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Facility: Pilgrim Nuclear Power Station

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Scope: To evaluate the effectiveness of processes for identifying, resolving, and preventing issues that degrade the quality of plant operations and safety. In addition, the team conducted a limited review of the recent Maintenance Improvement Program initiatives and their effectiveness. The team used the guidance of NRC Inspection Manual Chapter 40500 and conducted a close examination of a number of operational events to help focus the team's examination of the Boston Edison Company (BECo) corrective action processes.

Findings: The corrective action processes reviewed were found to be generally effective. The team identified no violations and two unresolved items. One unresolved item **(URI 96-80-03)** identified a broad based performance concern with proper procedural use (reference Section 8.0). The second unresolved item **(URI 96-80-02)** involved the conduct of two maintenance activities and potential deficiencies in the implementation of new work control processes (reference Section 7.3). One noteworthy process weakness was identified involving the adequacy of root cause analysis and the thoroughness of BECo's examination of use of procedures causal factors (reference Section 3.0). An inspector follow item **(IFI 96-80-01)** was identified to review the results of BECo's evaluation of unexpected plant response to recirculation pump trips (reference Section 4.0). Results are summarized in the Executive Summary.

## EXECUTIVE SUMMARY

## Pilgrim Inspection Report 50-293/96-80

### Problem Identification

The various problem identification processes utilized by the Pilgrim staff were effective in surfacing problems, concerns, and deficiencies. This effectiveness was demonstrated in a variety of ways, including: frequent and broad use of Problem Reports (PRs); a low threshold for PR initiation; the employee concerns program; and, the use of lessons learned meetings and critiques following events or plant evolutions of a non-routine nature. In contrast to these effective problem identification processes, the team noted a licensee identified weakness in Problem Reporting and Quality Assurance Deficiency Reporting (DR) trending and trend analysis. BECo is credited with the self-identification of this program weakness.

### Root Cause Analysis

The team found, based upon their sampling of Level 1 and 2 Problem Reports, that the root cause analysis process was not consistently thorough, and in particular, did not adequately examine procedure usage causal factors. Of the PRs reviewed by the team, procedural adherence, usage, adequacy, and understanding were an element of one or more of the events, but not explicitly addressed in the root cause analysis of those events. The lack of consistency in the root cause process was demonstrated by examples of: varying depths and scope of analyses; lack of independent examination and verification of information by evaluators; missing or incomplete information in the analyses; use of involved parties as evaluators; the lack of input from parties directly involved with an event; and reflected in the 10 to 20% rejection of root cause analysis (RCAs) by the problem assessment committee (PAC). This lack of consistency was also reflected in the generally poor quality of RCA documentation packages which the team viewed as a contributor to problems of translating causal factor data from the PR package into the PR integrated action data base (IADB). Another contributing factor to the quality and consistency weakness of root cause analyses was BECo's self-identified lack of or minimal training being afforded to all root cause evaluators. Overall, comprehensive and thorough root cause analyses, when done, suffer from a weak process, weak training/refresher, and inappropriate assignment of personnel.

### Corrective Actions

The team found that the corrective actions developed from the root cause analyses examined were generally good. Exceptions to this conclusion were cases where the team identified a root cause other than identified by the BECo evaluator (reference use of procedures observation above). The team identified two incomplete or overlooked training corrective actions which appear to be administrative oversights reflective of a potentially weak corrective action tracking process. Also, the team's review of the April 24, 1995 automatic EDG start event identified that a previous EDG automatic start event was not considered by the evaluator in determining root and contributing causes of the event.

## Oversight Groups

The team concluded that the oversight functions provided by the onsite and offsite review committees were, with a few minor exceptions, appropriately conducted. The exceptions included: a self-identified finding where not all completed significant Level 1 PR RCAs were being forwarded to the NSRAC; the Self-Assessment Program oversight functions required of the Nuclear Managers Committee were self-identified as not having been systematically exercised; and thirdly, the team identified that the ORC charter did not reflect the new station organization with respect to the I&C discipline representation on the committee. Several positive attributes were observed of these oversight groups including: timely and thorough reviews of plant events; comprehensive meeting minutes; good tracking of followup items; and good contributions made by outside BECo representatives on the offsite review committee.

## Self-Assessments

The team's review of the various self-assessment functions provided by the Quality Assurance staff, Departmental Self-Assessment Programs, management observation program, and independent third-parties provided generally good processes and performance feedback. Quality Assurance (QA) audits, surveillances, and self-assessments have provided comprehensive and thorough coverage of all functional areas as reflected in the quality of DR findings and audit assessments. A QA sponsored Corrective Action Self-Assessment conducted in December 1995 was reviewed and found to be generally comprehensive and self-critical of the corrective action processes examined by this NRC team. Department self-assessment programs varied in quality and coverage of their respective functional area, however, this observation was also self-identified and appropriate corrective actions were being developed at the time of this inspection. Third-party assessments were examined and found to have results consistent with BECo's internal self-assessments. Collectively they apparently missed the common cause theme of improper use of procedures (section 4.0 and 8.0)

## Maintenance Improvement Program Status and Effectiveness

BECo's maintenance improvement initiatives, recent re-organization actions, and the resolution of selected maintenance-related problems to assess the overall effectiveness of changes made to address long-standing work planning and control issues were reviewed. Both formal and informal problem identification and resolution processes were examined and assessed during this review.

The team found that rework and recurring maintenance evaluations were not consistently being performed by the maintenance organization per the existing procedural guidance. However, BECo acknowledged a weakness in this area and issued PRs 96.0033 and 96.0035 to address rework items during the team's onsite review. Notwithstanding the current procedural implementation shortcomings, team interviews and documentation provided by Maintenance Department Managers clearly demonstrated that rework was a concern and that rework was an important indicator of maintenance performance.

The Maintenance Performance Assessment Program was viewed by the team as an effective management tool to address maintenance performance. Efforts to

focus on in-process work versus post-activity reviews were commendable. Insights from these assessments were being incorporated into department self-assessments and the performance improvement initiatives. The team noted that station work control managers have also identified objectives, strategies, and performance indicators for 1996, that are intended to improve overall program effectiveness.

Two recent work control related events were examined by the team to assess the new work control process as defined in procedure 1.5.20. Based upon these two examples and the work control processes examined, the team concluded that, overall, the new work control process (which is one of a number of long-term corrective actions taken by BECo to improve in the maintenance area) was generally effective.

Notwithstanding, potential work control process implementation deficiencies appear to have contributed to the inappropriate post-work testing as identified in the PRs reviewed by the team. A preliminary examination of the circumstances involving these two PRs indicated to the team another possible procedural use and/or adherence concern. The BECo staff had not completed their evaluation of these events. Pending inspector review of these evaluation results, this item was unresolved **(URI 96-80-01)**.

**Overall Summary**

The team identified generally effective corrective action processes. The weaknesses identified in the root cause analysis process and the use of procedures issues identified in the various processes and activities reviewed during this inspection, represented to the team a vulnerability, that if not promptly addressed, could lead to similar and potentially more significant performance concerns or events than those reviewed by the team to derive this conclusion. The various use of procedures and adherence deficiencies identified by the team and not specifically recognized by the BECo managers and staff (including oversight groups), via station corrective action processes, collectively represent a broad fundamental performance weakness and is unresolved **(URI 96-80-03)**.

## TABLE OF CONTENTS

## DETAILS

### 1.0 INTRODUCTION

The purpose of this team inspection was to evaluate the effectiveness of Boston Edison Company's (BECo's) controls in identifying, resolving, and preventing issues that degrade the quality of plant operations or safety. The team used the guidance of NRC Inspection Manual Chapter 40500 in conducting this evaluation. To assist the team in focusing their evaluation of the licensee's corrective action processes, a number of specific events were examined by the team. The team also conducted a limited review of the recent Maintenance Improvement Program (MIP) initiatives and their overall effectiveness. The review of human performance issues associated with recent plant events and of MIP initiatives were assigned to the team via the Plant Performance Review conducted by the NRC staff in October 1995.

