assessment of engineering performance, while others assessed engineering support effectiveness. Also assessed were the licensee's responses to prior SALP assessments.

Engineering and technical support of maintenance showed improvement. For example, good engineering and technical support of maintenance was evident during the investigation of the brittle fracture of the "A" Salt Service Water Pump column and the failure of 480 volt circuit breaker B-202 . In both cases engineering and onsite system engineers provided detailed root cause analysis and provided maintenance technical support during the implementation of corrective actions.

The development of the DCRDR program is on schedule and a final report is to be submitted to the NRC in November 1990. Initial implementation difficulties have been encountered in the areas of control panel color contrast, control room lighting, and station procedure revisions.

A major design basis reconstruction effort, described during the previous SALP and planned to begin in 1990, was proceeding slowly. Present effort in this area is focused on selection of information to be included in the design basis document. Some effort has been expended in the development of a computer based configuration control system, which will be used to store the design basis information. Storage of the design basis on a computer based system is intended to provide a readily accessible user-friendly design basis document. A pilot design basis reconstruction for one plant system is tentatively scheduled for next year. Overall, this design basis reconstruction was assessed as proceeding slowly.

The Nuclear Engineering Department (NED) has a highly qualified staff. The engineering staff consisted of 87 engineers with an average of 9 years BECO and 15 years industry experience. Approximately half the engineers hold technical Masters degrees. The engineering staff made significant progress in reducing the backlog of Engineering Service Requests (ESRs) and drawings needing revision. Open ESRs were reduced from 952 in September 1989 to 435 in June 1990. The engineering department has established a 1990 goal to further reduce the number of open ESRs to 300. Significant improvements were also made in reducing the

backlog of priority "B" drawings requiring revision. That backlog was reduced from approximately 6000 to 1200 drawings. Continued strong performance was noted in the maintenance and control of priority "A" drawings.

The design change process effectively produced high quality plant modifications. The technical basis for modifications was sound. Calculations used for design and safety evaluation bases were detailed and well documented. Preoperational testing of installed modifications was thorough and detailed. Procedures for closeout of modifications were well stated and explicit. All training, procedure updates, drawing revisions, and post-modification testing were completed and documented prior to declaring a modified system operable. In the NED, the Design Review Board (DRB) was an outstanding asset, which assured high quality design change packages. The DRB provided a strong inter-disciplinary review of design changes and was effectively used to identify underlying problems with design packages prior to release for site review.

The NED provided timely, detailed responses to ESRs generated by the station staff. Examples of this were evident in a NED response to an inoperable high pressure coolant injection (HPCI) system valve and an evaluation of the vibration characteristics of the HPCI pump which had high vibration during an Inservice Service Test. In both cases the engineering support given to the plant was thorough and of good quality. It was evident from these examples that cooperation and communication among Nuclear Engineering, Site Engineering and other Station Departments are good. However, in an isolated instance, the disposition of an ESR did not thoroughly address Technical Specification requirements pertaining to the operability of two instrument line excess flow check valves. The occurrence was properly corrected and not indicative of programmatic deficiencies.

The System Engineering Section consisted of 22 system engineers. Their primary function was root cause analysis and technical support of maintenance and operation. System engineers continued to respond to plant equipment failures with detailed and thorough root cause analysis. In addition to root cause analysis, system engineers also establish and assist in implementation of corrective action plans for equipment failures. Examples were seen in the detailed root cause analysis and corrective action plan implementation of the reactor building closed cooling water (RBCCW) heat exchanger divider plate cracking/corrosion and the HPCI steam inlet valve failure. Notwithstanding generally strong engineering performance, apparent routine corrective maintenance activities in which system engineering expertise was not enlisted tended to result in less comprehensive causal analysis and a higher incidence of rework.

The NED was frequently and effectively involved in site activities. The NED installed a communication and data link between the site and the Braintree office. This allowed engineering management to actively participate in the site Plan of the Day (POD) meetings. In addition to the data link, the Design Section Manager attended the POD meetings at the site. These enhanced communications between the site and engineering office allowed the Engineering Department to provide strong support to the station. The NED maintained an outage control center at

the Braintree office and provided around-the-clock site coverage during outages. These actions were recent initiatives which resulted in improved engineering input into the development of responses to emerging issues.

