DECEMBER 1984
CONSTRUCTION PROJECT EVALUATION
RESTRICTED DISTRIBUTION

SEABROOK STATION

PUBLIC SERVICE COMPANY
OF NEW HAMPSHIRE

INPO

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EVALUATION

of

SEABROOK STATION

Construction Project

Public Service Company of New Hampshire

December 1984

SUMMARY

INTRODUCTION

The Institute of Nuclear Power Operations (INPO) conducted an evaluation of the Public Service Company of New Hampshire (PSNH), New Hampshire Yankee Division (NHY) Seabrook Station construction project during the weeks of December 3 and December 10, 1984. The project is located in Seabrook, New Hampshire, approximately 50 miles north of Boston, Massachusetts. The project has two 1,198-Mwe Westinghouse pressurized water reactors.

PURPOSE AND SCOPE

INPO conducted an evaluation at the site with follow-up at the principal design office, United Engineers and Constructors in Philadelphia, Pennsylvania to evaluate the control of design and construction processes and to identify areas needing improvement. Information was assembled from discussions, interviews, observations, and reviews of documentation.

The INPO evaluation team examined the areas of organization and administration, design control, construction control, project support, training, quality, test control, maintenance, technical support, and industry operations experience. The team observed actual work performance and test performance. A portion of the evaluation focused on a detailed vertical path examination through the design, construction and quality of the project, combined with a horizontal examination at several points. The team follow-up at the design office reviewed the design control, and the team at the project site examined, in some detail, the installed equipment.

INPO's goal is to assist member utilities in achieving the highest standards of excellence in nuclear plant construction. The recommendations in each area are based on best practices, rather than minimum acceptable standards or requirements. Accordingly, areas where improvements are recommended are not necessarily indicative of unsatisfactory performance.

DETERMINATION

Within the scope of this evaluation, the team found, except as indicated by the findings, that the systems in place to control the quality of design and construction are being implemented effectively.

The following beneficial practices and accomplishments were noted:

A strong corporate commitment exists to complete the Seabrook Station project.

Personal involvement and commitment of senior managers are reflected in effective meetings, improved communications, and in holding personnel accountable for project goals.

The establishment of a site engineering team is resulting in the definition of remaining engineering work, improved communications, and in holding personnel accountable for project goals.

The control room simulator is being effectively used to check out start-up and operations procedures and to develop human factors improvements.

The early establishment of an experienced plant operations staff has enhanced the preparation of operating procedures.

Improvements were recommended in a number of areas. The following are considered to be among the most important:

In the near term, the project needs to complete a detailed integrated schedule of all major milestones in sufficient detail to ensure that needed personnel and material resources are identified to support schedule dates.

Increase emphasis on training craftsmen and inspectors in site requirements. Include provisions to retrain personnel as requirements change.

Ensure increased involvement of first-line supervisors in the day-to-day direction of work activities.

Strengthen the corrective action program to identify problems, analyze generic issues, and provide timely resolutions to root causes.

Strengthen start-up and hydrostatic testing activities through improved staffing and operations involvement and the routine use of procedures, valve lineups, and good testing practices.

Improve the quality of preparation and review and the timely issuance of engineering change authorizations.

Increase emphasis in completion of systems and correction of walkdown deficiencies on a schedule to support testing.

In each of the areas evaluated, INPO has established Performance Objectives and supporting criteria. Findings and recommendations are listed under the Performance Objectives to which they pertain. Particularly noteworthy conditions that contribute to meeting Performance Objectives are identified as Good Practices. Other findings describe conditions that detract from meeting the Performance Objectives. It would not be productive to list as Good Practices those things that are commonly done properly in the industry since this would be of no benefit to Public Service Company of New Hampshire, New Hampshire Yankee Division, or to INPO's other member utilities. As a result, most of the findings highlight conditions that need improvement.

The recommendations following each finding are intended to assist the utility in ongoing efforts to improve all aspects of its nuclear programs. In addressing these findings and recommendations, the utility should, in addition to correcting or improving specific conditions, pursue underlying causes and issues.

As part of each construction project evaluation, the evaluation team follows up on responses to previous findings, in this case those from the INPO Construction Project Evaluation Report of October 1983. Findings with response actions that are incomplete but progressing on a reasonable schedule have been carried forward in APPENDIX 1 to this report. In areas where additional improvements were needed or where response actions have not been timely, a new finding that stands on its own merit has been written. Thus, this report stands alone, and reference to the previous INPO construction project evaluation report should not be necessary. For this evaluation, there are nine new findings relating to previous findings and three findings carried forward in APPENDIX I.

The findings listed herein were presented to Public Service Company of New Hampshire, New Hampshire Yankee Division, management at an exit meeting on January 10, 1985. Findings, recommendations, and responses were reviewed with Public Service Company of New Hampshire, New Hampshire Yankee Division management on March 7, March 14 and March 15, 1985. Responses are considered satisfactory.

To follow the timely completion of the improvements included in the responses, INPO requests a written status by October 15, 1985. Additionally, a final update will be requested six weeks prior to the next evaluation of the Seabrook Station construction project.

The evaluation staff appreciates the cooperation received from all levels of the Public Service Company of New Hampshire, New Hampshire Yankee Division.

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE
NEW HAMPSHIRE YANKEE DIVISION

Response Summary

Public Service Company of New Hampshire (PSNH), New Hampshire Yankee Division has reviewed the findings and recommendations resulting from INPO's December 1984 Construction Project Evaluation of the Seabrook Project.

This evaluation identified a number of areas where improvement can be made in project procedures and methodology. Each INPO finding has been evaluated along with its associated recommendation. A description of the appropriate corrective action that has already been implemented or is planned for the future is provided in each attached response. A schedule for implementation of outstanding corrective action is provided with each response.

Our review of INPO's findings has indicated a need to enhance training on a project-wide basis. The Project is presently developing a customized training program that will include comprehensive supervisory, technical, and procedural training for both manual and non-manual personnel. We will request INPO's assistance in development of the training course outlines to ensure that the final program will adequately address Seabrook's needs.

The management of the Seabrook Station project wishes to express their appreciation to the evaluation team for their effort and dedication and to INPO for its assistance in striving for a high level of excellence in the construction of Seabrook Station.

ORGANIZATION AND ADMINISTRATION

THE ROLE OF FIRST-LINE SUPERVISORS AND MIDDLE MANAGERS

PERFORMANCE OBJECTIVE: The project first-line supervisors and middle managers should perform a significant role in ensuring the quality of the project.

Finding (OA.3-1)

Some first-line supervisors need to be more involved in the daily activities of their craftsmen to ensure quality construction. On a number of occasions, quality control inspectors provided work instructions to craftsmen in lieu of the foremen. Since the foremen were not present, they were unaware of the instructions given. Specific work activities included piping, hanger, and instrumentation and control installations.

Recommendation

Improve supervisory attention to quality by strengthening the accountability of supervisors for their crew's work performance. Ensure supervisors take effective corrective action on problems identified. Consider establishing specific quality goals and objectives for supervision.