### 2.0 PROBLEM IDENTIFICATION

A sampling of the various problem identification programs were examined by the team to determined their extent of use and effectiveness. The team reviewed implementing procedures, interviewed a cross-section of responsible plant managers and plant workers, observed problem identification processes in progress, and conducted followup of selected problems and issues.

#### 2.1 Problem Reporting

The Problem Report (PR) process is governed by Nuclear Organization Procedure NOP92A1. The team found the process well-defined. Implementation of the PR process to formally address identified problems and/or concerns was observed to have been generally effective. PRs were observed by the team to have been the most prevalently used vehicle for problem identification. The PR process was found to be reasonably structured and used by the entire nuclear organization. The broad use and low threshold of PR initiation was evident. Management support of the PR process was also evident and the Problem Analysis Committee (PAC) review of all PRs was determined to have added quality and consistency to the PR process.

The team did note the lack of effective trending of PRs to assess repetitive problems and/or potentially adverse performance trends. This was viewed as a program weakness. The team acknowledged that the plant staff had earlier identified this process shortcoming, as documented in the December 1995 Corrective Action Self-Assessment (reference section 6.5) and had initiated action to develop a trending program.

#### 2.2 Lessons Learned Meetings and Critiques

The licensee has recently implemented (informally) Lessons Learned meetings following significant planned evolutions for the purpose of documenting and learning from problems encountered or barriers not anticipated in the conduct of these activities. Lessons Learned meetings were also used to build upon the positive aspects of the evolutions. The meetings were implemented to be constructively critical and non-confrontational, with craft worker participation encouraged. Lastly, the lessons learned from these meetings were captured in meeting minutes for broad distribution and use.

The critique process was formalized by Pilgrim Nuclear Power Station Procedure No. 1.3.63, Conduct of Critiques and Investigations. Critiques are initiated via management prerogative to formally document a better and more timely understanding of keys issues or concerns involving an event or problem. Procedure 1.3.63 provides appropriate structure to the process and ensures proper documentation of the results for followup. Team review and interviews identified that critiques have a more negative connotation, but BECo management was sensitive to this aspect of the process and limited their application, where possible. Notwithstanding, critique documentation reviewed by the team reflected an effective fact-finding and corrective action initiation process.

The team attended a Lessons Learned Meeting following a planned plant downpower evolution to conduct corrective maintenance. The team observed good involvement and participation by all parties. Discussions were open and frank. Suggestions for improvement appeared to have been freely given and well received by the management facilitator. Although no issue discussed at this meeting lead to the issuance of a PR, the meeting did lend itself to good problem identification and corrective action initiation. Meeting minutes were written and a copy provided to the team for review. No concerns were identified.

## 2.3 Nuclear Safety Concerns Program

In addition to reviewing the governing program guidance, the team interviewed the manager of the Nuclear Safety Concerns Program (NSCP). This program, initiated in 1994, serves as a vehicle for all employees and contractors to report nuclear safety concerns and have the concerns addressed at a management level. The program does offer the option of confidentiality, if requested. Concerns are encouraged by the program to use their chain of command and the PR process to address their concern. In some instances the NSCP staff will generate a PR. However, should the initiator object to the use the PR process, the concern can be addressed more discretely through the NSCP at a management level.

The team observed widely disseminated NSCP advertisements and concerns forms available throughout the plant. In spite of this broadly publicized program, a small interview sampling of plant staff determined that the worker level employees were not that familiar with the program. Notwithstanding, NSCP appeared to be a viable problem identification and resolution process when routine chain of command processes are chosen not to be used.

## 2.4 Detailed Event Followup

The team examined a number of PRs to better focus their review of the corrective action processes and to assess the overall effectiveness of these processes in identifying causal factors and appropriate corrective actions. A brief summary of the PRs examined and specific team observations for each event is addressed below.

### 2.4.1 Missed Core Spray Surveillance (PR 95.9448)

An August 1995 quality assurance (QA) audit identified the missed performance of the May 1995 surveillance procedure No. 8.5.1.3, "Motor Operated Valve Core Spray (CS) system Quarterly Operability Test" for the "B" loop valves. The test of the "A" loop valves was performed; however, both loops were signed off in the master surveillance tracking program (MSTP) as completed. BECo determined that the cause of this missed Technical Specification surveillance test (reference LER 95-09) was operator error due to inattention to detail.

The team determined that, for situations where the surveillance test procedure addresses both sub-systems and only one sub-system is tested, the operators are procedurally directed to initiate a Problem Report and a NWE Surveillance Test Review Form to capture this testing anomaly. These procedural requirements were not followed and the licensee's root cause analysis did not specifically address this operator performance shortcoming as a root or contributing cause. This was a team identified example of improper procedural adherence (reference Section 8.0). Secondly, the corrective actions reflect that the applicable test procedure (and others like it) was revised to test the A and B sub-systems by separate test procedures. Consequently, the team concluded that a procedural inadequacy directly contributed to this event. The team also determined that neither licensed operator involved with this event participated in the critique. This was viewed by the team as an event assessment weakness. Lastly, the team noted that this missed surveillance was discovered through a QA audit and not by the Operations staff internal review processes.

### 2.4.2 Control Rod Inserted without Blade Guide installed (PR 95-9234)

On April 21, 1995 during the refueling outage (RFO), control rod 22-35 was inserted without a blade guide installed. The licensee determined the root cause of the event to have been poor communications between the control room operator and the operator in-charge stationed at the hydraulic control unit (HCU). This was based upon the control room operator having advised the operator in-charge that no blade guide was installed at the control rod location. The rod insertion proceeded despite this information being communicated. The team determined that inadequate use of procedures and procedural inadequacy also contributed to this event. Specifically, the operators involved did not verify the blade guide was installed prior to the control rod insertion, as required, and that an operator aid used by the licensed operator in-charge was not a controlled document and was found to be in error. This was a team identified example of improper procedural adherence and usage (reference Section 8.0). The team determined that no corrective actions regarding procedural use or adequacy were implemented by the licensee for this event.

### 2.4.3 Control Rod Inserted in a Twisted Blade Guide (PR 95-9255)

On April 30, 1995 during the RFO, control rod 18-35 was attempted to be inserted and was wedged into a twisted double blade guide. The licensee determined the root cause of this event to have also been poor communications between the control room operator and the operator on the refueling floor. In

addition, the licensee determined that a contributing cause was that the operator on the refuel bridge did not monitor the rod insertion, as required, due to being distracted by other refueling activities. The cause of this event was determined by the team to be inadequate procedural adherence (reference Section 8.0).

Similar to the team's observations discussed in Section 2.4.2, the licensee did not specifically recognize and address the procedural adherence deficiencies which contributed to this event, other than disciplinary action taken against the operator on the refuel bridge for not monitoring rod insertion. The lack of recognition of the use of procedures and procedural adequacy causal factors for this and the other control rod insertion event, represented to the team missed opportunities for more definitive corrective actions and missed data for Operations staff human performance trend analysis.

**2.4.4 Inadvertent Automatic Start of the "A" EDG (PR 95.9230)**

On April 24, 1995, during the performance of a tagout that was required to implement procedure 3.M.3-47, Load Shed Relay Operational/Functional Test, the "A" EDG automatically started when the feeder breaker (A504) from the start-up transformer to A-5 bus was racked down. Although the A-5 bus was de-energized at the time, and the EDG output breaker (A509) to the bus was racked down and tagged open, the racking down of the A504 breaker completed a permissive in the EDG's automatic initiation circuit.

