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Facility: Haddam Neck Plant

Inspection at: Haddam, Connecticut

Inspection conducted: August 27 - September 21, 1990

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EXECUTIVE SUMMARY

An in-depth team inspection of the Haddam Neck maintenance program and its implementation was performed on August 27 - September 21, 1990. The inspection included a review of the maintenance program and observations of maintenance work in progress. NRC Maintenance Inspection Guidance, dated September 1988, and Temporary Instruction 2515/97, dated September 22, 1989 were used for this inspection.

The inspection team evaluated three major areas: (1) overall plant performance as related to maintenance; (2) management support of maintenance; and (3) maintenance implementation. For each element, the inspectors evaluated both the program and the effectiveness of the implementation. The inspection results for each area are summarized in the following paragraphs and are discussed in detail in Sections I, II and III in the body of the report.

I. OVERALL PLANT PERFORMANCE RELATED TO MAINTENANCE

After resuming power operation from the last two refueling outages which have been extended due to work on the thermal shield, the plant has generally operated well as evidenced by its high availability and capacity factors and with few challenges to its safety systems or forced outages. It is apparent that past effective maintenance practices and the systematic upgrading of systems and components which can cause reactor trips or forced outages have contributed to this good operating history. The inspection team concluded that the Haddam Neck Plant had an effective maintenance program which had been adequately implemented.

The general material condition of the plant including its maintenance facilities and equipment were good with only minor housekeeping items noted that required attention. Good, clear labeling of plant equipment was observed.

II. MANAGEMENT SUPPORT OF MAINTENANCE

The Northeast Utilities (NU) Production Maintenance Management System (PMMS) provides an effective tool to implement the Haddam Neck maintenance program and fulfill the direction established in the NU policy statement "Nuclear Plant Maintenance". The PMMS enables maintenance personnel to control and monitor maintenance activities ensuring that established maintenance requirements are properly implemented.

The Haddam Neck maintenance program is generally supported by management as indicated by their presence in the plant and at daily meetings plus their support of various maintenance initiatives. For example, the licensee had performed a maintenance self assessment in 1987 and had implemented or resolved most of the proposed recommendations. Also, the team found that strong internal and external communication channels existed on key issues such as plant aging considerations and training and that a good document control system is in place. However, the team identified several areas that warrant management attention. The Reliability Centered Maintenance program, the Bill of Material (BOM) project, and onsite technical support need attention to ensure that proper technical emphasis is placed in the maintenance program. The team considered that a more structured approach to the measurement of maintenance performance would improve the maintenance process. The team noted that the licensee had not corrected known work order package documentation deficiencies identified by its Quality Services Department (QSD) in 1989. Also, the team discussed the licensee's intent to implement additional work control changes which would further reduce the QSD involvement in the maintenance process.

The licensee has established corporate and onsite engineering organizations which are actively involved in the maintenance process. This was evident by the incorporation of preventive maintenance and spare parts recommendations in plant modifications and the participation of plant engineers in the resolution of technical issues related to the repair or replacement of equipment. Also, the review of regulatory documents and operating experience is closely coordinated with plant maintenance.

Radiological controls to reduce exposure have been effectively implemented into the maintenance process. However, the use of Probabilistic Risk Assessment techniques has not been applied to maintenance at the plant level on a structured basis. The quality control role in the maintenance process could be strengthened by improving its followup to the corrective action of identified deficiencies.

III. MAINTENANCE IMPLEMENTATION

The licensee has developed and implemented an effective plant maintenance program. The experience level of the maintenance staff, organization and quality of work performed was considered to be good.

Maintenance personnel (mechanical, electrical, I&C) were found to be knowledgeable, highly trained and enthusiastic toward achieving maintenance goals. A low maintenance staff turnover rate contributed significantly to good continuity in the maintenance philosophy, effort, and morale.

The PMMS was found to be an effective tool for identifying, planning, conducting, reviewing and closeout of maintenance activities. The planning and tracking of activities by maintenance planners was well directed and controlled. Adequate attention was given toward work prioritization and limiting maintenance backlog.

The recent procedure upgrade effort has produced station procedures consistent in format, comprehensibility and user friendliness.

Although a mechanism exists for the documentation of maintenance for systems and equipment (Automated Work Order or AWO), the implementation was found to contain significant weaknesses regarding the thorough and logical documentation of actual work performed, problem descriptions, problem cause and retests for maintenance activities. These deficiencies identified in the documentation and closeout of work orders may be attributed to weak guidance in the work order procedure concerning documentation requirements. In addition, the team noted that inadequate maintenance documentation negatively impacts maintenance trending and root cause analysis efforts plus future plant life extension licensing considerations.

The plant maintenance organization effectively controls the mechanical, electrical and instrumentation and controls maintenance activities. A good deficiency identification and control system exists and the maintenance organization interfaces well with other departments. The team noted that significant room for improvement existed in the programs for control of contracted personnel and equipment and maintenance program trending.

Good maintenance facilities exist in the plant which permits efficient conduct of maintenance activities. The calibration laboratory for maintenance tools and equipment plus the warehouse storage facilities are well equipped to support maintenance. The identification and control of equipment parts will be improved upon completion of the BOM project which is approximately 95% complete.

Review of the licensee's personnel controls indicated this to be an area of strength. The licensee's training facility is well designed and equipped. Entry requirements for new personnel are stringent and initial training is extensive. The continuing training program is also extensive and closely tailored to plant needs.

Appendix 2 contains a summary of identified weaknesses.

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 Policy Statement, dated March 23, 1988, that states, "It is the objective of the Commission that all components, systems, and structures of nuclear power plants be maintained so that plant equipment will perform its intended function when required. To accomplish this objective, each licensee should develop and implement a maintenance program which provides for the periodic evaluation, and prompt repair of plant components, systems, and structures to ensure their availability."

This inspection was one of a series being performed by the NRC to evaluate the effectiveness of maintenance activities at licensed power reactors. The inspection was conducted in accordance with the guidance provided in NRC Temporary Instruction 2515/97 and the NRC Maintenance Inspection Guidance. The temporary instruction includes a "Maintenance Inspection Tree" that identifies for inspection the major elements associated with effective plant maintenance.

Scope of Inspection

Site specific information concerning the maintenance program was provided by the licensee in response to the letter dated June 7, 1990. The team reviewed the information submitted by the licensee and planned for the inspection starting on August 27, 1990. The team conducted the onsite inspection at the Haddam Neck Plant from September 10 - September 21, 1990.

Daily meetings were held by the NRC team leader with plant management and maintenance supervision to summarize the inspection team findings and identify areas where additional information was required. On September 20, 1990, an extended meeting was held with responsible members of the licensee's organization to communicate the strengths and weaknesses identified by the team and to discuss the team's preliminary findings. A summary of the inspection team's findings, including a presentation of an evaluated maintenance inspection tree, was discussed with licensee representatives including management, supervisors and engineers at the exit meeting on September 21, 1990 (see Appendix 1 for attendees).

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 topic of the block is described and documented in the plant maintenance program, including the 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 a marginal but acceptable condition 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 due to recent changes to plant conditions.

Inspection Findings

The inspection team's findings and conclusions regarding the Haddam Neck Power Plant site maintenance program and its implementation are documented in each section of the report. The weaknesses are listed in Appendix 2.

I. OVERALL PLANT PERFORMANCE RE' TED TO MAINTENANCE

1.0 DIRECT MEASURES

Scope

The scope of this part of the inspection was to review the availability, operability and the material condition of the plant as it relates to the implementation of an effective maintenance program.

Findings

1.1 Historic Data

The plant has been systematically upgraded with systems/components (e.g., feedwater heaters, condenser tubes, reactor protection and nuclear instrumentation systems) to make it less susceptible to reactor trips or extended outages. It has generally operated well with few challenges to its safety systems or forced outages after achieving full power operation. The cumulative values for reactor availability and capacity have been above industry average. The number of reactor trips, ESF actuations and forced outages during the last two cycles have been below the national average. It is apparent that past effective maintenance practices and the systematic upgrading of systems and components have contributed to this good operating history.

The licensee has made significant strides in improving their ALARA program and the total exposure at the site has decreased significantly the last several years. However, even with these improvements the plant yearly exposure is still significantly above the industry average. This is due to the thermal shield modification and removal work that extended the last two refueling outages.

1.2 Plant Walkdown Inspection

The inspectors conducted frequent, independent tours of the accessible plant areas. The team noted good, clear labeling of plant equipment and that the material condition of the plant was generally good. The housekeeping in some areas needed attention, but these findings were minor in nature. At the end of the inspection, a tour was made with the Assistant Maintenance Supervisor to summarize the findings. The team's observations are summarized below.

The screenhouse contains the service water, circulating water, and fire protection pumps (one of which is diesel driven). This area was observed to be relatively well kept. However, the team members noted that several fire hoses were loose on the stairwell hand rails. Also, as a result of a team observation which indicated that smoking was not prohibited, the licensee posted this building as a non-smoking area.

The emergency diesel generator (EDG) rooms were also observed to be in good order. Minor items noted included oil leaks on the "B" EDG skid and what appeared to be a temporary patch on the "B" EDG air start system flexible hose.

In the Primary Auxiliary Building (PAB) the inspectors noted that the storage of certain primary water hoses and ladders was not properly controlled. There were several hoses directing leakage from equipment to the floor drains on the PAB upper level, and temporary structural supports that were used to facilitate installation of new piping for the Adams Filters were also noted. Throughout the PAB and most other plant areas, old quality assurance acceptance and warehouse identification tags were observed on equipment which was in service.

In the "A" switchgear room test cables used for grounding had exposed copper. Also, a cover over the "A" battery charger was provided as a temporary measure to collect water from ductwork condensation leakage.

The outside plant areas were observed to be in relatively good condition. Minor housekeeping items (loose ladders, ropes and hoses) were noted in the areas around the refueling water storage tank and containment ventilation duct penetrations. These are areas where work was to be performed but not in progress at the time of the inspection.

The items identified by the inspectors were brought to the attention of station management and corrective actions were being taken to resolve them. For example, work control procedures were being changed to remove extraneous equipment identification tags after installation in the plant. In general, the plant areas were observed to be in good material condition and housekeeping was determined to be adequate.

Conclusion

The inspection team concluded that effective maintenance practices have contributed to a good overall operating history of the Haddam Neck Plant. Eventhough the inspection team noted housekeeping items in various plant areas that needed attention, the general material condition of the plant and its maintenance facilities and equipment was good.

II. MANAGEMENT SUPPORT OF MAINTENANCE

2.0 Management Commitment and Involvement

Scope

The scope of this section is to determine Management's involvement in supporting and being involved with the maintenance process. This section considers the emphasis placed on nuclear industry programs and initiatives and the leadership provided in maintenance training, self evaluation and the use of historical plant data.

Findings

2.1 Application of Industry Initiatives

The licensee participates in various nuclear industry groups such as INPO, ASME, EPRI, and NUMARC and applies useful industry initiatives obtained from these groups. The licensee uses the guidelines provided in INPO 85-038, "Guidelines for the conduct of maintenance activities at nuclear power stations", in conducting maintenance activities.

The licensee has embarked on an alternate testing program for Motor Operated Valves called the Valve Operator Test and Evaluation System (VOTES). This method is intended to improve analytical ability while reducing radiation exposure. Based on INPO initiatives, the licensee has also instituted an improved check valve maintenance program and a Reliability Centered Maintenance (RCM) program (See Section 3.3). The RCM program is directed to improving predictive maintenance.

The licensee also tracks and reviews NRC Information Notices, licensee event reports, 10CFR Part 21 notifications and other industry documents as noted in Section 4.7 to ensure that these documents are reviewed and acted upon by the plant.

2.2 Management Vigor and Example

The licensee issued a nuclear maintenance policy statement, Nuclear Engineering and Operations (NEO) policy statement No. 31, " Nuclear Plant Maintenance " in 1988. This statement defines the objectives of, and management's responsibility in regard to the maintenance program. The licensee conducted a maintenance self-assessment in 1987 which pointed out weaknesses and potential problems. Management developed action plans to strengthen weaknesses and resolve potential problems. All action plans have been implemented completely except for that involving parts identification which is discussed in Section 7.0 of this report.

Management has been involved in developing projects such as the Production Maintenance Management System (PMMS), the Plant Information Report (PIR), and Plant Performance Indicators which have been implemented to improve the maintenance program. Also, management support in plant aging and maintenance training efforts was evident as discussed in Secitons 3.7 and 8.0 respectively.

The licensee participates in maintenance peer evaluation programs throughout the country. Management uses the Beneficial Suggestion program to help judge the positive and negative aspects of the maintenance program.

One significant weakness that the inspectors observed concerned the lack of management attention to previously identified deficiencies in work order packages. The inspectors reviewed several work order packages and identified some that contained poor documentation (See Section 5.10). Subsequent to this finding, it was learned that the Quality Services Department (QSD) had previously identified to management significant deficiencies in work order packages that QSD had reviewed in 1989 (See Section 4.4). Management had not implemented effective corrective actions to address many of these deficiencies.

Conclusions

Licensee management is committed to improving maintenance activities at Haddam Neck as evidenced by the development of various maintenance program improvement projects. However, management attention is needed to ensure that effective corrective actions are taken in response to known maintenance program deficiencies such as those noted concerning the poor documentation of closed out work packages.

3.0 MANAGEMENT ORGANIZATION AND ADMINISTRATION

Scope

The objective of the inspection in this area was to evaluate the effectiveness of the organization and administration of the maintenance program. To provide a broad perspective of the maintenance process, the team reviewed areas encompassing: the existence, availability and scope of a formal maintenance program; maintenance policy, goals and objectives; allocation of resources; identification and definition of maintenance requirements; performance measurements; the document control system for maintenance; and the maintenance decision process.