Response

Since the INPO evaluation, the following corrective actions have been implemented for the contractor's Instrumentation and Control (I&C) Construction discipline:

a. In January 1985, all I&C craft pipefitters, supervisors, engineers, and QC inspectors received intensive training on the Field Instrumentation Procedures, App. B of 10 CFR 50, weld symbol nomenclature, and general Nuclear Quality Assurance Manual (NQAM) requirements.

b. In January 1985 a Lead I&C Superintendent was added to the Owners Construction Group to strengthen the management of the instrumentation and control effort. In addition, the contractor appointed a new I&C Superintendent who assumed all of the contractor's managerial responsibility for the I&C Department. This action released field superintendents and supervisors to concentrate their efforts directly with craft activities. These changes provide for improved supervisory attention to installation quality and direct craft supervision.

c. Additional field engineers were added in February 1985 to relieve the foremen and superintendents of paperwork processing, thus allowing the supervisors to spend more time with the journeymen in the installation process.

d. In January 1985, installation crews were established in groups to specialize in the installation of specific commodities (i.e., instrument tube installers proficient in tube clamping and tube connecting).

e. In January 1985, the policy was reemphasized that all installations be rigorously checked by field engineers before turnover to QC for final acceptance inspection.

f. Additional training was performed. Qualification and certification of pipefitters in the use of cryofit couplings was accomplished in January 1985. In February 1985, the manufacturer of the stainless steel hoses conducted on-site training to teach installation techniques to craft supervision.

One of the practices instituted to correct the condition reported is the assignment of craft personnel to QC inspectors at the time of final acceptance inspections. This practice optimizes personnel utilization within the bounds of the program. Minor installation discrepancies can be corrected on the spot without the generation of unnecessary paperwork. Repetitive cases of poor workmanship, specification violations, or procedural breakdowns are properly recorded in the Nonconformance Report (NCR), In-Process Inspection Report (IIR), In-Process Inspection Discrepancy Report (IIDR), and Corrective Action Report (CAR) systems. Trend reports will be prepared and evaluated to ensure management involvement is attained at all levels.

The ASME III piping contractor has taken the following actions in the areas of piping and hangers:

a. Additional craft supervisors have been added to the piping contractor's staff to increase the level of craft supervision during in-process work.

b. By procedures, the field supervisor is directly responsible for the quality of work produced by the craftsmen. The site is presently reviewing training needs for supervisory personnel as well as craft personnel to clearly establish responsibility for quality and training programs.

c. The contractor is now staggering start times of second-shift craft supervisors to allow cohesive turnover of work activities between first and second shift. A one-hour overlap permits the supervisors to walk down work being turned over and pass on the appropriate paperwork.

d. When required, a shift turnover form is included in work packages being worked on a two-shift basis.

The form provides for instructions from first to second shift and second to first shift. It identifies problems encountered and records the foreman and field engineer involved in the work. The shift turnover form enhances communications between shifts and direct involvement of supervision in the work.

e. First-line supervisors will perform the necessary supervisory functions to ensure quality installations.

The existing program, supplemented by the actions discussed above, will ensure that project first-line supervisors and middle managers will perform the necessary supervisory functions to ensure quality installations and schedule adherence.

DESIGN CONTROL

DESIGN INPUTS

PERFORMANCE OBJECTIVE: Inputs to the design process should be defined and controlled to provide a consistent basis for making design decisions in order to achieve a complete, high quality design.

Finding (DC.1-1)

Thermal overload trip setting criterion for engineered safety motors (class 1E) requires evaluation. The overload setting of class 1E continuous duty motors connected to the MCCs is higher than the values normally used by the industry to protect the motors. The FSAR commitment to match the overload heater characteristic curve with the motor thermal limit curve has not been done.

Recommendation

Evaluate the thermal overload settings selected that are based upon the present criterion. Determine if adequate protection is provided for continuous duty motors. If not, review normal industry practice and implement appropriate changes.

Response

New Hampshire Yankee (NHY) has evaluated the criteria for overload protection for continuous duty motors (less than 100 hp) that are powered from motor control centers. The Seabrook design places special emphasis in the sizing of the overload protection for Class 1E motors, such that completion of the safety function is assured. Nuisance trips, transient overloads, and manufacturer's tolerances in heater size were taken into consideration and minimized to the extent practical. For additional conservatism, motors have been specified to have their rated horsepower at least 5 percent above the maximum brake horsepower required. In summary, New Hampshire Yankee concludes that the Seabrook design for overload protection of continuous duty motors is acceptable.

New Hampshire Yankee has reviewed the FSAR commitment regarding the comparison of the thermal overload protection curves with the manufacturer's motor thermal damage curves. The review concludes that, for small motors (less than 100 hp), this comparison is unnecessary, and, therefore, NHY plans to revise the FSAR accordingly.

DESIGN VERIFICATION

PERFORMANCE OBJECTIVE: The design should include a verification process to ensure conformance with design requirements.

Good Practice (DC.4-1) The project has implemented an "As Engineered" program to verify that design requirements have been appropriately defined, interpreted correctly by interfacing organizations, and provided for in the design. Calculation review teams verify assumptions and references, reconcile inconsistencies, and identify potential problem areas requiring design evaluation to minimize impact on project schedules. Review teams such as the Safe Team for pipe-support design are established to perform site walk-down reviews. Best alternative solutions are determined for installed systems requiring additional design consideration. The program has been implemented in all design disciplines.

DESIGN OUTPUT

PERFORMANCE OBJECTIVE: Project design documents should specify complete, accurate, and clear requirements for a constructible, testable, operable, and maintainable design.

Finding (DC.5-1) **Clearance requirements between major components have not been addressed.** In some cases, displacement data necessary to evaluate potential interactions are not available in existing seismic test reports. For example, it could not be demonstrated that the existing .25 inch clearance between the Remote Safe Shutdown Panel and Motor Control Centers would not result in unacceptable interaction during seismic events.

Recommendation Establish minimum clearance criteria between major components to preclude seismic interactions. Identify installed equipment that violate the criteria and resolve these violations either through additional analysis, test, or a combination thereof.

Response Component separation criteria are addressed in Technical Procedure TP-8 entitled "Technical Procedure for Separation Criteria." This procedure is presently being modified to establish minimum clearance criteria among major components (such as I&C panels, motor control centers, etc.) in Seismic Category I buildings to preclude seismic interaction. TP-8 will be reissued to include this acceptance criteria by May 1985. Subsequently, deviations from this criteria will be identified and evaluated for acceptability.

Finding (DC.5-2)

Improvement is needed in the control of instrumentation calibration information provided in the Standard Instrument Schedule (SIS). In some cases, the calibration range specified in the SIS does not agree with the value used in the approved setpoint calculation. As a result, correct instrumentation calibrations cannot be assured.

Recommendation

Update the calibration range information provided in the SIS to match the source calculations. Establish necessary controls to ensure the information is updated when source calculations are revised.

Response

A program is being implemented to verify those safety-related fields of the Standard Instrument Schedule (SIS) required to ensure startup testing and pre-operational readiness. The SIS verification will be completed by July 1985. This information will then be issued as a safety-related document in accordance with pre-established procedures. This will ensure that the calibration range information in the SIS matches that of the source calculations. Verified setpoint data will be provided by system turnover. Any changes to the SIS resulting from the verification or changes to the source calculations will be implemented via standard Project design change procedures.

DESIGN CHANGES

PERFORMANCE OBJECTIVE: Changes to approved project designs should be controlled to ensure the design criteria are not violated.