Each NED section manager performed a self assessment of their section's activities. These assessments were quite candid, and identified both perceived strengths and weaknesses to corporate management. In addition, Quality Assurance was requested by NED to perform an audit of the standing modification system, due to a perceived weakness in this area. The audit required significant dedication of resources and resulted in a number of significant findings, such as a snubber which had not met Technical Specification acceptance criteria.

Since October 1989, the licensee methodically managed the investigation, troubleshooting and corrective actions associated with five unanticipated recirculation pump MG set trips. The testing and repair efforts were carefully integrated with plant operation to allow for continued operation while benefitting progress in resolving the root cause effort and effecting repairs. The licensee utilized industry and vendor expertise in resolution of this issue. With the exception of incomplete evaluation of the impact of an aspect of an MG set design change which contributed to the inability to restart the "A" MG set July 2-3, 1990, engineering response to this issue has been analytical, well documented, and effective implemented.

The licensee fire protection staff are knowledgeable of fire protection requirements. Surveillance/test records of fire protection equipment were complete, well maintained and thorough. Decision making is consistently at a level that ensures adequate management attention as was evident in the management presence and participation in resolving NRC concerns as they occur.

Overall, the engineering and technical support organization continued to provide high quality engineering technical support to the station. Initiatives in the reduction of the backlog of open ESRs and drawing revisions indicated a commitment to improve performance. Engineering involvement in station activities and support of maintenance activities was an organizational strength. The design basis reconstruction effort appears to be proceeding slowly.

III.F.2. Peformance Rating: Category 1.

III.G. Safety Assessment/Quality Verification (919 hours/13.7%)

III.G.1. Analysis

The previous SALP rated this area as Category 2. It was noted that the licensee management was attentive and involved in licensing issues and NRC initiatives and that a heightened awareness and responsiveness to safety issues was evident. The Quality Assurance (QA) and Quality Control (QC) department audits and surveillance programs were active and sound. There was an enhanced focus on operations safety as a result of strengthening the offsite safety review committee

and the improved onsite safety committee. A significant improvement of the corrective action process and senior management's increased visibility and involvement in site activities were also noted. However, examples were cited where policies and performance standards were not satisfactorily implemented at the working level, resulting in personnel errors and procedure inadequacies.

Submittals of licensing actions and responses to bulletins and information notices and other regulatory concerns have been timely, of high quality and technically accurate. Some examples include the response to "Fastener Testing", IEB-87-02, "Channel Box Bowing", NRCB-90-02 and "Request for Information on the Status of Licensee Implementation of Generic Safety Issues (GSI) Resolved with Imposition of Requirements or Corrective Actions", GL 90-04. The relief and exemption requests submitted were timely and generally complete and technically accurate. Additional information was required in some instances and the licensee was very responsive to NRC requests. Two temporary waiver of compliance requests were submitted and were well supported by design basis criteria. There were several licensing amendments in various stages of processing to bring the facility more in line with the Standard Technical Specifications. These amendment requests required close coordination by engineering among almost all departments. Licensee response to requests for additional information was excellent. Overall, the licensing function was assessed as excellent.

Two TMI items outstanding during the last SALP period were the Safety Parameter Display System (SPDS) and Detailed Control Room Design Review (DCRDR). The SPDS has been completed and the Supplemental DCRDR Summary Report is to be forwarded to the NRC by November 30, 1990. It is apparent that facility licensee management has focused on resolving these two remaining TMI items, and overall progress on these items has been satisfactory.

Licensee performance on self improvement and independent reviews and audits continued to show strong management involvement. The licensee conducted two self-assessment reviews of each discipline this assessment period. An external management consultant firm was also contracted to assess management administration and organizational efficiency. At the conclusion of the assessment period, the licensee was evaluating the results of the assessments and was prioritizing ennancements for implementation. Additionally, selected station and NED management participated in a visit to a similar European facility to provide technological and managerial information exchange. Emergency preparedness drills and exercises exceeded the requirements of the Emergency Plan and were well planned, properly approved and documented. Licensee initiatives such as the Senior Management Surveillance Watch Program and the Peer Evaluator Program achieved intended results such as improved back shift operation. Inspection of the Quality Assurance Department (QAD) audits and surveillance indicated that the licensee exhibited a thoroughness and technical depth that were noteworthy and that the findings and recommendations were excellent. Overall, the self-assessment function was assessed as excellent.