Findings

3.1 Program Coverage for Maintenance

Northeast Utilities (NU) nuclear plant maintenance policy is described in Nuclear Engineering and Operations (NEO) Policy Statement No. 31, Rev. 0, "Nuclear Plant Maintenance". This policy statement covers all NU nuclear power plants and provides a broad-based overview of maintenance functions required to "preserve or restore safety, reliability, and availability of plant structures, systems and components." The policy statement identifies the types of maintenance and support activities required to implement the maintenance program.

Preventive maintenance (PM) is a major part of the overall program, augmented by a predictive maintenance program. The predictive maintenance program objective is to improve availability and reliability. Maintenance activities are controlled and monitored by the Production Maintenance Management System (PMMS).

PMMS is implemented through Nuclear Operation Policy (NOP) 2.13 "Implementation of the Production Maintenance Management System". This policy establishes responsibilities for the Vice President - Nuclear Operations, Station and Unit Superintendents, and Maintenance and I & C Supervisors. The team determined through interviews and observation that individuals were aware of maintenance policies and the uses of PMMS.

NEO policy statements are controlled through NEO procedure 1.08 "Preparation, Issuance and Control of Nuclear Engineering and Operations Policies." Revisions can be issued through use of this procedure; however, no periodic review requirements are established.

3.2 Establish Policy, Goals, and Objectives

NOP-2.13 states each level of management is "Responsible for establishing the maintenance related goals and objectives at their level and insuring that appropriate maintenance goals and objectives are established for the next lower level." Both the Maintenance and Instrument and Control (I & C) Departments establish goals and objectives for their respective departments through Department Instructions. These instructions define responsibilities within the departments for activities associated with maintenance. The inspector reviewed Maintenance Department Instruction (MDI)-01 "Maintenance Department Organization and Administration" and found it to be consistent with NEO policy statement No. 31. MDI's are reviewed annually through an administrative PM. I & C Department goals and objectives were also reviewed and found to be consistent with the policy statement. Individual responsibilities are well defined.

The team found plant management and first line supervision generally aware of goals and objectives.

3.3 Resource Allocation

Direct observation of maintenance activities and a review of maintenance work order backlog indicates that sufficient maintenance staffing levels exist to perform required surveillance, preventive and corrective maintenance. However, a review of records show a large use of overtime for maintenance and I&C personnel. I&C specialist average overtime for the first eight months of 1990 exceeds 700 hours. Maintenance overtime is comparable.

During normal plant operation, essentially all maintenance personnel are full time utility employees. The normal maintenance work force is augmented by contractors during refueling outages.

Throughout the inspection several observations were made by the team which indicate that certain engineering responsibilities require close attention to ensure that engineering adequately supports maintenance activities. Examples identified by the team included:

1. On Site Technical support - Six of the engineers in the Mechanical Engineering section have both system and project assignments. During the on-site inspection period, it was observed that problems associated with the emergency diesel generator, condensate system, and auxiliary feedwater system were being addressed by the same lead engineer. This led to a delay in the resolution of the diesel generator problem due to the relative importance of the other issues.

2. Identification of Spare Parts - The inspection team observed the resolution of problems associated with the emergency diesel generator which initially were thought to be related to the air start system. However, certain air system equipment spare parts which may have been needed were not available on site since a Bill of Material (BOM) for this equipment was not available. This was a specific perceived weakness. The broader concern was spare parts availability in general. Approximately 5 years ago the licensee initiated a project to create a BOM for identification of equipment spare parts. The licensee stated that this project was 95% complete, and in June, 1990 management decided to terminate contractor support and complete the BOM project with in-house staff. Licensee management recognized its maintenance program would be strengthened with the completion of the BOM project and stated that its progress to completion would be reevaluated in 6 months. A related weakness exists concerning the procurement engineering effort to clear the spare parts ordering backlog for those items already reviewed in the BOM project.

3. Reliability Centered Maintenance - The reliability centered maintenance (RCM) program implemented in January of 1990 under MDI-76 "Predictive Maintenance Program", is currently in place. This is a pilot program for which data collection is limited to the service water and circulating pumps and the service and control air compressors. Most of the current data has been obtained on the 4 service water pumps. The current resources devoted to this program are the mechanical maintenance engineer and one technician both of whom have additional duties.

4. Check Valve Program - The inspectors evaluated the licensee's program concerning check valve maintenance. The inspectors found the licensee had decided internally to inspect major feedwater check valves as a result of NRC Information Notice 86-01, Failure of Main Feedwater Check Valves. The listing of valves included in the PM database was expanded

to include other major system check valves in 1988. More recently, the licensee hired a contractor, Gilbert Commonwealth, to perform an applications review of check valves. This review led to further recommendation to the current listing of valves receiving inspection and testing. The inspectors attended a meeting held on 9/13/90 to discuss the implementation of this new expanded program. The initial group of check valves to be disassembled and inspected as part of this new program will occur during the scheduled 1991 outage. The inspectors concluded implementation of a formalized program for testing and inspection of check valves would strengthen the maintenance program.

3.4 Define Maintenance Requirements

The licensee's maintenance program includes surveillance, preventive and corrective maintenance. PMMS is the management system used to control and track maintenance activities; PMMS automatically initiates work orders for preventive maintenance and surveillance as they become due. Components having distinctive requirements such as quality control (QC), inservice inspection (ISI) or environmental qualification (EQ) are included in the PMMS data base, thus automatically appearing on the printed Automatic Work Order (AWO). The team reviewed selected surveillance and preventive maintenance work orders to verify that requirements were implemented as stated. In addition, the team verified that new and modified plant equipment were added to the PM or surveillance data base and that recommendations made by engineering for additions to the PM program were being implemented. Revisions to the PM program are implemented through MDI-16 "Preventive Maintenance" attachment 12.2, PM change form. MDI-16 also provides a mechanism for providing feedback. Section 6.6.1 states attachment 12.3 "PM feedback form" will be included in all PM AWO packages. The team found that this form was not being utilized.

3.5 Performance Measurement

To monitor the licensee's performance of maintenance, several reporting requirements exist. These requirements include quarterly PMMS "maintenance performance indicators" defined by NOP-2.13; ADM 1.1-33, attachment 12.3 "Safety Observation Report;" ADM 1.1-125 "Station Housekeeping and Inspection Program," as implemented through lower tier procedures; and resolution of Plant Information Reports (PIRs) including root cause analysis. Through review of records and direct observation, the inspector determined that these methods for measuring performance were generally implemented. Also, the I&C Department noted their use of a feedback form concerning personnel safety issues applicable to maintenance activities. However, it was evident that the I&C personnel safety data was not used regularly to provide feedback and improve the maintenance process.

In addition to the various reports issued, the team noted management and supervisory oversight of specific maintenance tasks. Departmental meetings are held daily to discuss current issues and provide and give feedback. The inspector concluded that although various attributes are present which monitor performance, no structured method (e.g., periodic evaluations of selected work activities) exists to evaluate the day to day maintenance work process. A formal method for management and supervisory inspection and feedback of work activities would strengthen the overall maintenance process. Such an activity could be added to existing programs (e.g., NOP 2.13).

3.6 Document Control System for Maintenance

Maintenance work orders are created and controlled by Administrative Control procedure ACP 1.2-5.1 "PMMS Trouble Reporting System and Automated Work Order". PMMS is a comprehensive system that uses the company's computer to manage and control the work process. The team observed functions of PMMS including work histories being entered into the PMMS data base.

The inspectors examined the methods in place for periodic review and implementation of revisions to plant documents. The licensees method for review and, if appropriate, incorporating applicable regulatory and industry information into the maintenance process is the controlled routing system. This system is discussed further in section 4.7. The team verified that documents were being periodically reviewed as required. The Inspectors also reviewed completed work orders and Plant Information Reports extracted from plant records. The team concluded that the document retrieval system was functioning adequately.

3.7 Maintenance Decision Process

The team evaluated plant and corporate management involvement with the maintenance decision process through interviews, observation of licensees meetings and review of past and future equipment upgrades. Discussion with corporate and site personnel and a review of complete and scheduled improvements indicate that plant aging and upgrade items are being identified and evaluated for future action. Recently completed upgrades included the reactor protection system and the nuclear instrumentation system. Engineering project assignments ongoing include incore thermocouple, radiation monitoring, and service water system analysis.

Management involvement in day-to-day decisions was evident by attendance and participation at various meetings held during the inspection period. Recently initiated and expanded programs, such as the RCM and check valve programs, have been initiated to evaluate plant material condition and equipment performance.

Conclusion

The nuclear maintenance policy for Northeast Utilities provides a consistent, broad based approach for conducting a maintenance program at Haddam Neck. The program is established and documented through procedures that define requirements and establish responsibilities for various maintenance and support activities. The PMMS, which is used to control and monitor maintenance, is considered a strength for insuring that established maintenance requirements are adequately reflected on work orders and properly scheduled. The document control system is well established. Recent system upgrade and maintenance program developments, such as the predictive maintenance program, have been implemented which evidence good management involvement in the maintenance decision process.

A concern was identified in the delay experienced in the repair of the emergency diesel due to competing demands on a single engineer. The BOM project is incomplete and a procurement engineering weakness exists concerning a spare parts ordering backlog. Also, the team concluded that the development of a structured method for evaluating the performance of maintenance activities would improve the licensee's current informal approach to maintenance performance measurement.

4.0 TECHNICAL SUPPORT

The inspector assessed the area of technical support by evaluating the availability and performance of various engineering organizations, reviewing corporate and plant procedures, and observing maintenance activities. The means for detecting and correcting deficiencies in the maintenance process were evaluated, along with the programs that have been established to assure personnel safety and radiological control. The inspector also determined that appropriate regulatory documents are integrated into the maintenance program, and that prioritization tools such as probabilistic risk assessments are considered.

4.1 Engineering Communication Channels

Scope

The objective of this inspection element was to evaluate the licensee's organizational communication systems to assure that corporate policies for the resolution of technical issues associated with maintenance are established and implemented.

Findings

The Nuclear Engineering and Operations (NEO) Policy Statement No. 31, Rev. 0, states that "The Nuclear Plant Maintenance Program involves a wide range of support activities and support organizations." The inspector witnessed the practical implementation of this policy through the observation of the many organizations which interface with the maintenance department. These include corporate-based groups such as Nuclear Safety Engineering, Project Management, Training, and Generation Test, as well as plant-based groups such as Engineering and Quality Services Division (QSD). Overall, the support of maintenance by these various groups was found to be satisfactory.

A hierarchy of procedures exists which clearly delineates the responsibilities of the various groups towards meeting the NEO policy for maintenance. Several types of procedures were reviewed and were found to be consistent with this policy and with each other. These include the Nuclear Operations Department Procedures (NODs), the Nuclear Engineering and Operations Procedures (NE&Os) and the station procedures, such as the Administrative Control Procedures (ACPs).

Several observations were made by the inspectors which indicated that the internal and corporate communication channels are effective in supporting the maintenance department at Haddam Neck. For instance, the Nuclear Safety Engineering (NSE) branch performs routine assessments of Plant Information Reports (PIRs), Licensee Event Reports (LERs) and other plant and industry operating experience to determine if any improvement in plant practices is warranted. As described in Procedure NSE 4.01, Rev. 11, "Operating Experience Assessment," evaluations of component failures and administrative controls are conducted. In addition, NSE is periodically tasked with performing independent root cause investigation of plant events in accordance with NSE 7.01, Rev. 0, "Independent Root Cause Investigation Program". Their report concerning a review of incorrect greasing of MOVs at Haddam Neck was found to be detailed and informative.

Other examples of corporate support to the maintenance process include the timely response by corporate engineering to the failure of the feedwater regulating valve (loose parts significance), the identification by the Project Management group, of the need to replace or upgrade certain equipment due to its impact on maintenance, and the support of corporate engineering towards recommending preventive maintenance and spare parts for large replacement items installed during the last outage. The inspectors toured the training facility located near the Millstone Station, and observed that the training department reviewed Plant Information Reports so that their training programs for mechanics, electricians, and technicians could be continually upgraded. These observations are all considered to be strengths in this inspection area.

On the other hand, an area where improvement could be obtained was noted in the communication link between the corporate and plant quality services organization. The inspector observed that the Haddam Neck QSD supervisor was not on distribution for the quarterly trend analysis summary issued by the Director of QSD. For example, when a copy of the most recent reports was requested by the inspector, they had to be transmitted from the corporate office. The trend analysis summary could provide a useful input to the QSD supervisor for recurring problems or weaknesses, and should be used to schedule and plan QSD inspection activities. Examples of the useful output from this trend analysis report are provided in Section 4.4.

Conclusion

The inspectors concluded that the licensee's organization exhibited strong communications in response to maintenance problems. Only minor items were noted concerning the observed activities of the QSD and NSE groups where clarifications could further strengthen communications. The corporate and onsite organizations are in close contact with the maintenance department and have provided useful assistance in resolving technical issues.

4.2 Engineering Support

Scope

The objective of this inspection element was to evaluate the area of engineering support by examining the effectiveness of the plant engineering group in analyzing equipment failures, assessing preventive maintenance practices, and identifying and implementing corrective actions.

Findings

The onsite engineering group is closely tied to the maintenance process through its involvement in the daily planning and scheduling activities, and through the regular assignments by plant management to resolve Plant Information Reports (PIRs). To assess engineerings support of maintenance, the inspectors reviewed the following: (1) engineering backlog, (2) disposition of PIRs, (3) engineer system assignments, (4) involvement in equipment problem resolution, and (5) plant design changes (PDCRs).

Strengths and weaknesses were identified in this area as described in the following paragraphs.