Finding (DC.6-1)

Improvement is needed in the preparation, review, and distribution of Engineering Change Authorizations (ECA). A significant percentage of ECAs reviewed contained errors such as the following:

a. incomplete interdisciplinary review

b. failure to list affected documents

c. failure to provide marked-up affected documents with the ECA

Recommendation

Conduct a technical review of a representative sample of ECAs from each discipline to determine the extent of problems similar to those noted above. Determine whether generic program changes or discipline-specific changes are required and take appropriate corrective actions. Periodically re-sample ECAs to assess the effectiveness of the corrective actions.

Response

A representative sample of ECAs from each discipline will be reviewed to determine the extent of problems similar to those discussed in this finding and to identify any appropriate corrective actions. These reviews will be completed by July 1985. Ongoing monitoring of these types of problems will be included as a portion of an ECA trending program to be implemented by May 1985.

CONSTRUCTION CONTROL

MATERIAL CONTROL

PERFORMANCE OBJECTIVE: Material and equipment should be inspected, controlled, and maintained to ensure the final as-built condition meets design and operational requirements.

Finding (CC.3-1)

The present maintenance program does not include equipment qualification (EQ) requirements and shelf life considerations for safety-related equipment and components. Worst-case qualified life conditions have not been extrapolated to actual plant environmental parameters, such as radiation and temperature, and equipment locations. Some spare parts with limited shelf life have been procured without identifying shelf life requirements.

Recommendation

Evaluate the plant maintenance program for safety-related equipment to ensure that environmental qualification requirements are appropriately identified and implemented.

Response

Environmental Qualification (EQ) Program Considerations

An integrated EQ task force (NHY, YAEC, and contractors) is actively working on the completion of an overall EQ program. Task force efforts include the following:

a. the review and acceptance of the qualification documentation for all class 1E equipment located in a harsh environment

b. the compilation of EQ documentation files on a purchase order basis

c. the identification of the worst-case qualified life for 1E equipment based on calculated environmental parameters for specific equipment locations in the station

d. the preparation of an overall EQ program manual

e. the incorporation of EQ program requirements into the maintenance program via implementing statements inserted into existing station administrative control programs/procedures (Design Control, Work Control, Procurement and Issue Control, etc.)

EQ associated mechanical equipment tasks paralleling a., b., and c. above have already been completed for the station.

The overall schedule of the above activities is designed to be more than 85 percent complete prior to the NRC EQ audit, which is anticipated in late 1985. The total EQ program is scheduled for completion prior to plant commercial operation.

Preventive Maintenance Program Considerations

At the present time, a station maintenance program has been established that is based upon the equipment manufacturer's recommendations and requirements as identified in applicable instructions, maintenance manuals, and engineering specifications.

The Station Maintenance Program Manual includes provisions for EQ component replacement, as well as storage and shelf life considerations. The safety-related technical manuals and applicable vendor requirements for both harsh and mild EQ components are reviewed and incorporated into the appropriate storage or operating component preventative maintenance programs.

The project-responsible engineer/organization reviews those components that are located in a "harsh" environment to ensure compliance with the requirements stipulated in 10 CFR 50.49. The appropriate parameters (temperature, pressure, radiation, humidity, chemical spray, submergence) are applied to each component in order to determine its qualified life. The core load date is the initiation of the qualified life for electrical equipment, since the safety-related components are not subjected to the harsh parameters prior to fuel loading. However, as stipulated above, vendor documentation is also reviewed to determine the component preventive maintenance replacement schedule to ensure equipment operability.

In summary, shelf life limitations provided by the vendor are considered along with harsh environment qualified life in determining the replacement schedule for 10 CFR 50.49 related equipment.

Finding (CC.3-2)

The storage and control of ASME material by the piping contractor need to be improved. Some ASME pipe hanger, piping, and bolting material in outdoor storage areas exhibit large amounts of rust and corrosion. Some non-safety material and material with obvious damage are not segregated from acceptable ASME material and do not have required hold tags attached.

Recommendation

Improve the degree of protection provided to material stored in outdoor storage areas to minimize corrosion. Initiate tighter

controls on storage areas to ensure that acceptable ASME material remains segregated from non-safety and non-conforming material. Increase surveillance activities of material storage conditions to identify improper storage conditions and to ensure continued effectiveness of the storage program controls.

Response

The ASME III piping contractor has a surveillance/monitoring program in effect for all ASME-designated storage areas. The January 1985 ASME piping contractor inspection reports (14 total) identified 37 unacceptable conditions, including segregation of ASME and non-ASME items, that are being resolved by appropriate construction supervision.

Since the time of the INPO evaluation, the NHY Quality Assurance (QA) Department has increased the frequency of its surveillances of areas in which the piping contractor is storing ASME materials. A significant improvement in storage conditions in these areas has been noted, as demonstrated by a NHY QA surveillance conducted during the last week of January 1985 in which no deficiencies were found.

In addition to the above activities, covered farm wagons are being used for storage of materials outdoors to help alleviate the cosmetic rusting problem. Cosmetic rust will be cleaned to meet specification requirements prior to finish painting.

Surveillance by both the ASME III piping contractor QA and YAEC QA will continue on a regularly scheduled basis to ensure adequate material control in storage areas is maintained.

CONTROL OF CONSTRUCTION PROCESSES

PERFORMANCE OBJECTIVE: The construction organization should monitor and control all construction processes to ensure that the project is completed to design requirements and that a high level of quality is achieved.

Finding (CC.4-1)

The care and protection of electrical cables need to be upgraded to ensure that cables are not damaged. Some cables were being mishandled during installation, and others were not properly protected after installation.

Recommendation

Initiate action to ensure that procedural requirements are understood, implemented, and enforced.

Response

The Field Electrical Procedure (FEP-504) training sessions conducted by NHY and Construction Management personnel placed a great deal of emphasis on the care required during cable installations. Special consideration was given to minimum

bending and sidewall pressure limitations. All cable pulling foremen were trained and tested to FEP-504 with a minimum acceptable score of 80 percent. A survey of cable rework during the months of November and December 1984 revealed that only 1 percent of rework was due to damaged cable. Because some rework was still occurring, all foremen received additional instruction on the aforementioned subjects in March 1985.

Finding (CC.4-2)

The monitoring and control of some construction activities need improvement. Specific problems were noted in the following areas:

a. hanger erection

b. pipe installation

c. welding process

Recommendation

Implement in-process inspections by craft supervision to ensure that construction is performed in accordance with procedures and quality requirements. Hold field supervision responsible for the quality of work produced by the craftsmen. Monitor construction activities to ensure that quality and project objectives are met.

Response

Since the INPO evaluation, the following corrective actions have been implemented for the ASME III piping construction discipline:

a. Additional craft supervisors have been added to the piping contractor's staff to increase the level of craft supervision during in-process work.

b. By procedures, the field supervisor is directly responsible for the quality of work produced by the craftsmen. The site is presently reviewing training needs for supervisory personnel as well as craft personnel to clearly establish responsibility for quality and training programs.

c. The contractor is now staggering start times of second-shift craft supervisors to allow cohesive turnover of work activities between first and second shift. A one-hour overlap permits the supervisors to walk down work being turned over and pass on the appropriate paperwork.

d. When required, a shift turnover form is included in work packages being worked on a two-shift basis. The form provides for instructions from first to second shift and second to first shift. It identifies problems encountered and records the foreman and field engineer involved in the work. The shift turnover form enhances communications between shifts and direct involvement of supervision in the work.

e. Some procedures related to this finding have been or are in the process of being revised. Specific changes include the following:

1. Mandatory root inspection by QC has been eliminated and now can be performed by the welding supervisor and welder.

2. The piping installation specification has been revised to provide more realistic construction dimensional tolerances.

3. The engineering specification addressing requirements for cold pulling of pipe has been revised to allow more precise interpretation and implementation.

