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Licensee: Boston Edison Company
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Facility Name: Pilgrim Nuclear Power Station

Inspection At: Plymouth, Massachusetts

Inspection Conducted: November 5 - 16, 1990, and December 10 - 20, 1990

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Inspection Summary: A special announced maintenance team inspection of the Pilgrim Nuclear Power Station maintenance program and its implementation was performed. The inspectors used the NRC maintenance guidance in Temporary Instruction 2515/97 Maintenance Inspection. Major findings associated with maintenance resulting from Special Inspection 50-293/90-21, conducted September 5 - 7, 1990, were also followed up during this inspection.

Results: Overall, the maintenance program and its implementation were determined to be adequate. Areas of strengths and weaknesses are identified in the Executive Summary and discussed in the report. Findings from the follow-up to Special Inspection 50-293/90-21 are presented in Attachment 4 to this report.

No violations or unresolved items were identified.

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EXECUTIVE SUMMARY

An in-depth team inspection of the Pilgrim Nuclear Power Station Maintenance Program and its implementation was performed November 5 - 16, 1990. A follow-up inspection was conducted by two team members during December 10 - 20, 1990. The inspection included a review of maintenance documentation, observations of maintenance work in progress, and discussions with personnel.

The inspection team evaluated three major areas: (1) overall plant performance related to maintenance; (2) management support of maintenance; and (3) maintenance implementation. Under each of these areas, elements considered important for proper function of the area were inspected. For each element, the inspectors evaluated both the program and how effectively the program is implemented. The inspection results are summarized in the following paragraphs, and are discussed in detail in the body of the report. Two weaknesses were identified. These weaknesses are listed in Attachment 3. No violations were identified during the inspection. Maintenance Team Inspections are generally performed during plant refueling outages when maintenance activities are more intense. This inspection was conducted with the plant operating; consequently, the number of maintenance activities in progress for the team to observe were limited in both number and complexity, and several elements on the maintenance inspection tree (those colored blue on the maintenance inspection tree) were not evaluated due to insufficient opportunity for evaluation. Also, during the follow-up portion of this inspection conducted December 10 - 20, 1990, by two team members, the licensee's actions relating to major findings identified in NRC Special Inspection 50-293/90-21 were reviewed. Special Inspection 90-21 was performed to review the circumstances associated with a forced shutdown which occurred on September 2, 1990. Since many of the issues identified in this Special Inspection related to maintenance, they were followed up as part of the Maintenance Team Inspection. Findings associated with this portion of the inspection are presented in Attachment 4.

I. Overall Plant Performance Related to Maintenance

The Pilgrim Nuclear Power Station (PNPS) returned to operation in early 1989 following an extended shutdown period. This inspection focused on plant performance since the extended shutdown. Plant availability in 1990 has shown an improvement over that achieved in 1989. Some deficiencies in the control and conduct of maintenance have contributed to a number of plant trips, ESF actuations and unplanned shutdowns. Management has initiated steps intended to improve plant performance. However, the overall goals, especially for ESF actuations for 1990 have not been met and continued management commitment is needed to improve this area. The overall condition of the plant was found to be good, with the exception of the screenhouse. The licensees plant tour programs appear to be fragmented and an overall program coordinating walkdown inspections has not been developed.

II. Management Support of Maintenance

Licensee management has actively supported self-evaluations and programmatic changes to improve the overall maintenance program. Management has extensive and meaningful involvement in the maintenance process and encourages implementation of industry initiatives. Comprehensive and clear maintenance policy and goals have been established and documented in plant and department procedures. The maintenance program is periodically reviewed, and improvements are made as needed. Sufficient resources and management attention have been committed to the maintenance organization. An effective program for addressing maintenance-related regulatory and industry-wide issues has been developed. A generally adequate root cause analysis program has been established. However, additional training in this area is being considered by the licensee. An effective maintenance document control system has been established. Both the corporate and site management are deeply involved in decisions regarding the improvement of the overall maintenance process.

The establishment of effective communications among the various plant and corporate groups which support maintenance is considered to be a strength. Likewise, the engineering support provided to the maintenance section is also considered to be a strength. Risk factors resulting from an individual plant evaluation have, as yet, not been factored into the maintenance program. Quality assurance programs and procedures are in place and are being implemented to provide audits and surveillances of maintenance activities. Radiological controls have been effectively incorporated into the maintenance process and a well defined ALARA program has been established and implemented. The level of personal safety maintained at the site is good. An effective program has been established and implemented to ensure that regulatory and industry documents are integrated into the maintenance program.

III. Maintenance Implementation

The team concluded that maintenance job packages which are provided to craftsman are complete and prepared in accordance with procedural requirements. The overall implementation of maintenance packages was not evaluated due to the lack of significant work in progress during the inspection. Procedures have been provided to adequately control maintenance activities and these procedures are being adhered to. Equipment records are being maintained and are readily retrievable. Although complete work packages are being provided, the lack of verification by craft supervisors of parts, material, and tools being available was found to delay the performance of scheduled work. This inadequate preparation is considered to be a weakness. Both safety related and balance of plant work is promptly prioritized by knowledgeable personnel in accordance with procedural guidance. The scheduling of maintenance work needs to be improved to assure that jobs identified as "task ready" have all materials available so that the work can be performed expeditiously. Maintenance backlog

is being monitored and controlled. The development and control of maintenance procedures as well as post-maintenance testing is adequate. However, implementation could not be verified. The licensee has developed a good system for assuring closeout of completed work control packages.

Adequate measures have been established to control maintenance activities. Mechanical maintenance first line supervision is an area which appears to require management attention to ensure that tasks are adequately planned and controlled. The program for control of contractors is well documented in both procedures and records of work performed during past outages. Program implementation could not be verified due to a lack of work being performed by contractors during the inspection. The licensee has provided a program for the identification of deficiencies. This program worked well throughout the plant with the exception of the screenhouse, where significant deficiencies were identified by the team. A maintenance trending program has been established with certain improvements to the program currently being implemented. Good interfaces between maintenance and the various support groups have been established.

Excellent physical facilities have been provided with spacious and well maintained shops in close proximity to the supervisor's offices. Measures and facilities have been established for the control and storage of materials and spare parts. The control of tools, equipment, and measuring and test equipment is adequate.

The team concluded the facility has a stable and experienced craft work force. However, a high turnover rate in first line supervisory positions was noted. Up-to-date organization charts and job descriptions are available. A supervisor-to-worker ratio of approximately one to six has been established. Provisions for the performance of emergency maintenance have been provided. The training program is adequate for craft and management personnel. However, first line maintenance supervisory personnel and planners' training is not included in the program. The training, test, and qualification program is well documented and implemented.

During the follow-up to Special Inspection 50-293/90-21, it was determined that many programmatic improvements to the maintenance program have been made as a result of a detailed licensee review of a September 2, 1990 event. Also, self-assessments are being performed: In one instance, the completion of an assessment could have been more timely. A weakness was noted in the lubricating oil procedure review process.

Introduction

Background

The Nuclear Regulatory Commission considers the effective maintenance of equipment and components a major aspect of ensuring safe nuclear plant operations and has made this objective one of the NRC's highest priorities. To this

end, the Commission issued a revised Policy Statement dated December 8, 1989, which states that the Commission desires to have in place an industry-wide program that will ensure effective maintenance is achieved and maintained over the life of each plant.

To ensure effective implementation of the Commission's maintenance policy, the NRC staff will continue to inspect and evaluate the effectiveness of licensee maintenance activities. This inspection was one of a series being performed for power reactors. The inspection was conducted in accordance with the guidance provided in NRC Temporary Instruction 2515/97. The temporary instruction includes a "Maintenance Inspection Tree" that identifies for inspection the major elements associated with effective plant maintenance.

Scope of Inspection

The inspection team evaluated three major areas: (1) overall plant performance related to maintenance; (2) management support of maintenance; and (3) maintenance implementation. Under each of these major areas, elements considered important for proper functioning of the area were inspected For each element, the inspectors evaluated both the program and the effectiveness of program implementation.

The inspection at the Pilgrim Nuclear Power Station (PNPS) was initiated with a site meeting on October 17, 1990, where the scope of the inspection, including the maintenance inspection tree, was discussed with licensee management. A list of requested site specific information was provided previously to the licensee by letter dated October 1, 1990. A comprehensive pre-inspection submittal of information based on this request was provided to the team leader by the PNPS management following the October 17, 1990 meeting.

The NRC inspection team spent October 22, 1990 to November 2, 1990, at the NRC office preparing for the inspection and examining the information submitted by the licensee. The team conducted an onsite inspection at the PNPS from November 5 - 16, 1990. The team leader, plus one team member, conducted an onsite follow-up inspection from December 10 - 20, 1990.

The Maintenance Inspection Tree

The inspection team's conclusions about the status of the plant's maintenance program are indicated by colors (green, yellow, red or blue) on the Maintenance Inspection Tree (Figure 1). For parts II and III of the tree, the upper left portion of each block indicates how well the team judged the topic of the block to be described and documented in the plant maintenance program, including adequacy of procedures. The lower right portion of each block indicates the team's conclusion as to the effectiveness of implementation of the topic covered by that block. Green indicates that the program is well documented or that the program implementation is effective. However, even for blocks shaded green, some areas for improvement may be indicated in the report. Yellow indicates an acceptable condition which could be strengthened and red indicates the topic is

missing or the intent of that portion of the tree is not being met by maintenance activities. Blue indicates the item was not evaluated or could not be properly evaluated.

Inspection Findings

The inspection team's findings and conclusions regarding Pilgrim's site maintenance program and its implementation are documented in the Details portion of this report. The weaknesses, which were identified, are listed in Attachment 3.

DETAILS

I. Overall Plant Performance Related to Maintenance

1.0 Direct Measure

The objective of the inspection in this area was to assess overall plant performance, material condition and upkeep, and management involvement in maintenance and plant performance activities. The plant operating history was reviewed, plant system walkdowns were conducted and mechanisms for housekeeping and material deficiency control were inspected.

1.1 Historic Data

Scope

The purpose of this element was to assess overall plant performance with respect to plant, system and equipment availability, operability and general reliability related to plant maintenance programs. The inspection team reviewed various sources of historical information, including monthly operating report data, plant performance indicators, licensee event reports, systematic assessment of licensee performance reports and Plant Failure and Malfunction Reports.

Findings

The Pilgrim Nuclear Power Station returned to operation in 1989 following an extended shutdown period. During the recent operating cycle, plant availability has shown a steady increase, and to date, the 1990 cumulative availability represents an overall increase from 1989. Events which occurred during this operating cycle indicate that some deficiencies in the control and conduct of maintenance have contributed to a number of reactor trips, ESF actuations and unplanned shutdowns. Plant management recognized these shortcomings, and 1990 plant department goals stressed a maintenance self-assessment, an enhancement of preventive and predictive maintenance programs and improved maintenance management awareness of programmatic deficiencies. Though some reduction in the number of plant events attributed to maintenance is evident, the overall goals for 1990 have not been met, especially for ESF actuations related to maintenance.

Conclusions

Maintenance program improvements have resulted in increased plant availability since 1989. Management has taken steps toward minimizing program deficiencies and eliminating plant events attributed to maintenance. These steps have not been fully effective to date.

1.2 Plant Walkdown Inspection

Scope

This inspection element focused on licensee integration of facilities, material control and plant condition into the plant maintenance process. The inspection team performed a plant walkdown inspection to assess general plant housekeeping, equipment condition, extent and effectiveness of the licensee walkdown inspections, tagout control and the plant deficiency identification and resolution mechanism.

Findings

Throughout the course of the inspection, walkdown tours of the plant were conducted to assess housekeeping practices, system and equipment tagging, deficiency identification and the extent to which safe, effective work practices were employed by station maintenance personnel. Due to the operating status of the plant, walkdown tours were of limited scope in the turbine building, but thorough tours were conducted in the reactor building, screenhouse, maintenance shops, warehouse, switchgear and battery rooms, and the emergency diesel generator rooms, and accessible portions of auxiliary buildings.

The team found that most plant spaces exhibited an adequate degree of cleanliness. Equipment labelling was good. Many of the areas toured in the reactor building were accessible without protective clothing. Throughout most of the plant, deficiency tags for out-of-service equipment were evident. However, the team found that the screenhouse and, to a lesser degree the auxiliary bay area, in contrast to the rest of the plant, appeared deteriorated, and some equipment was determined to be deteriorated. This had not been identified as such by the licensee. These items are detailed in section 6.3 of this report.

The plant control room tagout log was reviewed and found to be up to date. A spot check of the tagout log verified that information contained in the log was consistent with information gathered from various deficiency tags throughout the plant. The team noted that there was considerable equipment located throughout the plant that was no longer in use. The licensee had also identified these items, and an inventory list was maintained, along with plans for eventually removing this equipment.

The licensee's walkdown program was evaluated. Currently, plant walkdowns consist of informal tours by various groups, including senior plant management, maintenance supervisors and managers, along with management backshift surveillances. Additionally, system engineers are required to conduct system walkdown inspections under SI-SG.1010 "Systems Group Systems Walkdown and Area Inspection

Guidelines." This procedure was the only formal document governing plant tours, documentation and reporting of inspection findings. The procedure itself was found to be deficient in that there are no guidelines for inspection of structural aspects of systems and equipment. The licensee, during the inspection, submitted a revision to this procedure to add structural inspection guidelines.

The team determined that the plant walkdown efforts appeared fragmented, and that a high level governing program and formal procedures had not been developed to integrate the various plant groups currently engaged in plant inspection tours, and to provide a mechanism for consistent documentation of findings, followup action, resolutions and feedback related to plant material condition.

Conclusion

Control of maintenance related to plant condition and upkeep were considered adequate. The material condition of the majority of the plant was very good except for the screenhouse. The management initiatives in the plant tour program appear fragmented and inconsistent. An overall program which coordinates walkdown inspections has not been developed.

II. Management Support of Maintenance

This part of inspection determined the degree of management support of the maintenance process, including application of industry standards, initiatives, and participation of management.

2.0 Management Commitment and Involvement

Scope

The purpose of this element was to evaluate the degree to which licensee management is involved in industrial, professional, and technical organizations; and the extent to which initiatives have been developed and incorporated into the maintenance process. The team evaluated these elements through formal and informal interviews with corporate and plant management and staff, and reviewed the licensee's planned, in-progress, and/or completed activities with respect to industry initiatives, industry events and experiences, and self-analysis of plant performance.