The engineering backlog is well documented and controlled. The inspectors were initially concerned that there were approximately 40 work orders greater than a year old that were being tracked as "awaiting engineering review" (reference - status of maintenance AWOs as of 7/31/90). This backlog was reviewed in detail and found to contain no items of safety significance. Furthermore, most of the items were open due to the administrative delays in closing out the work order packages, i.e., the work had been completed. The engineering assignments were found to be properly prioritized, with the tracking system indicating the responsible engineer and the expected completion date.

To determine the technical adequacy of the engineering support, ten significant PIRs that had been assigned to Engineering were reviewed. The PIR evaluations were found to be complete in that they appropriately extended the scope of the failure investigation to other similar equipment, and documented the cause of failure and the recommended corrective action. The following example illustrates this favorable observation.

1. PIR 89-70: Engineering initiated a detailed action plan in response to this PIR which identified an unqualified agastat relay. The action taken included an extensive walkdown of all agastat relays per AWO 89-4481. Additional unqualified relays were detected when the inspection results were reviewed. Engineering coordinated the replacement of these relays through the issuance of additional work orders.

During the inspection period, problems with equipment occurred which required engineering assistance. These maintenance activities were involved with nuclear instrumentation, pressurizer level controls, the emergency diesel generator, the auxiliary feedwater turbine, the condensate system, and the heater drain pump motor. The team observed that engineering support was timely, and that the plant engineers were experienced and knowledgeable about their systems. A detailed review of the work order package 90-09648 for the troubleshooting of the emergency diesel generator demonstrated these attributes. Followup of the resolution of engineering involvement with a relay setpoint change for the heater drain pump motor revealed a strong station program for controlling setpoints.

A new battery charger, two new inverters, and two motor control centers were installed during the last outage. The inspectors verified that preventive maintenance procedures had been written and spare parts obtained for this safety related equipment. These were initiated by engineering and further documents engineering's involvement in the maintenance process.

The inspector observed that the plant engineer associated with the emergency diesel generator was not familiar with the limitations of the plant troubleshooting procedure. This caused some confusion in planning this activity. Similarly, the work order indicated that QSD be notified prior to the start of work. The engineer inadvertently neglected to notify them until after work had been initiated. It appears that an improvement in the engineer's knowledge of station procedures would enhance their support of the maintenance process.

Conclusion

The inspectors observed close involvement of the engineering group in the daily meetings, in the PIR evaluation process, and in the setpoint change procedure. A minor weakness was noted concerning engineering personnel implementation of certain administrative and maintenance procedural requirements. Overall, the inspection team concluded that the engineering support of maintenance activities was well documented and was functioning well.

4.3 Role of PRA in the Maintenance Process

Scope

Through interviews with licensee personnel, the inspectors determined the effectiveness of the program for incorporation of the probabilistic risk assessment (PRA) into the maintenance process. Planning, scheduling, and prioritization of work were discussed, as well as the considerations given to potential common mode failures, single failure vulnerability, and safety system and equipment significance.

Findings

A Probabilistic Safety Study (PSS) for Haddam Neck was completed in February, 1986. The PSS is a Level 1 PRA which addresses core related accidents caused by internally initiated events during power operations.

On the corporate level, the PSS is used as one of four ranking attributes in the Integrated Safety Assessment Program (ISAP). ISAP was initiated in May, 1985, to address safety issues and provide an integrated, cost-effective implementation schedule using deterministic and probabilistic techniques. NEO 2.28, "Project Prioritization", Revision 1, details the method by which outstanding regulatory issues and plant improvements are prioritized and scheduled. The ISAP process is used exclusively for the scheduling of high cost plant modifications such as the recent replacement of the reactor protection and nuclear instrumentation systems.

Onsite, there is no formal program for incorporation of the PSS and risk considerations into maintenance planning, scheduling, and prioritization (see Section 5.5). However, the inspectors determined that plant management is aware of the benefits of the PSS and has requested guidance from the corporate PRA group during off-normal plant conditions and for selected site programs.

For example, during Cycle XV operations, the plant experienced a charging pump shaft failure. During pump repair, compensatory measures to counteract the small increase in core melt frequency were identified and implemented. In support of the motor-operated valve diagnostic testing program, which was initiated during the recent refueling and maintenance outage, the corporate PRA group provided a prioritized list of the valves to be tested. Additionally, selected surveillance and preventive maintenance frequencies have been changed accordingly when identified by the corporate PRA group as being beneficial in reducing risk.

Conclusions

Corporate personnel actively utilize the PSS in priority determinations for costly plant changes and implementation of regulatory requirements through the ISAP process. When the corporate PRA group identified changes to operational or maintenance activities which are beneficial in reducing risk, the information has been relayed to the site for evaluation and incorporation. Although the site has requested assistance from the corporate PRA group during off-normal plant conditions, there is no formal site program for PSS usage. The inspectors concluded that there is significant room for expanding onsite use of the PSS as it applies to plant maintenance activities.

4.4 Quality Control in the Maintenance Process

Scope

The objective of this inspection was to assess how quality control is utilized in the maintenance process, and to evaluate the licensee's program for reporting and correcting deficiencies related to maintenance activities.

Findings

Plant Quality Services (PQS) is the arm of the corporate Quality Services Department (QSD) which has the responsibility for the quality control of maintenance activities at Connecticut Yankee. With the overall upgrade of procedures that has occurred recently, the scope of quality control from a maintenance perspective has transformed from multiple inspector hold points in the maintenance procedures to a variety of inspector surveillances of the maintenance process. Certain selected plant activities are periodically surveilled as deemed necessary by QSD. Also, PQS reviews work orders prior to the start of work and their further involvement in that job is determined at that time. Generally, PQS notes on the work order to be notified when work commences. This policy is described in NOD 3.02, Rev. 5, "Control of QA Work Utilizing the PMMS Work Order System," and is applied at Haddam Neck by QSD 2.03, Rev. 4, "Performance, Reporting, and Followup of Surveillance Activities."

The inspector observed several positive attributes which demonstrated that quality control is adequately addressed in the maintenance process. These include the surveillance reports, the corporate trend analysis program, and the detection and reporting of deficiencies in the work order package documentation.

Surveillance reports on maintenance activities were reviewed by the inspector. These reports identified the scope of the activity, documented the observations made by the PQS inspector, and requested a response where appropriate. Monthly, PQS issues a report which identifies the surveillances of the past month, lists all of the surveillances awaiting a response, and presents a summary of the surveillance findings of the past twelve months by category. Three surveillances assigned to maintenance which were still open from 1989 were found to be "work complete", but were part of the administrative backlog in the maintenance department.

A PQS surveillance was conducted of the 2A emergency diesel generator troubleshooting (AWO 90-09648). The PQS inspector verified that drawings, test equipment, and tagging were properly documented, and that the troubleshooting method stayed within the bounds of the station procedure. Surveillance report number CY-Q5-90-230 accurately presented the quality control involvement in this job.

The corporate trend analysis program as defined by NEO 2.11, Rev. 3, "Trend Analysis from Quality Documents," collects, reviews, and reports significant items involving quality control. Input is obtained from PQS surveillance reports, nonconformance reports (NCRs), and audits. The inspector reviewed the two quarterly trend analysis reports which had been issued in 1990, and found them to be useful documents for identifying quality control issues. For instance, the second quarter report (QSD-90-5206, 8/7/90) described a repetitive problem area concerning foreign material exclusion and inadequate housekeeping at Haddam Neck. This was attributed to the lack of contractor awareness of the plant's procedural requirements. As described further in Section 6.2 of this inspection report, they recommend that contractors be trained in the procedural administrative requirements prior to the start of their assignment. The trend analysis program was also found to have sorting capabilities which can identify to maintenance and PQS supervisors the specific program areas where deficiencies have occurred, the discipline involved with the work (I&C, electrical, mechanical), and the cause of the problem.

As described in Section 5.10, the inspectors found various examples of documentation deficiencies in many work order packages being closed out. Subsequent inspection in this area revealed that these same weaknesses had been observed by the corporate quality control department and the plant quality services division. These observations were documented in NUSCO Audit A60270, 11/21/88, and "Summary Report of 1989 QSD Work Order Review", 2/2/90. The lack of followup by QSD and plant management on these issues, however, is important and is discussed below along with other areas where the program could be strengthened.

NUSCO audit A60270, "Automated Work Order Process," reported that there was a lack of understanding of the need to "accurately document the actual work and material used," and that the review process for AWOs was not adequate. Similarly, the plant QSD report of completed 1989 work orders stated that more than one third of the packages (193 of 529) had to be returned to the responsible party to address discrepancies. The dominant contributors identified were poor documentation, procedure deviations, and material control deficiencies. Since these same types of weaknesses were independently observed by the NRC inspectors, it is apparent that corrective action has not been effective. The QSD organization shares the responsibility with plant management to assure that identified deficiencies are corrected. Additional assertiveness and attention by QSD and plant management are necessary to achieve effective corrective action concerning this issue.

A major revision (Revision 5) to NOD 3.02, "Control of QA Work Utilizing the PMMS Work Order System," became effective on 4/20/90. It removed PQS from the review of completed work orders with the exception of those work orders which involve implementation of a design change. The plant implementing procedure, QSD 4.06, Rev. 0, "Review and Control of Automated Work Orders at Connecticut Yankee," presently requires that PQS review completed work packages on a sampling basis. This procedure is in the process of being revised to reflect the changes in NOD 3.02, Revision 5. However, based on the results of this inspection concerning the review of the work order package documentation, it would appear premature to reduce the amount of QSD involvement in the work order process.

The procedure associated with the reporting of nonconforming conditions, ACP 1.2-15.1, Rev. 20, was reviewed and found to provide fairly clear guidance as to when an NCR should be initiated. However, when comparing it to NEO 3.05, Rev. 1, "Nonconformance Reports," an apparent difference in philosophy was noted. Step 6.1.1 of NEO 3.05 states that "In the field, the NCR is not used to identify deficiencies but to provide engineering direction to the field when a condition adverse to quality cannot be made to conform to requirements..." Step 6.1.6 of ACP 1.2-15.1, however, states that "Nonconforming conditions involving material, parts, components, or installed plant equipment and systems shall be reported using an NCR even when identified as part of surveillance, audits, etc."

The inspection team observed one example where the plant maintenance department did not write an NCR for an apparent deficiency but followed the corporate philosophy rather than the station procedure. During the recent outage a 6-inch service water system check valve (SW-CV-271A) was disassembled and found to be stuck open. The other 3 similar valves (SW-CV-271B,C,D) were disassembled, inspected and repaired. However, since maintenance knew what repairs were needed to make these valves conform to requirements, no NCR was written. Clarification of the use of the NCR is needed to eliminate this current weakness so that a consistent approach is obtained which identifies, corrects and trends significant deficiencies.

Conclusion

The quality services department is adequately involved in the maintenance process through its review of work orders, its surveillance and audit of maintenance activities, and the trending of its findings. However, the inspection team questioned the lack of management attention to achieve effective corrective action to known work order package documentation deficiencies identified by QSD in 1989. Also, a concern was identified concerning additional work control changes being considered which would further reduce QSD involvement in the maintenance process. The team concluded that the implementation of the QSD involvement in the maintenance process could be strengthened by improving its followup of any identified deficiencies, by applying the results of the trend analysis program and by providing corporate and plant procedures with a consistent philosophy.

4.5 Radiological Controls in the Maintenance Process

Scope

The purpose of the inspection was to determine the extent to which radiological controls are integrated into the maintenance process. This area was reviewed by observing ongoing maintenance activities, by reviewing Radiation Protection's involvement in the planning and preparation for supporting maintenance work, and by reviewing the licensee's program for maintaining exposures as low as reasonably achievable.

Findings

Radiation exposure during maintenance work is controlled in a number of ways depending on the expected cumulative exposure for the job. These methods of control are described in Procedure RPM 1.5-2, "ALARA Review". For example, if the estimated exposure for the job is between 1-5 man-rem, control of exposure is rather formal. The job supervisor must complete a short-form ALARA (As Low As Reasonably Achievable) review, which consists of a check list of items to consider that may be used to reduce job exposure. The list is submitted with the radiation work permit (RWP) to health physics (HP) and is reviewed for adequacy and completeness. The licensee stated that, although not required by procedure, meetings are usually held between the job supervisor and the ALARA coordinator to discuss jobs in this exposure range. For jobs with exposure estimates exceeding 5 man-rem, the ALARA review is even more formal and is done in cooperation with the Station ALARA Coordinator. For jobs with exposure less than 1 man-rem, control is informal and is exerted through the job supervisor's knowledge of ALARA as well as the RWP which is issued by HP.

Additional control on exposure is exerted during the job by the job supervisor and by HP. The supervisor is responsible for ensuring that any ALARA reviews are incorporated in the job order package, that ALARA controls are available before the job starts, and that the workers have been appropriately trained. The ALARA Coordinator and the HP staff ensure that the ALARA measures, as well as other radiological controls practices, are being properly implemented. The HP group has stop work authority if they observe unsafe or improper practices. At the end of the job, a post job review is completed by the job supervisor for all jobs with exposures between 1-5 man-rem. These reviews are done by the ALARA Coordinator for jobs over 5 man-rem.

Maintenance procedures are reviewed for inclusion of ALARA considerations. However, these inclusions are normally of a general nature and often are limited to reminders that an RWP or and ALARA review is required for the job. The licensee stated that the important radiological input to maintenance work is at the preparation of the RWP and the ALARA review. Such a process was observed during this inspection in connection with a containment power entry. The entry was made to perform a number of repair and inspection activities, and the work was coordinated between maintenance, operations and health physics. The entry was completed smoothly and as planned.