The licensee determined the cause of this event to have been the failure of the electrical coordinator to correctly specify the sequence on the tagging order for removal of bus A-5 from service. This was due, in part, to the electrical coordinator's mis-reading of an electrical drawing. Proper removal sequence would have placed the EDG engine stop switch in the "stop" position prior to racking down the A504 breaker. The licensee determined that the proper sequencing of the tagging order relied on a knowledge based decision. Further, they noted that while the subject procedure specified a specific sequence for returning the A-5 bus to normal line-up, there was no specific precautions or notes pertaining to the specific order for the tagging sequence necessary for establishing equipment conditions needed to conduct the test.

The team made the following observations: 1) The PR specified that a HPES evaluation would be performed in accordance with procedure 1.3.102.6 to determine the cause of this Significance Level 2 event. From interviews it was determined that: the person performing the evaluation was the individual assigned as the electrical coordinator, and therefore was directly involved in the event itself; this was his first and only time performing such an evaluation and he had no specific expertise in the conduct of root cause analysis; and, he was provided no formal HPES evaluation training. 2) Although the root cause evaluation documentation was not clearly and concisely written, the team concluded that appropriate root and contributing causes were identified for this event; and, 3) The translation of information from the Causal Factor Matrix into the Integrated Action DataBase (IADB) for this PR appeared to lack consistency.

### 2.4.5 Chloride Intrusion Event (PR 95-9282)

On May 14, investigation of conductivity alarms (condensate demineralizer inlet/outlet and waterbox conductivity) by the Chemistry staff identified high chlorides in the condenser hotwell (158 ppm), CST (10 ppm), and reactor vessel (900 ppb). The licensee determined the cause to have been a condenser tube plug installed in the incorrect tube on the outlet side tubesheet as a result of inadequate verification (by the worker) of the tubesheet plugs in relation to the tube sheet maps.

The team observed that the root cause analysis and event critique focused mainly on the Operations and Chemistry staffs' poor communications in identifying this chloride intrusion event earlier. This was viewed as good problem identification and analysis per the PR process. A review of the corrective actions for these communications concerns found them to be appropriate. Corrective actions for the direct root cause of this event (improper tube plugging verification) was to impose an additional independent verification activity and conduct maintenance staff training. These actions were viewed by the team as appropriate.

The team noted that this event was repetitive. During follow up of the corrective action involving maintenance staff training (lessons learned training scheduled to be conducted prior to the next refueling outage per memorandum M95-53) the team identified that the training memorandum action items did not get communicated to the maintenance training staff. This was determined by the licensee to have been a administrative oversight because the corrective action memorandum was attached to a different PR (PR 94-9496) which captured a similar event in 1994. PR 95-9282 did not address this previous event or its similarities.

### 2.4.6 Start of Residual Heat Removal Pump with Suction Valve Shut (PR 95-9292)

On May 17, 1995, operators were restoring the B loop of shutdown cooling to service when the B RHR pump was started and run for approximately two minutes with its associated suction valve shut. After the pump was secured, the valve was opened and a water hammer transient was experienced in the RHR piping. The licensee determined that the root causes for this event were inattention to detail and lack of self-checking.

The team's review identified that the governing procedures for restoration of shutdown cooling were not followed and lacked some clarity. This was a team identified example of inadequate procedural adherence and adequacy (reference Section 8.0). Potential contributing factors were crew composition and cumulative operator fatigue. The team determined that these human factors and procedural adherence and adequacy observations were not sufficiently explored in the licensee's critique and root cause evaluation of this event.

### 2.4.7 Control Rods Mispositioned During Forced Downpower Event (PR 95-9528)

On October 6, 1995 a salt service water seaweed intrusion caused the control room operators to rapidly reduce reactor power. Power was initially reduced by running back recirculation pumps to minimum speed and than control rods

were inserted in the reverse withdrawal sequence. Initial licensee evaluation of this event and control room operator performance identified that one control rod was mispositioned during the rod insertion sequence. A subsequent review of this event by an independent third party (further discussed in Section 6.4, below) identified that the initial licensee evaluation of this event was poor because two additional rods were mispositioned during the rod insertion sequence and this was not detected during the initial post-event review.

Team followup identified that the licensee fully concurred with the third party assessment of this event. BECo had improperly characterized the single rod mispositioning event as a Significance Level 2 event (requires only an evaluation) vice Significance Level 1 event (requires a detailed root cause analysis) and accordingly did not provide appropriate management focus to the evaluation of this event. The team identified that this event involved the failure of the control room operators to follow the established rod insertion sequence and was another example of a procedural adherence problem (reference Section 8.0).

## 2.5 Problem Identification and Event Followup Summary

As discussed in subsequent sections of this report, a variety of additional problem identification processes were observed at the facility including: departmental self-assessments; Quality Assurance audits and surveillances; third party audits; and oversight committee activities. The subsequently discussed programs and the above stated problem identification processes were determined to be generally effective in identifying and raising issues to station management for appropriate causal determination and resolution.

As discussed in the preceding sections, a number of examples of inadequate procedural use, adequacy, and adherence causal factors were identified by the team during their review of the selected plant events. These causal factors were not specifically addressed by the BECo staff in their assessment of these events. These particular causal factor determinations are important because procedure adherence and adequacy are essential elements for assuring licensed activities are carried out in a safe manner. (See Section 8.0 for further discussion of this team observation and assessment.)

# 3.0 ROOT CAUSE IDENTIFICATION

The team evaluated the effectiveness of BECo's root cause assessment processes through a review of selected procedures, a review of PRs, and interviews with BECo staff. Pilgrim Nuclear Power Station (PNPS) Procedure No. 1.3.102, "Root Cause Analysis and Corrective Measures Evaluation," defines basic methods for determining root cause and corrective measures to prevent recurrence. The procedure allows for multiple levels of depth and alternative approaches to be used depending on the complexity of the problem or event under review.

Alternative means of analysis are provided in several sub-tier procedures. Although the team considered the flexibility allowed by PNPS 1.3.102 to be appropriate for root cause assessment (RCA), it considered this flexibility, in conjunction with limited requirements for assessment documentation, to be a potential contributor to the inconsistent quality of RCAs reviewed by the team.

The team noted that Nuclear Organization Procedure (NOP) 92A1, "Problem Report Program," provides criteria for determining the significance level of PRs. NOP92A1 requires that PRs determined to be Significance Level 1 (as exemplified by the events discussed in Sections 2.4.1, 2.4.2, 2.4.3, 2.4.5, and 2.4.6) require a formal root cause analysis. PRs determined to be Significance Level 2 (as exemplified by the events discussed in Sections 2.4.4 and 2.4.7) are allowed to be addressed through evaluations. Evaluations require the determination of direct cause rather than root cause. BECo has defined direct cause as the final action, equipment failure, or malfunction that caused the event to occur.

The team found that RCAs and evaluations were typically conducted by personnel experienced in conducting RCAs or evaluations. Most of these assessments were conducted by system engineers with several years of technical expertise in their current position. For the I&C and Maintenance departments, the assessments were generally conducted by personnel outside the group conducting the work. The team considered this approach to be potentially beneficial in facilitating objectivity and independence in the assessment process. Evaluators estimated that they were dedicating 30-50 percent or more of their time in activities related to conducting RCAs and evaluations; and that their performance appraisals were in part based on the quality of their assessments. Evaluators consider RCAs and evaluations a primary job duty and believed that station management was adequately supporting their accomplishment of these duties.