Licensee Event Reports (LERs) continued to be clear and concise and provided a thorough analysis of the events, causes, corrective actions and safety implications of the described events. The licensee demonstrated a conservative approach toward reporting issues. The LERs issued during this assessment period were comprehensive stand alone documents that provided facilitation as formal training material. Licensee performance remained excellent in this aspect.

The onsite Operations Review Committee (ORC) continued to support plant operations. Several issues came before ORC involving plant operation and license requirements this SALP period. One was the leak rate failure of two excess flow check valves. The ORC review of this matter rejected a Technical Specification (TS) clarification and recommended plant management declare the affected check valves inoperable as they were not tested within the interval prescribed by TS. The licensee subsequently declared the valves inoperable, then requested and the NRC granted a temporary waiver of compliance relating to TS surveillance testing for instrument line excess flow check valves. Additionally, ORC effectively provided clarification of TS requirements for surveillance of passive motor operated valves and for inspection of safety relief valves. In another case, the licensee identified and resolved two TS requirements relating to the APRMs that were not consistent with plant design. An exigent change to the licensee's TS was issued to correct the problem. In this case licensee action was indicative of the proper questioning attitude. Overall, ORC functioned effectively, however, early in the assessment period, the licensee threshold for enlisting ORC expertise to plant issues was determined to be high. As the period progressed, ORC became involved more frequently and earlier in the oversight of issue resolutions.

As a result of an inspection of Procedures 1.4.5 "PNPS Tagging Procedure" and 1.5.9.1 "Lifted Leads and Jumpers", the adequacy and effectiveness of these licensee procedures were called into question. The error rate on tagouts and lifted leads and jumpers was unacceptably high and indicated failure to comply with existing procedures. The licensee confirmed the NRC findings in PNPS Operations Department memorandum on 11/13/89. Additionally, the memorandum identified possible causes and detailed a corrective action and prevention program. The program included a new procedure requiring periodic tag audits and a Quality Assurance tagging audit. Performance in equipment tagging was assessed as a weakness, but overall configuration control was satisfactory.

In summary, licensee performance in licensing and technical support of operation continued to be excellent. Submittals were timely, of high technical quality, and the licensee was responsive to NRC requests for additional information. Quality Assurance programs appear to be working well in all areas inspected. Strong management involvement continued throughout the organization. ORC involvement in compliance evaluations was improving. Additionally, some examples were cited of procedural inadequacies and personnel errors in tagging and in use of lifted leads and jumpers.

III.G.2. Performance Rating: Category 2.

SUPPORTING DATA AND SUMMARIES

A. SALP Evaluation Criteria

Licensee performance is assessed in selected functional areas which are significant to nuclear safety or the environment.

The following evaluation criteria were considered, as applicable, to assess each functional area:

1. Assurance of quality, including management involvement and control.

2. Approach to the resolution of technical issues from a safety standpoint.

3. Enforcement history.

4. Operational and construction events (including response to, analyses of, reporting of, and corrective actions for).

5. Staffing (including management).

6. Effectiveness of training and qualification programs.

On the basis of the NRC assessment, each functional area evaluated is rated according to three performance categories. These categories are:

Category 1. Licensee management attention and involvement in nuclear safety or safeguards activities resulted in superior performance. The NRC will consider reduced levels of discretionary inspection.

Category 2. Licensee management attention and involvement in nuclear safety or safeguards activities resulted in good performance. The NRC will consider maintaining normal levels of discretionary inspection.

Category 3. Licensee management attention or involvement in nuclear safety or safeguards activities resulted in acceptable performance. Performance at this level is of concern to the NRC because a decrease in performance will approach or reach an unacceptable level. The NRC will consider increased levels of discretionary inspection effort.

The SALP Board may assess a functional area and compare the licensee's performance during an entire period in order to determine a performance trend. The trend definitions used by the SALP Board are as follows:

Improving: Licensee performance was determined to be improving during the assessment period.

Declining: Licensee performance was determined to be declining during the assessment period and the licensee had not taken meaningful steps to address this pattern.