2.1 Findings

The licensee's corporate and plant management showed strong support to, and interest in achieving an optimum maintenance program to improve plant performance and assure safety. This strong commitment is evident by the allocation of resources and the increase in staffing needed to increase effectiveness of the maintenance organization and recent initiatives for better planning, scheduling, and execution of work. These initiatives are intended to enhance the maintenance

program to assure a more balanced approach to prioritization and implementation of predictive, preventive, and corrective maintenance. Major initiatives include a broad-based upgrade of administrative and maintenance procedures, establishment of reliability centered maintenance program, and enhancment of the review and planning of maintenance activities.

A comprehensive self-assessment of the maintenance program has been completed. Corrective actions to resolve programmatic concerns are continuing to be incorporated into the licensee's long-term enhancement plan. These actions are designed to increase management oversight and involvement in the maintenance process, formalize maintenance planning on a twelve-week rolling schedule, and change from a reactive to a pro-active management involvement. As a result of the self-assessment and continual review of the effectiveness of the maintenance program (monthly self-assessment review), additional supervisory and support staff dedicated primarily to planning, scheduling, and specifically to radiation dose control and coordination of maintenance activities has been emphasized in the program. Recently, the licensee has implemented a program to review all maintenance work requests and prioritize the work on the basis of safety and reliability importance. The target of this system is to schedule emergency (E) and priority one (1) maintenance immediately, and generally schedule and complete all work in a twelve-week schedule. The system is intended to reduce the maintenance backlog.

The licensee is an active participant in many industry and technical organizations and is responsive to industry initiatives. The licensee is a member of the BWR Owners Group, funds research at EPRI, and actively supports and participates in INPO programs. Currently, the licensee is planning to implement a reliability centered maintenance program developed by EPRI. Although, the program is still developmental, the licensee has made plans to incorporate it in the maintenance program. The maintenance and engineering procedures have provided guidance for improving feedback information, and training has been provided to system engineering personnel in root cause analysis.

The licensee has an INPO accredited training program, and participates in the Nuclear Plant Reliability Data System (NPRDS).

Conclusions

Licensee management has actively supported self-evaluations and programmatic changes to improve the overall maintenance program. The team concluded that management has extensive and meaningful involvement in the maintenance process and encourages implementation of industry initiatives to improve quality and effectiveness of the facility maintenance program.

3.0 Maintenance Organization and Administration

The objective of this element was to determine how management supported maintenance activities; what long-range plans had been established; and how effectively the program had been implemented, controlled, and evaluated for adequacy and effectiveness. The inspection included the existence, availability, and scope of formal programs; allocation of resources; identification and definition of maintenance requirements; and performance measurements.

3.1 Program Coverage for Maintenance

Scope

The purposes of the inspection in this element were to determine the scope of the present maintenance program and whether a long-range plan has been established and periodically reviewed for adequacy. The team evaluated these by discussions with cognizant personnel, review of approved current administrative and maintenance procedures, and examination of long-range plan documentation in the company five-year plan and goals.

Findings

The licensee's maintenance program is described in the maintenance department manual and covers plant-wide policies, goals, and administrative controls. The individual maintenance activities are identified and specific procedures are in place to implement policy goals. Procedures and instructions are available to identify, scope, and implement maintenance work in the areas of predictive, preventive, and corrective maintenance work. The predictive maintenance program includes vibration monitoring, lubricating oil analysis, and thermography. The preventive maintenance program considers manufacturers' recommendations, plant and industry experience, and the failure and root-cause analysis feedback from the design and system engineering organization. The long-term program improvements planned are improvements in spare parts purchasing and availability program, an enhanced maintenance surveillance program, and a computerized maintenance history system. A computerized record management system is also being considered.

Conclusion

The licensee has improved the maintenance program, and is making efforts to assure more effective and consistent plant maintenance. The team concluded that there were reasonably comprehensive and clear maintenance policy and goals established and documented in plant and department procedures and there was adequate review and evaluation to keep the program updated.

3.2 Policy, Goals, and Objectives

Scope

The purpose of this element was to determine if corporate and plant directives addressing policies, goals, and objectives for maintenance were documented, approved, and issued. Through rev'ews of supporting documentation and discussion with cognizant personnel, the team evaluated the accountability and consistency of maintenance policy implementation.

Findings

The current policies and goals are documented in the maintenance manual. The long-term policies and goals are documented in the licensee's five-year plan. This plan is widely publicized and personnel are aware of company goals. The station director maintains a close contact with the maintenance organization. Close communications provide direct feedback to the plant and corporate management. Responsibility and authority are delineated clearly by organization charts and position descriptions. Organizational conflicts are brought up and resolved in management meetings of the plant and corporate management. The licensee has performed a structured review of the adequacy, formality, and consistency of the maintenance program, and has taken steps or is currently planning improvements in the areas identified for improvement.

Conclusion

Overall, management policies, goals, and objectives for maintenance have been clearly established and communicated to plant personnel. The goals and objectives are periodically reviewed for adequacy and effectiveness.

3.3 Resource Allocation

Scope

The purpose of this element was to determine the adequacy of the resources and staffing dedicated to the maintenance organization. To make this evaluation, the team reviewed records, examined facilities, and interviewed corporate and site management and technical personnel.

Findings

A review of current maintenance activities, projected programmatic improvements, and the implementation of new initiatives indicates that the licensee has allocated significant resources in manpower and materials to the maintenance organization.

In the past, the licensee relied heavily on contractor support for labor intensive, as well as specialized technical, activities. The licensee, however, is continuing to increase its overall complement of engineering and skilled maintenance staff by absorbing contractor personnel who had been working on site into its own organization. Recently, the maintenance department has received the full-time services of three engineers from the licensee's Nuclear Engineering Department to assist in planning, preparation, and technical guidance in maintenance activities. Also, full-time planners have been assigned to plan and prepare maintenance work packages, and to schedule the work to facilitate and efficiently implement the work execution. The above additions are designed to improve prioritization of work, resolve any technical question before the work starts, and improve communications with the support organizations.

Conclusion

The licensee has committed significant resources and management attention to support the maintenance organization, and to assure that plant maintenance is carried out effectively and efficiently. Although the improvements mentioned above have not been in operation for a sufficient period of time to establish their effectiveness, the team concluded that these initiatives are in the right direction and have the potential to enhance the effectiveness of plant maintenance.

3.4 Definition of Maintenance Requirements

Scope

The purpose of this element was to determine if maintenance requirements, e.g., preventive, corrective, emergency, surveillance testing, etc., were adequately defined and implemented. Additionally, the team assessed the effectiveness with which the administrative system incorporates document changes, e.g. vendor manuals and regulatory changes, into the maintenance requirements. To make this determination, the team inspected ongoing maintenance activities and reviewed licensee procedures and records.

Findings

The licensee has formally addressed the various maintenance requirements by dedicating specific categories of procedures to the types of maintenance being performed whether it be on the system level or component level. Post-maintenance testing requirements on specific components are spelled out in the body of the maintenance procedure and are usually performed by the craft performing the maintenance. Integrated system tests are proceduralized.

NRC Bulletins and other generic and compliance communications are analyzed and handled by the licensee's Regulatory and Compliance

department. The department management assures that cognizant managers and engineers expeditiously evaluate and properly respond to issues. For an in-depth determination of applicability of the issue to the plant or licensee, the Regulatory and Compliance department receives assistance from Nuclear Engineering and/or System Engineering departments.

Conclusion

The licensee has an effective program of defining maintenance requirements and of addressing current maintenance-related regulatory and industry-wide issues.

3.5 Performance Measurements

Scope

The objectives of this element were to determine if walkdown inspections of maintenance work are performed, if root cause analysis is performed on maintenance-related failures, if maintenance performance is included in Quality Assurance Audits and if a plan is established for the periodic review of maintenance procedures.

Findings

The team reviewed and evaluated the licensee's program for management walkdowns, root cause analysis, feedback, and performance indicators. The team noted that there was an approved procedure for most of the above activities and the activities were carried out by various departments and personnel.

The degree of effectiveness of these activities varied from program to program; e.g., the findings of management walkdowns or backshift surveillances or were not consistently documented by different management personnel (Section 1.2 for additional detail). In the area of walkdown inspections by system engineers, the inspection did not cover observations/examination of structural items, in that the fasteners, supports, foundation and walls, and drains, etc. were not included in the inspection checklist. A clear indication of this deficiency was identified by the team regarding corroded support bolts in the screenhouse (Section 6.3). The licensee was in the process of expanding the instruction while the team was on-site.

In the area of root cause analysis, the licensee has established a program to analyze, evaluate, and determine the root cause of failures of equipment and other items. Generally, the program appeared adequate, but the team noted that in some cases the analysis appeared to lack sufficient depth by terminating the analysis with multiple "root causes," rather than establishing the principal contributing factor (root cause). Although, it is recognized that

it may be possible to isolate a single root cause for every problem or event, and in some cases more than one factor could contribute equally to the event, terminating root cause analysis without adequate depth diminishes the value of analysis and the effectiveness of corrective actions. The licensee has recognized this problem in his program and is considering some additional training in this area.

The feedback information from maintenance work activities is provided to and used by maintenance planners in improving the planning and scheduling process and improving/upgrading of maintenance procedures.

Conclusion

The licensee has adequate programs in place to control, monitor, evaluate and implement maintenance activities. Periodic reviews are performed to assess maintenance program performance. However, a system has not been formalized to measure the effectiveness of walk-down activities of management personnel. A root cause analysis program has been established but is somewhat diminished in effectiveness of implementation.

3.6 Document Control System for Maintenance

Scope

The objective of this element was to verify that a document control system is in place to control ongoing maintenance activities and establish traceability for completed maintenance.

Findings

The document control system is described in Nuclear Organization Procedure (NOP) 83A7 Controlled Documents, and Work Instructions No. 220, Control and Processing of Vendor Manuals. The team reviewed the storage and retrievability of completed maintenance requests (MRs) and the controls for updating procedures, manuals, and drawings. In each of these areas, the document control center maintained the documents in a controlled and updated condition.

A review of selected vendor manuals in the maintenance, planning, and training department determined that they were current and in accordance with the master vendor manual listing in the document control center.

The team also verified that bulletins, information notices, and industry data are controlled. This material is reviewed for applicability, issued for action and tracked until an answer is received to closeout the item.

An Equipment Technical Information Project (ETIP) has been developed to increase the effectiveness of the existing documentation control system. One major element of the ETIP program to provide clearer documentation in the maintenance work packages for the crafts use.

Conclusion

The licensee's proceduralized document control system provides an effective method for documenting maintenance activities. The retrievability of equipment historical records and the control of documentation such as vendor manuals, drawings, and procedures is well managed and controlled.

3.7 Maintenance Decision Process

Scope

The objective of this element was to determine if corporate management is involved in decisions regarding maintaining and upgrading the plant and improving the overall maintenance program.

Findings

Corporate and site management representatives showed strong support for achieving an optimum maintenance program to improve plant performance and extend plant operating life. Their commitment was evident by the allocation of resources and the increases in staffing needed to support recent initiatives. These initiatives are designed to formalize the overall maintenance process to assure a more balanced approach in implementing predictive, preventive, and corrective maintenance. Major initiatives include implementing a broad based configuration management program, upgrading maintenance and administrative procedures and establishing a reliability centered maintenance program.

Conclusion

The team concluded that corporate and site management was deeply involved in the maintenance decision process and dedicated to improving overall program performance.

4.0 Technical Support

Scope

The objective of this area was to determine the effectiveness of the technical support organizations with regard to maintenance activities. The team evaluated the following: internal corporate communication channels, engineering support, risk assessment in the maintenance process, radiological controls, integration of regulatory

documents into maintenance activities and quality control and industrial safety practices in the maintenance process. The evaluation consisted of a review of selected maintenance requests, observation of maintenance activities and interviews with the maintenance and technical support staff.

4.1 Internal Corporate Communication Channels

Scope

The purpose of this element was to determine the extent to which the plant management has established channels of communication between corporate and site organizations and among the various groups participating in the maintenance activities at the plant. The team attended planning meetings, interviewed corporate and plant management, and reviewed completed maintenance work packages to determine the effectiveness of the communication channels.

Findings

The team observed the morning planning meeting conducted at the site. The meeting was attended by plant and corporate management and staff. The meeting provided an excellent forum for communicating staff and management concerns, problems encountered, and maintenance activities scheduled for the next several days. Due to the presence of management, the resolutions of concerns and problems, and decision-making were expeditious. Management attention, interest, and support was evident to the staff for effective and efficient resolution.

In addition to the above, the higher management of the plant (VP Station Director and his staff) holds a morning meeting to discuss, resolve, and plan actions that involve plantwide and corporate policy, performance, and operational goals, effectiveness, and management concerns. The corporate headquarters in Boston and the Nuclear Engineering department in Braintree, MA, participates in these meeting via communication hookups. This meeting provides a fast and effective communication channel to plant and corporate higher management.

Conclusion

The team concluded that effective communication channels were established amongst various plant and corporate support groups, plant and corporate management, and the maintenance organization at the plant. The establishment of effective communication channels is considered to be a strength in the maintenance process.

4.2 Engineering Support

Scope

The purpose of this element was to evaluate the extent to which engineering support was available to the maintenance organization at the plant. This was accomplished by reviewing maintenance work packages, discussions with engineering and maintenance staff and managers; and observation of maintenance activities.

Findings

Routine engineering support to maintenance is provided by two nuclear engineering department engineers assigned to the maintenance department. Additional support is provided by system engineers assigned to various plant systems on a full-time basis. The Nuclear Engineering department (NED) has also assigned three full-time engineers to maintenance for assistance in front end planning, design engineering, and procurement of materials. NED also maintains a site extension office with an engineering supervisor and at least one fulltime engineer in each discipline with additional engineering manpower available on an as-needed basis.

Observation of interaction between maintenance and engineering personnel during the team's inspection activities indicated a well established working relationship between maintenance department and engineering. Discussions with maintenance department personnel indicated that engineering was responsive to their needs. The maintenance management was familiar with the Engineering Services request (ESW) process for obtaining assistance.

The team also noted the speed, efficiency, and technical thoroughness with which the NED management and staff reacted to the finding of corroded bolts in the service water pump base during the team inspection. NED's resolution of this concern, once they were made aware of the existence of the condition, was technically acceptable, and it also indicated the NED's responsiveness to and pride in the safety of plant and maintenance process.

Conclusion

The team concluded that on-site system engineers and NED engineers are providing effective engineering support to the plant. The support provided by NED to maintenance is considered to be a strength.