The team found that the training of plant staff (evaluators) in root cause assessment was weak. Although many of the evaluators were trained in RCA techniques, most evaluators who received formal training indicated that they were trained approximately 3-4 years ago. The evaluators had not received subsequent refresher training and did not believe they were scheduled for future training sessions. The team also found that the depth of training was inconsistent, ranging from several days of training in root cause methods to a few hours of training on the site root cause assessment procedures.

Interviews indicated that root cause assessments were not consistently assigned to individuals with formal training in the appropriate root cause assessment methodologies. PNPS 1.3.102.6, "Human Performance Enhancement System," states that only personnel who have satisfactorily completed Human Performance Enhancement System (HPES) coordinator or evaluator training may serve as the qualified evaluator for an event. The team found through interviews that personnel who were not HPES trained were occasionally assigned HPES evaluations. This was a team identified example of improper procedural adherence (reference Section 8.0).

The team noted that the licensee had identified, during their December 1995 Corrective Action Self-Assessment, weaknesses in BECo staff awareness of minimum training requirements for personnel conducting root cause assessments and a lack of documentation of qualified staff. BECo initiated PR-95.0660 in response to these findings. The BECo staff was evaluating potential corrective actions at the time of this inspection.

NOP92A1 requires the Problem Analysis Committee (PAC) to review selected PR action item responses for technical adequacy. The PAC chairman is the Operations Department Manager and the PAC includes senior representatives from the following areas: maintenance, regulatory relations, quality assurance, nuclear services and nuclear engineering. The team observed a PAC review of several evaluations and RCAs and found that the PAC members generally demonstrated a questioning attitude in their reviews. The team concluded that the PAC appeared to be an effective means of fostering consistency of assessment quality across departments. The team noted through interviews that the PAC was estimated to reject between 10 and 20 percent of action item responses because of inadequate evaluations or RCAs. Although the rejection rate suggested an effective PAC review process, the team considered the rejection rate indicative of weaknesses in the evaluations and RCAs performed.

As highlighted in section 2.4 above, the team evaluated the effectiveness of BECo's root cause assessments and evaluations through a detailed review of the assessments and corrective actions developed for a number of events. The team found that the root cause assessments frequently lacked depth of analysis (e.g., the assessment documented personnel errors without addressing why the errors occurred) or were not comprehensive in consideration of other potential causal factors. For example, a common weakness in the analyses was a failure to adequately examine procedure use causal factors. Procedure adherence, adequacy, and understanding causal factors were apparent contributors to one or more of the events reviewed, but not explicitly addressed in root cause assessments of those events.

In addition to the RCA weaknesses described above, the team made several observations concerning the conduct of RCAs at PNPS that were considered potential contributors to the inconsistent quality of RCAs. The team noted instances of evaluators failing to independently examine and verify information, missing or incomplete information in the analyses, use of involved parties as evaluators, and lack of input from parties directly involved with an event.

The team also found the quality of RCA documentation practices to be generally poor. RCAs typically did not identify the assessment methods used, depth of analysis conducted, and information sources considered. Although the PR packages clearly identified root and contributing causes, the bases for these determinations were not always readily apparent. The team viewed these documentation weaknesses as contributing to potential problems in RCA validation and observed discrepancies in the translation of causal factor data from PR packages into the Integrated Action Database (IADB).

During this inspection the team made additional observations concerning procedure use that underscore the potential significance of the failure to

explicitly address procedure usage in root cause assessments (reference Section 8.0). These observations included:

- Despite recent rework and recurrent maintenance in the I&C department, the procedure that was established to evaluate rework and recurring maintenance (Procedure 1.5.3.2) has not been used for at least a year (reference section 7.1).

- The Nuclear Managers Committee (NMC) had not performed reviews of self-assessments as required by their charter (reference section 6.5).

- A RCIC system rupture disc replacement on January 23 was caused, in part, by the failure of the work control department planner to follow Procedure NOP83MI, "ASME Code Repairs and Replacements" (reference section 7.3.2).

### 3.1 Root Cause Identification Summary

In general, the team found BECo's root cause assessments were inconsistent in depth and scope, but were effective in identifying the majority of the event causal factors. The information obtained through the RCAs was not effectively recorded in, or readily retrieved from, the database used for problem trending. As a result, the RCA information could not be used effectively to identify trends and monitor the effectiveness of past corrective actions. The team concluded that the inconsistencies in the BECo root cause analysis processes have contributed to the use of procedures, adherence, adequacy, and understanding causal factors not being clearly identified and addressed. The team noted that the weak initial training and refresher training of evaluators, along with inappropriate assignment of evaluators, appeared to have contributed to these process inconsistencies.

## 4.0 CORRECTIVE ACTION FOLLOWUP AND SUMMARY

To examine the implementation of corrective actions the team reviewed, to a limited extent, long-term training corrective action items. Using specific examples, the team reviewed the processing of training related corrective actions from the source document (PR) to the training staff's incorporation into the applicable lesson plans. The lesson plans were prepared by the training staff from the input received (PRs and associated documentation).

Based upon the corrective action items examined, the team determined that the lesson plans were generally good and contained appropriate training corrective actions. However, the team did identify some discrepancies. The lesson plan for PR 95-9292 concerning the start of the RHR pump with the suction valve closed event was found to be technically incorrect. As discussed in section 2.5.5 above, administrative oversights were made in the communication of training corrective action items.

The team determined that the lesson plan for PR 95-9230, concerning the inadvertent start of the "A" EDG (reference Section 2.5.4), had not been prepared due to an administrative error. In addition, the team observed that BECo relied upon a knowledge based decision for a complicated infrequently

performed evolution consisting of 41 steps that required a specific sequence of implementation. The team learned that the procedural instructions for sequencing the return of this bus to service, which was already contained in procedure No. 3.M.3-47, resulted from the corrective actions for a previous un-intended automatic start of an EDG. Consequently, the team concluded that the licensee's corrective actions for this event were too narrowly focused and did not consider more generic implications of the conduct of this type of evolution.

The team observed the weekly plant status update briefing by the Operations Manager conducted at the BECo Training Center. This training is conducted to ensure the plant operating crews receive timely management feedback and prompt notification of recent industry events and operating concerns. The team found these meetings beneficial and the participants actively engaged in the discussion topics.

As a result of the team's specific observations, the team questioned the potential plant response to recirculation pump trips during power operations. Subsequent to the inspection, BECo conducted recirculation pump trip scenarios from various reactor power levels using the plant referenced simulator. Based on the results of these scenarios, BECo determined that the plant may potentially operate in unexpected regions of the power to flow map following the trip of a recirculation pump and the runback to minimum speed of the operating recirculation pump. As a potential consequence, operator actions may be delayed by the additional time needed to assess plant conditions.

The team determined that BECo had in place plant operating procedures that were adequate to provide directions to the operating staff following abnormal recirculation pump operations. BECo management promptly informed the operating staff of the results of this recently completed recirculation pump trip testing on the simulator and initiated problem report 96.9082 to more fully analyze the unexpected plant response and to develop long term corrective actions. The team concluded that the unexpected plant response to recirculation pump trips was an area which requires further review and evaluation by the NRC staff and determined this item to be an inspector follow item **(IFI 96-80-01)**.

The team identified different or additional root causes than those derived by the BECo staff for the events reviewed (section 8.0 related to procedure use). Logically, the licensee's root causes (and corresponding corrective actions) would not be expected to directly correspond to the team's root causes. However, the common cause theme on improper procedure use appears to have been missed by the organization and independent oversight groups. Given the short nature of this team inspection, a detailed root cause of this problem could not be done. Based on the above sections 3 and 4, potential causes appear to be: weak training and/or guidance on the conduct of root cause analysis, inconsistent application of existing guidance, weak focus on processes in distinction to individual cognitive errors, and lack of trending for the identification of common causes. Accordingly the team viewed as weak the root cause analysis process as reflected in your problem reporting process (corrective action program).