The existing program supplemented by the actions enumerated above will ensure that the first-line supervisor will perform the necessary supervisory functions to ensure quality installation in accordance with the established project procedures.

PROJECT SUPPORT

INDUSTRIAL SAFETY

PERFORMANCE OBJECTIVE: The construction site industrial safety program should achieve a high degree of personnel safety.

Finding (PS.1-1)

More aggressive management actions are needed to ensure that the site industrial safety program is fully implemented. Some areas are not receiving proper safety and fire protection coverage.

Recommendation

Increase management emphasis on implementation of the industrial safety program. Initiate appropriate actions to ensure safety personnel provide adequate site coverage.

Response

A Seabrook Project Safety Committee was established in January 1985. The committee's goals and objectives will be as follows:

a. Ensure that present safety programs are being implemented to their fullest.

b. Look for areas to improve present safety program.

c. Increase safety awareness for every employee at the Seabrook site through safety meetings, accident reports, and updates in the project newspaper.

d. Review present project disciplinary actions for safety violations; the need for stronger disciplinary actions will be evaluated.

The program will complement an already stringent campaign toward protection rules, hard-hat utilization, safety belt use, grinder shield usage, elimination of tripping hazards, and danger tagging programs, thereby asserting the project's dedication to a "safety first" approach to industrial safety practices.

The first Project Safety Committee meeting was held January 30, 1985. Subsequent meetings will be held on a regular scheduled basis. One of the actions taken by the committee was to establish regularly scheduled safety meetings with craft foremen. The first foremen meeting was held February 6, 1985, during which the project safety rules were reviewed. Subsequent meetings will identify other project safety problems and implementation of corrective measures. The emphasis will be on accident prevention.

PROJECT PLANNING

PERFORMANCE OBJECTIVE: Project plans should ensure completion of the project to the highest industry standards by identifying, interrelating, sequencing, and implementing the tasks of the project organizations.

Finding (PS.2-1)

Development and implementation of the overall project schedule remains to be completed. Some detailed level III schedules need to be completed and integrated to properly access the following:

a. impact upon major milestones in the level I and level II schedules

b. time phased manloading of the remaining project work

c. projected needs for the various support requirements

Recommendations

Continue to develop the detailed project schedules on an urgent basis. Ensure that all major work activities are integrated into the schedule such as engineering, major rework, walk-downs, hanger verification (NRC IE Bulletin 79-14) inspections, verifications/review of paperwork, testing and building/room close out.

Response

Detailed schedule levels currently exist defining work activities for the workforce levels anticipated through May 1985. The detailed schedule development process has been recently accelerated to increase the lead time. It is the intention that detailed schedules will be developed three to six months ahead of the anticipated construction manpower assignment.

While the construction detailed activities are developed on a priority basis in support of the critical path, it should be noted that all startup and engineering logic has been established in detail. Efforts currently are nearing completion that consolidate the engineering logic into the common Project 2 network processing. This transition will allow fully integrated (i.e., engineering, construction, and startup) critical path analysis (CPM) type schedule analyses and reporting.

The detailed schedule system will be utilized to manage the completion of all remaining construction work scope. Schedules will be developed to specifically identify not only system completion, but commodity-type activities such as insulation, cable tray bracing, penetration sealants, building completions, etc.

In addition, it is noted that execution of the detailed schedule work activities is assisted through the Project Completion System program (Level 4) management and will be assisted in the future by a new production planning function (Level 5) (i.e., three-week production schedule) currently being established.

DOCUMENTATION MANAGEMENT

PERFORMANCE OBJECTIVE: The management of project documentation should support the effective control and coordination of project activities and provide a strong foundation for the documentation/information requirements of the plant's operational phase.

Finding (PS.6-1)

The control of documents used by start-up personnel needs improvement. Some drawings and documents used by start-up personnel for performing tests are not controlled and are not the latest revision.

Recommendation

Implement improved controls to ensure that drawings and documents used by start-up personnel during the conduct of testing activities are the current revision. Perform follow-up reviews in this area to ensure effective corrective action.

Response

Startup Administration Instructions, "Control of Drawings," will be revised to improve controls for the notification and issue of drawing revisions to Startup Test Engineers (STE). STEs will be notified of drawing revisions and will be required to acknowledge that a drawing previously issued to him has been revised. The latest revision will then be issued if requested. These drawing control changes should be fully implemented by May 1985.

TRAINING

GENERAL TRAINING AND QUALIFICATION

PERFORMANCE OBJECTIVE: The training program should ensure that all employees receive indoctrination and training required to perform effectively and that employees are qualified as appropriate to their assigned responsibilities.

Finding (TN.3-1)

Improvement is needed in the training of craftsmen and quality control (QC) inspectors. Some craftsmen and QC inspectors are not effectively trained in installation procedures and acceptance criteria. Craftsmen are allowed to work on site prior to receiving safety training.

Recommendation

Develop and implement training methods to ensure that craftsmen and QC inspectors are knowledgeable concerning procedures and acceptance criteria. Implement a monitoring and feedback mechanism to assure management that requirements are being met. Hold first-line supervision accountable for the knowledge level and quality level of work of their subordinates. Implement administrative controls to ensure that craftsmen are not assigned work prior to receiving site-specific safety training.

Response

The need for procedural and acceptance criteria training for craftsmen will be addressed in the revised Orientation Program for new employees. The procedural and acceptance criteria training will be predetermined per craft function via a training needs matrix. The training format will be prescribed by the Construction Site Training group. This program is first priority in the development of craft training. Initial implementation is planned for April 1985. Retrofitting all present craftsmen to this program should be complete by June 1985.

Procedural and acceptance criteria training for QC personnel will be predetermined by job function via a training needs matrix and will be implemented during April 1985. The training format will be prescribed by the Construction Site Training group. Required refresher training will be completed by June 1985.

The existing training procedure (ASP-8) will be revised by April 1985, and will include a monitoring and feedback mechanism to ensure that desired results are attained and supervisory accountability is established.

First-line supervisor accountability for the knowledge level and quality level of subordinates' work will be strongly emphasized in a general foreman/foreman training program, which is expected to be developed and implemented by April 1985.

Administrative controls to ensure that the craftsmen receive safety training on a timely basis will be included in the revision

of the training procedure (ASP-8). Safety training will be an integral part of the Employee Orientation Program.

The Site Training Administrator has developed the scope and implementation plans for a completely revised construction site training program. The revised training program will be implemented by June 1985.

NHY, with outside consulting assistance, will design, develop, and monitor the programs to address the above mentioned actions, as well as the necessary training to meet the project schedule milestones.

QUALITY

PROGRAM IMPLEMENTATION

PERFORMANCE OBJECTIVE: Quality assurance and quality control functions should be performed in a manner to support and control the quality of the project activities.