4.3 Risk Significance in the Maintenance Process

Scope

The purpose of this element was to determine the extent to which risk assessment methodologies are considered and results applied to the prioritization, planning and scheduling of plant maintenance activities.

Findings

Interviews were conducted with personnel from the licensee Nuclear Engineering Department (NED) analysis group. This group has conducted analysis of plant system importance using a draft Individual Plant Examination (IPE), conducted in response to NRC Generic Letter 88-20. The complete IPE is scheduled to be proceduralized and available for use in 1991. The NED analysis group recently completed a system importance sensitivity study with respect to improvability and degradability of the top 18 safety systems. The study is intended to identify areas upon which to focus system and equipment reliability efforts. Additionally, component importance ranking for one safety system (HPCI) has been completed and data made available to plant personnel. The data is compiled to illustrate component total unavailability and maintenance unavailability for critical components of the HPCI system. Similar component rankings are planned for other safety systems.

The licensee anticipates that studies of this nature will be used by plant maintenance planners and the work coordination group. To date, however, maintenance planners have not used NED analysis results in the prioritization and planning process. The licensee has indicated that IPE results are to be incorporated into the maintenance process in the near future.

Conclusion

The licensee recognizes and has taken steps toward, integrating system and component risk factors into the maintenance process. The short term results of system studies conducted have not yet been used in the prioritization and planning of maintenance activities.

4.4 Quality Control in the Maintenance Process

Scope

The purpose of this element was to evaluate the extent of quality assurance (QA) support of maintenance activities, including criteria for inspection and implementation of hold/witness points, assessment of QA methodology for reporting, analysis and correction of quality deficiencies, and observation of QA involvement in maintenance activities.

Findings

The plant QA department is organized into four divisions to support quality engineering, surveillance, audit and quality control (QC) functions. The QC division is responsible for QA review of safety significant maintenance request packages prior to the start of work, as part of the maintenance planning process. During this review, hold/witness points are verified, and additional hold/witness points are inserted if determined to be necessary by the QC inspector. The team observed this QA review process on several work packages. Reviews were thorough and well documented and appropriate hold/witness points were included.

Monitoring of plant activities is accomplished through the QA Surveillance Monitoring Program. A quarterly report is issued summarizing the surveillance activities conducted, deficiencies identified and deficiency reports (DRs) issued. Surveillances are scheduled depending on plant status or recent trends identified by previous surveillances. The most recent (3rd Quarter 1990) surveillance report was reviewed. Of the forty-eight (48) surveillances conducted during the quarter, approximate one-third were maintenance related, indicating a visible QA presence in the plant maintenance processes.

The DRs issued due to surveillance findings are routed to the responsible department, and responses detailing corrective action are subject to a thirty-day time clock under QADP 16.03 "Processing of Deficiency Reports, Action Items and Recommendations". For example, QA surveillance 90-9.2-01, identified through review of MRs and MWPs, a problem with EQ maintenance of a Limitorque motor operator. Deficiency Report 1904 was issued and corrective action was initiated immediately to ensure EQ requirements were met for the motor operator (MO-1400-413). A final QA surveillance was conducted during the 3rd quarter to verify corrective action for this DR.

The QA surveillance division tabulates DRs and Recommendations for Investigation (RFIs) issued as part of their quarterly report. These tabulations and tabulations of other QA concerns such as Potential Conditions Adverse to Quality (PCAQs), Non-conformance Reports (NCRs) and Immediate Corrective Action (ICA) items, are collected by the QA engineering division. The engineering division is responsible for data analysis and reporting to management adverse trends via a quarterly trend analysis report, as well as recommending an appropriate corrective action process to upper management. The team identified one concern regarding QA trend analysis reports in that the reports for 1989 and 1990 had not been issued in a timely enough fashion to make them useable to management. For example, the trend report concerning the first and second quarter of 1989 was not issued until March 1990 and the report for the third and fourth quarter of 1989, and first quarter of 1990 was not issued until August 1990. Due to problems in the collection and collation of data, reports were issued in a sporadic fashion instead of quarterly, as required by QADP 16.02 "Trend Analysis."

The QA engineering manager previously identified the lateness with which the trend analysis reports had been issued. A Management Corrective Action Request (MCAR 89-12) was issued to investigate the trend analysis report problem. The MCAR process is the primary tool for upper management to investigate, develop or implement actions or programs to resolve significant quality problems. Since MCAR 89-12 was issued, the trend analysis report methodology has been upgraded. The trend analysis report for the second and third quarter of 1990 was expected to be issued in November 1990.

The licensee's audit program was reviewed. The QA audit division is responsible for administering the audit program. The audit schedule was found to be up-to-date. The process for announcing, conducting and reporting audits was considered good. Audits of the maintenance program processes are conducted by QA as part of regular safety system audits. The team reviewed system audit files for the Core Spray system (Audit 89-29), Control Rod Drive system (Audit 89-07), and the 125/250 VDC system (Audit 90-08). The documentation of findings for each of these audits was adequate. Qualifications of personnel assigned as auditors were verified to be complete and satisfactory. The QA audits were found to have a positive impact on plant programs. For example, the team reviewed audit report 90-07 which documented findings in a plant corrective action program audit. This particular audit revealed improvements in the corrective action program, specifically processing of MCARs and NCRs and the tracking system for action items through closeout, which had been made as a result of findings identified in previous QA audit 89-40.

Conclusion

The QA department is fully integrated into the plant maintenance control process. Programs and procedures are in place and are implemented by an experienced QA staff. Surveillance and audit efforts have contributed to improving special processes like the plant Corrective Action Program.

4.5 Integration of Radiological Controls into the Maintenance Process

Scope

The purpose of the element was to determine the extent to which radiological controls are integrated into the maintenance process. Areas reviewed included direct observation of ongoing maintenance activities radiation protection involvement in the planning and preparation to support maintenance work, control, and maintaining exposures As Low As Reasonably Achievable (ALARA).

Findings

Radiological controls are integrated into plant maintenance initially by the process of generating a work package. For routine work, the ALARA Senior Engineer receives the maintenance request (MR) package the next working day. The ALARA Senior Engineer assigns an ALARA specialist to include ALARA concerns in the package, and enters the package into a database for tracking. The package, with an ALARA review sheet, is forwarded to planning. This flow path includes the preliminary ALARA input prior to developing the actual work plan. For certain MRs, the planner generates a Maintenance Work Plan (MWP). The ALARA Group reviews the MWP to ensure that ALARA concerns are adequately addressed in the package or will be addressed on the Radiation Work Permit (RWP). Typical ALARA items found in the MWP are hold points for shielding installation and removal, or radiation and contamination surveys to be performed following a system breech. The Radiation Protection Supervisor reviews and approves the MWP. Any discrepancies between the ALARA Group and the Radiation Protection (RP) requirements are addressed at this time. The MWP is forwarded to the implementing work group (i.e., mechanical, I&C, electrical) for resource allocation (i.e., staffing and materials). This process is facilitated by placing the ALARA group in the Planning Department instead of the Radiation Protection Group.

The implementing groups are trained to the GET II level, which qualifies them as radiation workers. Integrated into the cyclic training that these groups receive are contamination control and ALARA techniques. Periodically the Maintenance Radiological Advisor provides specific training to these groups regarding changes in the RP organization, changes in procedures or equipment such as replacing the pocket dosimeter with an integrating, alarming dose rate meter.

The ALARA Group holds a quarterly meeting to review the dose budget for the year. The maintenance group has consistently demonstrated an understanding of ALARA techniques by consistently staying below the quarterly maintenance dose projections.

Specific training in contamination control or ALARA techniques other than GET is not provided to contract workers because their contract specifically identifies the work tasks that they will perform. However, an extensive pre-job briefing is provided for these workers. Some supplemental training may be given to the contract workers such as mock-up training or instructions regarding the use of glove boxes.

The dosimetry requirements are determined by the RP group during the planning process and are specified on the RWP. The respiratory requirements are also determined by the RP group and are based on historical data. The ALARA group and the RP group work together to provide the necessary air sample data at the beginning of a job lacking any historical data. Also, the ALARA group performs Post-Work Reviews of certain jobs to accumulate data for future reference.

The station is involved in a Source Term Reduction program. Some maintenance practices have been altered to include cleanliness requirements. The cleanliness practice is intended to reduce the amount of stellite entering the vessel. The cleanliness practices are also included in the MWP by the ALARA Group as a reminder to the workers. In another attempt to reduce the station's source term, a list of valves in an unfiltered flowpath into the primary recirculation system was generated. The ALARA group compares the valves indicated on a MR with the listed valves. For valves present on the list, the ALARA group requests engineering to determine an alternative material or valve that can be used to reduce stellite in the system. Also, during Refuel Outage #8 the station plans to remove 30 Control Rod Blades and use replacements that have low stellite roller guide bearings.

The ALARA group assures compliance with ALARA packages by performing in-process reviews. An ALARA specialist will observe and document a review while a job is in progress. The in-process reviews are performed on first time procedures or procedures where workers historically have ALARA problems.

Some steps have been taken to minimize the time spent in high dose rate areas. For example, the station purchased quick install blanket insulation; "Genie" lifts, which are single man hydraulic lifts to reduce scaffolding use; "Quick Disconnect" scaffolding, to reduce the time required to build and dismantle scaffolding; high powered inspection scopes, and a telescope used to inspect some hangers, fire penetrations, and component identification tags.

The ALARA Group developed a 1990 station exposure goal of less than 185 person-rem. This goal was adjusted to 210 person-rem because of forced outages and emergent work. Currently the station has expended 190 person-rem. This would indicate that the goal of less than 210 person-rem is attainable.

Conclusion

Radiological controls have been effectively incorporated into the maintenance process. A well defined ALARA program has been established and is being comprehensively implemented.

4.6 Safety Review of Maintenance Activities

Scope

The purpose of this element was to evaluate the licensee's use of safety measures during maintenance activities. The control of chemicals and hazardous materials, fire protection program and general practices regarding personnel safety were reviewed.

Findings

The licensee has established and implemented measures to ensure safe performance of maintenance activities at the Pilgrim Nuclear Power Station. Administrative procedures are in place to control the use of hazardous materials, chemicals and consumables. A Fire Protection Division has been established to control and implement the requirements of the station fire protection program. Special procedures are in place for confined space entry and working in inert atmosphere spaces such as the primary containment and condenser bay.

Plant personnel are knowledgeable of safety measures and demonstrated, during observed maintenance activities, an understanding and willingness to comply with accepted practices and procedures regarding personnel and equipment safety. For example, the team observed that maintenance personnel had a completed Cutting, Welding or Hotwork Permit at the job site during welding repair on RWCU piping, as required by station procedure 1.5.5 "Cutting, Welding and Hotwork Fire Safety." Maintenance personnel appeared to be careful and conscientious during the repair activity and the designated fire watch was aware of his responsibilities.

The team also observed asbestos removal work under MR 90-33-182 for the diesel driven fire pump. This activity was governed by station procedure 1.4.38, "Asbestos Associated Project Work." The applicable permit was found to be part of the MWP, and proper authorizations for this work were evident. Respiratory equipment and protective clothing were utilized.

The licensee has established organizational safety committees as required by the Boston Edison Safety Manual. These committees are made up of departmental, sectional and divisional personnel to discuss and address safety issues. Committee meeting minutes are distributed to respective managers and are posted for plant personnel on a monthly basis.

Conclusions

The level of industrial safety maintained at the station was considered good. The licensee has effected a program for ensuring thorough safety training and communication. Station personnel comply with sound industrial safety practices.

4.7 Integration of Regulatory Documents with the Maintenance Process

Scope

The purpose of this element was to evaluate the licensee's method of integrating regulatory documents into the maintenance process. Licensee activities regarding NRC documents and industry information were evaluated.

Findings

The licensee has established and implemented procedures for the review, evaluation and dispositioning of correspondence with, and commitments to, the NRC and other regulatory agencies. Procedures are also in place to ensure that industry events and documentation are incorporated into station and maintenance activities. Regulatory and NRC communication and commitment contact is the responsibility of the Nuclear Engineering Department (NED) manager and the Regulatory Affairs Division. Industry event information is administered by the Operating Experience Review Program (OERP).

Each NRC document and industry event report received is evaluated for input and applicability to the station, assigned for action and placed into a computer tracking system. An individual or group is assigned for action on each item. Outgoing correspondence concerning NRC items are controlled by the Regulatory Affairs Department. All corrective action items are tracked by the OERP coordinator, who issues a monthly status report regarding the disposition of all action items. The coordinator is responsible for providing status of open items on a periodic basis.

The team reviewed licensee actions relative to several Information Notices and NRC Bulletins. The correspondence packages were found in order. The OERP coordinator demonstrated the computer tracking system process to illustrate the documentation trail for each item. In addition, as part of the action for each item, respective procedure reference sections are revised to include applicable NRC document and industry reports. The team examined several procedures affected by recent reports and found that revisions had been made or were planned.

Conclusions

The licensee has established and implemented an effective program and adequate controls to ensure that regulatory and industry documents are fully integrated into the maintenance process.

5.0 Work Control

Scope

The objective of this element was to evaluate the effectiveness of the maintenance work control process to assure that plant safety, operability and reliability are maintained. Areas evaluated by the team included review of work in progress, control of work requests, equipment maintenance records, job planning, prioritization of work, scheduling of work, maintenance backlog control, maintenance procedures, post-maintenance testing and completed documentation.

5.1 Review of Maintenance in Progress

Scope

The purpose of this element was to observe the performance of selected mechanical, electrical, and instrumentation and control (I&C) maintenance activities from issuance of the Maintenance Request (MR) or Maintenance Work Package (MWP) to craft personnel through final completion and closeout. The team evaluated performance through witnessing work in progress, reviewing documentation, and discussions with workers, supervisors and management.

A. Mechanical Maintenance

Findings

A limited number of mechanical maintenance activities were observed. All of the activities observed exhibited problems in activity planning due to improper scoping of work, improper or lacking tools and replacement parts at the job site, or inadequate coordination between craft, supervisory and support personnel. These deficiencies in the planning process are referenced in section 5.4 of this report.

The following activities were observed: MR 90-33-182/MWP 90-33-182-1 involved asbestos removal from the diesel fire pump exhaust line. This work necessitated placing the diesel fire pump out-of-service, resulting in the plant entering an LCO condition. Tagging orders for this job were verified; but, when the work was stopped due to lack of materials to aide in asbestos removal, the return to service of the fire pump was delayed several hours, increasing the time the site remained in an LCO condition.