Notwithstanding, the corrective actions implemented for the events reviewed by the team were generally good and, in some instances, were sufficiently comprehensive to address the root and contributing causes identified by the team. Based upon the limited selection of training corrective actions reviewed by the team, a disproportionate number of apparent administrative discrepancies were identified. Collectively examined, this indicated to the team a potential weakness in the corrective action tracking process. The two incomplete or overlooked training corrective actions appeared to be administrative oversights reflective of a potentially weak corrective action tracking process.

## 5.0 OVERSIGHT GROUPS

As part of evaluating the effectiveness of the licensee's controls for identifying, resolving, and preventing issues that degrade the quality of plant operations and safety, the team focused on selected activities of oversight groups [i.e., the Onsite Review Committee (ORC) and the Nuclear Safety Review and Audit Committee (NSRAC)].

The team reviewed requirements established by the TSs, the Updated Final Safety Analysis Report (UFSAR), administrative procedures, and other relevant licensee documents associated with these oversight groups. Based upon documentation reviews, interviews, and review of activities, the team concluded that the oversight functions provided by these groups were, with a few minor exceptions, appropriately conducted. One exception included a BECo self-identified finding where not all completed Significance Level 1 PR RCAs were being forwarded to the NSRAC. The team identified a second item where the ORC charter did not reflect the new station organization with respect to the I&C discipline representation on the committee. Several positive attributes were observed of these oversight groups including: timely and thorough reviews of plant events; comprehensive meeting minutes; good tracking of followup items; and good, contributing external representation on the offsite committee. The team identified ORC performance strengths involving their safety focus and the encouragement of an open environment that contributed to the articulation of diverse views and the probing of safety issues.

### 5.1 Onsite Review Committee

The team reviewed ORC meeting minutes issued for meetings held from March 24, 1995 through January 18, 1996. These meeting minutes demonstrated that plant events and issues germane to the ORC's oversight responsibilities were conducted in a timely and thorough manner. As exemplified by the meeting minutes of January 4 and 18, 1996 (Meetings 96-01 and 96-04, respectively) the Committee effectively probed issues and demonstrated an outstanding safety focus.

The ORC meeting minutes of January 4 documented, in excellent detail, that the ORC did not recommend approval of an engineering evaluation associated with Rosemount Master Trip Unit K1 relays. The ORC's concern was that an equipment anomaly described in the evaluation was occurring at a frequency approximately 20 times greater than the established failure rate for the reliability goal.

The ORC specified that the evaluation be revised to discuss why this anomaly does not invalidate assumptions or conclusions associated with reliability and availability goals specified in TSs, the UFSAR, and General Electric technical reports. At the close of this inspection, this area was an open action item for the BECo staff.

The January 18 meeting minutes documented the ORC's review of Safety Evaluation (SE) No. 2971, "Replace All Piping Thermal Insulation in the Drywell with Owens-Corning Nukon Fiberglass Blanket Insulation." The historical design basis and licensing basis documentation for this issue were reviewed at the meeting. Presenters and managers discussed their conclusion that the contribution from containment overpressure following reactor vessel blowdown, as a result of a loss of coolant accident, contributed to available net positive suction head (NPSH) for the core spray and residual heat removal pumps and that this was consistent with the plant's original licensing and design basis. However, a licensing engineer (LE) who independently reviewed the historical documentation on this issue reached an opposite conclusion (i.e., the plant was licensed to Regulatory Guide 1.1 and it is not appropriate to include the contribution from containment pressurization in the NPSH calculation). According to the meeting minutes, the ORC members were unaware of the controversy on this issue, prior to the meeting, and had not been provided the applicable licensing documents for review. The ORC Chairman decided that no vote would be taken on the SE until the LE's concern was evaluated and resolved. The ORC Chairman elicited an agreement from the LE to document his position and concern in writing and requested that the licensing and engineering managers respond in writing, point by point.

Based upon these two examples, the team concluded that the ORC Chairman and the Committee positively contributed to plant safety with its openness to safety concerns and to the appropriate resolution of those concerns. ORC meeting minutes clearly demonstrated the encouragement of airing diverse views on important technical issues.

The team attended the regularly scheduled ORC meeting on January 22 and took note of the ORC's discussion of Pilgrim's total number of Significance Level 1 PRs versus the industry average of Level 1 type events in comparable programs. The members attributed Pilgrim's relatively high number of Level 1 PRs to be related to the low threshold that they use for assigning this level to events. Notwithstanding, a concern was expressed that the unnecessary assigning of events to this level exacerbates current resource demands. The ORC Chairman stated that he would forward the Committee's comments, insights, and concerns to the Vice President of Nuclear Operations.

The team noted that the ORC membership, with respect to I&C discipline, has not been formalized since the Maintenance Department re-organization in September 1995. While recognized by the ORC Chairman that this discipline needs to be represented, no procedure or charter change had been initiated to ensure that, long-term, this membership would be maintained. An ORC Charter revision was initiated to revise committee membership prior to the conclusion of the inspection.

## 5.2 Offsite Review Committee

Based upon the team's request for BECo to provide the applicable NSRAC meeting minutes that reviewed the Level 1 events under review by the team, the licensee issued PR 96.0025, on January 25, 1996. This PR identified that the PR coordinator was not forwarding all Significance Level 1 completed evaluations to the NSRAC Coordinator per NOP 92A1, section 6.5.3. The team determined that only PR 95.9234 and 95.9255 were among the documents submitted to the NSRAC Coordinator for subsequent member review. Although submitted, the team concluded that there appeared to be an inordinate delay for these two events (which occurred in April 1995) to be submitted for NSARC member review. The self-identification of this issue (although prompted by the team's request), was positive, but considered by the team as another example of improper procedural adherence (reference Section 8.0).

The selection of the ORC Chairman to be the new NSRAC Coordinator was considered by the team to be a good initiative. Also, the team noted that, as of February 1996, four of the nine NSRAC members were external members and represented "outsider" influence on the Committee. The team determined that documentation of the activities reviewed by the Committee was comprehensive and further noted that insights shared by the external Committee members positively contributed to the overall NSRAC oversight responsibility. Examples included: subcommittee member observations that plant inspections by management personnel showed a continuing lack of in-depth area inspection and effectiveness (May 1995); and, that as a result of organizational changes, BECo needed to expedite the selection and appointment of a permanent Manager of Regulatory Affairs (August 1995). The team also noted that NSRAC routinely performed followup of previously identified concerns and that new concerns and issues were entered into their open item tracking system.

## 5.3 Oversight Group Summary

The team concluded that the oversight functions provided by the onsite and offsite review committees were, with a few minor exceptions, appropriately conducted and demonstrated generally timely and thorough reviews of plant activities. The exceptions included a self-identified finding where not all completed Significance Level 1 PRs were being forwarded to the NSRAC and the team identified that the ORC charter did not reflect the new station organization with respect to the I&C discipline representation on the committee.

# 6.0 SELF-ASSESSMENTS

## 6.1 Review of Departmental Self-Assessments

By memorandum dated September 19, 1994, the Senior Vice-President-Nuclear promulgated a broad self-assessment policy. This self-assessment policy embraces four levels of defense in-depth. One element of this defense in-depth self-assessment process is the Self-Assessment Program as defined by NOP90A4, "Self-Assessment Program." NOP90A4 defines the responsibilities of

the Nuclear Managers Committee (NMC) and Department managers in this area and outlines the essential characteristics of each department's self-assessment process.