Finding (QP.2-1)

Identification of dimensional deficiencies in the construction of pipe supports needs to be more timely. The current practices of QC and field engineering do not identify dimensional deficiencies until after pipe supports have been completed. As a result, numerous dimensional problems are not identified until the as-built walkdowns.

Recommendation

Revise pipe support inspection procedures to include dimensional and configuration checks during fit-up and final weld inspections.

Response

The majority of pipe support dimensional deficiencies being identified during the as-built walk-downs relate to gap dimensions between the pipe and support members. These result from shrinkage/warpage of support components and the piping system during the welding process and would not be identified during in-process dimensional checks. Correct gap dimensions are achieved by shimming as permitted by project specifications.

A project rework study was performed in order to identify the root cause of rework. The study concluded that the major portion of rework was related to small bore pipe installation tolerance. In an effort to minimize rework, the installation tolerances for small bore pipe has been substantially modified. Additionally, Technical Procedure 26, "As-Constructed Requirements for Pipe Systems," has been revised to provide a more concise mechanism of taking piping and pipe support as-built information.

Presently, the ASME III contractor as-builds the piping and pipe supports immediately following installation. Prompt identification of dimensional deficiencies minimizes the impact on the project schedule. The engineering stress reconciliation effort and piping walkdowns required by IE Bulletin 79-14 have been accelerated and are expected to start in April 1985. This approach will ensure that installation deviations are identified early and reconciled accordingly, thereby minimizing the impact on the project milestones.

QUALITY INSPECTIONS

PERFORMANCE OBJECTIVE: Quality inspections should be performed in a manner that ensures optimum monitoring of project activities.

Finding (QP.3-1)

Quality control inspection hold-points are not adhered to by all craftsmen and inspectors. The hold-point programs are not always understood by all craftsmen and quality control inspectors.

Recommendation

Provide a more consistent methodology for annotating hold points in weld process sheets. Provide clear and consistent procedural guidance as to the meaning and requirements of hold points, and provide training to both QC inspectors and craftsmen to ensure their understanding of the hold point program requirements.

Response

The symbol H indicates a QC hold point on the weld process control sheets and is well understood by craftsmen, supervisors, and inspectors. The symbol Ⓗ (H with a slash) with initial and date indicates a hold point has been deleted. Deleted hold points were shown on the ASME III pipe contractor's process sheets several weeks prior to the INPO evaluation and may not have been fully understood by craftsmen. QC inspectors were informed of the deleted hold point symbol.

As of January 1985, there is no question as to the meaning of a hold point by QC or craft personnel, and the existing procedures are clear in this regard. Disciplinary action is administered against any individual bypassing designated hold points.

In the event a hold point is inadvertently bypassed, a non-conformance report (NCR) and a Corrective Action Report are generated. Trend analyses are performed monthly to confirm that hold points are being adhered to by the ASME III piping craftsmen and inspectors.

Similar misunderstanding of hold point symbols existed in the area of the electrical contractors. To clarify any misunderstanding on electrical field procedures, a training seminar for quality control and construction personnel is scheduled for April 1985. The training will highlight attributes to be inspected at hold points and symbols used to identify hold points.

Finding (QP.3-2)

Some QC inspectors are not adhering to requirements of the QC procedures. Deficiencies were noted in the inspection of instrumentation and controls (I&C), pipe supports, and electrical.

Recommendation

Ensure that QC inspectors understand the importance of following all procedural requirements. Conduct training of QC personnel on changes to procedural requirements that affect inspection attributes.

Response

Three memorandums have been issued to remind QC inspectors of the importance of certain procedural requirements. The content of the memorandums are highlighted below.

a. ASME Pipe Supports, "Material Identification and Fit-up Inspection for Support" dated December 20, 1984. This memorandum provided the following direction:

   1. to ensure that both pieces of material being joined at fit-up inspection are identified by proper markings

   2. actions to be taken if marking is not on one or both pieces in order to resolve the problem

b. I&C, "Liquid Penetrant Testing" dated January 15, 1985. This memorandum directed that the temperature of surfaces to be examined by liquid penetrant testing must be determined prior to performing the test, utilizing a calibrated surface temperature indicator.

c. Electrical, "Use of a Suitable Weld Measuring Tool" dated February 11, 1985. This memorandum directed that a suitable weld measuring tool (e.g., fillet gauge, six-inch scale, etc.) must be utilized to determine acceptability of fillet welds.

In addition, all I&C, QC, and construction personnel received comprehensive documented training in January 1985. An electrical field procedure training seminar will be conducted in April 1985 to highlight all QC notification points and inspection acceptance criteria. All QC and construction personnel involved in electrical construction were required to attend this seminar. UE&C Procedure QCP-10-8, "AWS D1.1 Safety-related/Seismic Weld Inspection," was revised in February 1985 to clarify that the weld size will be measured utilizing a suitable weld measuring tool (e.g., fillet gauge, six-inch scale, etc.).

Changes to inspection procedures are reviewed by responsible supervisors for inspector training needs. If the supervisor determines that training is necessary, inspectors affected by the change either receive formal classroom training or are required to complete reading assignments. The supervisor determines the type of training based upon the complexity of the change. The training in either case will be documented.

Finding (QP.3-3)

Improvements are needed in the review of quality records for accuracy and completeness. Areas for improvement include hardware to software reconciliation, non-conformance report (NCR) review, and the evaluation of non-destructive examination (NDE) results.

Recommendation

Increase the statistical overview inspection of NCRs, NDE results, and hardware to software reconciliation to identify existing deficiencies. Implement corrective actions to correct root causes of deficiencies. Enforce review of all documents pertaining to quality by the contractor documentation review groups.

Response

Level I QA review of turnover packages now includes a verification that applicable documentation required to substantiate field implementation of NCR disposition and NCR closure is included in the package. The project issued an interim procedure change in February 1985 to incorporate this requirement into QCP-17-1, "Records Review." Appropriate personnel were trained accordingly. NHY Level II QA review now includes a verification that applicable NCR closure documentation has been reviewed and is included in the documentation package.

In the area of hardware to software reconciliation, the problem relates specifically to ASME code items installed by the previous I&C contractor. A task force has been established to address and resolve any hardware/software problems. The effort will be conducted to support the system turnover schedule and is anticipated to be complete by hot functional testing. By nature of the differences between the previous and new contractor programs pertaining to responsibility for recording/verifying information on weld process sheets, the possibility of any similar problems with the new contractor's I&C documentation is considered to be extremely remote.

In respect to reviews of contractor RT film, the problem is precluded from recurring by a NHY QA policy that was instituted in early 1984, which requires the contractor to present all RT film transmittals and corresponding film packages for NHY QA review immediately prior to their transmittal to the Records Vault. This review is performed to ensure that NHY QA has previously reviewed all film packages included in the transmittal. In addition, NHY began an ongoing effort in January 1985 to re-inventory all RT film in the Records Vault by system and alpha-numeric isometric/ drawing sequence. This re-inventory effort will identify any RT film that bypassed the NHY QA review prior to instituting the film transmittal review policy discussed above.

CORRECTIVE ACTIONS

PERFORMANCE OBJECTIVE: Conditions requiring corrections or improvements should be resolved in an effective and timely manner.

Finding (QP.5-1)

Improvement is needed in root cause analysis for changes affecting design and construction. Reasons for engineering change authorizations (ECA) are not trended and evaluated to improve design and construction processes.