It should be noted that Category 3 performance, the lowest category, represents acceptable, although minimally adequate, safety performance. If at any time the NRC concluded that the licensee was not achieving an adequate level of safety performance, it would then be incumbent upon NRC to take prompt appropriate action in the interest of public health and safety. Such matters would be dealt with independently from, and on a more urgent schedule than, the SALP process.

B. BACKGROUND

Licensee Activities

At the conclusion of the previous SALP period, the licensee had been released from the 25% NRC approval point, allowing operation up to 50% power and had successfully completed the first phase (reactor scram to reactor coolant system hot standby condition) of the shutdown from outside the control room (SDOCR) test. The licensee was preparing to restart the reactor following the June 29, 1989 SDOCR test to continue with scheduled testing in accordance with the 25% - 50% phase of the Power Ascension Test Program (PATP). The PATP included NRC approval points prior to initial criticality and at 5%, 25%, 50% and 75% of full power and a licensee self assessment report of the PATP with NRC review after completion of testing at full power. The NRC assessed licensee performance at each plateau. Prior to continuation of the PATP at each plateau the licensee obtained NRC Region I Regional Administrator authorization.

The following is a summary of plant events associated with the PATP and routine operations during this SALP period. After achieving criticality on June 30, 1989, and synchronizing the turbine-generator to the grid on July 1, 1989, the plant operated at 50% power until July 18, 1989, when a manual reactor scram was inserted from 50% power due to rapidly decreasing main condenser vacuum. The degraded condenser vacuum was initiated by procedural error which resulted in having two sets of steam jet air ejectors (SJAEs) in service simultaneously during air ejector shifting, thereby exceeding the heat removal capacity of the air ejector condensers. The plant remained in cold shutdown until July 26 to facilitate removal of mussels from the main condenser water boxes, the reactor building and turbine building closed cooling water systems.

On July 19, 1989, the licensee requested NRC approval to proceed with power ascension from 50% to 75% power.

On August 2, 1989, during a filling and venting evolution on the isolated "C" condensate pump, the pump suction strainer box and expansion joint were damaged due to inadvertent overpressurization. The cause of the event was determined to be personnel error during backfilling of the "C" condensate pump suction piping without verification of a proper vent path. Repairs were completed on August 14, 1989.

On August 18, 1989, the Acting Region I Administrator approved the NRC Restart Assessment Panel recommendation to release the licensee from the fourth NRC approval point (50% of rated power) in the PATP. On August 24, 1989, the licensee completed the original testing scope of the PATP up to the 75% power plateau.

On August 30, 1989, an automatic reactor scram occurred from 75% power due to a failure of the main generator voltage regulation circuitry. Safety-related systems responded as designed. A failed potential transformer that feeds the main generator voltage regulator caused a turbine runback and the reactor scrammed on reactor vessel high pressure.

On September 5, 1989, with the reactor in cold shutdown, an inadvertent actuation of a portion of the Residual Heat Removal (RHR) System/Low Pressure Coolant Injection loop selection logic circuitry occurred. The actuation caused an automatic start of the "A" Emergency Diesel Generator and the repositioning of several RHR system valves.

On September 6, 1989, the reactor was made critical and the 75% power plateau was reached on September 8, 1989.

On October 6, 1989, the Region I Administrator approved the NRC Restart Assessment Panel recommendation to release the licensee from the fifth NRC approval point (75% of rated power) in the PATP. On October 10, 1989 the reactor achieved 100% power.

On October 7, 1989, with reactor power at about 89% and subsequently on October 12, 1989 with reactor power at 100%, the "A" Recirculation motor-generator (M-G) set tripped when both the motor drive breaker and the generator field breaker opened in response to voltage oscillations. In both instances, the reactor stabilized at 60% of rated power following the transient.

On October 12-13, 1989, the licensee conducted an annual full participation emergency preparedness exercise. On October 13, 1989, the licensee successfully completed the second phase (hot standby to cold shutdown) SDOCR test. At the conclusion of the SDOCR test, the plant was maintained in cold shutdown to conduct a scheduled maintenance and surveillance outage. On November 6, 1989, the outage was completed and the reactor was made critical.

On December 6, 1989, the "A" recirculation pump M-G set tripped with reactor power at 97% when the generator field breaker opened due to generator field undervoltage. The reactor stabilized at 55% power following the transient. Licensee troubleshooting identified two possible causes; a failed resistor in the M-G set voltage regulation circuitry and a degraded resistor in the M-G set speed control circuitry. After replacement of the resistors and testing of additional components, the "A" M-G set was returned to service.