Based upon the above stated policy and implementing procedures, the team examined a sampling of departmental self-assessment programs and self-assessment reports/products. The team found that the self-assessment programs established in the areas of plant operations, maintenance, and radiological operations were well-defined and the self-assessment reports and findings were generally well supported, documented, and tracked. The engineering and training department self-assessment documentation reviewed by the team represented programs that were less aggressively pursuing the BECo self-assessment goals. The team's observations in this area were shared by the BECo staff as reflected in a QAD report entitled "Review of NuOrg Self-Assessment Process," dated September 29, 1995, and the December 1995 Corrective Action Self-Assessment. The team found the functional area performance matrix, attached to the September 29, 1995 report, particularly useful in focusing the audited departments on areas to improve their self-assessment processes. The matrix rated each department against the essential characteristics defined by NOP90A4.

Discussions with the manager of QAD identified that as a result of the self-identified inconsistencies between department self-assessment processes (with respect to programmatic and process effectiveness differences), the QAD staff was tasked with sponsoring a totally revised self-assessment process. The revised governing procedure (to replace NOP90A4) was published for BECo staff comment by memorandum dated February 5, 1996. The team determined that the draft document provides considerably more guidance and structure to the self-assessment process than outlined by NOP90A4. In addition, QAD was chartered with direct oversight of the new program's implementation and the IADB was proposed to be used to track functional area self-assessment schedules, at a minimum.

### 6.2 Management Observations

Another element of the defense in-depth self-assessment process, as defined by BECo, is a management observation initiative. The team examined a sampling of the management observations documented via electronic mail (e-mail) from the responsible manager to the Vice President, Nuclear Operations. The team's understanding of this self-assessment process was that each manager was to spend at least four hours a week in the plant observing work in progress and report their observations via e-mail. E-mail messages reviewed by the team were found to be generally valuable in both narrative content and constructive observations. Observations varied from comments on housekeeping, material condition, and conduct of workers on a specific job, to staff interview feedback pertaining to job satisfaction and morale. A number of observations highlighted specific action items or "blue cards" being issued to correct housekeeping discrepancies. The team concluded this initiative was effective in identifying minor problems and in supporting more frequent management presence in the field.

In summary, the team found the department self-assessment processes and management observation program generally effective mechanisms for the self-identification of problems. BECo's initiative to strengthen this program with a more formal and uniformly structured process, currently mirrored by a few of the existing departmental self-assessment processes, indicates a noteworthy commitment of resources.

### 6.3 Review of Quality Assurance (QA) Oversight Functions

The team examined various QA department activities and processes to assess the effectiveness of the QA department in independently identifying and assessing line management and staff performance. QA activities and processes reviewed by the team included: routine and special audits; surveillances; Deficiency Reports (DRs); executive management summary reports; and trending. In general, the team found that the QA department was effective in identifying problems or deficiencies and in assessing plant staff performance. The team's review in this area identified the following:

- Routine and special QA audits provided a comprehensive, periodic assessment of all Nuclear Organization (NuOrg) functional areas. Proper planning and execution of audits was evidenced in the sampling of audits and audit summaries examined. The team noted that the late issuance of several 1994 and 1995 QA audits (not issued within the required 30-day limit) was self-identified and being appropriately tracked by Deficiency Report (DR) #2077. This was another example of improper procedural adherence (reference Section 8.0).

- Quarterly Executive Summaries of Internal Audit Reports were reviewed by the team and found to provide a good summary of audit activities and significant findings by the QA staff for each calendar quarter. However, as specified by FSAR section 13.2.3.4 entitled, "Quality Assurance Department", and the Boston Edison Quality Assurance manual (BEQAM), formal trending and trend analysis of QA findings was not being conducted or provided via these quarterly reports to executive management. This was a team identified example of improper procedural adherence (reference Section 8.0). This team observation was similarly self-identified by BECo as documented in their December 1995 Corrective Actions Self-Assessment and tracked via DR #2072.

- A team review of a sampling of "Summary of QAD Activities for NSRAC" memorandums identified good independent coverage of major functional areas by the QA staff and a concise summary of significant findings and assessments.

- A detailed followup of selected open and closed DRs identified the following:

  DR #2072, "Failure to Establish and Document an Integrated Trend Analysis Program," was identified by QA Surveillance 95-03. This DR identified that both the line organization (via NOP92A1) and the QA department (via BEQAM, Sections 1, 2, 16 and 18) were not implementing effective trending programs to detect and report adverse performance

trends. Team review determined that QAD was partially compensating for this deficient process via an informal computer-based data collection system. Evidence of the use of this informal process was prevalent, in that, data entry forms were affixed to each DR examined by the team. The team determined that no formal trending or trend analysis was developed from this data base, but auditors did use it to identify repetitive problems (reference DR #2064 below).

DR #2074, "Surveillance Procedure Not Signed by IST Engineer and ASME XI IWP 4-day IST Review Not Satisfied," was identified by QA Audit 95-07. This DR was written to document a procedural non-compliance, but the team determined that no corrective action was required. The DR stated that the test data was within the acceptance criteria and that subsequent surveillances of the same system were conducted and that proper and timely reviews were completed for those tests. The team verified the DR was closed and that an informal data trending sheet was included in the DR closure package.

DR #2064, "I&C Surveillance Procedures Not Completed as Required," was identified by surveillance 94-3.1-35. The team determined that this DR was a followup action to NRC inspection findings and subsequent escalated enforcement action (EA 95-010) in early 1995. This DR identified errors in seven of twenty-four I&C surveillance tests reviewed. Errors involved: missing independent verifications; missing check marks; missing initials; and not meeting acceptance criteria. The DR also identified that these findings were not isolated.

The team determined that line management's response to DR 2064, which included a statistical analysis of the number and significance of the QA identified errors, trivialized the importance of procedural adherence and reflected poorly on the quality of the closeout package. Notwithstanding, the corrective actions taken in response to this DR and the broader actions taken in response to the escalated enforcement action appeared to be appropriate.

DR #2065, "Valves Listed in 8.C.13 Not Adequately Secured", was identified by surveillance 95-012. Followup by the team of this DR concluded that the deficient "locked" valve conditions identified by the auditor were the result of a combination of procedural use and adequacy problems which contributed to the poor implementation and control of "locked" valves. This was another team identified example of poor use of procedures (reference Section 8.0).

In summary, the team's review of QA activities identified generally good independent problem identification and oversight of corrective actions. The lack of formal trending and the use of an informal data collection process to identify repetitive findings, although self-identified, was itself an example of inadequate procedural adherence and usage. In addition, lack of an aggressive response to procedural adherence issues by the QA organization indicated to the team that this is a broader performance issue (reference Section 8.0).

## 6.4 Review of Third Party Assessments

The team examined selected third party assessments conducted during 1994-1995 at the Pilgrim station. One special assessment of the Operations Department was specifically requested by the BECo staff and three others were routinely conducted third party assessments. The team found that the third party assessment findings were generally consistent with line management and QA self-identified performance assessments and programmatic findings.

A special assessment of the Operations Department was conducted in late 1995 by a consulting firm to provide an independent evaluation of several human performance related events that occurred during the 1995 refueling outage. The team's review of this assessment identified no new concerns or problems not previously identified by the Operations staff. However, the consultants offered a number of recommendations to enhance the station's technology and capabilities in the areas of root cause analysis, performance monitoring, and trending of organizational, programmatic, and human performance issues. This independent assessment concluded that the human performance related events during the 1995 refueling outage represented a "slight decrease in Operations Department performance." The team concluded that this report was a reasonable effort and provided good recommendations for performance improvements which could be readily applied beyond the Operations Department.

Team review of the 1994 and 1995 Combined Utility Assessments (annual required independent audit of the adequacy of the BECo Quality Assurance Program) identified findings and assessments consistent with QA Department self-assessed findings and observations. No significant programmatic problems or weaknesses were identified via these assessments.