Recommendation

Implement a program that identifies, evaluates, and corrects the root causes of problems that result in recurring design changes.

Response

A new Engineering Change Authorization (ECA) trending program is now being developed. The emphasis of the program will be identification of root causes of problems resulting in recurring design changes, as well as ECA problems. The goal of the new trending program will be reduced rework, reduction in avoidable ECAs, and identification of engineering problems impacting construction. This program is scheduled to be implemented in May 1985.

Finding (QP.5-2)

Conditions adverse to quality are not consistently documented and corrected in an effective and timely manner. Trend analysis has not been performed by the constructor for seven months. Frequently documents identifying problems do not receive timely review to identify action and to correct the problems and root causes.

Recommendation

Continue ongoing efforts to establish a site trend analysis program. Implement a documented program to review the prime contractor's NCRs for the identification of root causes and actions to prevent recurrence. Review the various programs for documenting conditions adverse to quality, and implement an aggressive program for the following:

a. Obtain corrective action responses from organizations responsible to correct conditions adverse to quality.

b. Follow-up on responses to ensure that timely and effective action is taken to correct and prevent identified conditions.

Response

The prime contractor's QC organization had failed to perform the NCR trend analysis in accordance with their procedure. It was recognized by the prime contractor, and a Corrective Action Request was issued. Cause was identified and corrective action was implemented. A status system has been established that will preclude recurrence.

Implementation of an overall site trending program commenced in November 1984 under the direction of the NHY Project Construction Quality Assurance Manager. All deficiencies identified by NCRs, Inspection Reports, Audit Reports, Surveillance Reports and other deficiency documents are recorded on a computer input sheet daily. Printouts are distributed monthly to the applicable QA/QC managers who analyze the data for trends adverse to quality that require corrective action. The QA/QC managers are responsible for the following:

a. reporting identified trends to appropriate management within their organizations

b. obtaining action responses that address the root causes and prevent recurrence of the condition

c. verification of corrective action completion

The QA/QC managers submit monthly trend analysis reports and action item follow-up reports to the NHY Trending Supervisor for QA. The construction QA Manager will evaluate these reports for significant trends that may impact the project as a whole. Due to the newness of the program, adequate time has not elapsed to evaluate its effectiveness.

It is recognized that there have been occasions when corrective action responses and/or implementation have not been accomplished in an effective or timely manner. A recent restructuring of the Project QA Organization immediately under the Project Construction QA Manager will focus attention in this area. A formal Corrective Action Report (CAR) system is now being implemented to replace the Startup Notification Report (SNR).

Project Management issued a memorandum on February 12, 1985 directing all project participants to comply with Project QA Program requirements regarding prompt identification and correction of conditions adverse to quality. In order to ensure that this direction is properly implemented, the Project QA organization has developed an additional corrective action follow-up system whereby department heads will be issued a bi-weekly report of the status of open corrective action documents for which they are responsible. Any repetitive failures to comply with corrective action requirements will be presented by the Construction QA Manager at Project Management staff meetings for resolution. It is anticipated that this additional

corrective action follow-up system will be fully implemented by April 1985.

TEST CONTROL

TEST PLANNING

PERFORMANCE OBJECTIVE: Testing activities should be controlled effectively through the use of detailed plans and schedules.

Finding (TC.3-1)

The scheduling of day-to-day testing activities needs increased attention. Detailed short-term scheduling is not used to forecast and monitor test progress. Operator support needs are sometimes not known until just prior to the beginning of the test activity.

Recommendation

Establish the use of a detailed schedule that shows all testing and testing-related activities on a daily basis. This schedule should include support manpower requirements and be distributed to involved personnel including test engineers. Hold personnel accountable for preparation for and implementation of activities shown on this schedule.

Response

The Startup Test Department (STD) has increased its attention to detailed short-term planning. STD currently convenes a startup schedule review meeting at least weekly. This meeting is attended by the STD manager, group managers, discipline supervisors, and test engineers responsible for accomplishment of scheduled activities. Testing and support activities relating to established milestones are addressed and a dynamic "TO GO" schedule is generated that incorporates the most recent knowledge and reflects current problems.

To support the increase in construction and startup activities, the plan-of-the-day (POD) meetings have been resumed on a daily basis. In addition, the STD nuclear steam supply system (NSSS) and balance-of-plant (BOP) groups hold daily meetings to lay out specific activities for that day. All of the above meetings are attended by representatives of the affected STD disciplines, as well as members of the Station Staff Technical Services, Maintenance and Operations groups, and Safety Department representatives. Organizational interface and support manpower requirements will be addressed at these meetings and planned as far in advance as practical.

Parallel to the above-mentioned efforts, the Startup Planning and Scheduling group is developing three-week "look-ahead" schedules for the entire Startup logic. These schedules will be used by the discipline supervisors to better integrate their activities with the overall startup program. It is anticipated that these schedules will be implemented by June 1985.

TESTING PERFORMANCE AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Performance and documentation of the test program should ensure that test objectives are achieved and that test results are reviewed and documented properly.

Finding (TC.4-1)

Some start-up testing is performed without proper controls. Test activities such as major equipment operation, water transfers, and valve manipulation are performed without procedures. As a result of this practice, the systems and components under test, as well as other equipment, could be adversely affected.

Recommendation

Implement guidelines to define the complexity level of Phase I testing that requires the use of detailed procedures and valve lineups to supplement generic test procedures.

Response

Startup testing activities are controlled through generic or specific procedures as the specific nature of the test dictates. In addition, equipment operations and maintenance are supported by the use of vendor manuals, instructions, drawings, and plant operating procedures as is appropriate to the task being performed. These evolutions are directed through a single System Test Engineer (STE) who maintains a high degree of knowledge and control regarding system status and technical operating requirements. A policy guideline will be issued to clarify the philosophy regarding the proper use of procedures and to more clearly define when detailed procedures are required. The guidelines will not only address complex tasks, but will address the use of procedures as a communications device for multiple shift operations and/or when large numbers of personnel are involved.

This guideline will be issued by April 1985.

Finding (TC.4-2)

The program to complete integrity test (IT) packages and perform hydrostatic tests needs strengthening. The contractor hydro group is understaffed, inexperienced, and not effectively planning and scheduling the conduct of tests. In addition, insufficient priority is given to the completion of IT packages.

Recommendation

Strengthen the contractor hydro group and provide sufficient priority to complete IT packages as required to support the Cold Hydro Schedule. Ensure that required systems are identified and completed in time to support the hydrostatic testing schedule.

Response

The program for performing hydrostatic testing was in the process of being realigned during the INPO evaluation. The ASME III piping contractor now has personnel dedicated to cleaning up outstanding items restraining issuance of the test packages in each of their operating groups (Field Engineering, QC, QA, and Production).

Scheduling of the tests is now being coordinated with the Startup Department, and priorities are being established with regard to project milestones. The scheduling of this work is being coordinated with startup flushing and hydrostatic (hydro) test activities.

Sufficient personnel including supervisors have been assigned to the ASME III piping contractor hydro test group to handle the workload presently scheduled. As the scheduled hydro test activities increase, additional staff will be assigned to the group.

The personnel assigned to the ASME III pipe contractor hydro test group have prior field experience in hydro test activities and are considered fully qualified to perform the assigned responsibilities. Actual testing is being performed in conjunction with Startup Test Department personnel, fully certified Quality Control inspection personnel, and the Authorized Nuclear Inspector, when applicable.