On December 8, 1989, an automatic reactor scram occurred from 95% power as a result of a false low reactor water level signal received during calibration of a reactor vessel level instrument. On December 11, 1989, the reactor was made critical. The plant reached full power on January 2, 1990.

On December 14, 1989, the licensee completed the PATP and submitted the PATP Final Assessment Report to the NRC. The report concluded that NRC Confirmatory Action Letter (CAL) 86-10, dated April 12, 1986, and its supplements were satisfied and requested closure of the CAL.

On March 9, 1990, the licensee commenced a planned reactor shutdown for a surveillance outage. Following completion of the outage, the reactor was made critical on April 24, 1990. The plant reached full power on May 1, 1990.

On May 13, 1990, an automatic reactor scram occurred from 100% power due to a turbine trip/generator lockout resultant from a fault on one of the two 345 KV offsite electrical distribution lines. The reactor was made critical on May 15, 1990 and reached 100% power on May 27, 1990.

On May 25, 1990, a remedial offsite emergency preparedness exercise was conducted to demonstrate the Commonwealth of Massachusetts correction of two FEMA identified Exercise Ojective deficiencies during the October 12-13, 1989 exercise.

On June 21, 1990, the licensee conducted an annual partial participation emergency preparedness exercise.

On July 2, 1990, the "A" recirculation motor-generator (M-G) set tripped. The reactor stabilized at 65% of rated power. Following several unsuccessful attempts to restart the M-G set, the licensee determined it would be necessary to shutdown in order to facilitate appropriate corrective actions. On July 3, 1990, at 4:19 a.m., an Unusual Event was declared in accordance with station emergency action level procedures upon initiation of a technical specification (TS) required shutdown. Reactor power was reduced to 30% and a reactor scram was initiated by placing the reactor mode select switch (RMSS) in shutdown at 5:00 a.m. The Unusual Event was terminated at 5:03 a.m. Upon plant shutdown, the licensee commenced a seven day unscheduled maintenance outage. On July 10, 1990, the reactor was made critical following completion of repairs to the "A" recirculation M-G set and other maintenance activities. The turbine-generator was synchronized to the grid on July 11, 1990. During power ascension, the licensee tripped each M-G set individually and successfully performed hot starts.

At the conclusion of this SALP period, the plant was operating at full power.

NRC Review and Inspection Activities

NRC continued to devote above normal inspection resources at Pilgrim during this assessment period. The three inspector resident staff has been maintained and programmatic inspections have been conducted in all SALP functional areas.

During the thirteen and one-half month assessment period, 6707 hours of direct NRC inspection were performed. A breakdown of the total inspection hours into SALP functional areas is included in Table 2.

The Pilgrim Restart Assessment Panel, composed of senior management from the NRC Office of Nuclear Reactor Regulation (NRR) and Region I, coordinated the planning and execution of NRC activities during the PATP. The Panel also provided an independent assessment of licensee readiness for restart and subsequent release from PATP holdpoints. A series of management meetings to discuss licensee progress and self-assessment activities was held. Additionally, site tours by the Regional Administrator and other senior NRC officials were conducted. The process for release of the licensee from power ascension approval points at 5%, 25%, 50%, and 75% of full power included an information paper to the Commission following the development of the staff recommendation. The paper included a staff evaluation of licensee and plant performance and summarized the status of offsite emergency preparedness. Extensive review of licensee performance and self-assessment during the PATP was performed by the NRC Restart Staff and Pilgrim Restart Assessment Panel.

The NRC Restart Staff, composed of the resident inspectors, regional specialists, NRR personnel, and resident inspectors from other sites, was formed in December 1988 to provide in-depth inspection coverage during plant restart and the PATP. The Restart Staff was dissolved at the conclusion of the PATP and following release from the CAL. Throughout the PATP, the NRC Restart Staff monitored licensee management and personnel performance on an as-needed, around-the-clock basis.