Lastly, the team reviewed a broad-based multi-functional third party assessment conducted in November 1995. Similar to team observations of other third party assessments, this assessment's observations were consistent with BECo self-identified findings and concerns, with one noteworthy exception. The third party review of an October 6, 1995 rapid reactor power reduction identified two additional control rod mispositionings, beside the one rod mispositioning event identified by the BECo staff. Team followup of these findings determined that the BECo staff mis-characterized the rod mispositioning reactivity control event (Significance Level 2 vice Level 1). As a result, BECo did not conduct a sufficiently detailed event critique and root cause analysis. In light of this oversight, the team viewed BECo's event assessment as poor, but it was appropriately identified for BECO mitigation by the third party review.

## 6.5 December 1995 Corrective Action Self-Assessment

As referenced in other sections of this report, BECo conducted a special self-assessment in December 1995 of their corrective action processes in preparation for this team inspection. BECo utilized a multi-disciplined team of individuals and NRC Inspection Manual Chapter 40500 as guidance. The team reviewed this self-assessment and found it to have been thorough and self-critical. Assessment observations were clearly and concisely written and appropriate corrective action tracking processes (Problem Reports or

Deficiency Reports) were used to ensure proper resolution of identified concerns. The team conducted a detailed followup of one specific self-assessment observation involving the Nuclear Managers Committee (NMC) lack of routine review of departmental self-assessment.

The team reviewed the NMC departmental meeting minutes from January 1995 to December 1995, to independently determine whether departmental self-assessments were discussed on a regular basis. At the beginning of the year, the NMC committed to doing self-assessments. There was to be monthly self-assessment presentations from each department. In February, the Nuclear Training & Management Services Department presented their self-assessment. During the course of the year, per the meeting minutes, the NMC infrequently talked about self-assessment, but did look at other BECo self-assessment processes, and held discussions of self-assessment cross functional issues. By December 1995, the committee members realized that they needed to focus on consistency and more explicitness in the departmental self-assessments.

Based on the team's review, the NMC has not routinely discussed self-assessments nor have department managers routinely made presentations of their self-assessments to the NMC. The governing Nuclear Operating Procedure (NOP90A4) and more specifically the NMC Charter obligates the NMC to routinely include in their agenda the review of departmental self-assessments, and this was not routinely conducted. The team considered this observation to demonstrate another example of poor procedural adherence (reference Section 8.0).

### 6.6 Self Assessments Summary

In summary, the team's review of the various self-assessment functions identified generally good processes and performance feedback. Quality Assurance (QA) audits, surveillances, and self-assessments have provided comprehensive and thorough coverage of all functional areas as reflected in the quality of DR findings and audit assessments. Department self-assessment programs varied in quality and coverage of their respective functional area. However, this observation was self-identified and appropriate corrective actions were being developed. Third-party assessments were examined and found to have results consistent with BECo's internal self-assessments. The Corrective Action Self-Assessment conducted in December 1995 was generally comprehensive and self-critical of the corrective action processes examined.

## 7.0 MAINTENANCE IMPROVEMENT PROGRAM (MIP) EFFECTIVENESS

The team reviewed the recent evolution of improvements made in maintenance work practices at PNPS. Specifically, the Vice President of Nuclear Operations (VPNO) directed on September 7, 1994 that a focus group evaluate the conduct of maintenance activities at the station, identify problems or impediments to the performance of physical work, and to develop an action plan to resolve identified problems. The ensuing Maintenance Improvement Team (MIT) provided their evaluation to the VPNO on November 10, 1994. Although no formal root cause evaluation was conducted, the team concluded that these efforts were commendable because the MIT: performed direct observation of work in progress at the station; conducted detailed interviews with personnel

at all levels of the organization; benchmarked plant results, procedures, and practices against other plants; and modeled plant procedures important to the work process.

To assess the overall effectiveness of changes made to address long-standing work planning and control issues, the team reviewed the BECo maintenance improvement initiatives, recent re-organization efforts, and the resolution of selected maintenance related problems. Both formal and informal problem identification and resolution processes were examined and assessed during this review. Processes reviewed included: PRs; self-assessments; Maintenance Performance Assessment Program; matrix human performance monitoring system; and processes for evaluating rework and recurring maintenance. For the specific work control related events reviewed, the team examined the associated operability assessments performed by the BECo staff.

### 7.1 Review of Rework/Recurring Maintenance Monitoring

The team identified that rework/recurring maintenance evaluations were not consistently being performed by the Maintenance and Instrument & Controls departments, in accordance with the guidance contained in procedure No. 1.5.3.2, Rework/Recurring Maintenance Evaluation. This was a team identified example of improper procedural adherence (reference Section 8.0). However, BECo management acknowledged a weakness in this area and issued PRs 96.0033 and 96.0035 to address recent rework items, concurrent with the team's onsite review. Notwithstanding the current procedural implementation shortcomings, team interviews and documentation provided by Maintenance Department Managers clearly demonstrated that rework was a concern and that rework was an important indicator of maintenance performance.

### 7.2 Review of Maintenance Performance Assessment Program (MPAP)

The team observed that the MPAP was being implemented as an effective management tool to address maintenance performance. Noteworthy examples of completed MPAPs included: the identification of in-field adverse personnel safety conditions; the assessment of in-process training activities and subsequent identification of improvements to enhance training; and, the need for maintenance personnel to review maintenance night orders (a licensee initiative intended to improve organizational communications and one of the corrective actions identified by the MIP). Efforts to focus on in-line work versus post-activity reviews, as part of the MPAP, were considered by the team to be commendable. Insights from these performance assessments were being appropriately incorporated into department self-assessments.

### 7.3 Review of Work Control Activities

Work Control management has identified objectives, strategies, and performance indicators for 1996, that are intended to improve program effectiveness. Some examples of these initiatives included: promote planning consistency and define standards by developing planner desk-top instructions; develop and implement a planner peer review program to elevate the quality of work

packages; and to develop and implement comprehensive planner plant systems training program. These Work Control management initiatives were considered by the team to be appropriate.

Efforts by BECo to develop and implement a new work control process were one of the longer term corrective actions of the MIP that was developed to improve overall performance in the maintenance area. Two recent work control related events were examined by the team to assess the new work control process as defined in procedure 1.5.20. Specific observations follow:

**7.3.1 Problem Report 95.9636**

PR 95.9636 was issued on January 25 due to the release of the RHR cooling system from an LCO without the conduct of a post-work test for a repaired 1-inch drain valve. This was dispositioned as a non-cited violation in inspection report 95-26 and identified by BECo as a work preparation breakdown. The preparation effort relies on a maintenance planning team (MPT) approach. The MPT consists of a systems engineer, a maintenance supervisor, and a planner for each maintenance request (MR).

Followup by the team identified an additional process breakdown that was not identified by BECo and therefore was not addressed by PR 95.9636. Specifically, the breakdown involved the development of work instructions for the repair of valve 10-HO-4B (per MR 19503568) that were intended to convey the requirement to perform a post-work operational leak test at system pressure. Because the MPT failed to effectively implement a number of procedural 1.5.20 requirements (i.e., work plan details prepared by the planner shall be commensurate with the complexity of the task; steps in the work plan shall be clear; and the system engineer shall, as part of the task ready review, verify that the PWT requirements have been developed and are adequate) no operational leak test was performed. (The team identified procedural adherence concerns are discussed in Section 8.0, below.) The team was informed that a separate PR (96.9059) was written to address this observation.