Major projects involving new equipment installation or design changes in existing equipment are reviewed for radiological considerations and ALARA during meetings between the project engineer and site personnel, including the HP staff and the ALARA coordinator. Such meetings typically occur well before the planned start date for the project, typically at least six months before that date. The radiological implications of the project are discussed in detail, as well as possible alternatives for the proposed project or for the proposed methods of implementation. Procedure RPM 1.5-5 "ALARA Design Audits", provides guidance for the design engineer in the form of checklists. These lists include the items to be considered in designing components and systems to ensure that radiation exposure is minimized both during construction and installation and also over the life of the system.

Several systems are in place to allow identification of improper work practices in the RCA and to allow corrections to be made. These systems include the Radiological Deficiency Reports (RDR, Procedure RPM 1.1-1), the Radiological Incident Reports (RIR, Procedure RPM 1.1-2), and the ALARA Feedback Reports (Procedure 1.5-8). These three systems allow site personnel to report poor practices that they may have observed and to make suggestions for improvements in radiological performance.

The licensee stated that they have developed and are testing a computer system that will improve the current access control system. The new software will also allow storage of an extensive data base for exposures incurred during maintenance work. This data base will allow a variety of trending studies to be done to identify types of maintenance activities or classes of components that are exposure intensive. This type of trending is possible with the current data bases but is cumbersome because it must be done manually.

Several measures have been implemented to minimize the stay time in radiation areas during maintenance work. One of these is a system to enable personnel to quickly identify the component to be repaired or inspected. When operators identify a repair item during their routine tours, they tag it with an orange tag. This tag is easily seen when the repair crew enters the area to effect the repairs. The licensee stated that other efforts include attempts to replace manually operated valves located in radiation areas by air operated valves to minimize the need to enter such areas. Remote monitoring equipment is also being used for the same reason. Photographs of areas and components are used to brief workers before entry to minimize the time spent in the radiation areas identifying the components they are to work on.

ALARA training is provided to all first line supervisors onsite. This training consists of about two hours of classroom presentations plus about five hours of case history studies and exercises. Design engineers also attend these training sessions. Some ALARA training is also provided to radiation workers during their required annual radiation worker training. However, no training is currently being offered that is specifically designed to inform the design and project engineers from the corporate office of the current ALARA techniques used to minimize source terms in the plant and to minimize radiation exposure incurred during installation and maintenance of equipment. The licensee stated that the engineers meet frequently with site personnel, including health physics personnel, to discuss ALARA concerns during the planning phases of jobs, and that ALARA design considerations are discussed during these meetings.

There is currently no formal program to schedule maintenance activities to minimize the number and duration of entries into radiation areas, by postponing work, consolidating activities, or both, to coincide with periods of low radiation levels in the work area, or to combine work in a single radiation area to achieve a minimum number of entries into that area. The licensee stated that these objectives are considered informally on a short term basis during the daily planning meetings.

Conclusion

Integration of radiological controls, and particularly ALARA, into maintenance activities is a strength in the licensee's maintenance program. Some improvements can be made, however, particularly in long range planning and scheduling of maintenance activities to minimize the number and duration of entries into the RCA. Training in ALARA for corporate engineers involved in plant and equipment modification can also be improved.

4.6 Safety Review of Maintenance Practices

Scope

This portion of the inspection focused on the consideration given to safety in maintenance activities. This assessment was made by reviewing station procedures which address personnel safety issues, attending a plant supervisor's monthly safety meeting, observing plant maintenance personnel, and noting plant conditions, including signs, lighting, and the availability of protective equipment.

Findings

The licensee's safety program is an extensive one in which all personnel are required to participate. The maintenance manager is the plant safety coordinator and is responsible for leading the monthly supervisor's safety meeting, maintaining records of department safety meetings, and coordinating action required to correct a safety concern. Historically, the number of recorded accidents has been low, although there have been two lost time accidents in the past year.

The inspector reviewed the safety procedures that comprise the safety program, and found them to be detailed and well written. These included:

- ADM 1.1-33, Rev. 15, "Station Safety Program"
- ADM 1.1-72, Rev. 4, "Enclosed Volume and Hazardous Atmosphere Work Practices"
- ADM 1.1-123, Rev. 4, "Asbestos Material Identification, Handling, and Removal"
- ADM 1.1-162, Rev. 5, "Heat Stress Management Program"

Within ADM 1.1-33 are specific requirements for footwear, hard hats, safety glasses, and hearing protection. During the inspection period, the inspectors observed that personnel were in compliance with these requirements.

Throughout the station, signs clearly alert personnel to hazardous conditions such as loud noises, high voltage, and the presence of asbestos. "No Smoking" signs were noted at the battery rooms and the screenhouse. Eye wash stations were located throughout the plant.

A significant observation by the inspection team was the total management support, commitment, and involvement towards personnel safety. At the monthly supervisors meeting, both the station superintendent and the unit director emphasized the commitment to safety excellence, and urged supervisors to continuously monitor jobs for good safety practices.

Conclusion

The inspectors concluded that the licensee's safety program is well established. It is supported by plant supervision, as witnessed by the substantial resources dedicated to implementing the program.

4.7 Integration of Regulatory Documents into the Maintenance Process

Scope

The objective of this part of the inspection was to determine the methods used to integrate regulatory documents into the maintenance process.

Findings

Documents such as NRC Information Notices, Bulletins, and Generic Letters are evaluated to determine their applicability to Haddam Neck. This is coordinated by the corporate licensing group and is described in NEO 4.01, "Communication's with the NRC," Revision 5. Following an initial screening at the corporate level, the documents are transmitted to the plant for review. The inspector found that these documents were assigned to various plant organizations and tracked in a controlled routing database as specified in ADM 1.1-45, "Relational Data Base Processor (RDP) Commitment Tracking, Controlled Routings and Red Folders," Revision 9.

Using the controlled routing database, the inspector selected a sample of NRC documents that had been assigned to maintenance for evaluation and disposition. These included several Information Notices and Bulletins. The reviews were found to be complete and several action items had been generated as a result of the reviews. For instance, the review of NRC Information Notice No. 88-24, "Failure of Air-Operated Valves Affecting Safety-Related Systems" resulted in the replacement of several solenoid valves used for containment isolation. Similarly, the inspector reviewed the licensee's evaluation of Generic Letter 88-14, "Air Systems Problems."

Engineering performed several reviews and analyses towards resolving the issues expressed in the document, including a test to verify that all safety related air operated valves failed in the required safety position following a loss of air. In addition, the I&C department is implementing maintenance on boundary components such as pressure regulators between the air supply system and the safety related component, and the chemistry department implemented a procedure to detect contaminants in the system, CHM 7.7-12, "Sampling of Control Air for Particulate Testing." These corrective actions demonstrate that the stations procedures for integrating regulatory documents into the maintenance process are functioni satisfactorily.

Independently, the corporate Training Department and Nuclear Safety Engineering Section also reviews regulatory and industry documents to determine their applicability to the licensee's maintenance program. The inspector toured the training center and learned that representatives from training and maintenance meet periodically to discuss the need to modify training as a result of the review of operating experience and regulatory documents.

A minor weakness in the process of tracking the disposition of regulatory documents was discovered by the inspector while reviewing the licensee's evaluation of Information Notice 88-44. The inspector found that the controlled routing status was closed even though the corrective action had not been implemented. The status should have referenced the nonconformance report which had been issued to replace nine circuit breakers which did not have the required traceability.

Conclusion

The licensee has established an effective system to control and track regulatory documents to ensure that regulatory documents are factored into the maintenance process. Both plant and corporate activities in this area have been appropriate.

III. MAINTENANCE IMPLEMENTATION

Scope

The purpose of the inspection effort in this area was to determine the effectiveness of established maintenance controls and, more importantly, the quality of maintenance performed. Controls established in the following areas were evaluated: Work Control; Plant Maintenance Organization; Maintenance Facilities, Equipment and Tool Control; and Personnel Control. The inspection team evaluated the effectiveness of these controls through observations of maintenance in progress; review of work orders, procedures and other maintenance related documentation; maintenance personnel training; equipment and spare parts disposition; and interviews/discussions with plant personnel at all levels.

5.0 WORK CONTROL

Scope

The effectiveness of the Work Control Process was determined by evaluating established programs, procedures and policies and their implementation in the following areas: Maintenance in Progress, Work Order Control and Execution, Maintenance History, Maintenance Planning, Scheduling and Prioritization, and documentation related to plant maintenance, including Procedures, Post-Maintenance Testing and Maintenance Documentation review and closeout.

Evaluations of the work control process included observation of actual work in progress, review of completed automated work orders (AWOs) inspection of selected systems and components and discussions with maintenance personnel at the craft, supervisor and managerial level.

5.1 Maintenance in Progress

Scope

An evaluation of Maintenance in Progress was conducted by observing actual maintenance, including corrective maintenance, preventive maintenance, surveillances and ISI/IST evaluations performed by the Mechanical, Electrical, Instrumentation and Control (I&C) and Engineering disciplines. Observations of actual maintenance were limited due to the operating status of the plant.

5.1.1 Mechanical Maintenance in Progress

Findings

During the inspection period, preventive and corrective maintenance (CM) activities were observed to evaluate procedural adequacy, adherence to procedures, work preparation, planning, and performance. The inspectors observed PMs associated with the control air compressors, service water Adams Filters, the "A" emergency diesel generator (EDG), and corrective maintenance associated with the "B" auxiliary feedwater (AFW) pump terry turbine and a spare condensate pump.

Prior to the monthly surveillance of the "A" EDG, the monthly PMs were performed on the associated air compressor and air start system oil filter. Good coordination with the operations department was noted in jacking the diesel for the oil filter PM. The work packages contained sufficient instructions for work performance. Equipment clearance sheets were present and tags verified. The mechanics performing these PMs were familiar with the procedures and equipment and aware of work requirements for safety related components.

The inspectors observed portions of corrective maintenance on the "B" AFW turbine. On September 18, excessive steam leakage was observed from the turbine area during monthly surveillance testing. The "B" AFW pump was removed from service and AWO 90-9684 was initiated for disassembly and repair of the turbine in accordance with CMP 8.5-184, "Overhaul of Auxiliary Feedwater Pump Turbine", Revision 0. The inspectors noted that the AWO was initially prioritized as Priority 3, this was subsequently changed to Priority 1. Maintenance personnel were observed prestaging the necessary tools and coordinating efforts prior to work authorization. The inspectors observed the pre-job briefing, tagging verification and commencement of work. The mechanics raised questions on specific steps in the procedure and obtained supervisory and engineering review and the necessary procedure changes prior to proceeding.

Inspectors also witnessed maintenance associated with a work order to rebuild a spare condensate pump per MA 8.5-1, Revision 2, "Condensate Pump Maintenance". The maintenance was being expedited because of operational problems associated with one of the in-service condensate pumps. During the pump rebuild, the team observed almost constant supervisory presence at the job site. No concerns were noted.

5.1.2 Electrical and Instrumentation & Control Maintenance in Progress

Findings

The inspectors observed the following work in progress:

- Loop #1 Steam Flow/Feed Flow Mismatch Troubleshooting per AWO 90 CY 09453

- NIS #1 (Power Range) Troubleshooting and Detector Replacement (Preparation) per AWO 90 CY 09448

- Troubleshooting of EDG-2A, "Start Failure" alarm per AWO 90 CY 09648

- Functional Verification of Auto Initiation of AFW Solenoid Valves per PMP 9.2-164, Revision 0

- Safeguards Equipment Timer Tests per Procedure SUR 5.2-24, Revision 10

While witnessing the above maintenance items, the inspector noted that technicians appeared knowledgeable in plant and system requirements and of the maintenance evolutions being performed. All I&C technicians observed were qualified as specialists and certified to perform any plant related I&C activities.

No concerns were noted during the conduct of these activities with the following exceptions:

During the steam flow/feed flow troubleshooting activity, the I&C technicians utilized ACP 1.0-68, "Troubleshooting Guidelines", Revision 0. This procedure requires that initial troubleshooting steps be documented on an attachment checklist and then reviewed and approved by the Operations Shift Supervisor. Should the scope of troubleshooting activities change, a new attachment is required to be completed and approved (signed) by the Shift Supervisor. In many cases, additional troubleshooting steps are documented on the original checklist and initialed by the Shift Supervisor. The inspector observed that the I&C technicians completed initial troubleshooting steps and started to leave the control room to examine the local steam flow transmitter. Subsequent transmitter troubleshooting steps were not documented, nor was the Shift Supervisor aware of the technician's intentions to begin troubleshooting the steam flow transmitter. This concern regarding control of troubleshooting activities was communicated to both the I&C Supervisor and Shift Supervisor, who agreed that greater communications and control was needed to keep control room operators advised of maintenance troubleshooting activities in progress, especially when the scope of such activities changes.

Another concern was identified during troubleshooting of the EDG-2A, "Start Failure" alarm. The troubleshooting work order had required Plant Quality Services (PQS) to be notified prior to commencing work. Work activities were well underway, and Reliability Engineering and I&C personnel were already installing diagnostic equipment when the engineer supervising the evolution realized that the PQS quality control (QC) inspector was not present. The engineer left to notify QC, and the inspectors noted that work continued uninterrupted even though QC was not present. The inspectors determined that work control deficiencies existed in that QC was not notified prior to commencing work, as required by the AWO, and that work was not halted when the absence of the QC inspector was discovered.

The inspectors noted that for all other maintenance activities observed, preparation of work was adequate. Careful consideration was given to using proper support documents, drawings and procedures, and care was taken to use proper tools and test equipment. Review of AWO packages for maintenance activities observed revealed that proper authorization and reviews had been obtained and that the latest documentation was being used. Tagging of equipment out of service was adequate as well as housekeeping and cleanliness. For electrical work, a Jumper Device log and Independent Verification documentation was evident. Adequate supervision and oversight was provided by the I&C and Electrical Maintenance Supervisor where appropriate.