Finding (TC.4-3)

Site safety tagging requirements are not always followed. Maintenance and construction personnel were observed working on improperly isolated equipment that had been turned over to Start-up or Operations.

Recommendation

Emphasize the need for all site personnel to adhere to the site safety tagging requirements. Increased management attention should be given to the strict enforcement of site tagout requirements.

Response

Two tagging programs are currently in effect for all site safety tagging of equipment. One is for equipment under the Operation's Department jurisdiction. The other covers equipment under the jurisdiction of the Startup Test Department.

Both Construction and station personnel have been trained and reminded of the importance of adherence to and the consequences of non-adherence to the safety tagging programs. These groups will continue to receive management emphasis in this regard. The following additional actions have been taken to

preclude repetition of the Station Maintenance Department personnel-related observations and safety tagging problems:

a. Station Maintenance Department personnel have been directed to use their own tags for work on equipment under the jurisdiction of the Startup Safety Tagging Program. This action will ensure that Station Maintenance personnel are cognizant of proper tags. Any exceptions to this directive requires a Station Maintenance supervisor's approval.

b. Additional Station Maintenance Department personnel are being qualified for the Startup Tagging Program.

c. Station Maintenance Department Supervisors have been instructed to periodically check tagging orders for violations or deficiencies.

Good Practice (TC.4-4) The use of the Seabrook simulator to check some pre-operational test procedures and to brief operators is effective in upgrading the test procedures, checking simulator performance, and training test engineers. At present, 18 test personnel have validated 32 test procedures. As a result, some simulator and procedure problems were corrected, some procedures were changed to suit control room arrangement, and inconsistencies between FSAR commitments and plant design were discovered.

OPERATIONS

CONDUCT OF OPERATIONS

PERFORMANCE OBJECTIVE: Operational activities should be conducted in a manner that achieves safe and reliable plant operation.

Finding (OP.2-1)

The Operations Department needs to be more involved in start-up testing activities. Communication between Start-up and the Operations Department does not ensure shift operating personnel are aware of scheduled tests or of the personnel needed to support these tests.

Recommendation

Increase the involvement of the Operations Department in the coordination of start-up testing activities. Control room personnel should be informed in advance of all planned start-up testing and manpower requirements. Consideration should be given to conducting pre-shift briefings to ensure operating personnel are cognizant of scheduled tests.

Response

A number of positive actions have been taken to improve the interface and communication between the Startup Test Department (STD) and Operations Department personnel. These include the following:

a. Startup has initiated daily nuclear steam supply system (NSSS) and balance-of-plant (BOP) discipline meetings to discuss activities planned for the day. An Operations supervisor participates in these meetings.

b. Shift test directors have been instructed to brief the appropriate Operations personnel at the start of each shift.

c. When performing individual preoperational or acceptance tests, the test director will brief Operations personnel involved in the test prior to the start of the shift and/or prior to the start of the test.

In addition, ongoing STD activities have been evaluated to verify the extent of Operations Department personnel involvement. Operations personnel have been heavily committed to the operator cold license training program and to construction support. All parties agree that once these commitments are met, Operations personnel will participate in STD testing activities to the maximum extent feasible. Participation is anticipated to commence in April 1985. Also, it has been emphasized to the Operations personnel that the purpose of their involvement in STD activities is twofold; first, to support test activities, and second, to learn the plant systems.

Finding (OP.2-2)

Auxiliary operator (AO) adherence to procedures needs improvement. Instances were noted where operating procedures were not followed or were not used to guide operating activities.

Recommendation

Emphasize to AOs the need to use operating procedures and to adhere to procedure requirements. In addition, Operations Department supervisors should periodically monitor AO activities with emphasis on procedure usage and adherence.

Response

Auxiliary operators have been verbally reminded, in weekly meetings with the Assistant Operations Manager, of the need for using procedures and for adherence to procedure requirements. Operations Department supervisors have been instructed, by department memorandum, to periodically monitor the auxiliary operator's use of procedures and to validate procedures during equipment and system testing in conjunction with the Startup Test Department. The Plant Manager and the Operations Manager will monitor the actions taken and evaluate the effectiveness by May 1985.

OPERATOR KNOWLEDGE AND PERFORMANCE

PERFORMANCE OBJECTIVE: Operator knowledge and performance should support safe and reliable plant operation.

Finding (OP.4-1)

Auxiliary operator (AO) knowledge of some plant systems needs to be improved. Several AOs were not familiar with some plant equipment they operate. Formal AO qualification requirements for individual systems and equipment have not been developed.

Recommendation

Evaluate the current level of AO knowledge and provide appropriate remedial training. Develop formal qualification requirements for individual systems and equipment that AOs operate. Ensure qualification requirements are met prior to assigning AOs operational responsibilities.

Response

In accordance with the plans being developed prior to the INPO evaluation, the auxiliary operator training program has been transferred to the Licensed Training Department. A task force of Training Center staff and Operations Department staff has reviewed the INPO generic job task analysis for applicability to Seabrook Station. The task force is revising the training

program for auxiliary operators accordingly. The revised program will include formal qualification requirements. These qualification requirements will take into consideration both initial training and recycle training to reduce known weaknesses. Plans are being made to recycle on-shift operators to training as soon as possible. The Operations Department is also developing a procedure to matrix and track tasks that an auxiliary operator needs to accomplish. The matrix will be used by the shift supervisors to document demonstrated proficiency in specific tasks and to schedule on-the-job training for areas of noted weakness. These program revisions are scheduled to be in full effect by June 1985.

OPERATIONS PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Operational procedures and documents should provide appropriate direction and should be effectively used to support safe operation of the plant.

Finding (OP.5-1)

Uncontrolled drawings and sketches used as operator aids are located at various places throughout the plant. Administrative controls have not been established for approving, updating, or verifying these documents.

Recommendation

Review all posted operator aids for continued applicability, and remove those no longer required. Update and authorize those that need to remain posted. Document the posting of all operator aids so an effective review for continued applicability can be conducted. Posted operator aids of a procedural nature should be minimized. INPO Good Practice OP-207, "Control of Operator Aids," could be of assistance in this effort.

Response

Operations Department personnel have been notified that only controlled operator aids are to be used and that uncontrolled information will not be allowed in the performance of duties at the station. Many uncontrolled operator aids have been removed and others are being reviewed to determine the need for their continued use. Those aids found useful will become controlled and the others will be removed by June 1985. The importance of using controlled documents will be stressed to all individuals in weekly Operations Department meetings. A procedure for the use and control of operator aids is presently under development and will be issued for use by June 1985. The procedure will incorporate the beneficial aspects of INPO Good Practice OP-207, "Control of Operator Aids."

OPERATIONS FACILITIES AND EQUIPMENT

PERFORMANCE OBJECTIVE: Facilities and equipment should effectively support plant operation.

Good Practice (OP.6-1) Control room instrument faceplates are color coded to facilitate operator identification of a parameter within an instrumentation cluster. Specific colored faceplates are used to identify level, pressure, temperature, or flow instruments. This practice allows the monitored parameter to be readily identified from a distance.

MAINTENANCE

PREVENTIVE MAINTENANCE

PERFORMANCE OBJECTIVE: Preventive maintenance should contribute to optimum performance and reliability of plant equipment.