MR 90-12-40/MWP 90-12-40-1 involved replacement of RWCU pump "A" seal purge elbow. Initial coordination of this activity appeared to be good. A health physics technician was assigned to define and rope off the radiation area boundary, position a HEPA filter and ventilation fan at the work area, and provide guidance during performance of the task. The actual work activity, however, was delayed approximately seven (7) hours due to lack of equipment and tools at the work site. When the work finally did commence, no deficiencies were noted. Post work testing was successfully completed and the MR was closed out.

MR 90-50-24/MWP 90-50-24-1 involved repair of the reactor building outer truck bay door. A radiation survey was conducted, boundaries established and personnel made aware of radiation levels and locations. This job was stopped due to in-field identification of additional work requirements. The vendor

drawing was discovered not to be complete in that all the parts were not identified. Consequently, spare parts were not available to replace all damaged parts. An engineering service request (ESR) was written to resolve these discrepancies. The team determined that this job had not been scoped properly, which resulted in delays in the repair.

All of these activities demonstrated a lack of aggressive, thorough and attentive supervision which resulted in delays or stoppage of the work. Each of these jobs had been designated as "Task Ready" by the planning department, when by observation they were not completely task ready.

Also, during another maintenance activity which was performed during the inspection, precise coordination and communication appeared to be lacking which resulted in improper adjustment of the HPCI turbine EGR during a post work test as part of MR 90-23-94, which resulted in an over speed trip of the turbine.

B. Electrical Maintenance

Findings

The team partially observed two minor maintenance activities since these were the only ones available with the plant in normal operation.

Maintenance Request (MR) 90-20-147 involved replacement of a defective light socket on radwaste control panel C-20. This MR involved a health physics technician, who checked and cleared the working area underneath the radwaste control panel prior to commencement of work. The completion of this activity was delayed by lack of an additional part needed to complete the light socket replacement.

The radwaste panel light socket activity appeared not to have been planned and scoped adequately by the electrical supervisor, which led to craft personnel reporting to the job site without the necessary replacement parts. As a result, this task ready activity was delayed.

The team also observed electrical maintenance MR 90-46-005, involving phase I preparation of switchyard relay cabinet wiring for eventual replacement of switchyard event recorders. This preparatory work was performed in accordance with procedural requirements, and no post-work testing was conducted.

Both of these MRs were reviewed by the team and found to contain the proper authorizations. Test equipment used was calibrated, and in the case of the switchyard work, BECo E-Lab (offiste transmission and distribution specialists) personnel were knowledgeable and well coordinated, and familiar with the MR processes.

C. Instrumentation and Control Maintenance

Findings

Only one instrumentation and control (I&C) maintenance activity was observed during the inspection. This activity involved the replacement of a HPCI ventilation flow switch (MR 90-24-204). The replacement flow switch available was a non-Q part and a Commercial Quality Item Engineering Evaluation (CQI-323) was conducted for this part prior to QC inspection and dedication for use. At the pre-job briefing for this activity, the designated QC engineer for the installation discovered that the part had not yet received QC inspection. The QC engineer halted the activity until the flow switch could be inspected and dedicated. As a result, the maintenance activity was delayed for approximately eight hours and exemplified a lack of administrative control, communication and coordination between the maintenance first line supervisor and other departments, who together are responsible for overall planning and coordination of work activities.

Conclusion

Due to the normal operating status of the plant, only a limited amount of maintenance was available to be observed by the team. With the exception of work planning deficiencies which are discussed in section 5.4, job packages were complete, prepared in accordance with procedural requirements, and craft personnel were aware of administrative requirements. Due to the few maintenance tasks observed and the relative minor nature of these tasks the team could not evaluate the overall implementation of maintenance in progress.

5.2 Work Order Control

Scope

The purpose of this element was to determine whether the work order control program identified, implemented and reported maintenance work to ensure that plant safety, operability and reliability were maintained.

Findings

Station instruction SI-MT-1000, chapter 7, Control of Maintenance Activities defines and outlines the maintenance work order control

program. Procedure 1.5.3, "Maintenance Requests"; 1.5.3.1, "Maintenance Work Plan" and 1.5.7, "Emergency Maintenance, implement the work control program for the station."

Maintenance requests (MRs) require detailed information describing the needed work. MRs provide for prioritization, reviews, post-work testing requirements and the documentation of the completed work. Maintenance Work Plans (MWPs) used in conjunction with MRs provide additional detailed instructions for the performance of the work. In addition, an MWP log sheet is used to document a description of the completed work, parts installed and a section to describe any problems noted during the performance of the work.

The team's review of MR packages indicated that these requirements were being implemented. The review of completed packages by the team indicated that they were properly completed and that all sign-offs were properly performed.

The flow path of MRs from origination to accomplishment is clearly specified and includes quality control and fire protection department reviews, work coordination efforts, and post-work briefings. Post-work briefings include the job scope, procedures required, ALARA and RWP requirements as well as post-work testing. When completed, the work package is routed to the applicable division managers for review and sign-off.

The team's review of work packages, both in progress and completed, verified proper implementation of the work control process.

Conclusion

Adequate procedures are provided to implement the control of maintenance work. Individuals are aware of their responsibilities and are adhering to procedural requirements in the preparation and completion of work packages.

5.3 Equipment Records and History

Scope

The purpose of this element was to evaluate the method of maintenance requests (MR) preparation, the combination of functions supporting maintenance, and the extent that equipment records are used for trending of maintenance on a component, system, and part level. The team reviewed maintenance MRs, evaluated the retrieval of records, reviewed procedures and interviewed the licensee's staff.

Findings

Procedures SI-MT.1000, Maintenance Section Manual, 1.5.3 Maintenance Work Plan, SI-SG.1030, Root Cause, Analysis and Corrective Measures Evaluation, and SI-SG.1070, Nuclear Plant Reliability Data System (NPRDS) are the controls for equipment records and history.

The maintenance request form is used to generate the maintenance work plan (MWP) for all work not screened by the shift work coordinator (SWC) as site service work (i.e., floor cleaning, replacing light bulbs, etc.). The work prioritization team establishes the priority of each MR on a daily basis. The assigned planner for each MR with the assigned craft supervisor identifies the required support groups and ensures that the MWP packages contain the required documentations, such as special tools, equipment, procedures, instructions, expected exposure levels, and the requirement to provide feedback when the work is completed. To ensure that the task is ready, the planner and craft supervisor are to verify that the documentation, materials, and tools are available to perform the task. The team reviewed 25 completed MRs. These MRs complied with the requirements of Procedure No. 1.5.3; however, the team did identify problems with ongoing MWP's during this inspection. The active MWPs reviewed during the inspection are discussed in paragraph 5.4, "Work Planning."

The inspectors verified that both the planners and craft supervisors used information as applicable from technical bulletins, vendor manuals, plant spe : history and NPRDS data during the preparation of the MWP.

Although the MWP is manually prepared, the data generated such as, manhours expended, work accomplished, parts used, etc. is entered into a computer-based retrieval system called NUCLEIS, "Nuclear Plant Information System." This data, along with other data entered into NUCLEIS, is reported to management weekly to provide them with the status of maintenance requests, maintenance trend analysis, preventive maintenance overdue, and other information needed to monitor and control maintenance.

The team reviewed the central records files and determined through selected closed MWPs that the records were easily retrievable and were complete. In addition to the MWP records, the team was able to easily retrieve engineering reports, vendor manuals, and a master equipment list.

Conclusion

The team determined that adequate procedures have been issued to implement the control of maintenance work. Personnel are aware of their responsibilities and are adhering to procedure requirements in the preparation and completion of MWP packages. The licensee was able to retrieve all requested data in a timely manner. The team determined the maintenance history records to be well maincained.

5.4 Work Planning

Scope

The purpose of this element was to determine the adequacy of the planning function in providing maintenance request (MR) implementation guidance in the areas of safety coordination of activities, technical accuracy, completeness of MR packages, scheduling of special activities and exposure controls. The team reviewed MR packages, observed maintenance activities associated with selected MRs and interviewed craft personnel.

Findings

Station Instruction SI-MT.1000, Maintenance Section Manual, Procedure No. 1.5.3, Maintenance Work Plans, and Station Instruction SI-WP.2000, Planning and Processing of Maintenance Requests are the procedures that control the work planning function. These procedures were verified to provide the direction to consider such areas as input on safety, sequencing of job activities, qualification requirements, special processes, material and equipment, and radiation exposure criteria. The team noted that the above subjects were adequately addressed in the maintenance work packages (MWPs) reviewed as part of planning. Job walkdowns are performed and pre-job craft briefings are conducted prior to MWP implementation. The teams review of the MWPs in the mechanical, electrical, and I&C areas verified that the planners for these sections did consider and require in their planning such items as ALARA, safety, qualification criteria, and special processes.

The team witnessed the maintenance activities described in section 5.1 of the report and determined that the MWP instructions were adequate. However, six of the seven tasks could not proceed as intended due to lack of parts, material or equipment at the work location. The team determined that the lack of craft supervisors to ensure that the required parts, material or equipment was available at the work locations was the main reason for the MWPs not being ready to be fully implemented.

One example of the craft supervisor not performing the required parts, materials or equipment verification for an MWP to be declared "Task Ready" was the work on MR 90-33-182/MWP 90-33-182/diesel fire pump. To perform this maintenance task on the diesel fire pump, the system had to be placed in a Limiting Condition for Operation (LCO). After the work started, it was determined by the craft that the maintenance could not proceed due to lack of material to complete the MWP. The diesel fire pump was returned to service and the system was taken out of the LCO status, however, the system should not have been put into an LCO in the first place since the work was not task ready. This is one example of the six that the team witnessed where the "task ready" MWPs were delayed or rescheduled due to unavailability of parts, materials or equipment.

The craft supervisors should have notified the scheduling organization that the assigned "task ready" MWPs could not be started due to the lack of parts, materials or equipment before the MWPs were started by the craft not, as was the case, after the work started. The team determined that the incomplete overall planning, which includes the supervisor's responsibility for assuring all tools, materials, or parts are available prior to starting a maintenance task, is a weakness.

Conclusion

The team concluded that both scheduled and non-scheduled work is well documented and administratively controlled. Detailed maintenance work packages (MWPs) are provided. However, the lack of verification by the craft supervision that parts, materials and equipment are available for scheduled work was found to delay the performance of the work and is considered to be a weakness.

5.5 Work Prioritization

Scope

The purpose of this element was to evaluate the maintenance work prioritization method and criteria. The team reviewed the licensee's work prioritization for both safety significant work and balance of plant work which could effect safety systems.

Findings

The prioritization of maintenance requests (MRs) is described in licensee Procedure No. 1.5.3, Maintenance Requests. A six level priority system is used both for safety systems and balance of plant equipment. Normally one day after a MR is written a work prioritization team (WPT) which consists of the Chief Operating Engineer, Deputy Maintenance Section Manager, and Scheduling personnel prioritize the maintenance request based on the plant operational status, Technical Specifications (TS) requirements, and safety significance of the equipment. Both NSSS and BOP equipment are considered during the prioritization of the MRs. The Chief Operating Engineer and the Deputy Maintenance Section Manager are knowledgeable of the plant systems and well qualified by training and experience to perform as members of the WPT. The WPT members were aware of the probabilistic risk assessment (PRA) concepts. The existing site procedures do not include PRA concepts in MR prioritization.

During the review of completed work packages the team verified they were prioritized in accordance with procedural requirements.

Conclusion

The team concluded that work prioritization of both safety related and balance of plant MRs is performed promptly by a team of knowledgeable and experienced personnel in accordance with procedural guidance.

5.6 Maintenance Work Scheduling

Scope

The purpose of this element was to determine the extent to which maintenance scheduling and the work tracking system are established and support the maintenance process and to evaluate the methods used to identify and control preventive, corrective, and predictive maintenance. The team reviewed maintenance work scheduling, backlog identification and control systems. Daily work scheduling and coordination activities were witnessed.

Findings

Scheduling of maintenance is coordinated by the scheduler as described in Procedure No. 1.5.3, "Maintenance Requests." The maintenance scheduling system used during outages is by necessity more detailed than that used during operations, in that during outages scheduling meetings are held at least two to three times per day, while during this inspection a daily meeting was held since the plant was operating normally. Maintenance requests (MRs) are tracked both by the scheduling and maintenance department and the results are issued weekly in a Work Control Performance Monitoring Report. Tracking data begins when the MR is authorized to begin, and ends when post-maintenance testing is satisfactorily completed and a "closeout" status entry is entered into the tracking system. A completed Maintenance Work Package (MWP) is reviewed by the craft supervisor prior to closeout evaluation by the planners.

The teams review of maintenance work performed and the completed MWPs verified that the above elements were being performed as required by procedures. The team verified that preventive, corrective, and predictive maintenance is controlled and documented by the licensee's tracking system.

The team witnessed work scheduled to be performed during the inspection and noted that work packages described as "task ready" could not be performed as planned due to tools, parts and/or materials not being available when the work was intended to begin. This subject is discussed in Section 5.4.

Conclusion

The team concluded that maintenance scheduling includes preventive, corrective, and predictive maintenance along with surveillance testing. The daily work prioritization team meetings track and maintain the maintenance activities such that the master maintenance schedule is maintained.

Improvement is needed to assure that jobs identified as "task ready" have all materials available so that the work can be performed expeditiously.

5.7 Backlog Control

Scope

The purpose of this element was to determine the effectiveness of backlog and maintenance deferral controls. The team reviewed the control system for the monitoring of the backlog and discussed its implementation with management.

Findings

The licensee's backlog and monitoring system is described in Nuclear Organization Procedures (NOP) 85A1, "Nuclear Organization Performance Monitoring and Management Information Program" and Procedure No. 1.5.3, "Maintenance Request." A weekly Work Control Performance Monitoring Report is issued by the Planning and Outage Manager with performance indicators such as MR Trend Analysis, Powerblock Backlog (MRs greater than 3 months old), Control Room Deficiencies, number of MRs scheduled, number of MRs closed, number of Emergent MRs and number of scheduled MRs not worked and/or rescheduled. Man-hours and overtime statistics are also provided. The report has the capability of identifying the ratio of safety-related maintenance, and man-hours versus total backlog status.

The team verified that the Work Control Performance Monitoring report was distributed to licensee management as well as the maintenance supervision. The report is used by management in determining the cause and effect of the backlog level.