Conclusion

Field observations of maintenance activities indicated that good maintenance practices were employed and that mechanics and technicians were quite knowledgeable of work assigned. The inspectors determined that, for activities involving troubleshooting and QC oversight, more control and communications between departments could correct the observed weaknesses. These weaknesses could be strengthened with more attention to detail regarding troubleshooting steps and PQS determinations.

5.2 Work Order Control

Scope

The objective of this area of the inspection was to evaluate the licensee's work order system and the various mechanisms related to the work identification, documentation, review and approval process and procedure performance.

Findings

The licensee's standard for work identification, disposition and documentation is ACP 1.2-5.1 "PMMS Trouble System and Automated Work Order", Revision 39. This procedure provides for reporting plant system material deficiencies via a Trouble Report (TR). Additionally, provisions for periodic maintenance, surveillance, repair and design changes are included as part of the procedure. Overall disposition, review and approval for the work order document is by respective department PMMS planners and operations department. The work order document includes information regarding problem description, category codes, work to be performed, actual work performed, equipment used, retest requirements and necessary operations, engineering and QC review/approvals. A thorough examination of the work order procedure and work order document (forms) indicated discrepancies and concerns as follows:

- There is no procedural guidance for indicating "Priority" for work orders except the informal "guide" included as an attachment to the procedure. This attachment is not referred to in the procedure.

- The work order form contains a "Failure Code" blank, to be used in identifying the root cause of equipment or component failure. This failure code is not explained or referenced in the procedure.

- Job supervisor instructions for completing applicable sections of the work order are vague in that the procedure is not clear as to what sections are applicable.

- The procedure contains no clear guidelines or instructions for personnel to document "Actual Work Performed" on the work order. As a result, many work orders contain summaries of work performed that are not descriptive or specific.

Effectiveness of the work order system is due in large part to good communications between the various departments. Steps have been taken to improve the standard document to include "Failure Code" guidelines, and the standard automated work order form is undergoing revision. The inspector determined that procedural weaknesses, however, contributed directly to deficiencies identified in Section 5.10 of this report.

Conclusion

While the standard work order control document is adequate, work control is effective primarily due to the verbal communications between departments. The maintenance process could be strengthened by providing specific guidance in the various areas of the work control procedure as noted by the inspection team.

5.3 Equipment Records and History

Scope

The objective of the inspection in this area was to assess the maintenance history system for plant components and determine the extent to which plant equipment historical records are updated, retrieved and utilized for maintenance planning, analysis, trending and NPRDS reporting.

Findings

Equipment history is accessed through the Production Maintenance Management System (PMMS) database. This database can be manipulated through component, system and activity codes to provide up-to-date information on all maintenance activities associated with any plant equipment item. Information in the historical database is entered by PMMS planners following work order closeout. In addition, hard copies of all work orders are maintained at the Nuclear Plant Records Facility onsite. Throughout the course of the inspection, the inspectors requisitioned many records from this facility for review. In general, the inspectors found this facility to be a good mechanism for expeditious retrieval of all types of maintenance records.

The PMMS planners also demonstrated the retrieval of historical information from selected work orders and equipment. The information obtained from the historical database proved to be extensive, and between a database printout and work order hard copy, it was easy to determine the scope of actual maintenance performed, provided that work was documented adequately. In this regard it should be noted that the actual data inserted into the maintenance records is dependent on documentation practices. Certain weaknesses were identified concerning this matter as discussed in Sections 5.2 and 5.10.

Currently, the plant NPRDS coordinator is working to update engineering data from the PMMS database prior to issuance of any subsequent NPRDS reports. The PMMS system is used because it is the most up-to-date source of system/equipment/component identification information (ID number, part number, model number). The PMMS database is also used in some cases to evaluate I&C equipment performance, determine if problems exist with selected instruments, and modify the instrument surveillance schedule accordingly.

Conclusion

The licensee has an effective and extensive method for maintaining equipment records, and the inspection team concluded that the PMMS database and Nuclear Plant Records Facility were strong elements in storing, retrieving and analyzing equipment maintenance data. This conclusion is separate from the weaknesses noted in Sections 5.2 and 5.10 concerning certain maintenance work documentation practices observed.

5.4/5.6 Maintenance Planning and Scheduling

Scope

The inspector observed maintenance activities to determine and evaluate the job planning process, specifically coordination of activities, construction of work packages, supervisory control, scheduling and job tracking.

Findings

Most maintenance items are coordinated by the respective department's job planners. These personnel are responsible for generating an Automated Work Order (AWO) from a Trouble Report (TR) using the PMMS system. For preventive maintenance and surveillance items, the PMMS database supplies most of the relevant information associated with any task, as part of the master preventive maintenance program. The job planners can manipulate the PMMS system as needed to provide information, procedures, retest requirements, personnel requirements and special equipment directly on the AWO for corrective maintenance items. The review process of a typical AWO prior to commencement of any task is such that all major departments (operations, QA, engineering and maintenance) share in the overall planning and coordination effort. Much of the coordination of maintenance activities is accomplished on an informal basis through daily meetings. Although informality was not a problem during non-outage conditions, during the recent extended outage, plant management was forced to examine the overall outage planning process and as a result, adopted a "Restart" process driven by anticipated operating modes. The restart process was a systematic method for ensuring completion of work orders, NCR's, controlled routings and licensing commitments prior to entry into various operating modes. Lessons learned from the adoption of this system are being incorporated with a modification of the PMMS system for use in the next outage, for planning purposes.

The inspector reviewed planning aspects for a corrective maintenance item entailing replacement of NIS channel #1 power range detector. It was noted that spare cable conduit was obtained from the warehouse, staged and fabricated especially for this job and with sufficient lead time prior to the short maintenance outage. An engineer from the corporate offices briefed maintenance personnel to ensure that support documents and preparations were appropriate. Overall control of this evolution, from a planning standpoint, was considered to be good.

Scheduling of maintenance during plant operation is coordinated and controlled by Operations. The Operations Coordinator assigns maintenance items to a daily plan based on plant conditions, technical specification considerations and support manpower availability. Special considerations and concerns are discussed at the daily meetings, and the daily schedule (Plan of the Day) is modified accordingly. The Plan of the Day report was restructured during the inspection to strengthen communications by including in it descriptions of current work items according to working group. All maintenance tasks are tracked through PMMS to provide real-time status throughout the disposition of a work order. A schedule of high priority work items is maintained for short duration maintenance outages. An example of this contingency planning was observed during the inspection, as maintenance, operations and I&C departments prepared for a short duration outage to repair NIS, pressurizer level and condensate system components.

Conclusion

Coordination of planning scheduling activities among various departments is considered good. Activities are adequately scheduled and tracked using priority codes and the PMMS system. Ongoing modifications to the outage planning process will contribute favorably to subsequent outages. Overall, the planning and scheduling of maintenance is adequately controlled and coordinated.

5.5 Work Prioritization

Scope

The inspectors interviewed licensee personnel and reviewed completed work orders to determine the methods by which routine and unscheduled work is prioritized. Specifically, this inspection evaluated whether maintenance activities are prioritized with consideration for probabilistic risk assessment (PRA) criteria, equipment safety significance, and the affects of balance-of-plant maintenance on safety.

Findings

The priority system at Haddam Neck is controlled by ACP 1.2-5.1, "PMMS Trouble Reporting System and Automated Work Order", Revision 39. This procedure governs the authorization, control, and documentation of work activities. Attachment 12.8 to the procedure is a matrix of the criteria used to determine work priority codes (1 through 4). The evaluation categories include plant reliability, personnel safety, outage work, regulatory requirements, preventive maintenance, and security requirements. The significance relative to the plant PRA is not included which was perceived as a program weakness by the team. Although the matr.x is relatively complete, no procedural guidance is provided for the assignment, modification, review, and use of the priority codes.

The inspector discussed the use of priority codes with several individuals, including the maintenance manager, maintenance PMMS planner, and the operations coordinator. The priority codes are being utilized as a gross sorting mechanism for automated work orders (AWOs). Priority 1 and 2 AWOs are of an immediate nature and are worked accordingly and Priority 4 AWOs are routine preventive maintenance and outage work. The bulk of the AWOs are Priority 3 which cover non-critical corrective maintenance and some preventive maintenance. During normal plant operations, the Priority 3 AWOs are reviewed by operations, maintenance, and instrumentation and controls personnel monthly to evaluate the priority codes and schedule necessary work activities.

In practice, work activity prioritization is driven by Technical Specifications, operational and personnel safety, operational experience, and balance-of-plant reliability. Station management in heavily involved in the process through the two daily planning meetings at which ongoing and planned work activities are discussed.

The inspectors attended several daily planning meetings and reviewed many completed work orders to verify that work is being assigned the appropriate priority codes, and scheduled and performed according to safety significance. Modifications to work priorities were observed as plant operational concerns changed over the course of the inspection.

Conclusions

The inspectors concluded that work prioritization at Haddam Neck is performed adequately and with the appropriate importance placed on reactor safety. This program could be strengthened by the creation of guidance for the assignment, modification, review and use of the priority code system available in PMMS and inclusion of PRA-based priority in the scheduling of Priority 3 and 4 AWOs.

5.7 Backlog Control

Scope

The inspectors determined the adequacy and effectiveness of the Maintenance and I&C Department backlog controls and backlog measurement methods.

Findings

Backlog parameters are tracked and measured on a quarterly PMMS report in accordance with NOP 2.13, "Implementation of the Production Maintenance Management System", Revision 2. Indicators that are tracked and reported include corrective maintenance AWO's overdue, including estimated manhours, preventive/corrective ratio, number of work orders awaiting parts, plant conditions or engineering review and corrective maintenance backlog trends over the previous twelve months. In addition, I&C trends PM performance and forecasts estimated manhours by CM and PM. I&C also records and tracks the twenty top components as far as manhours consumed as well as ten top systems. A review of tracked data for the past year indicated that the total plant maintenance backlog was low and adequately managed. In addition, a review of system/equipment contained in the current backlog revealed no significant safety items or components.

Conclusions

The licensee's backlog monitoring system includes a quarterly indicator report and trending of problem systems/components as well as indicators for manhours and backlog item status. The current low backlog indicates that management attention in this area is good.

5.8 Maintenance Procedures

Scope

The inspection objective was to assess the development and approval process, technical content, administrative method of control, and review process for maintenance procedures.

Findings

Procedure development, control and use is governed by ACP 1.2-6.5, "Station Procedures", Revision 26, which provides format, standardization and content guidelines for all procedures. A recent upgrade effort on procedures has resulted in consistent formatting and improved user friendliness of maintenance procedures. The inspector reviewed several corrective, preventive and surveillance maintenance procedures. All exhibited consistent format and had necessary prerequisites, notes, cautions and review/approval sections. The inspector noted that no procedures were overdue for biennial review, and the I&C procedure biennial review process was three months ahead of schedule.

During a plant walkdown, the team noted an inconsistent pattern for the as-found condition at the jacking bolts for the "A" auxiliary feed pump turbine foundation. Two jacking bolts for equipment alignment in one axis were torqued at the turbine foundation while the jacking bolts for alignment in the other axis were backed off. By the end of the inspection, the licensee revised MA 8.5-9, "Alignment of Rotating Equipment," to require that all jacking bolts be removed or backed off at the end of the equipment alignment procedure. This change will achieve consistency for all rotating equipment alignments so that the jacking bolts are not in contact with aligned equipment.

Conclusions

The maintenance procedure development, control and revision process was well documented and implemented, and was determined to be a strength of the overall maintenance program. The efficiency of the process was indicated by the consistent format evident in the procedures reviewed.

5.9 Post Maintenance Testing

Scope

This inspection objective was to determine whether post maintenance testing (PMT) criteria were established, documented and implemented. The PMT program was reviewed to evaluate the assurance of equipment operational readiness and specification of adequate acceptance criteria.

Findings

The PMT program is described by ACP 1.2-11.3, "Retest/Functional Verification", Revision 13. This procedure provides clear instruction for the determination and performance of PMT. Worklists in the form of detailed matrices are provided as attachments; these matrices highlight all of the equipment covered by the Inservice Inspection and Testing programs and the required PMTs for each. This is a valuable tool which has proven instrumental in assurance of adequate PMT for this equipment.

PMT is also addressed by ACP 1.2-5.1, "PMMS Trouble Reporting System and Automated Work Order", Revision 39; ACP 1.2-11.2, "Review of Test Data", Revision 9; and ACP 1.2-11.7, "Special Testing", Revision 2. The inspector reviewed the guidance for PMT provided by these procedures and found it to adequately incorporate the applicable criteria of ACP 1.2-11.3.

Due to plant status, a limited review of in-progress PMT was conducted. The inspectors observed PMT of a boration flow path check valve (BA-CV-387) which had been blocked by an accumulation of boric acid and the "A" emergency diesel generator following troubleshooting of a recurring start failure alarm. The inspectors observed that the appropriate PMTs were specified by the work packages, equipment was restored to the normal configurations, and PMT was conducted prior to acceptance for operation.

During the recent refueling outage, the licensee identified a problem involving the documentation of completed PMTs. The adequate documentation of PMTs is aggravated by the fact that separate AWOs are issued for actual work and PMTs. Plant Information Report 89-169 identified that the associated AWOs were not being adequately referenced on the initial AWOs to provide traceability. Changes were made to ACP 1.2-11.3 and ACP 1.2-5.1 and the computer programs were modified to permit this data input. The inspectors reviewed AWOs completed since these changes and determined these corrective actions to have been adequately implemented.

The inspectors also reviewed about 120 completed work packages from the recent refueling outage to verify that the appropriate PMTs were specified and performed. Generally, the appropriate PMTs were required and the AWOs indicated that the testing had been performed or referenced the associated AWO under which the PMT was conducted. A few examples of inadequate documentation of PMT requirements and performance were identified and are discussed with other AWO documentation deficiencies in section 5.10 of this report.