On January 4, 1990, the NRC conducted a meeting open to the public at the licensee Chiltonville Training Center in Plymouth, Massachusetts. The NRC reviewed licensee performance during the last PATP plateau and received a licensee presentation of the PATP Final Assessment Report. On February 12, 1990, following several weeks of staff deliberations and confirmatory inspections, the NRC accepted BECo completion and self-assessment of the PATP and closed Confirmatory Action Letter 86-10 and its supplements. The NRC staff concluded that management performance, plant material condition, and operational performance supported proceeding with normal operation of the facility. On the evening of February 21, 1990, Region I Division of Reactor Projects management responsible for the inspection program at PNPS, attended a Town of Plymouth Selectmen meeting and presented town officials with a summary of NRC activities which led to the issuance of the February 12, 1990 letter.

C. Reactor Trips/Unplanned Shutdowns

	Date	Power Level	Root Cause	Functional Area
1.	7/18/89	50%	Inadequate Procedure	Operations

Description: Manual Reactor Scram in anticipation of an automatic reactor scram due to decreasing vacuum in the main condenser. The degrading condenser vacuum resulted from having two sets of steam jet air ejectors in service during air ejector shifting, exceeding the heat removal capacity of the air ejector condensers.

2.	8/30/89	75%	Component Failure	Not Assigned

Description: Automatic Reactor Scram due to a failure of the main generator voltage regulation circuitry. A failed potential transformer that feeds the main generator voltage regulator caused a turbine runback and the reactor scrammed on reactor vessel high pressure.

3.	12/8/89	95%	Design Sensitivity	Engineering/ Technical Support

Description: Automatic Reactor Scram on a false low reactor water level signal during calibration of a reactor vessel level instrument. When an isolation valve to the "A" and "B" reactor level and pressure transmitters instrument rack was opened, a pressure spike in the common variable leg caused the low reactor water level scram signal.

4.	5/13/90	100%	Random Component Failure	Not Assigned

Description: Automatic Reactor Scram due to a turbine trip/generator lock-out as a result of an offsite fault on a 345 KV electrical distribution line. The offsite fault caused an instantaneous actuation of the main generator loss of field relay which resulted in the turbine trip. The loss of field relay is designed with a 15 cycle time delay. However, due to failed contact in the relay the time delay was defeated.

5.	7/3/90	30%	Deficient Design Change Review	Engineering/ Technical Support

Description: Manual Reactor Scram to complete a Technical Specification required shutdown due to one recirculation loop being inoperable for 24 hours. The "A" M-G set had tripped the previous day and was unable to be restarted. An unusual event was declared.

Note: Not Assigned indicates root causes which could not be attributed to a functional area.

D. Management Conferences

Several management conferences were held with the Pilgrim Restart Assessment Panel (PRAP). This panel was established to coordinate the planning and execution of NRC activities and to assess the results of licensee activities during the extended Pilgrim shutdown and the PATP. The panel was in place during this and the two previous SALP periods. The Panel was composed of senior members of the Region I and Headquarters staffs. This panel generally met bi-monthly, with alternate meetings on site. The Pilgrim Restart Assessment Panel was disbanded on February 12, 1990 following closure of CAL 86-10.

E. Enforcement Action

On August 23, 1989 the NRC issued a Notice of Violation and proposed imposition of a civil penalty in the amount of $25,000 for violations of NRC requirements identified during the NRC Augmented Inspection Team (AIT) conducted on April 13-19, 1989 involving the overpressurization of the Reactor Core Isolation Cooling (RCIC) system. The licensee accepted the Notice of Violation and civil penalty, and corrective actions were implemented.

F. Confirmatory Action Letter

On April 26, 1986, the NRC issued Confirmatory Action Letter (CAL) 86-10 to BECo. This CAL identified specific technical issues to be resolved prior to the return of PNPS to power operations. CAL 86-10 was later amended by supplemental letters dated August 27, 1986 and December 30, 1988 which identified additional technical issues and confirmed the licensee commitment to perform a comprehensive assessment of the PATP and to submit the assessment in report form to the NRC. On December 14, 1989, BECo declared the completion of the PATP and formally submitted the PATP Final Assessment Report to the NRC. On January 4, 1990, a meeting open to the public was conducted at the Chiltonville Training Center to discuss the PATP and the Final Assessment Report. On February 12, 1990, the NRC accepted BECo completion and self-assessment of the PATP and closed out NRC CAL 86-10 and its supplements.