A review of the maintenance deferral process indicated that the daily meeting of the work prioritization team (WPT) reviews the status of deferral orders. Deferred maintenance is tracked by the planning and scheduling manager and is reported and tracked on a daily basis. Management is kept informed of the status of deferred maintenance through the issuance of the weekly Work Control Performance Monitoring Report which tracks this item.

The total backlog consists of 1568 Maintenance Requests as of November 6, 1990. The November 7, 1990 report describes the following MR status:

- Of the 1568 MRs, 514 require a station outage, 237 require a system outage to perform the work, and 253 of the MRs require parts and/or materials. The rest of the MRs are scheduled and being worked within the task schedule.

The team verified that management was tracking these items and that the maintenance work staff was adequate to accomplish the backlog given the man-hours assigned to backlog tasks.

The licensee has established goals for each of the maintenance performance indicators which are separately tracked. Currently, indicators are at or below the goals established with the trend being to reduce the overall backlog.

Conclusion

The team concluded that the backlog monitoring system is well controlled and maintained by the licensee. Management is aware of the backlog status and is provided with a report containing numerous indicators which provide sufficient information on which to make decisions. The backlog is within the goals established.

5.8 Maintenance Procedures

Scope

The purpose of this element was to review maintenance procedures and to evaluate the extent to which they enhance the maintenance process. The team reviewed the process, procedures, and format established by the licensee to generate mechanical, electrical, and instrument and control maintenance procedures.

Findings

Station instruction SI-MT.1000, Chapter 5, provides the framework for the control of maintenance. PNPS procedure 1.3.4-1.3 provides guidelines for the development of maintenance procedures. These are established to provide a consistent format among maintenance procedures. The licensee has established a program for periodic review of procedures as described in PNPS procedure 1.3.4-5, "Procedure 2-Year Review Program."

The team reviewed a sample of mechanical, electrical, and I&C maintenance procedures to evaluate their technical content and control. In addition, procedures utilized by personnel during work activities were also reviewed. These are determined to be adequate for the task, technically correct, properly developed, authorized and controlled. Appropriate cautions and warnings were also evident. The team did express a concern to the licensee with respect to the test for the 125 VDC 'B' battery performed with procedure 8.9.8,

"Battery Rated Load Discharge Test." The final battery terminal voltage upon termination of the test was not clearly documented. Discussions with test personnel resolved the team's initial concern. The licensee stated that future test result documentation would be enhanced due to the acquisition of a battery test unit which will provide complete readings upon request. During these discussions both maintenance and technical support personnel displayed a thorough understanding of this issue.

The team made only limited evaluation of the implementation of maintenance procedures since insufficient maintenance of a complex nature was performed for the team to observe.

Conclusion

The development and control of maintenance procedures reviewed was determined to be adequate. A program is in place to develop, approve and review subject procedures. The team could not verify the implementation of a sufficient sample of maintenance procedures to evaluate their use.

5.9 Post-Maintenance Testing

Scope

The purpose of this element was to determine whether the licensee has established, documented and implemented a post-work testing (PWT) program to assure operational readiness of repaired equipment.

Findings

The PWT testing program is controlled by station instruction SI-MT.1000, Chapter 8, "Maintenance Section Manual," Procedure 1.5.3, "Maintenance Requests," Procedure 1.5.3.1, "Maintenance Work Plan," Procedure 3.M.1-30, "Post-Work Testing Guidance," Station Instruction SI-MT.0501, "Post-Work Test Matrices and Guidelines," and Procedure 8.1.1.1, Inservice Pump and Valve Testing Programs. During the processing of a maintenance request the planner determines the scope of testing required using the guidance of SI-MT.0501 and any other resource that is necessary to ensure that all requirements are met to ensure operability of the equipment. If maintenance is required for equipment in the ISI testing program, the planner notifies the ISI program coordinator to verify that the testing requirements are accurately described. The planner also enlists input from the operations department, technical support system engineers and any other group that may be required. In addition, the system engineer is also required to perform an independent review of the PWT and indicate approval if the PWT is other than an established station procedure. The maintenance supervisor is also responsible for reviewing the PWT to ensure that the testing verifies that the

deficiency has been corrected. In addition, the operations shift supervisor must also verify that the PWT testing restores the equipment to Technical Specifications operability requirements.

The team inspected several work packages during the inspection to ensure that the above stated requirements for PWT are included in the work packages prior to commencement of work. In all cases the required reviews and approvals were documented in the packages. The team was unable to observe PWT in progress during the inspection. However, a review of completed work packages indicated that the testing was completed satisfactory and that the documentation was satisfactory.

Conclusion

The team concluded that the licensee's control and documentation of PWT testing is satisfactory. No maintenance activity which required PWT was observed during the inspection.

5.10 Completed Work Control Documents

Scope

The purpose of this element was to inspect, verify and evaluate the extent to which the completed maintenance work package (MWP) review is documented, implemented and performed in a timely and consistent manner. A representative sample of MWPs was examined along with administrative procedures concerning MWPs. Staff responsible for controlling and dispositioning MWP reviews were interviewed.

Findings

Station Procedure 1.5.3.1, "Maintenance Work Plan" is the document which details the work package closeout process. Station maintenance planners are responsible for review of work packages and attached documentation for completeness and ensuring proper equipment history is maintained. A MWP review checklist is used as part of the completed document review. The checklist itemizes supplemental work package documentation such as special procedures (EQ, welding, etc.). ALARA review forms, material and spare parts requisition and drawings. The closeout checklist provides a systematic mechanism to ensure that MWP documentation is complete prior to archiving.

The team reviewed over twenty (20) completed MWPs for the Salt Service Water System from 1989 and 1990. The MWPs covered all maintenance disciplines. All MWPs reviewed contained complete copies of supplemental attached documentation. The review checklist for each MWP recorded the verification of all supplemental documents. All appropriate MWPs were found to contain complete post work testing documentation.

During the MWP review, the team identified one concern. The MWP review process contains a feedback mechanism to communicate technical information related to maintenance activities to responsible departments such as systems engineering, procurement personnel and QA. This feedback mechanism was not used consistently, and in many of the MWPs reviewed, the "Feedback" block was not checked or was checked by a clerk. The maintenance planning manager explained that the new computerized maintenance tracking system would automate the feedback between planners and other departments and eliminate the need for the "feedback" block.

Conclusion

The MWP closeout process was found to be functioning adequately. The licensee has implemented a good system for ensuring work package completeness, and the system will be enhanced by inclusion and utilization of work package review feedback.

6.0 Plant Maintenance Organization

The objective of the inspection in this area was to evaluate the control of maintenance activities and determine the effectiveness of the maintenance organization. Areas evaluated by the team were: control of plant maintenance activities, control of contracted maintenance, deficiency identification and control system, maintenance trending, and support interfaces.

6.1 Control of Plant Maintenance Activities

Scope

The inspection of this area was to determine the extent of established controls for the performance of maintenance activities and to verify that these controls have been properly implemented in the mechanical, electrical, and instrumentation and control disciplines. The inspection consisted of a review of documents, interviews with craftsmen, supervisors and managers as well as the observation of work in progress, the supervision of the work, the degree of adherence to established controls, and tours of the physical facilities for each department.

6.1.1 Mechanical Maintenance

Findings

Mechanical maintenance is identified and controlled by station procedures and instructions. Station instruction SI-MT.1000, Chapter 7, "Control of Maintenance Activities," defines and outlines mechanical maintenance requirements. Procedure 1.5.3, "Maintenance Requests," implements the planning and control of mechanical maintenance and

procedures 1.5.3.1, "Maintenance Work Plan," is used to develop individual work control plans for each work request that does not have a procedure developed for use. The MWP delineates the specific task requirements and develops procedural steps to accomplish the required work.

Plant and system integrity is maintained by the station tagging program which is controlled by the Operations Department. Quality verification is assured through the review of work packages by the Quality Assurance/Control Department and appropriate Hold Points are inserted into the MWP to allow for direct inspection of the task. The MR & MWP procedures also establish supervisory control of tasks by requiring maintenance department supervision to directly oversee task performance on a periodic basis to ensure proper performance by craft personnel is maintained.

Temporary repairs are made to station systems/equipment in accordance with Procedure 1.5.9, "Temporary Modification," which controls the duration of the modification and assures proper station management and engineering department review and approval prior to accomplishment.

The team observed that during the performance of mechanical maintenance activities that work packages were reviewed by the maintenance supervisor prior to the start of work. The supervisor usually assigned the work to shop crafts and conducted a briefing on the work package. Maintenance work packages are usually assigned to two or more craftsmen, with the most experience person being designated as the lead man. Training status is displayed in the maintenance shop for supervisor review prior to personnel assignment to tasks. Spare parts and tools are to be assembled prior to commencement of work, but the team observed on several occasions that this was not occurring (Section 5.4). Discussions with mechanical maintenance supervisors revealed that this situation occurred frequently and station maintenance management attention to this problem appears to be necessary.

Controlled vendor manuals were observed to be used for maintenance activities. During performance of MR 90-50-24, Reactor Building Truck Bay Overhead Door Repair, the vendor's print was found not to contain all the parts that were physically in place on the door. The craftsmen notified their supervisor, who appropriately stopped work and initiated an Engineering Service Request (ESR) to request engineering assistance in resolving the discrepancy. Maintenance procedures that were part of the work packages were verified by the mechanical maintenance supervisor prior to performance of the tasks.

Observation of maintenance work in progress indicated personnel were knowledgeable in the use of procedures, familiar with the required tools and equipment and aware of proper safety and ALARA practices. Crafts personnel were aware of station requirements that when procedural steps could not be accomplished, work should stop and supervisory assistance be requested. Mechanical Maintenance supervisors were observed to be at the work sites during performance of work activities.

Conclusion

Adequate measures have been established for the control of mechanical maintenance activities. Personnel are trained and are experienced to perform the required work. Craftsmen were aware of safety and radiological concerns and practices. Supervision appears to be an area that requires additional maintenance management attention to ensure tasks are adequately planned and controlled due to observed problems with task readiness and performance at the work sites.

6.1.2 Electrical Maintenance

Findings

The licensee has established administrative and specific electrical procedures to control electrical maintenance activities. The team determined through the review of several completed electrical maintenance packages that these controls were being implemented. The review of some specific procedures such as 3.M.3-51, "Electrical Termination," 1.5.10, "Control of Fuses," and 3.M.3-41, "Station Transformer Auxiliaries Calibration and Functional Testing," shows that these procedures have sufficient details to adequately perform their intended function. Electrical maintenance personnel were observed to be knowledgeable of the established procedures.

A limited number of electrical work activities were available to be observed during the inspection. In those activities inspected the team verified that maintenance request packages addressed administrative controls such as, proper tagging, wire determination and termination process, proper control of parts and material, use of vendor manuals, and ALARA practices.

For the two activities observed by the team, except for the inadequate planning by the supervisor which resulted in craft personnel reporting to the job site without required parts, the established procedures were being adequately implemented. ALARA practices were verified as was the use of calibrated instruments.

Conclusion

The team concluded, based on the limited observation of activities that the electrical maintenance staff has a adequate program for controlling maintenance activities. Personnel are knowledgeable of the established procedures and are aware of safety and radiological concerns and practices.

6.1.3 I&C Maintenance

Findings

The team reviewed the programmatic controls established in the various maintenance procedures. These controls provide a means for ensuring that maintenance activities are performed in accordance with procedures. Appropriate levels of review are provided throughout the maintenance planning and closeout of scheduled work. Procedure 1.4.35, "Personnel and Material Controls", defines the requirements for the control of activities and conditions that could affect the quality of maintenance. The team also reviewed station procedures developed to administratively control certain specific aspects of maintenance. These included, 1.5.9 "Temporary Modifications," 1.5.9.1, "Lifted Leads and Jumpers," and 1.5.10, "Control of Fuses." These procedures provide sufficient detail to adequately perform their intended function.

The I&C maintenance group is located in an area which provides for close interaction between the technicians and supervision. The team observed that the I&C offices maintain controlled vendor manuals. The quality control of parts and materials was evident throughout the inspection period. The team observed the I&C technicians and supervisors to be knowledgeable of the maintenance program requirements.

During this inspection period the team was unable to observe I&C maintenance work activities. Most of the I&C work activities conducted during the inspection were associated with surveillance activities. One activity which the team planned to observe was corrective maintenance to be performed on HPCI HVAC. Although scheduled, this activity could not be performed due to the unavailability of a commercial grade part. The part had been procured as commercial grade, but had yet to be inspected for acceptability by QC. Deficiencies of this type are further discussed in Section 5.4 of this report.

Conclusion

The licensee has a maintenance program in place to control the maintenance activities related to I&C. Technicians and supervisors are knowledgeable of the program requirements. Due to the lack of I&C maintenance conducted during the inspection, the team could not verify the implementation of this program.

6.2 Control of Contracted Maintenance

Scope

The purpose of this element was to determine the extent to which controls of contracted maintenance personnel are established, documented, and implemented.

Findings

The control of contractors is described in Procedure SI-MT.1000, Maintenance Section Manual and is managed by the Construction Division Manager.

Contractors are selected on the basis of nuclear power experience and past performance at Pilgrim. The supervision of contractor work is provided by site construction engineers reporting to the construction manager. The work of contractors is evaluated by the assigned construction engineers and documented on a construction Evaluation of Field Services (EFS) form. The team reviewed the evaluation of contractors used during the last outage and determined that these EFS were detailed with specific attributes identified and evaluated.

The team reviewed the training provided to contractor personnel and determined that General Employee Training (GET), (including plant administrative procedural controls, procedural adherence, and notification communications), HP, Security, and Emergency Preparedness training is provided to all site personnel including those working for contractors. Job training for specialized job contracts is normally a part of the contract and is to be provided by the contractor. An exception to this would be contract health physicists who are qualified by the Pilgrim staff.

Contractor personnel working at Pilgrim are required to abide by a QA program approved by the licensee or work within the licensee's QA program at the site. Likewise, procedural compliance with approved procedures, controlled by the licensee or supplied (as contracted) by the contractor and reviewed by the licensee, is required.

During this inspection period the licensee had only one contractor working on plant equipment. This work effort was limited in scope, thus an effective evaluation of the implementation of contractor controls could not be performed.

Conclusion

The team concluded that Pilgrim's program for management of contractors was well documented in both procedures and records of work performed during past outages. Program implementation could not be observed due to a lack of work being performed by contractors during the inspection.

6.3 Deficiency Identification and Control System

Scope

The purpose of this element was to determine the extent that a deficiency identification and control system is established, documented and implemented. The team evaluated this area by sampling maintenance requests, licensee records, and observing plant conditions.