According to an engineering representative, as part of the root cause evaluation for PR 96.9059, other work packages being prepared or approved for implementation that involve potential primary containment integrity (PCI) issues would be reviewed for the adequacy of PWT. Subsequent to the completion of onsite inspection activities, the team was informed that this effort identified an additional PWT inadequacy issue involving pending maintenance on a component connected to the primary containment. PR 96.0048 was issued to address this additional self-identified concern.

As part of the team's review of this event, BECo's operability assessment for PR 95.9636 was examined. The team concluded that the operability determination was not thorough and was made prematurely. Specifically, the team observed that the Operations Manager assumed an operability determination success path because an identical downstream closed manual valve (10-HO-5B) would act as the safety class boundary. This assumption was based upon knowledge of a similar type engineering evaluation having been previously used to support a comparable as-found condition. Secondly, the evaluation that was

performed did not specifically address appropriate PCI issues (e.g., the reliance on components that were not local leak rate tested to provide the assurance that the PCI boundary was intact). Lastly, the team noted that this issue was not submitted (not required by NOP92A1) to the onsite review committee for their inter-disciplinary safety review.

Based upon the guidance contained in Generic Letter 91-18 pertaining to consideration being given to reliance on test results as part of an operability determination, (which for this case was a local leak rate test of the 10-HO-5B valve), the team concluded that an indeterminate operability condition existed at the time of discovery. This situation more appropriately warranted entry into the applicable TS action statement(s) when it was determined that there was sufficient evidence to suggest that valve 10-HO-4B was open. The team concluded that BECo's operability assessment for this valve issue was adequate, but opportunities for improvement were noted.

### 7.3.2 Problem Report 96.9027

PR 96.9027, issued January 24, 1996, identified the failure to perform a PWT involving a ASME code required visual examination for the replacement of the safety-class rupture disc on the steam exhaust of the RCIC turbine. This event was self-identified and under review by the BECo staff at the time of this inspection. A preliminary team review determined that this event involved inadequate implementation of the work control process. Specifically, the work planner did not identify appropriate industry codes and standards to ensure this maintenance activity was conducted per the applicable quality and safety requirements specified in station procedure 1.5.20. Additionally, the planner did not incorporate station procedure 83M1, ASME Code Repairs and Replacements, for the development of proper post-work testing. The team concluded that this oversight directly contributed to the failure to perform the required PWT examination. In addition, initial team review of the event details identified that the work package may have been developed prior to the release and availability of the applicable design document (Field Review Notice) generated for the replacement of the rupture disc. The Work Control Manager acknowledged the team's observations and preliminary assessments related to this event and indicated that these items would be pursued as part of BECo's root cause evaluation. (Reference Section 7.4 below for the team's disposition of these observations.)

The team found BECo's operability evaluation for this issue appropriate. The basis for this operability determination included the fact that an operational leak check was performed by a qualified individual (albeit not an ASME Code qualified examiner). This condition, under similar circumstances, was endorsed by a previous ASME Code case recognized by the NRC staff. The team had no further questions on this matter.

### 7.4 Work Control Review Summary

Based upon the above examples and the work control processes examined, the team concluded that, overall, the new work control process was generally effective. Notwithstanding, potential work control process implementation

deficiencies appeared to have contributed to inappropriate post-work testing. The preliminary examination of the circumstances involving the two PRs discussed above indicated to the team the likelihood of additional procedural use and/or adherence concerns. BECo's staff had not completed their evaluation of these events. Recognizing that other root or contributing causes may be identified by BECo's evaluations, for which further NRC review may be warranted, this area remains unresolved pending further BECo and NRC staff review. **(URI 96-80-02)**.

## 8.0 ROOT CAUSE ANALYSIS AND USE OF PROCEDURES

The team noted a common theme of inadequate procedural use by BECo representatives based upon the team's observations made during the review and followup of the specific plant events and their examination of the various corrective action processes. The attached Table A provides a summary of the team's procedure use observations. Individually the identified procedural use problems were of low safety consequence and many could be viewed as additional root causes to the cognitive or personnel errors or other root categories as identified by BECo. It was evident to the team that BECo's programs and process did not identify the broad inadequate procedural usage issue. Collectively, the specific procedure use problems represent a potentially broad performance concern and, as previously noted, a weakness in the root cause evaluation process (Section 3).

To address the broad performance concern, inadequate procedure use at Pilgrim is unresolved **(URI 96-80-03)** pending further BECo and NRC staff review.

## 9.0 REVIEW OF FSAR COMMITMENTS

A recent discovery of a licensee operating their facility in a manner contrary to the UFSAR description highlighted the need for additional verification that licensees were complying with UFSAR commitments. All reactor inspections will provide additional attention to UFSAR commitments and their incorporation into plant practices, programs, and procedures.

While performing the inspections discussed in this report, the inspectors reviewed the applicable portions of the Updated Final Safety Analysis Report (UFSAR) that related to the areas inspected. The following inconsistencies were noted between the wording of the UFSAR and the plant practices, procedures, and/or programs observed by the inspectors.

A verification review of the FSAR commitments in the area of the Quality Assurance Program (Sections 1.10, 13.2.3.4, and Appendix E) did not identify any significant discrepancies between the FSAR and QA program implementation. Discussions with the QA staff identified that an internal effort was in progress to update Section 1.10. The team determined that Section 1.10 had not been revised and reflected original construction terminology in the description of the facility's QA Program. The team examined the proposed revisions and additions to Section 1.10 and concluded that these revisions constituted only administrative changes and not programmatic revisions to the QA Program.

The FSAR, Section 13.2.3.4, specifies that quarterly trend analysis reports are to be submitted to executive management. The licensee self-identified that they have not effectively conducted trending and trend analysis. The team verified that QA trending was weak as demonstrated in their "Quarterly Executive Summaries of Internal Audit Reports" (reference report section 6.3) and in the informal trending and trend results used in the QA Deficiency Report processing.

## 10.0 MANAGEMENT MEETINGS

Meetings were held periodically with BECo management during this inspection to discuss inspection findings. A summary of preliminary findings was also discussed at the conclusion of the on-site inspection on February 9, 1996. No proprietary information was identified as being included in this report.

## TABLE A

### Summary of Team's Procedure Use Observations

**Specific Event Observations**

| Section | Brief Description |
|---|---|
| 2.4.1 | Failure to initiate a PR on NWE Surveillance Test Review. |
| 2.4.2 | Failure to verify control rod double blade guide installation and use of an unapproved operator aid. |
| 2.4.3 | Failure to monitor control rod insertion. |
| 2.4.6 | Failure to verify the suction valve open prior to pump start and lack of procedure clarity. |
| 2.4.7 | Failure to adhere to the established rod insertion sequence. |

**Corrective Action Process Observations**

| Section | Brief Description |
|---|---|
| 3.0 | Untrained personnel performing HPES evaluations. |
| 5.2 | Offsite review committee not reviewing Significance Level 1 event evaluations. |
| 6.3 | QA audits not issued within required 30-day time period (DR 2077). |
| 6.3 | QA findings not trended per FSAR section 13.2.3.4 (DR 2072). |
| 6.3 | Locked valve procedure poorly written and not effectively implemented (DR 2065). |
| 6.5 | Nuclear Managers Committee and department managers not routinely reviewing department self assessments. |
| 7.1 | Rework/Recurring Maintenance Evaluation procedure not being consistently implemented. |

Table A (continued)

**Work Control Process Observations ****

| Section | Brief Description |
|---|---|
| 7.3.1 | Failure to develop a work plan commensurate with the complexity of the task and verify post-work testing requirements per procedure 1.5.20. |
| 7.3.2 | Failure to identify appropriate industry codes and standards for the work plan and to incorporate procedure 83M1 for the development of the proper ASME Code repair post-work testing. |

** The work control process review identified procedural inadequacies are being addressed by Unresolved Item 96-80-02.