Conclusions

The inspectors concluded that the PMT program is comprehensive and is being adequately implemented.

5.10 Review of Completed Work Control Documents

Scope

The objectives for this inspection were to assess the licensee's work order review process, general completeness and adequacy of work documents, and feedback from the maintenance process review.

Findings

ACP 1.2-5.1, "PMMS Trouble Reporting System and Automated Work Order", Rev. 39 describes the administrative control program for the disposition, documentation, review and closeout of maintenance activities. A routing system promulgated by this procedure provides a mechanism for feedback to various departments, but in practice, information feedback concerning active work orders is accomplished through daily planning and status meetings.

A weakness identified in the documentation and closeout system is that, in many cases, documentation of work performed and retest is either nonexistent, incomplete or non-descriptive. The inspector reviewed over one-hundred (100) completed mechanical, electrical and I&C work orders. Documentation deficiencies identified on work orders reviewed include the following:

- On AWO 90-6078 (failed check valve surveillance), the retest was performed under a separate AWO, but not referenced in the original AWO.
- On AWO 90-3299, initial work and several rework activities were conducted under this same AWO for EG-21 service water heat exchanger outlet valve.
- On AWO 90-7502, "Problem Description" was lined out and replaced by another entry, with no explanation.
- A retest AWO (89-4405 VOTES Test) for RH-MOV-22 stated that gasket work was performed under AWO 90-1657, but 90-1657 does not mention any gasket work.

- On AWO 90-0725, retest requirements are "N/A'd" with no explanation, justification.
- On AWO 90-8707, 18 man-hours were spent troubleshooting the main generator exciter for a ground, but no troubleshooting documentation was included in the AWO.

In addition to these findings, many AWO's had multiple crossed out entries in blocks for "actual work" and "cause of problem," and contradicting entries for the same documentation.

These findings were compounded by the team's subsequent finding that the plant Quality Service Department (QSD) conducted a review of 1989 work orders, detailed in CY-QSD-90-1117, dated February 2, 1990 This review revealed that approximately one-third of 529 work packages contained deficiencies, one of the dominant contributors being poor documentation. The QSD report attributes many of the deficiencies to a poor review by responsible departments in the closeout process. Review of AWOs during this inspection reflected the same basic results due to the licensee's inadequate corrective action which is a violation of 10CFR 50, Appendix B, Criterion XVI (50-213/90-80-01). The team noted that this weakness negatively impacts maintenance trending and root cause efforts.

Conclusion

Although adequate procedures exist to describe how completed work order packages should be reviewed for closeout, the inspection team's review of closed out work packages evidenced various deficiencies in the recorded information. This significant weakness was attributed in part to a poor review of the work packages by the responsible departments during the closeout process.

Overall Conclusion

Although the licensee has established adequate and effective measures for work order control in its maintenance program, a significant weakness was observed in the overall documentation of maintenance work much of which was attributed to inadequate guidance in the work order control procedure. These weaknesses are detailed in Sections 5.2 and 5.10 of this report.

6.0 PLANT MAINTENANCE ORGANIZATION

Inspection of the maintenance organization determined the effectiveness of control exercised by the maintenance organization for maintenance activities, contract maintenance personnel, deficiency identification and control, maintenance trending, and support interfaces.

6.1 Control of Maintenance Activities

Scope

The extent to which the mechanical, electrical, and instrumentation and control disciplines have established controls for performing maintenance activities was assessed. Specific attention was paid to the identification of the need for maintenance, the assurance that system integrity was maintained, the monitoring of maintenance activities, control of rework, use of procedures, and control of system configuration.

Findings

6.1.1 Mechanical Maintenance

The inspectors observed mechanical preventive and corrective maintenance activities and discussed aspects of the mechanical maintenance program with the maintenance craft, planners, engineers, and supervisors. Site and department level procedures implementing the maintenance program and associated with ongoing work activities were reviewed.

Preventive maintenance on the "A" emergency diesel generator, the "A" control air compressor, the "B" service water Adams filter, and the spare condensate pump were observed. Corrective maintenance was observed for the "B" auxiliary feedwater pump turbine. The inspectors reviewed associated work packages for completeness of information and procedures, observed work in progress to verify compliance with procedures and determine supervisor involvement, and discussed work activities and controls with the mechanics.

With minor exceptions, the work package contents were found to be complete. Job preparation was evident, personnel were knowledgeable in job and procedural requirements, and supervisors were present for portions of work performance. System configurations were reviewed and good coordination with other departments was observed.

The inspectors concluded that mechanical maintenance activities are well controlled through supervisory involvement and the PMMS process. Good coordination exists with the other departments to ensure that system integrity and configuration are maintained. The mechanical maintenance staff consists of highly qualified individuals with substantial site experience and a very low turnover rate.

6.1.2 Electrical Maintenance

The maintenance of electrical equipment is controlled using equipment-specific preventive maintenance (PM) procedures successfully coupled with generic procedures and instructions for repetitive electrical activities such as disconnecting and reconnecting devices and equipment grounding practices. The technical adequacy of selected procedures for both original and replacement equipment was reviewed. The following procedures were found to accurately define the maintenance requirements as well as contain the appropriate controls for working on plant equipment.

- PMP 9.5-18, "BC-1A Battery Charger Panel Preventive Maintenance", Revision 7
- PMP 9.5-95, "IV-1A, 1B, Vital Bus Inverter Preventive Maintenance", Revision 5
- PMP 9.5-42, "Motor Control Centers", Revision 10
- PMP 9.5-37, "DB-50 Breakers", Revision 10
- PMP 9.5-192, "Disconnection and Reconnection of Electrical Devices", Revision 1

The plant maintenance department has recently implemented a quarterly comparison of industry and plant equipment failure rates using the Nuclear Plant Reliability Data System (NPRDS). In July 1990, the PM coordinator identified a recurring problem concerning low output voltage on the "A" battery charger. This was further evaluated by maintenance, including contact with two other utilities with similar battery charger problems. This quarterly review was found to be supportive of the electrical maintenance program.

The motor-operated valve (MOV) diagnostic testing program was discussed with the maintenance electrical supervisor. The use of a diagnostic approach on a scheduled basis as well as for post maintenance testing satisfactorily addresses this area.

During the course of the inspection of electrical maintenance, the NRC inspectors noted the following conditions:

1. Semi-annually, corrective maintenance work orders are reviewed by the PM coordinator to detect previously unidentified problems. This activity focuses mainly on mechanical equipment failures and inadequately addresses electrical equipment. The licensee stated that a review of electrical equipment failures will be included as part of this activity.

2. An example was identified in which a PM procedure did not contain completed instructions for returning electrical equipment to service following maintenance. Plant Information Report (PIR) 90-191 concerned the failure of a contactor in the rod drive control cabinet. The licensee had discovered that the arc chute for one set of contactors had fallen off, which resulted in a flashover and destruction of the contactor when it was energized. Preventive maintenance had been performed during the recent refueling outage under PMP 9.5-2, "Rod Control System Preventive Maintenance", Revision 7. This procedure does not contain instructions for restoring the contactors to service following the cleaning and inspection activities of step 6.5. Temporary procedure change, TPC 90-879, was written to add the appropriate instructions for ensuring reassembly of the contactor following maintenance. The inspector determined that these corrective actions were adequate.

3. The inspector reviewed PMP 9.5-147, "Grounding of 4kV Breakers", Revision 3, and found it to be satisfactory with the exception that the grounding cable size is not specified. This is a personnel and equipment safety concern in that the ground cable must be capable of carrying the fault current associated with the system under test. The licensee resolved this concern by modifying the procedure to add a note specifying the minimum cable size to be used. This change is documented in TPC 90-893, dated September 19, 1990.

4. Two examples of substandard electrical equipment material conditions were observed in the "A" switchgear room. The "A" battery charger was covered by a plastic sheet to prevent water damage from the duct work located above it. A drain line in the duct was plugged; a PM was implemented to periodically verify that this line is clear. The licensee committed to repair and reinforce the duct as necessary. The second observation concerned the condition of the grounding cables. The insulation was severely damaged on several of the conductors. The licensee stated that the damaged portions would be removed.

The electrical maintenance organization was observed to be well controlled; with the exception of the rod control system PM procedure, the procedures reviewed were adequate; procedures are adhered to; and applicable industry experience is incorporated into the maintenance program.

6.1.3 Instrumentation and Controls

The inspector observed maintenance in progress in the instrumentation and controls (I&C) discipline, interviewed various I&C technicians and discussed policies for the I&C department with the I&C supervisor. The I&C maintenance activities witnessed were well planned, and technicians were knowledgeable and thorough in the performance of work assigned.

The I&C department is a separate maintenance organization governed by its own department instructions (ICDIs). Some instructions and procedures are parallel to those developed for the maintenance department. The ICDIs include provisions for outlining I&C jurisdictional boundaries, personnel qualification, EQ program, vendor documentation control, test equipment guidelines, and I&C maintenance history control and archiving.

Throughout the inspection, it was observed that I&C personnel were knowledgeable concerning departmental policies and procedures. The I&C staff had many years of plant experience and turnover was extremely low, contributing to the efficiency of this organization. Mechanisms are in place for oversight of in-process activities by supervisory personnel. Training and evaluation of technicians, review of administrative and technical procedures, and availability of appropriate procedures, tools, and test equipment were evident. Control of materials was good and the I&C shop was neat and spacious. Support personnel, including the I&C engineer, M&TE calibration technician , parts coordinator and planners were segregated from the shop area.

All activities witnessed were carried out efficiently, potential problems were identified and resolved, and the review process for completed items was well organized. One concern during actual I&C maintenance involved the use of ACP 1.0-68, "Troubleshooting Guidelines", Revision 0. This concern is detailed in Section 5.1.2 of this report. The inspector determined that the concern identified was an isolated case.

The I&C organization has a well developed program for performing and supporting maintenance. The highly experienced staff functions efficiently for all maintenance activities. Guidelines in place support all functions of the department and contribute to the overall excellent reputation.

Conclusions

The inspectors concluded that control of the mechanical, electrical, and I&C disciplines is adequate. When the necessity for maintenance is identified, the maintenance organization effectively assures that work is executed in a controlled manner. A part of the success of the maintenance program implementation can be attributed to the plant staff which was found to be highly qualified and experienced.

6.2 Control of Contracted Maintenance

Scope

This inspection area assessed the licensee's program for control of contracted maintenance personnel. Specifically, the methods by which the licensee selects, trains, and monitors contractors.

Findings

Although the licensee uses a substantial number of contract personnel for plant outages, there is no formal guidance or procedures which dictate how contractors are to be controlled. The maintenance manager indicated that each department has an informal process for using contractors.

The inspectors were unable to observe contractor personnel work activities and the interface with station personnel due to plant conditions. However, in their Second Quarter 1990 Trend Analysis Executive Summary, dated August 14, 1990, the Quality Services Department identified a repetitive problem in audit findings from the refueling outage which indicates that contractor personnel are not receiving sufficient training in procedural requirements including Foreign Material Exclusion areas, housekeeping, and documentation.

Conclusion

Although the inspectors were unable to observe contractor performance and licensee control of contractors, it was concluded that formal guidance or procedures would strengthen this area.

6.3 Deficiency Identification and Control System

Scope

By sampling existing trouble reports and work orders, and conducting plant tours, the inspectors evaluated the licensee's deficiency identification and control system. The inspection focused on the program for deficiency identification and control, the process implementation, its ease and efficiency, and the resolution of deficiencies.

Findings

The process for deficiency identification and control is defined by ACP 1.2-5.1, "PMMS Trouble Reporting System and Automated Work Order", Revision 39. Under this procedure, any station employee may initiate a trouble report (TR) and automated work order (AWO) for a noted deficiency. The process and responsibilities are clearly defined by ACP 1.2-5.1.

When a deficiency is identified, a TR is initiated in PMMS and reviewed by the originator's supervisor. If approved, the TR is forwarded to the lead department for review and initiation of an AWO by the PMMS planner. The AWO initiation process includes determination of the work required, applicable procedures and post maintenance testing, and priority code. The deficiency is then controlled as other AWOs in the PMMS database.

The inspectors conducted tours of the accessible plant areas and noted TR tags present and other minor deficiencies (see Section 1.2 of this report). The inspectors noted that most TRs are initiation by plant operators. About 20 TRs were traced to the resulting AWO. These AWOs were reviewed to determine if deficiencies were being controlled adequately. Generally, the AWOs were written promptly after the TR was initiated, appropriate work and post maintenance test procedures were specified, and priority codes were assigned.

Conclusion

The inspectors concluded that the plant is in generally good material condition and that deficiencies are identified and put into PMMS. The PMMS process for covering an identified deficiency into an AWO is effective and efficient.

6.4 Maintenance Trending

Scope

The inspectors evaluated the licensee's maintenance trending programs and their implementation. The two areas reviewed were equipment performance trending and maintenance program performance indicator trending.

Findings in Equipment Performance Trending

The preventive maintenance (PM) programs for the maintenance and instrumentation and controls departments are defined by PMP 9.5-0, "Maintenance Department Preventive Maintenance Program", Revision 5, and PMP 9.2-0, "Preventive Maintenance Program", Revision 4, respectively. Each program requires trend analysis of equipment performance. There are also department level procedures for trending; Maintenance Department Instruction 76, "Predictive Maintenance Program", Revision 0, and Instrumentation and Controls Department Instruction 18, "Trend Analysis", Revision 0.

The maintenance department PM program states that equipment trending is performed by Inservice Inspection (ISI) Engineering for selected equipment and by the Predictive Maintenance Program, MDI-76. ISI gathers and analyzes performance data for safety related pumps and valves as required by the Inservice Inspection Program. The current Predictive Maintenance Program is a pilot program for which data acquisition began in April 1990, and therefore has not progressed enough for an evaluation.