Findings

The licensee has established a method for the identification of deficiencies which require maintenance attention. The principal methods for identification of deficiencies are Procedure 1.5.3, "Maintenance Requests," and Procedure 1.3.24, "Failure and Malfunction Reports." These procedures provide a means for the reporting of deficiencies regardless of how they were identified. This includes if it was physically identified, resulted from an event, or a surveillance test. These procedures provide guidance for the actions necessary to resolve the deficiencies from identification to final closeout.

The team verified the use of these procedures to correct identified deficiencies through the Maintenance Work Request process. Also, five of six failure and malfunction reports were noted as being detailed and comprehensively evaluated. The sixth dealt with a matter which had been previously comprehensively evaluated.

The team performed inspection tours of the facility throughout the inspection period. The facility was observed to be clean and well maintained. The one exception was the screenwell pumphouse and, to a lesser degree, the auxiliary bay area. The team made tours of the screenwell pumphouse and observed the salt service water (SSW) pump rooms to have piping and supports with excessive amounts of rust. In addition, the grounding straps on several SSW pump motors were corroded. Furthermore, the separation wall (fire barrier) between the "A" SSW pump room and the "A" circulation water pump room was found to be breached due to an open "flood control flapper valve" in the "A" seawater circulating pump room. The licensee took immediate action by posting a continuous fire watch in the area. In addition,

the licensee conducted a survey of all the fire barriers and penetrations to the SSW pump rooms and discovered that 5 of 6 fire dampers located in the ventilation ducting for the salt service water pump rooms had broken springs in the fire dampers, rendering them inoperable. The licensee is conducting an investigation to determine the root cause for these failures. A check of the licensee's surveillance records indicated that dampers had been previously tested in March of 1990 with no observed deficiencies. Overall, some of these deficiencies indicate a lack of initiative on the part of the licensee to maintain this area.

The licensee had previously instituted a Plant Design Change Package PDC 86-22, Screenwell Restoration, to restore the salt service water system piping, supports and components to acceptable conditions. This PDC was partially implemented with over ninety (90) field revision notices. The PDC scope was to identify and repair, as necessary, any components that were found to be degraded in the screenwell pump house. This included visual inspection and ultrasonic testing of safety-related pipe supports, visual examination of salt service water pipe welds, ultrasonic examination of exposed salt service water piping and extensive examination and repair of buried salt service water piping. These inspections resulted in two pipe welds being repaired, replacement of four spool pieces in exposed piping and one section of underground piping being relined with rubber coating and replacement of two buried pipe spool pieces. In addition, an aluminum bronze spool piece was installed in a section of non-safety related salt service water piping for corrosion monitoring purposes. Work on this PDC was delayed as a result of a lengthy outage during which resources were diverted elsewhere. Further work on the screenwell restoration is to be performed during the next refueling.

The team expressed concern to the licensee regarding the failure to identify the screenhouse deficiencies prior to this inspection.

Conclusion

The licensee has provided a program for the identification and resolution of deficiencies. Documentation and plant walkdowns indicate the program is functioning well throughout the plant with the exception of the screenhouse. The licensee's efforts were deficient in that obvious screenhouse problems were not identified and corrected.

6.4 Maintenance Trending

Scope

The purpose of this element was to evaluate the licensee's maintenance trending program. The team reviewed procedures, reports, and held discussions with personnel in such areas as root cause analysis, self-assessments, performance indications, and rework evaluation.

Findings

The licensee has identified their maintenance trending program in various procedures such as: Procedure No. 1.3.24, "Failure and Malfunction Reports " "Station Instruction SI-SG.1030, Root Cause Analysis and Corrective Measures Evaluation," "Station Instructions SI-SG.2000, Maintenance Control Equipment Failure Analysis (MCEFA)," and "Maintenance Section Performance Indicators published weekly."

The above documents define the actions to be taken by the licensee in the areas of rework evaluation, self-assessment/performance indicators, root cause analysis, and systematic fixes versus specific fixes. The Planning and Outage Manager issues a weekly report that includes the status of overdue preventive maintenance and corrective maintenance backlogs. Backlogs are also identified to specific safety systems.

The team, in addition to reviewing the above procedures, verified that reports and evaluations prepared in accordance with these procedures are being distributed to and reviewed by management. Trends established in the various performance indicators monitored are indicated in a new Nuclear Plant Information System. This system's implementation is recent and is still in the verification process.

As a result of licensee reviews of maintenance activities root cause analysis reports are generated. These root cause analysis reports are used as part of the maintenance trending program. Root cause and reliability centered maintenance analysis training has been given to engineering, operations, and selected maintenance staff personnel. As part of a new program, root cause analysis reports are being evaluated. The results of this evaluation will not be available before the first quarter of 1991.

Conclusion

The team concluded that maintenance trending and analysis programs are in place and staffed; however, certain improvements to the program are being implemented and the effectiveness of these improvements could not be determined at this time.

6.5 Support Interfaces

Scope

The purpose of this element was to determine if the maintenance department had established an active interface for transfer of information and problem solutions with other organizations such as Engineering, Operations, Quality Assurance, Health Physics, and Procurement.

Findings

The team reviewed administrative, maintenance, and engineering procedures to determine the lines of communication established for transfer of information. The procedures adequately addressed and implemented interactive support of the maintenance process.

Quality Control actively participates in the maintenance process. Each safety-related MR is reviewed by QA to verify that appropriate hold points have been established. The maintenance work is monitored and/or witnessed per the requirements of the MR and final work inspected by QC.

Engineering support for day-to-day work is provided by permanently assigned design engineers from NED and on-site system engineers. More in-depth engineering support is provided by NED from the Braintree office via the Engineering Service Request (ESR) process.

HP support is provided to maintenance by permanently assigned HP personnel. Additionally, the daily morning meeting for planning and short-term scheduling provides an effective forum for interchange of management concerns and solutions. The team attended some of the morning meetings and verified the effectiveness of its purpose.

Conclusion

Interface support of the maintenance process has been established and effectively implemented.

7.0 Maintenance Facilities, Equipment and Materials Control

The objective of the inspection in this area was to assess the maintenance facilities and controls established to support the maintenance process. This was accomplished through plant walkdowns, document reviews, and interviews conducted with plant personnel. The team inspected the following areas: maintenance facilities and equipment, materials control, tool and equipment control, and the control and calibration of measuring and test equipment (M&TE).

7.1 Maintenance Facilities and Equipment

Scope

The purpose of this element was to evaluate the extent that facilities and equipment have been provided to enhance the maintenance process. The team toured plant facilities including maintenance shops, offices, the warehouse, M&TE room, and tool storage areas.

Findings

The team observed the close proximity of the various maintenance shops and areas to each other as well as to the main access control point. There are separate areas provided for each of the maintenance disciplines involved in the maintenance process. Mechanical, electrical and I&C personnel have separate offices and work areas. First-line supervisors are located in these office areas. Each shop area for the various discipline groups was found to be clean with ample work space. However, this observation was made in the circumstances of limited work activities due to the plant not being in an outage when more work activities would be scheduled. The maintenance shops and offices are also located in close proximity to where spare parts, tools and M&TE are stored. The team did not observe any Q-parts, materials or controlled tools within these areas which indicates appropriate control of tools and equipment; Q-parts and material issued to the maintenance groups are stored in a locked storage area to provide control. Support and interface organizations, such as QA, QC and engineering, are located in the floor above the maintenance offices.

Spare scaffolding was observed to be available and appeared to be sufficient to support maintenance needs. Scaffolding erected within the plant was found to be properly tagged and evaluated to ensure acceptability.

An adequate communication system was observed via the plant paging phones. The team observed various notices throughout the plant warning personnel as to the appropriate communication system in areas where sensitive electrical and electronic components were present. This is to minimize possible electrical interference from equipment such as two-way radios.

Conclusions

The team concluded that the close proximity within the various discipline shop areas and offices and other support organizations contribute positively to the maintenance process since communications and interfaces are enhanced. Supervisor offices were located in the same general areas as that of the craft and technician personnel. Appropriate levels of control of materials and equipment were evident in the various shop areas.

7.2 Established Materials and Controls

Scope

The purpose of this element was to evaluate the extent to which material controls have been established to enhance the maintenance process. This element was evaluated through the review of site procedures and inspections of facilities such as warehouse and tool rooms. The team also interviewed personnel involved in the control of materials.

Findings

The team reviewed various site administrative procedures governing the procurement, receipt and inspection, storage and issuance of materials. The licensee stated that a new Nuclear Operating Procedure was in the final stages of review and approval which would further describe the procurement process. Discussions with warehouse personnel indicated that they were knowledgeable of the procurement, receipt and inspection, storage, and issuance process. Documentation for several selected parts was found to be traceable to procurement, receipt, and inspection records. Traceability of documents was aided by the use of a computerized material database. Upon receipt of material, a Material Receipt Inspection Report (MRIR) number is used to track the individual components. This number enables the traceability of records and component attributes such as shelf life and supplier. The licensee uses the general guidance of first-in, first-out for the issuance of material with specified shelf life limits. Guidelines are also present for ensuring timely procurement of materials during normal operations as well as during emergencies. The licensee has also incorporated measures for controlling material which is returned for storage when not used.

The team toured the warehouse area and observed it to be in a clean state with materials well kept with appropriate levels of protection where required. There are separate areas for storing Q and non-Q materials, materials on hold for receipt inspection, and storage of material found to be non-conforming upon receipt. The licensee also has a separate area for staging components in preparation for a specific work activity. One deficiency was noted in the storage of a set of large metal clad gaskets. These were found to be bent and warped due to the method of storage. Warehouse personnel subsequently placed these gaskets in a different storage area with an appropriate means of storage. New shelving for the storage of this material was observed to be under construction.

One observation was made with respect to the monthly QC inspection attributes used to verify conformance to material storage requirements. These attributes are used to identify items which are not

appropriately stored and general cleanliness of the area. The inspection checklist used did not entirely identify the same storage requirements found in the warehouse material storage procedure. The licensee revised the subject inspection checklist to include other material storage attributes.

Conclusion

The measures established for controlling the use of materials was found to be acceptable. The material control elements were found to be well implemented with knowledgeable personnel. Adequate material storage was observed during warehouse tours.

7.3 Establish Maintenance Tool and Equipment Control

Scope

The purpose of this element was to evaluate the extent to which tool and equipment controls have been established to enhance the maintenance process. This element was evaluated through the review of site procedures and inspections of facilities such as warehouse and tool rooms. The team also interviewed personnel involved in the control and issuance of tools and equipment.

Findings

The licensee controls the issuance of tools and equipment from two separate locations. Tools such as slings, hoists, and other rigging equipment are controlled and issued from the tool room. M&TE is controlled and issued from the M&TE room. The team toured these rooms to evaluate their general condition in their storage areas and to verify implementation of site procedures governing their issuance and control. These areas were found to be generally well kept.

The team noted that slings located in the tool room were appropriately individually tagged with an identification number to track its use and condition. Maintenance Section Manual Chapter 7-A, "Portable Lifting Equipment", requires that slings be load tested after every 3000 hours of use or 5 years, whichever comes first. Controls are in place to track the hours of use for every sling issued. PNPS procedure 3.M.1-14, "General Maintenance Procedure for Heavy Load Handling Operations", provides extensive sling inspection guidance to inspect their condition prior to use. BECo does not possess a testing rig for load tests, and therefore, sends the slings to an off-site contractor for such tests. There is an on-going effort to send all the slings on a rotational basis to the contractor for baseline load tests. This effort will result in establishing data to track individual use and degradation. The team verified the initial implementation of this effort through the review of records for selected slings and hoists.

Tools and equipment such as electrical lug crimpers, torque wrenches, and pneumatic gauges are calibrated and controlled through the M&TE program. The condition of tools and equipment inspected was good and within calibration date requirements.

Conclusions

The licensee has established and implemented a program to control the issuance of tools and equipment. The personnel responsible for the control and issuance of tools and equipment were knowledgeable about the tool and equipment program requirements.

7.4 Control and Calibration of Measuring and Test Equipment

Scope

The purpose of this element was to determine the extent that M&TE is controlled and calibrated. The team interviewed M&TE personnel, inspected the M&TE calibration and storage areas, and reviewed equipment history files.

Findings

PNPS procedure 1.3.36, "Measurement and Test Equipment", establishes the process for the issuance, storage, control, and calibration at specified intervals of M&TE. The team assessed the implementation of the M&TE program through the review of equipment history files, tours of the M&TE storage room, calibration room, and interviews with licensee personnel. The storage of M&TE located in the storage room was found to be acceptable. Identification tags were placed on M&TE and observed to be calibrated and ready for issuance. These tags specify the identification number, calibration date and due date. Adequate controls were observed to be in place for ensuring traceability of use for each place of M&TE issued. This equipment is issued via a traveler specifying a maintenance request or procedure number. M&TE is issued on a daily basis unless extended use is authorized.

The licensee has incorporated a program for recalling instruments which require calibration. The frequency for calibration intervals may be revised or extended based on a review of the equipment history. The program also provides a means for evaluating work performed with M&TE found to be not within calibration tolerances. An Out of Calibration Report (OCR) is issued and distributed to initiate an evaluation of equipment inspected and/or tested with M&TE found to be out of calibration.

M&TE observed in use during work activities throughout the plant were verified to be within their specific calibration period.

Conclusion

The licensee has established an adequate program for calibrating and controlling the use of M&TE. Adequate measures are in-place for follow-up and evaluation should out of calibration M&TE be identified. Personnel implemented the M&TE program well.

8.0 Personnel Control

Scope

The objective of this element was to determine the extent to which personnel are trained and qualified to perform maintenance activities. In assessing this area, the team examined staffing control, training, testing and qualification, and current status. The team's evaluation was based on interviews, direct observations of the training facilities and field activities, and reviews of records and training programs.

8.1 Staffing Control

Scope

This element evaluated, through interviews with personnel and observation in the field, the extent that personnel control is proceduralized and implemented in the maintenance process.

Finding

The facility has a stable work force with the exception of a high turnover of first line supervisors. The supervisor turnover which has occurred resulted from transfer, promotion, and termination (Section 8.4). Vacant positions are filled with experienced individuals through promotion from within the BECo by employing individuals with previous on-site contractor experience, or by employing personnel with associated nuclear industry experience.