G. Allegation Review

Five allegations were received by the NRC during this SALP period. These were reviewed and found to be unsubstantiated or to be substantiated but of no safety significance. Appropriate inspection activities were conducted on the allegations which warranted followup and NRC findings were documented in inspection reports. One allegation open at the conclusion of the previous SALP period and four allegations received this SALP period were investigated and closed prior to August 15, 1990.

H. Licensee Event Reports

H.1. Quality

Table 1 reflects a summary of Licensee Event Reports (LERs) submitted during the SALP period. The LERs adequately described the major aspects of each event, including component or system failures that contributed to the event and the significant corrective actions taken or planned to prevent recurrence. The reports were thorough, detailed, well written and easy to understand. The narrative sections typically included specific details of the event such as valve identification numbers, number of operable redundant systems, the date of completion of repairs, etc., to provide a good understanding of the events. The root causes of the events were generally identified. If root cause determinations were not available the licensee typically committed to provide a supplemental report, as appropriate. Additionally, similar occurrences were properly referenced as applicable.

H.2. Causal Analysis

Thirty-three LERs (excluding supplements) spanning the range of causal factors were submitted during the SALP period. NRC review and evaluation identified some recurring problems. The majority of these issues were effectively dispositioned by the licensee.

Twelve LERs were classified as caused by personnel error. One event resulted in a reactor scram and another in the inadvertent actuation of an emergency diesel generator. The errors were mostly singular in nature and not indicative of programmatic deficiencies. However, several personnel error and defective procedure LERs resulted from Technical Specification required surveillances not being properly accomplished.

Several LERs were submitted due to reactor water cleanup system isolations and two LERs were submitted due to immediate isolations of the shutdown cooling system upon initiation. Shutdown cooling system automatic isolations continue to occur.

Ten LERs were generated due to component failures. With the exception of two HPCI gland seal condenser blower motor failures, the events were singular and unrelated.

One security LER was issued due to the identification of a handgun prior to entry beyond a protected area entry control point.

No events reported by the licensee during the SALP period were categorized by the NRC as Abnormal Occurrences or as important events.

TABLE 1

TABULAR LISTING OF LERs BY FUNCTIONAL AREAS

PILGRIM NUCLEAR POWER STATION

AREA	CAUSE CODE* A	B	C	D	E	X	TOTAL
1. Plant Operations	2	4	-	1	6	2	15
2. Radiological Controls	1	-	-	-	-	-	1
3. Maintenance/Surveillance	6	2	-	2	4	-	14
4. Emergency Preparedness	-	-	-	-	-	-	0
5. Security and Safeguards	1	-	-	-	-	-	1
6. Engineering and Technical Support	-	-	-	-	-	-	0
7. Safety Assessment/Quality Verification	2	-	-	-	-	-	2
TOTALS:	12	6	-	3	10	2	33

Cause Codes:
A - Personnel Error
B - Design, Manufacturing, Construction, or Installation Error
C - External Cause
D - Defective Procedure
E - Component Failure
X - Other

LERs Reviewed: 89-019-00 to 89-039 and 90-001 to 90-012

TABLE 2

INSPECTION HOURS SUMMARY (7/1/89 - 8/15/90)

PILGRIM NUCLEAR POWER STATION

		HOURS	% OF TIME
1.	Plant Operations	2577	38.4
2.	Radiological Controls	552	8.2
3.	Maintenance/Surveillance	1207	18.0
4.	Emergency Preparedness	434	6.5
5.	Security and Safeguards	321	4.8
6.	Engineering and Technical Support	697	10.4
7.	Safety Assessment/Quality Verification	919	13.7
	Totals	6707	100.0%

Inspection Reports included: 50-293/89-07 to 50-293/90-19

TABLE 3

ENFORCEMENT SUMMARY

FUNCTIONAL AREA	NUMBER OF VIOLATIONS BY SEVERITY LEVEL					
	V	IV	III	II	I	TOTAL
Plant Operations		1	(1)*			1
Radiological Controls		1				1
Maintenance/Surveillance		2				2
Emergency Preparedness						
Security						
Engineering/Technical Support						
Safety Assessment/Quality Verification		2				2
Totals	-	6	---	---	-	6

*A Severity Level III violation was issued during this assessment period, as a result of an event that occurred during the previous assessment period. This violation is noted only and not included in the total of violations for events which occurred or were initially identified and reported during this assessment period.