The instrumentation and controls department PM program states that equipment requiring trend analysis will be identified by the PMMS system and that the type of data required will determine the method of trending. ICDI-18 requires the I&C assistant supervisor to analyze or evaluate equipment calibration data for instruments that exhibit adverse performance.

The inspectors reviewed the program requirements for equipment trending and discussed the program contents with the responsible personnel. Apart from the ISI analysis of safety related equipment, a semiannual review of corrective maintenance (CM) activities (PM 45-002-SA) is performed by the maintenance PM coordinator to detect recurring equipment problems. The maintenance coordinator stated that attention is primarily focused on mechanical equipment which may not have received attention through the Plant Information Report (PIR) process. Electrical equipment was not being given comparable attention during this semiannual review. The inspectors concluded that the maintenance equipment trending program heavily relies on the success of the pilot Predictive Maintenance Program. An observed weakness is that the current ISI and CM activity review does not include all station equipment and relies on the PIR process.

It was determined that the I&C calibration trending program has recently been initiated utilizing the PMMS historical database. The intent of this program is to focus on problem instruments for potential calibration modifications (i.e., frequency upgrades). However, the inspectors concluded that this program was not being regularly implemented.

The inspectors noted that the PIR process is effective in identifying plant problems and that valuable data is amassed by this process. The licensee acknowledged that PIRs are not formally trended. However, they intend to have a system for trending PIRs in place by January, 1991.

The pilot Predictive Maintenance Program was reviewed and the plans for its future expansion were discussed with the responsible maintenance engineer and the maintenance manager. The inspectors concluded that this has the potential to be a strong and beneficial program.

Findings in Maintenance Program Performance Trending

The second type of maintenance trending involves the evaluation of the adequacy of implementation of the maintenance program. This is accomplished by evaluating trends in the maintenance performance indicators and developing and implementing improvement plans for areas in which negative or undesirable trends are identified.

ACP 1.0-44, "Implementation of PMMS", Revision 1, is the site procedure which implements the corporate procedure, Nuclear Operations Policy 2.13, "Implementation of PMMS", Revision 2. These procedures provide for the integrated, full implementation of the maintenance management concepts and practices through effective use of PMMS. To accomplish this, ACP 1.0-44 requires that a PMMS Quarterly Report be prepared; however, the inspectors concluded that a weakness exists in that no guidance is given for the evaluation or use of the insight into program effectiveness provided by the report. The report contains a graphical presentation of statistical information obtained from PMMS; for example, historical representation of the PM to CM ratios, rework percentages, corrective maintenance backlog categorized as awaiting plant condition, engineering reviews and spare parts.

Conclusion

Equipment performance is being trended by the maintenance department in accordance with the ISI Program for selected equipment and by I&C for selected instruments. In addition, the maintenance PM coordinator performs semiannual reviews of completed CMs for any unidentified equipment degradation. However, this trending omits many plant components, such as electrical equipment. Additionally, the information amassed by the PIR process is not formally trended and there is minimal use of Quarterly Report data for feedback into maintenance program improvements.

6.5 Support Interfaces

Scope

By observation of daily plant activities, the inspectors evaluated the adequacy of the coordination and communications between the organizations onsite. Specifically, the inspectors determined whether the support interfaces included active information transfer and problem resolution.

Findings

Coordination and communications between the station departments occurs mainly at the daily meetings. Two of these are planning meetings held prior to the start of the work day and immediately following lunch. They are attended by most first line supervisors, department managers, and the unit superintendent. The meetings are generally brief, about 15 to 30 minutes, and the agenda consists of discussions of plant activities. Discussions are characteristically open and candid; the departments coordinate the necessary support activities and evaluate courses of action for unplanned events. During the inspection period, the more significant items for discussion were the options for repair of the pressurizer level anomalies, replacement of the failed nuclear instrumentation channel, and the investigation into the condensate system perturbations. The inspectors also noted active and effective communications between the station departments on individual bases throughout the work day.

Conclusion

The inspectors concluded that communication and coordination between site departments is effective. The daily planning meetings provide a structured forum for open and active discussion of plant activities. Strong management involvement was present and provided guidance for response to unplanned equipment failures and events.

Overall Conclusions

In summary, the plant maintenance organization effectively controls maintenance activities in the areas of mechanical, electrical and instrumentation and controls maintenance; deficiency identification and controls; and communication and coordination with other station departments. The inspectors noted that there is significant room for improvement in the programs for control of contracted personnel and equipment and program trending.

7.0 MAINTENANCE FACILITIES, EQUIPMENT, AND MATERIALS CONTROL

Scope

The objective of this portion of the inspection was to assess the plant's maintenance facilities and control over maintenance equipment, tools, and materials. This inspection also assesses how well these elements support maintenance activities. Through plant walkdowns, document reviews, and interviews conducted with licensee personnel, the following areas were examined: (1) maintenance facilities and equipment, (2) materials control, (3) maintenance tool and equipment controls, and (4) control and calibration of measuring and test equipment.

Findings

7.1 Maintenance Facilities and Equipment

The team toured the maintenance and I&C facilities and found that they were well equipped and maintained. All maintenance offices are in proximity to shop spaces.

The maintenance facilities include a maintenance shop, and various smaller strategic areas of the plant. An oil room is conveniently located in the Turbine building and is being adequately maintained. The inspector discussed the issue of the relatively small hot tool room with the licensee and was informed that the licensee is already considering various options on increasing the size of the room. The inspector inspected the designated "Maintenance Annex". This annex is a large building that the licensee had planned to use for repairs and maintenance of large equipments such as pumps. Part of this annex was being used for insulation works but the larger part of it appeared to be an uncontrolled storage facility. The licensee is making plans for a better use of the building in the future.

7.2 Materials Control

The licensee has adequate procedures and guidelines established for the procurement, storage and use of parts and materials. These procedures have guidelines to ensure that appropriate specifications are identified in the procurement of materials and parts, and that the required documents are provided with the delivered materials and parts. The governing plant procedure for the control of parts procurement, upgrade and dedication is ACP 1.2-4.2 revision 3, "Commercial Grade Procurement, Upgrade and Dedication Process". This procedure also controls the emergency procurement of items.

Parts and materials for the plant are stored in the warehouse which has facilities for class B and C storage levels of ANSI N45.2.2. Personnel access to the warehouse and materials issued are controlled by identifying the individual to whom the material is issued and the work order number for which the material is to used. The inspector interviewed the stores manager. His goals and objectives are to maintain parts and materials availability and to efficiently support the plant's maintenance activities. The warehouse strives to provide timely allocation of parts and materials required by the plant. The licensee provides training for the warehouse personnel and, the stores manager participates in the Nuclear Materials Management Exchange group.

The warehouse was generally clean and well lighted. QA and non QA items are stored in separate locations. All QA items are identified by green tags or stickers. Consumable items are labelled in accordance with NFPA labelling guidances. The warehouse inventory is contro'led and tracked through a computerized database. Special storage requirements such as shelf life and EQ requirements are identified. Minimum and max mum inventory levels and inventory on hand are also identified on the computer. Automatic reordering is initiated when the inventory level drops below the minimum. All parts and materials received are inspected, identified, and tagged by Quality Control prior to storage in the warehouse. The inspector reviewed, on a sampling bases, some Repeating Requisitions and Purchase Orders. The inspector also selected six safety related items from the computerized data base and verified that (1) items were stored in designated locations, (2) QA items were properly identified as such, and (3) specified items were in fact available.

The inspector found no deficiencies in this area.

As part of it's Parts Identification and Control program, the licensee is currently working on a Bill Of Material (BOM) program that will ultimately identify all systems and components in the plant. The licensee feels that over 95% of these parts have been identified to date. The inspectors expressed concern over the issue of having safety related parts in the plant that have not been identified in the BOM program. The licensee was aware of this concern and is confident that existing programs adequately prevent this deficiency from being a significant safety concern. No parts are installed in the plant without proper identification through the BOM process. This ensures that the specifications and qualifications of installed parts are current and appropriate. The licensee's efforts towards attaining a BOM for all parts in the plant is continuing.

7.3 Maintenance Tool and Equipment Control

Maintenance tools and equipment are adequately stored in the maintenance tool room and other designated tool storage areas in the plant. The inspector conducted a tour of the tool room and found that the tools were orderly and cleanly stored. Tools are identified according to type and size. The inspector verified on a random basis that tool sizes were as designated. Maintenance tools and equipment requiring periodic calibration are stored in the I&C's M&TE calibration laboratory. Smaller tool cabinets and cages are located in strategic areas of the plant. For potentially contaminated equipment, a hot tool room is available and this room is located close to the health physics control point.

Issuance of tools from the main tool room is adequately controlled. During several walkdowns of the plant, the inspectors found very few tools laying about uncontrolled. These were brought to the attention of the licensee.

7.4 Control and Calibration of Measuring and Test Equipment (M&TE)

Maintenance tools and equipment and I&C M&TE that require periodic calibration are kept in the I&C calibration lab. MDI-35, "Obtaining Quality Assurance M&TE" and ICDI-20, "Test Equipment Calibration Program" ensure that equipment is controlled and kept in calibration. Test equipment calibration is performed both in house and off-site by a vendor. The calibration laboratory technician, who is qualified, performs the in house calibrations. Calibration records for multimeters (Fluke 8050A) CYIC-S-100 and CYIC-S-082 and a digital thermometry system CYIC-P-078 were reviewed and found traceable to the National Institute of Standards and Tests (NIST) formerly known as National Bureau of Standards (NBS).

Usage logs for test equipment in the field as well as those returned to the laboratory but not calibration checked yet were adequately maintained. The inspector observed test equipment being checked out for use under work order number AWO-90-2217 and verified that the laboratory files accurately reflected all pertinent information. The inspector also verified that the test equipment was in calibration. Overall, the inspector ascertained that:

- M&TE were properly identified, stored and controlled
- Calibration dates and due dates are shown on the equipment
- Out of calibration equipment is segregated and identified
- Calibration records are traceable to the NIST
- An updated listing of all M&TE is maintained in the lab.

The inspector found that the system used to maintain, control and document the use of M&TE tools and equipment was adequate.

7.5 Extended Outage Care and Preservation of Equipment

The licensee did not have a fully integrated program specifically for the care and preservation of equipment during extended outages. However, there are selective procedures in place that ensure minimal deficient equipment conditions occur due to extended outages. For example, chemistry procedures are in place to ensure that the condition of primary components such as the steam generator do not degrade. During the last outage, actions were initiated to improve the condition of components in the secondary side during extended outages. The licensee implemented a procedure (MA 9.5-38, Dehumidification of the MSRs, HP Turbine, LP Turbines, and Feedwater Heaters during extended plant shutdown) to ensure that corrosion buildup due to residual condensate and moisture in the MSRs, HP & LP Turbines, Feedwater Heaters and Condenser is reduced. Procedure MDI-70, Turbine Generator Condensation Control, provides instructions on preventing condensation damage to the turbine generator.

The inspector concluded that the licensee is taking adequate steps to ensure that plant equipment is preserved and good care is exercised during extended outages.

Conclusion

The licensee has good maintenance facilities to support the maintenance process. The layout and arrangement of these facilities permit efficient conduct of maintenance activities. There are appropriate administrative policies and procedures in place for controlling the specification, procurement, receipt, inspection and use of maintenance related parts and materials.

The M&TE calibration laboratory and the warehouse storage facilities are strengths in the maintenance program. The issue of parts identification discussed in Section 7.2 is a weakness that is focusing management's attention on the "Bill of Material" project. The completion of this program will strengthen the maintenance program.

8.0 PERSONNEL CONTROL

Scope

The objective of this portion of the inspection was to determine the extent to which personnel are trained and qualified to perform maintenance activities. To make the assessment the following areas were examined: (1) staffing control, (2) training, (3) testing and qualification, and (4) current status.

The assessment was based on interviews, observations at the training facilities, and observations of field activities.

Findings

The minimum educational and experience requirements for the maintenance staff is specified in the job descriptions for the positions they occupy. Minimum experience for maintenance personnel is based on ANSI/ANS-3.1-1978. The job descriptions also provide additional details on the trades in which experience would be considered acceptable. The turnover rate has been very low resulting in a very stable and experienced maintenance staff with a good morale. Most personnel have at least 10 years experience. Some of the maintenance personnel have an operations background such as the Maintenance Manager.

The application information provided by new applicants is verified by a 10 year background check. This check includes verification of education and experience. Following acceptance of the application, an applicant is required to pass uniform qualifying written and oral examinations. The employee is then sent for a period of initial training which consists of 11 weeks for mechanics, 15 weeks for electricians, and 20 weeks for I&C technicians. The purpose of the initial training is to review basic science and mathematics and also to review the basic theory and skills of the trade. Examples of initial training topics are basic electricity for electricians, basic pump repair for mechanics, and test equipment for I&C. This training includes both classroom and laboratory training. The licensee stated that the laboratory training is equivalent to on-the-job (OJT) training because the same type of equipment is used in training as that used in the plant. The licensee stated that the advantage of this form of OJT is that it gives more flexibility in training because mistakes are of no consequence, and it is also advantageous from an ALARA point of view.

Continuing training is also offered to maintenance personnel on an as-needed basis as determined by the worker's supervisors. This training includes new topics such as advanced valve repairs, switchgear, rod control and indication, reactor trip system, and emergency power systems. Continuing training also serves as a refresher for the technicians, and is used to discuss relevant industry events. In addition to this continuing training, specialized training is also offered, such as mockup training on a particular system or component as determined by the nature and complexity of the job planned.

A tour of the licensee's training facility was conducted during this inspection. The facility was found to be well designed, the classrooms were spacious and provided with the necessary audio-visual equipment, and the laboratories were of adequate size and well equipped. The training facility also contained support groups for generating training material in a variety of forms. All the training programs are accredited by the Institute for Nuclear Power Operations (INPO).