Up-to-date organization charts and position descriptions are maintained and were available during this inspection. The plant organization and staff responsibilities were well understood by craft personnel and management. First line supervisors with limited time in the maintenance department were noted as still gaining familiarity with procedural requirements and site specific interfaces. In the last two years, major organizational changes have been implemented in the maintenance section. This includes the consolidation of maintenance planning under the Planning and Outage Services Section and the establishment of a new senior supervisory position in each of the functional areas; mechanical, electrical, and instrumentation and control.

There has been a major effort ongoing in maintenance procedure upgrading and revision as well as new definitions for work practices such as the definition of "task ready" and the twelve-week planning schedule. Though these changes may improve the overall system, the team noted that the changes have not been in place long enough to assess the effectiveness particularly when the system is challenged, e.g., by a major refueling outage).

The supervisor to worker ratio varies among the various groups. The overall average in maintenance is approximately one to six. With the plant in operation, maintenance is performed only during the day shift. The provision for performing emergency maintenance is established and documented procedurally. A callout list for providing personnel from offsite is established. Typically, one electrical and mechanical, and two instrument and control maintenance personnel are assigned on second and third shift to process emergency maintenance requests.

Conclusion

A well staffed maintenance section has been established. However, the high turnover rate among first line supervisors has diminished the group's effectiveness. Organization charts and job descriptions adequately define the organization and responsibilities.

8.2 Provide Personnel Training

Scope

This inspection element determined the extent that training is implemented and documented, including effectiveness feedback in the maintenance process.

Finding

The facility has an INPO accredited maintenance training program. Maintenance training is provided by a maintenance training group within the nuclear training department (NTD). Training is conducted at the offsite Industrial Park Training Complex (IPTC). The IPTC is a leased facility which contains five classrooms and maintenance laboratories. The IPTC houses training aides such as a small scale Terry turbine, pumps, motor operated valves, circuit breakers, instrumentation modules, an instrumentation and control simulator, and a recirculation pump seal assembly. Other facilities used by the maintenance staff included the Chiltonville Training Center (CTC) offsite, and the Indoctrination and Support Building (I&S) located at the Pilgrim station.

The initial maintenance training includes GET, classroom, laboratory, and on-the-job performance measures. Continuing training includes

specialized training and operating industry events review and plant changes. Examples of specialized training includes vibration analysis, Raychem splicing, laser alignment, asbestos handling, and safety. Specialized offsite training coordinated by the maintenance training group includes Alco diesel training, infrared thermography, Limitorque motor operated valves, and pre-refueling training of control drive assembly and recirculating pump seals preparation.

The participants in the maintenance training programs have an opportunity to rate training and other suggestions regarding the training programs. The nuclear training department has developed a method to process the trainee's comments.

The team noted that in the past there was a licensee concern regarding the timeliness of personnel completing the requirements of maintenance training. To correct this deficiency, the team observed that the maintenance management and the maintenance training department are tracking the training scheduling and attendance of maintenance staff. The team concluded that plant management has increased the ownership in training programs, as evidenced by their participation in planning, monitoring, and evaluation activities.

Based on a review of the licensee's nuclear training manual, the team determined that no job specific training program existed for maintenance planners. Also, the first line supervisory maintenance personnel training program is currently in the developmental stage. The team further noted that two current supervisors recently assigned as first line supervisors had no documented site specific procedure training, only general indoctrination concerning plant procedures.

Conclusions

The training program is adequate for craft and management personnel. However, a first line maintenance supervisory personnel training program is not included in the overall maintenance training plan. In addition, there is no job specific training provided for the maintenance planners.

8.3 Establish Test and Qualification Process

Scope

This element evaluated, through interviews with personnel, tour of the training facilities, and review of procedures and documentation, the extent to which testing and qualification of maintenance personnel is integrated into the maintenance process.

Findings

The testing and qualifications process included written and practical demonstration skills. To assess training implementation, the team

reviewed a sample of quarterly training schedules, minutes of the monthly meeting between plant maintenance management and training center management and other specialists, a sample lesson plan, completed examinations, and trainee feedback forms.

The feedback program in the training department is functioning well, in accordance with Nuclear Training Department Procedures that define the Program Evaluation and the Program Evaluation Committees. The licensee's technical instructional staff and representatives of plant personnel meet at least once a year to review, assess, and recommend changes to specific maintenance training programs. The committee also reviewed the post training feedback data provided by the maintenance personnel. Formal and informal feedback exists between the Nuclear Training Department and plant maintenance personnel.

The training history for personnel is documented and personnel qualifications are traceable through records. The qualifications of maintenance personnel are prominently displayed in the maintenance area for supervisor's use in assignment of qualified personnel for maintenance activities. These personnel qualification status boards are maintained and controlled by the Nuclear Training Center.

Conclusions

The test and qualification process was determined to be well documented and implemented. Personnel qualifications are displayed and are traceable to training requirements.

8.4 Assess the Current Personnel Control Status

Scope

This element inspected and rated personnel status in the areas of testing and qualification, fitness for duty, work performance by unqualified personnel, and turnover rate. This area was evaluated through interviews with personnel and a review of procedures and documentation.

Findings

The Nuclear Training Manual is the document that describes requirements and programs for nuclear training of the personnel associated with the Pilgrim Nuclear Power Station. The manual also outlines the policy, the technical programs and courses, and describes the general programs and courses required for the maintenance department personnel. The nuclear training department maintains a matrix of personnel and qualifications at the station maintenance department areas for the maintenance supervisors use in assigning and scheduling work. The licensee has an established "Fitness for Duty" policy and program.

The facility has a stable craft work force with minimal turnover. However, over the past few years turnover has been evident in maintenance supervision positions. In December 1989, the new position of senior supervisor was created (one per discipline; electrical, mechanical, and Instrumentation and Control). One of the three originally assigned senior supervisors is no longer on the job. Five of the fifteen current maintenance first line supervisors have less than six months experience. The mechanical disciple had the highest turnover followed by the electrical disciple, with instrumentation and control being the most stable. Presently, there are two supervisor position vacancies one each in electrical, and instrumentation and control sections of the maintenance department.

Conclusion

The licensee has an experienced maintenance craft work force. The turnover rate in the first line supervisory positions is an area of concern. The licensee has implemented a fitness for duty program.

ATTACHMENT 1

Persons Attending Exit Meeting (November 16, 1990)

Boston Edison Company

R. Anderson, Vice President Nuclear Operations and Station Director
R. Bird, Senior Vice President Nuclear
B. Cannon, Senior Compliance Engineer
W. Clancy, Technical Section Manager
G. Davis, Senior Vice President Nuclear
D. Eng, Planning and Outage Department Manager
F. Famulari, Quality Assurance Department Manager
P. Hamilton, Compliance Division Manager
W. Rothert, Senior Program Manager
L. Schmeling, Plant Manager (Acting)
G. Stubbs, Plant Maintenance Section Manager
R. Swanson, Regulatory Affairs Manager
D. Tarantino, District Manager
E. Wagner, Vice President Nuclear Engineering

Nuclear Regulatory Commission

N. Blumberg, Chief, Operations Program Section, DRS
R. Eaton, Project Manager, NRR
J. Johnson, Chief, Reactor Projects Branch 3, DRP
J. Macdonald, Senior Resident Inspector, Pilgrim

ATTACHMENT 2

Persons Attending Exit Meeting (December 20, 1990)

Boston Edison Company

R. Anderson, Vice President, Nuclear Operations and Station Director
R. Cannon, Senior Compliance Engineer
D. Eng, Planning and Outage Department Manager
F. Fumulari, Quality Assurance Department Manager
P. Hamilton, Compliance Division Manager
E. Kraft, Plant Manager
D. Pierce, Deputy Maintenance Section Manager

Nuclear Regulatory Commission

A. Almond, NRR
J. Macdonald, Senior Resident Inspector, Pilgrim

ATTACHMENT 3

Summary of Weaknesses*

Weakness Description	Report Paragraph
The team concluded there is a weakness within the overall planning and supervision of maintenance activities which hinders the effective execution of tasks.	5.1, 5.4
The licensee's procedure review process failed to identify certain deficiencies which still existed when the lubrication sampling and change procedure was revised.	Attachment 4, 1.0

*A condition presented for licensee evaluation and corrective action as applicable.

ATTACHMENT 4

Background

From September 2 - 3, 1990, the reactor was manually shutdown due to feedwater level control problems. Associated with the shutdown, a number of operational complications occurred. A special NRC Inspection, 50-293/90-21, was conducted from September 5 - 7, 1990, to review this event. The NRC was concerned that inadequate maintenance may have contributed to several component malfunctions that occurred during the event. As a follow-up to the maintenance team inspection (MTI), two team members reviewed licensee actions associated with major inspection findings dealing with maintenance which are discussed in Inspection Report 50-293/90-21. The failure mechanism, causal analysis, and licensee corrective actions to resolve specific malfunctions which occurred during the event are discussed in NRC Inspection Report 50-293/90-20 (issued after Report 90-21). This attachment addresses the licensee's programmatic efforts to correct identified deficiencies associated with the event. Information obtained during the MTI was used in addressing the following findings.

1.0 Major Findings and Followup

NRC Inspection Report 50-293/90-21 identified certain major findings and conclusions which were associated with maintenance. This report provides additional details relating to these findings. The major findings as well as follow-up information are described as follows:

NRC Finding

Poor maintenance manifested by equipment failures complicated the mitigation of the event.

Follow-up

A 39-member Multi Disciplinary Analysis Team (MDAT) was established by the licensee to review the September 2 - 3, 1990 event to identify failures and to determine their root causes.

A review of MDAT findings as well as discussions with the MDAT team leader indicated that no specific failure which occurred can be directly linked to a specific deficiency in the maintenance program. The team, reviewed the 49 MDAT recommendations and identified those which are associated with maintenance program improvements as opposed to specific improvements related to single issues.

These programmatic recommendations are:

(1) The addition of junction box inspections to the preventive maintenance program.

(2) The establishment of guidelines for the inspection of areas affected by large leaks.

(3) Increased scope of feedwater regulating valve maintenance.

(4) The prompt updating of vendor manuals.

(5) Improvements to the lube oil monitoring program.

(6) Identification of valve packing requirements for all valves.

(7) Improvements to the program for recognizing recurrent events.

(8) Assure that warehouse parts are modified when modifications are made in the field.

To assure prompt incorporation of all MDAT recommendations into the maintenance program, their disposition is being specifically tracked by the onsite review committee.

Additional changes to the maintenance program are also being implemented and will be discussed later.

Although no specific weakness in the maintenance program can be attributed to a specific malfunction during the September 2, 1990 event, the implementation of the programmatic recommendations from the MDAT, as well as other maintenance program improvements have been implemented to prevent a similar recurrence.

NRC Finding

The licensee's corrective action program for addressing maintenance weaknesses identified by their self-assessment did not appear to be sufficiently aggressive.

Follow-up

A number of self-assessment initiatives have been conducted, including a nuclear managers' assessment, a work control task force to assess the work control process and an organization analysis and refinement (OAR) assessment. Many of the recommendations from these self-assessments have been or are in the process of being implemented. However, the OAR which is the most comprehensive of the self-assessments, which was initiated in January 1990 is still only in draft stage. It should be noted that some of the recommendations from the draft OAR report have already been implemented. Overall, the licensee has acted on many recommendations from self-assessments. However, completion of the OAR as well as approval of its recommendations could have been more prompt.

NRC Finding

Leak Sealant compound injections were not done in accordance with the facility's maintenance procedures.

Follow-up

This deficiency has been recognized by the licensee. A detailed critique of this repair was conducted. The critique recommended several procedural changes which have been made to preclude repetition. The critique further recommended that early corrective action be taken to control identified leaks. Leak sealant injections continue to be a problem due to a lack of control of the injection process. Failure to comply with the existing plant procedure and inadequate engineering reviews of plant design change field revision notices in the past resulted in a Notice of Violation being issued in Inspection Report 50-293/90-24. The licensee's actions to ensure proper leak sealant program implementation will be reviewed by the resident inspectors to ensure that the licensee's corrective actions are effective.

NRC Finding

An effective inspection of the electrical components and junction boxes exposed to the steam environment caused by the "B" feedwater regulating valve packing leak was not performed.

Follow-up

The MDAT recommended inspections be performed in areas adjacent to large leaks. The "Conduct of Operations" procedure will be revised to require this inspection. Also, junction box inspections have been added to the preventive maintenance program. The MDAT team leader indicated the current controls in place make minor repairs, such as gasket installation, a very time consuming activity. The effect of this is a reluctance to initiate minor repairs. The team discussed this observation with the licensee, and they agreed to examine the issue.

NRC Finding

The NRC observed workers removing the packing from the "B" FRV under inadequate lighting conditions. Additionally, the maintenance supervisor responsible for the "B" FRV packing removal was not directly supervising the workers at the work site.

Follow-up

Both the Maintenance Improvement Plan and the OAR contain recommendations and proposed program changes which are intended to improve the effectiveness of first line supervisors. Certain recommendations to improve supervision have been implemented; others are still being evaluated. Also, additional supervisors have been added to the staff. The requirement to assure adequate lighting exists at a work site has been added to the pre-job planning checklist.

Finding

The work prioritization process was not effective for establishing the appropriate priority for the FRV repair.

Follow-up

The priority of the repair effort was judged by the licensee to be correct for the original scope of work and plant conditions. The worsening of the leak, combined with the event, was not foreseen. The maintenance team found the licensee's work prioritization team to be an effective method for pricritizing work.

NRC Finding

The RCIC overspeed trip tappet did not move freely due to fouling apparently caused by a liquid gasket substance that had been used during the last bearing cover reassembly.

Follow-up

The specific cause for the fouling of the RCIC lube oil has not been determined. The maintenance work plan for the RCIC work did require lube oil samples be taken. However, problems encountered in handling the sample precluded obtaining sample results. No lube oil sludge sample was retained for analysis. The lubrication sampling and change procedure, 3.M.4-17.4 has been revised to incorporate improvements. The NRC's review of this procedure indicates it is still deficient in the requirements for the review of sample results. For example, no acceptance criteria is established for specific elements sampled. As a result, the most recent RCIC lube oil sample results indicate "Acid number has increased since last analysis along with a substantial increase in copper level." No licensee evaluation of this sample result was undertaken prior to the NRC review. The team is concerned with the identification of deficiencies in the lube oil program. Licensee corrective actions to previously identified lube oil analysis program weaknesses failed to address the most recent NRC concerns. The failure to detect lube oil procedure deficiencies during the review process of the recently revised procedure is considered to be a weakness.

NRC Finding

Improper dispositioning of at least two failure and malfunction reports (F&MRs) (incorrectly identified as work requests in Report 50-293/90-21) written for the RCIC overspeed trip mechanism prior to the event indicates poor maintenance or troubleshooting practices.

Follow-up

The MDAT has apparently resolved the issue of RCIC overspeed trip mechanism problems. As a result of past problems, failure and malfunction reports (F & MRs) had been prepared as required. In retrospect, a more detailed review of these F & MRs may have identified the problem sooner. However, the maintenance team review of recent F & MRs showed these reviews to be very detailed.

NRC Finding

There were no maintenance supervisors or plant engineers at the RCIC disassembly to record as-found data or provide assistance to the workers if needed.

Follow-up

The facts associated with this finding are that no maintenance supervisors or plant engineers were present during the initial RCIC disassembly. However, the maintenance work plan did specify the recording of certain as-found data and did specify the vendor be present during the performance of certain work. Also, at the time of this outage only two mechanical supervisors were available to support the workload. The MDAT, as well as licensee management, identified supervisory staffing levels as a weakness. The licensee has since initiated recruitment activity, and the present staff consists of five mechanical supervisors.

System engineer support also changed. RCIC/HPCI system engineering assignments have been expanded from one to two individuals. The importance of accurate documentation of as-found data during maintenance activities has been reinforced to these system engineers.

The overall need for improvement in the supervision of work has been recognized by the licensee and has been addressed in the Maintenance Improvement Plan as well as OAD recommendations. Certain of these recommendations have been implemented. Others are under evaluation.

NRC Finding

Hydrodynamic events to the "A" shutdown cooling system (SDC) system have occurred a number of times in the past. The system walkdowns performed by the licensee to inspect for piping damage after these events were not so comprehensive as they could have been. A damaged pipe hanger was documented only after this last event; there was no data from previous walkdowns indicating the condition of that pipe hanger.

Follow-up

Detailed licensee review has determined that the condition of the pipe support had been identified and is an initial installation condition.

2.0 Licensee Review of Maintenance Requests

As part of the licensee's investigation of maintenance activities, a review of maintenance requests (MRs) was initiated after the September 2, 1990 event to determine if programmatic weaknesses or certain negative trends in the performance of maintenance are evolving. The licensee established three teams under the direction of senior management composed of system engineers, training, engineering division, and QA personnel. The teams were charged to reviewed I&C, electrical and mechanical maintenance activities which had been completed within the previous 30 days. Work reviewed was balance of plant work but considered important to safety. Initially seventeen MRs were selected for review but this sample was increased by five. MRs in the mechanical area due to a number of deficiencies observed in the original sampling. Of the 21 completed MRs reviewed by the licensee, 11 had at least one identified deficiency.

The team reviewed the results of the licensee's evaluation of the complete MRs and expressed concern over the apparent large number of deficiencies identified. The team independently reviewed each of the MRs which exhibited a deficiency. This review consisted of the work packages and observation of the completed work at the job site. This review was conducted by the team to provide an independent assessment to assure that no significant problems exist relative to the performance of maintenance.

Several types of problems were identified by the licensee's review. Additional deficiencies were not always identified with the item that was repaired by the work request. MRs were improperly closed out, poor workmanship and supervision were noted, minor material discrepancies such as damaged fasteners, and minor oil leaks were found. The team agreed with the licensee's evaluation that none of the above observations affected operability of the repaired components.

The team also reviewed the corrective actions taken by the licensee in response to the noted deficiencies. These actions consisted of initiating new MRs to correct conditions that were identified, ensuring that new procedures now in place will prevent recurrence of identified deficiencies, discussions of expectations with maintenance department personnel, and the implementation of a Plant Quality Improvement Program.

Overall, the team determined that the licensee's review of recently completed maintenance activities to determine if problems exist in the performance of maintenance was a positive initiative. However, the team also concluded that the review of the completed evaluation by station management should have been documented, just as the resolution of any other deficiency which is identified is documented. The documentation of the management review would provide assurance that all aspects of the matter had been evaluated and that adequate corrective actions are in place to prevent recurrence. The licensee indicated future evaluations of this type would be documented.

As an additional measure, the NRC team independently selected and reviewed five safety related maintenance activities utilizing the licensee's inspection attributes. The review included physical inspection of the work sites. No major deficiencies were noted. Some damaged lagging and abandoned-in-place equipment was identified. The licensee has programs to address these conditions. The auxiliary bay area was found in a deteriorated condition due to the moisture resulting from intentionally plugged floor drains, along with equipment leaking. The licensee indicated this matter would be evaluated.

During tours of the facility, the NRC team observed that minor equipment deficiencies were being identified and properly documented by deficiency tags.

Summary

The MDAT team could not link any failure during the September 2, 1990 event to a specific deficiency in the station's maintenance program. Many programmatic recommendations were made by the MDAT team to improve the overall program. These improvements were detailed earlier in this section. The licensee's corrective action program is adequately providing for self-assessment of identified problems. The completion of the DAR could have been more timely in order to expedite the implementation of the report recommendations.

The licensee has made programmatic changes to ensure that electrical junction boxes and switches are inspected for water tight integrity, adequate lighting is specified on pre-job planning checklists and that overall supervisor training is being addressed to provide better supervisory oversight of maintenance tasks. However, it is noted that the licensee's response to improve the oil sampling and change procedure appears to have been deficient (the inspectors observed that recent sample results indicated elevated copper concentrations and this did not receive proper attention to determine the cause of the increase). The existing plant procedure does not specify acceptable levels of analyzed elements. The failure to detect lube oil procedure deficiencies during the review process is a weakness. The licensee investigation of the September 2, 1990 event to ensure that there were no negative trends developing in the performance of maintenance activities indicated that minor problems still existed after the review of completed non-safety work packages. The review indicated no significant safety concerns were discovered that affected equipment operability. To examine this, the inspectors determined by a sample of safety-related work packages utilizing the licensee's inspection attributes that no deficiencies existed in the sample which affect equipment operation. The licensee's initiatives for self assessment are noteworthy. The recently initiated programmatic changes are intended to resolve the recently identified maintenance program problems.

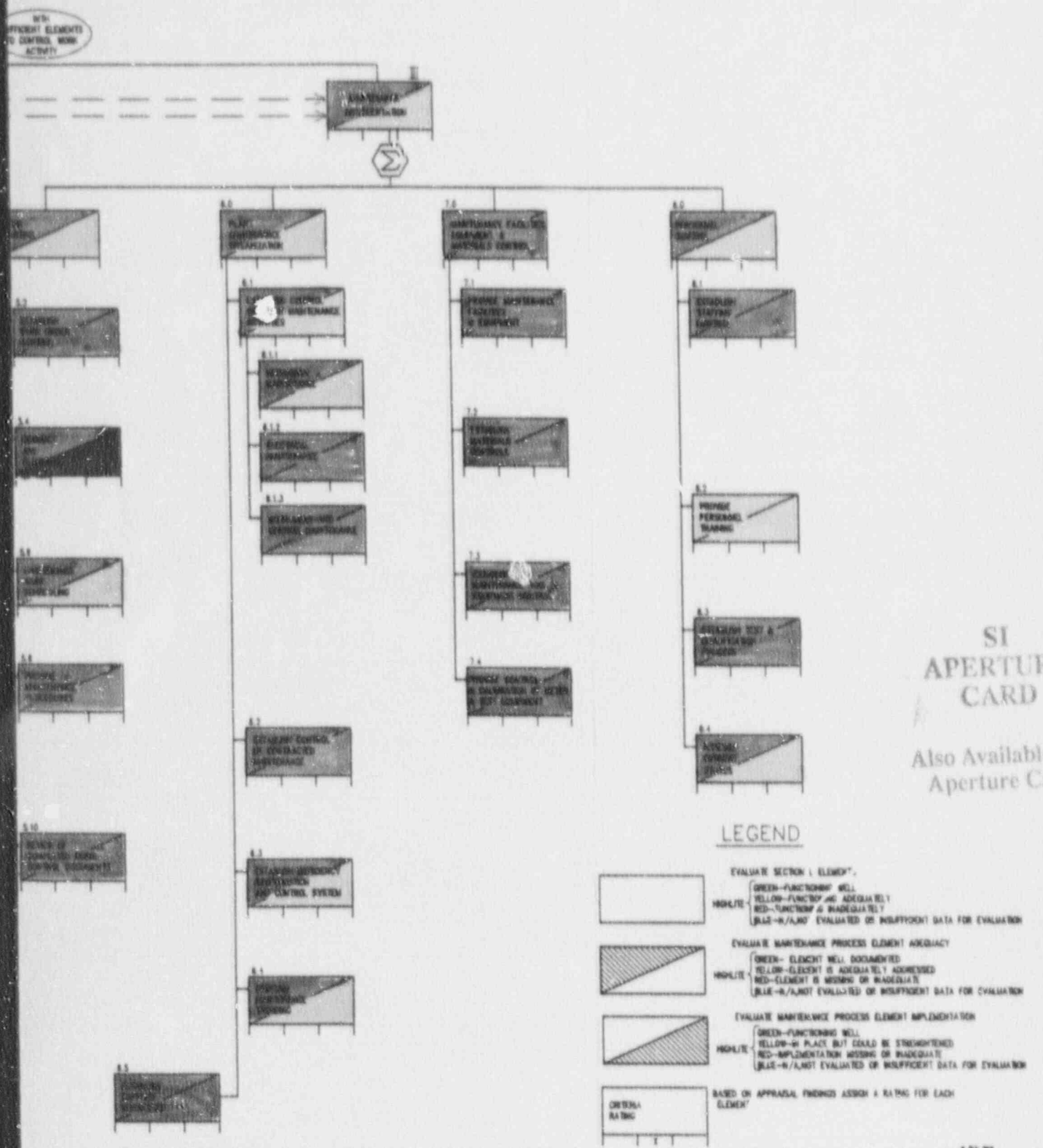
Conclusion

A detailed analysis of the September 2-3, 1990 event was made. The additional review of completed MRs was a positive initiative. Programmatic changes and the implementation of self-assessment recommendations along with increased supervisor staffing have been made. The failure to detect lube oil procedure deficiencies during the procedure review process is an area of concern.

TREE

FIGURE 1

PILGRIM

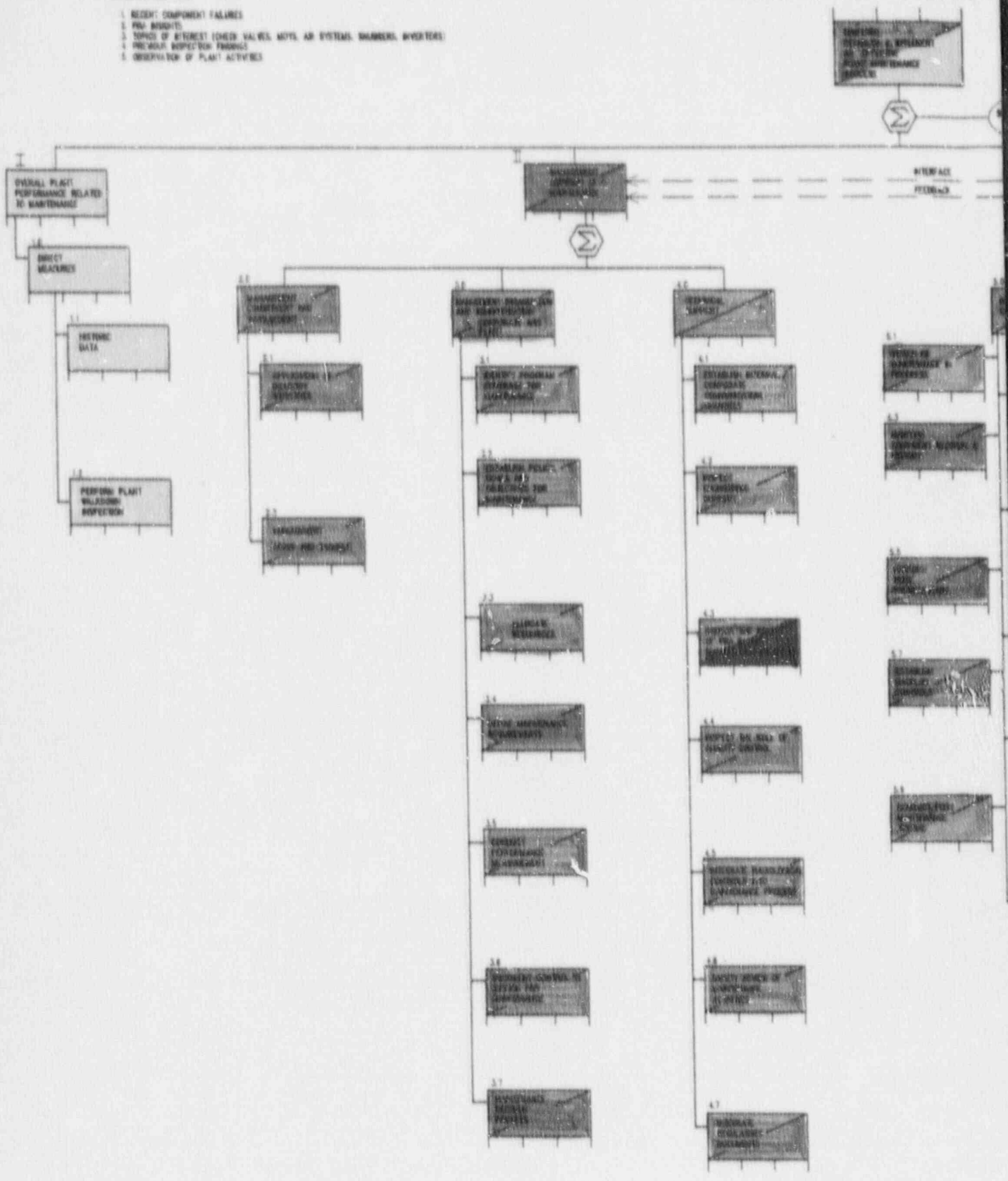


8/13/88
DRAWING NUMBER
425768-C

PRESENTATION TREE
MAINTENANCE INSPECTION

TREE INITIATORS

1. RECENT COMPONENT FAILURES
2. PRA INSIGHTS
3. TOPICS OF INTEREST (CHECK VALVES, MOV'S, AIR SYSTEMS, BREAKERS, INVERTERS)
4. PREVIOUS INSPECTION FINDINGS
5. OBSERVATION OF PLANT ACTIVITIES



NOTE: THIS DWG IS USED IN CONJUNCTION WITH 425801, 425802, 425803, 425804, 425808, 425807 & 425808