The licensee stated that an internship program is used to keep the instructor's knowledge of the applied aspects of their subject matter up to date. Under this program, an instructor exchanges positions with one of the site personnel in the appropriate department for a period that may extend up to six months. Instructors also frequently work at the sites during outages to gain site experience. In addition, training courses are offered to the instructors on methods to enhance their teaching skills and the student's retention of the subject matter. A system of feedback on the effectiveness of training is used, and it includes the students, their supervisors, and station management.

The inspector noted in discussions with the licensee that they have had no drug abuse problems in the maintenance department.

Conclusion

The area of personnel control is a strength in the licensee's maintenance program. The maintenance staff is quite stable and experienced with little turnover and no drug problems, and morale appears to be good. The licensee's training facility is well designed and equipped. The process of selection of new personnel, verification of past education and experience is stringent, and initial training is extensive. The continuing training program also appears to be extensive and closely tailored to plant needs.

APPENDIX 1

INDIVIDUALS CONTACTED

Northeast Nuclear Energy Company

W. Bartron	Management Staff Assistant
*J. Beauchamp	QSD Manager
R. Beganski	Maintenance Mechanical Engineer
*G. Bouchard	Unit Director
M. Brothers	I & C Engineer
*M. Brown	Manager Training
J. Calderone	Mechanical Engineer
R. Caminati	Lead Maintenance Supervisor
D. Casey	Nuclear Safety Engineer
J. Chiarella	I & C Manager, (Acting)
*B. Danielson	Maintenance Manager
J. Delawrence	ISI Supervisor
A. Donzello	I & C PMMS Planner
J. Evola	Maintenance Electrical Engineer
*C. Gladding	Engineering Manager
R. Guilmette	Maintenance PMMS Planner
J. Hartzell	Maintenance Supervisor
W. Heinig	QSD Supervisor
*T. Ickes	Reliability Engineer
*P. Jewett	Security Manager
B. Kadlec	Generation Test Supervisor
S. Kamm	Electrical Engineer
L. Lebaron	Electrical Engineer
*J. LaPlatney	Operations Manager
G. Lamitie	NPRDS Coordinator
C. Martin	Mechanical Engineer
B. Miller	Maintenance Electrical Supervisor
J. Miskimen	Maintenance Support
*B. Moyer	Materials Supervisor
E. Musil	Maintenance Supervisor
*W. Nevelos	Radiation Protection Supervisor
D. Nordquist	QSD Director
J. Overbaugh	Project Management
*M. Quinn	Chemistry Manager
*D. Ray	Nuclear Services Director
G. Rodimon	Maintenance PM Coordinator
R. Spiess	Reliability Engineer
*J. Stetz	Station Director
S. Thickman	Nuclear Safety Engineer
G. Tylinski	Electrical Engineer
J. Verdone	Reliability Engineer

United States Nuclear Regulatory Commission

*A. Asars	Resident Inspector, Haddam Neck
*P.K. Eapen	Section Chief, Special Test Programs
*B. Gunther	Inspector (BNL-Consultant)
*T. Fredette	Inspector (SAIC-Consultant)
*L.J. Prividy	Team Leader, Sr. Reactor Engineer
*J.T. Shedlosky	Sr. Resident Inspector, Haddam Neck
*D. Taylor	Reactor Engineer
*A. Wang	Project Manager, Haddam Neck
*J. Yerokun	Reactor Engineer

* Indicates personnel in attendance at the exit meeting held 9/21/90

APPENDIX 2

SUMMARY OF WEAKNESSES

Weakness - A potential problem or condition presented to the licensee for evaluation and corrective action as appropriate.

1. There was a lack of QSD and plant management attention to achieve effective corrective action to known work order package documentation deficiencies identified by QSD. (Sections 4.4, 5.10).

2. The BOM project concerning the identification and control of equipment parts is incomplete. (Sections 3.3, 7.2).

3. A structured method does not exist for management to measure maintenance performance and provide feedback for improving the maintenance process. (Section 3.5)

4. A substantial backlog exists in the procurement of spare parts which is attributed to insufficient engineering resources. (Sections 3.3, 4.2).

5. Some engineering personnel were not familiar with certain administrative and maintenance procedural requirements for testing safety related equipment in support of maintenance. (Section 4.2)

6. Reducing QSD involvement in the work order process by removing their requirement to review completed work orders would be premature at this time. (Section 4.4).

7. The need to initiate a nonconformance report (NCR) is not well defined nor uniformly implemented and differences between the corporate and plant NCR procedures should be corrected. (Section 4.4).

8. The work order procedure contains no specific instructions or guidelines for documenting "Actual Work Performed" on the work order. (Section 5.2).

9. The work order procedure contains vague instructions concerning job supervisor responsibilities regarding documentation on work orders and guidance for the assignment of "Priority" codes on work orders. (Sections 5.2, 5.5).

10. The documentation on complete work order packages, especially the "Work Performed" section, was poor as evidenced by various deficiencies in the recorded information. (Section 5.10).

11. There is no formal program for the hiring, training and control of contractors. (Section 6.2).

12. The semiannual review of corrective maintenance activities has only reviewed mechanical equipment which has not received attention via the PIR process. This trending has omitted other plant components such as electrical equipment. (Section 6.4)

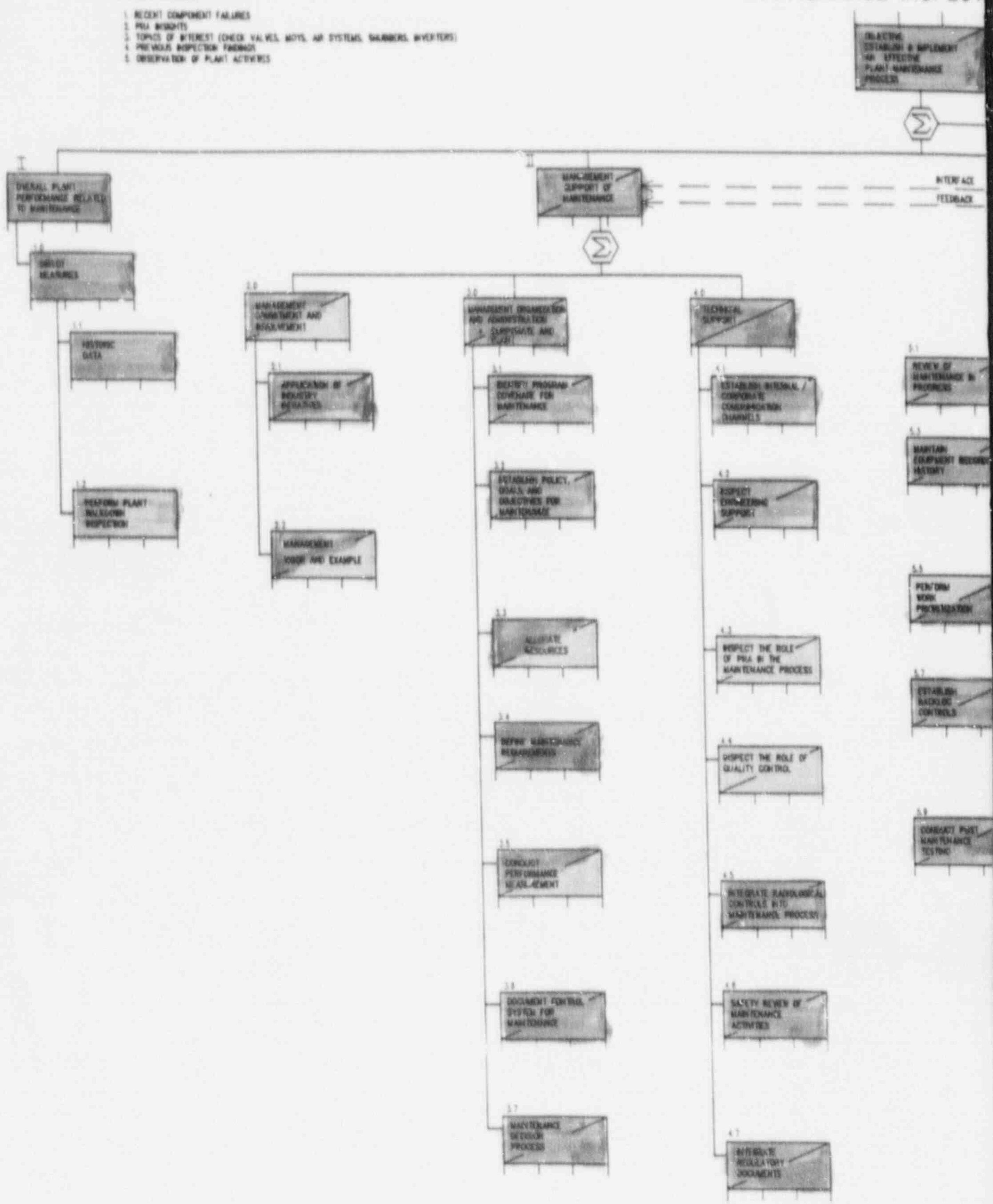
13. The procedure (ACP 1.0-44) for the review of maintenance program effectiveness requires a quarterly report but does not give sufficient guidance concerning analysis of this report for feedback to improve maintenance. (Section 6.4).

* Numbers in parentheses refer to report sections.

PRESENTATION T
MAINTENANCE INSPECT

TREE INITIATORS

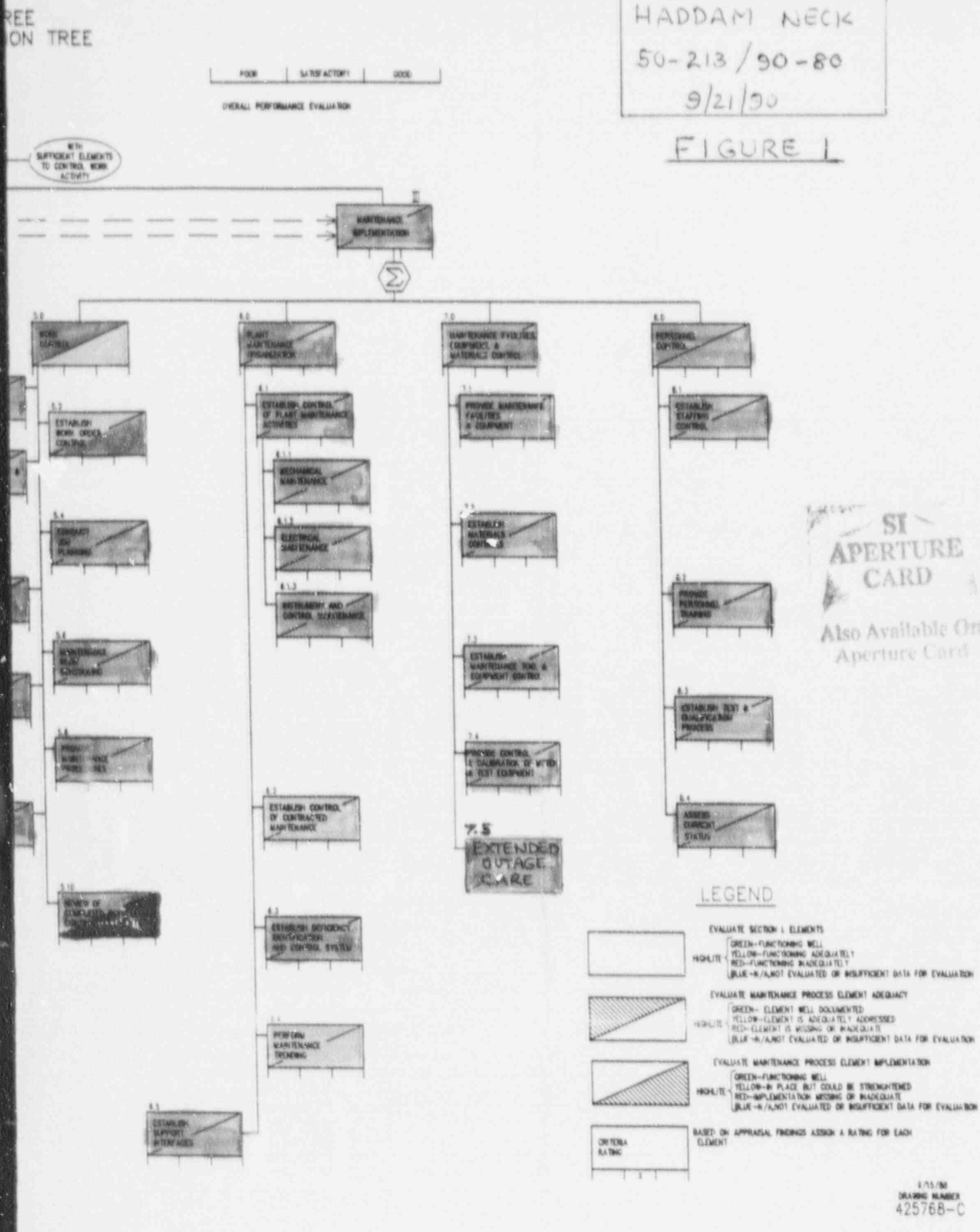
1. RECENT COMPONENT FAILURES
2. PRA INSIGHTS
3. TOPICS OF INTEREST (CHECK VALVES, MOVS, AIR SYSTEMS, SNUBBERS, INVERTERS)
4. PREVIOUS INSPECTION FINDINGS
5. OBSERVATION OF PLANT ACTIVITIES



NOTE: THIS DWG. IS USED IN CONJUNCTION WITH 425801, 425802, 425803, 425804, 425806, 425807 & 425808

HADDAM NECK
50-213/90-80
9/21/90

FIGURE 1



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