Finding (MA.5-1)

The preservation of station equipment needs improvement. Safety-related and important balance-of-plant equipment is not protected from degradation from ongoing construction work.

Recommendation

Upgrade the existing construction and start-up preservation programs to provide increased protection for plant equipment. Improve the directions given to construction and start-up personnel for protection of equipment. Ensure that installed equipment remains protected during testing activities. Provide a mechanism that will allow for prompt action to correct deficiencies. Construction and start-up management and supervision should periodically monitor protection measures.

Response

The existing protective and preventive maintenance program has been reviewed in order to ensure the operability and reliability of plant equipment. As a result, the project is providing additional personnel to perform required preventive maintenance functions in a timely manner. The Preventive Maintenance program has sufficient direction and corrective action procedures in place. Equipment under Startup Test Department (STD) jurisdiction will be adequately protected with the increased manpower assigned to the program. Startup management and the STD preventive maintenance program supervisory personnel, which already includes senior plant staff personnel, will monitor this area through increased plant inspections.

The Construction Preventive Maintenance Supervisor is periodically reviewing preventive maintenance actions for compliance with vendor recommendations and makes changes and improves directions, where necessary. Construction quality assurance will audit balance-of-plant preventive maintenance activities by April 1985. Any identified program deficiencies will be expeditiously corrected.

MAINTENANCE FACILITIES AND EQUIPMENT

PERFORMANCE OBJECTIVE: Facilities and equipment should effectively support the performance of maintenance activities.

Finding (MA.8-1)

Facilities in support of various maintenance functions for an operating plant need to be improved. The present facilities do not allow for the following:

a. a machine shop dedicated to repair and maintenance of radiologically clean components

b. sufficient work areas for maintenance and refurblishment of components, as well as storage of tools and tool boxes

c. an I&C shop of sufficient size that is outfitted with I&C equipment and provisions for radiological controls, including proper ventilation

Recommendation

Review existing facilities and develop a plan to upgrade them as construction funds become available.

Response

a. The Operations Maintenance Department has recently acquired a building that had been used as a construction machine shop. This building is located outside the site fence at the south end of the training annex. The building has 6,000 square feet of shop space with an overhead door and a 3 ton overhead crane. Included with the building was a small lathe, milling machine, surface grinder, and a small drill press. Operations plans to install additional fixed machinery in the near future and to use this shop to work on radiologically clean components.

b. The recently acquired shop discussed above has relieved the problem of adequate work area to maintain and refurbish components. To provide additional space for use by the Maintenance Department and future contractors, Operations plans to modify a second building that will provide another 6,000 square feet of space. The building will have overhead doors plus a 5 ton overhead crane. This additional building provides sufficient space for storage and component laydown. In addition, as buildings are turned over from construction to the operating staff, more space for storage and laydown will become available.

c. Operations recognizes that the existing provisions for an I&C "hot side" work facility require enhancement to support the I&C Department in performing work in the radiologically controlled

areas. Management is currently addressing this problem with the intent that improved facilities will be made available prior to the first refueling outage.

CONSTRUCTION EXPERIENCE

OPERATING AND CONSTRUCTION EXPERIENCE

PERFORMANCE OBJECTIVES: Industrywide and in-house design and construction experience, as well as operating experience, should be evaluated for applicability, and appropriate actions implemented in a timely manner. Information on in-house design and construction experience should be shared with the industry.

Finding (CE.1) The construction and operating experience programs have not been fully implemented. The following examples apply:

a. Significant Event Reports (SERs) are not yet being analyzed except for those associated with Significant Operating Experience Reports (SOERs).

b. A formal program for operating events has not yet been established.

c. Construction experience with generic applicability is not being distributed to the industry on NUCLEAR NETWORK.

Recommendation Complete implementation of the construction and operating experience programs. These programs should include provisions for the following:

a. evaluation of INPO Significant Event Reports

b. formal investigation and evaluation of plant incidents

c. industry notification of significant in-house events with generic implications

Response

CE.1a

A program to evaluate SERs at Seabrook Station was begun, as scheduled, in January 1985. The program will evaluate and issue recommendations for all SERs from January 1, 1983 onward. In addition, all 1982 and older SERs will be sorted to extract all items concerning Westinghouse NSSS, review them for applicability to Seabrook, and do a complete evaluation of those that are nuclear safety-related. This program has an estimated completion date of September 30, 1985.

CE.1b

NUREG-0737, Item IC.5 requires that "Procedures for Feedback of Operating Experience to the Plant Staff" be completed and placed into effect prior to issuance of an operating license. NHY has an FSAR commitment to meet the requirements of Item IC.5 and will have approved procedures for investigation

and evaluation of plant incidents in effect prior to fuel load. However, the following program for review of operating events is presently in effect at Seabrook Station:

a. The Operations Document Control Center (DCC) Supervisor, on a daily basis, accesses NUCLEAR NETWORK and distributes new entries to the Seabrook Station Compliance Manager for review.

b. At the end of each week, all new entries taken from NUCLEAR NETWORK are compiled into a report and issued in accordance with DCC distribution lists to Seabrook Station department supervisors and managers to review for applicability to their particular area. The Operational Engineering Supervisor and the Startup Test Department Manager also receive copies of this weekly report for review.

CE.1c

It is acknowledged that the Seabrook Project has experienced events that could have been of generic interest to the industry and should have been distributed via NUCLEAR NETWORK. As noted in CE.1b above, Nuclear Production (Station Staff and Startup) has developed a program for the distribution and review of incoming information from NUCLEAR NETWORK. They also have developed a program for the distribution of outgoing information to the industry, via NUCLEAR NETWORK. The project will expand the Nuclear Production program to include the QA, Engineering, Licensing, and Construction disciplines and will have the expanded program in place by May 1985. This program will provide a mechanism for these groups to evaluate the significance and generic applicability of significant in-house events and ensure distribution of this information via NUCLEAR NETWORK.

OPERATING AND CONSTRUCTION EXPERIENCE REVIEW PROGRAM

PERFORMANCE OBJECTIVE: Industrywide and in-house design and construction experience, as well as operating experience, should be evaluated for applicability, and appropriate actions implemented in a timely manner. Information on in-house design and construction experience should be shared with the industry.

SOER STATUS

The status of Significant Operating Experience Report (SOER) recommendations is as follows:

Number of Recommendations	Action Taken
98	Satisfactory
37	Not Applicable
58 (10 red tab)	Pending - awaiting decision
92 (17 red tab)	Pending - awaiting implementation
1 (0 red tab)	Needs further review
51	Previously evaluated as satisfactory or not applicable

The following recommendations are pending - awaiting decision:

SOER Number	Recommendation Number
81-1	1, 2
81-2	1, 2, 3, 4, 5, 6
81-3	1, 2, 3
81-5	1, 2, 3, 4
81-6	2
81-17	2
82-9	7
82-11	1, 2, 3, 4, 5
82-12	2
82-15	1, 2, 3, 4, 5, 6
83-2	12
83-3	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
83-5	2, 3
83-6	1, 2, 3, 4
83-8	1
83-9	7, 10, 11
84-3	4
84-4	3, 4, 5
84-5	2
84-6	3

The following recommendations are pending - awaiting implementation:

SOER Number	Recommendation Number
80-1	2
80-2	1, 2
81-6	1a
81-9	1, 2b, 2c
81-10	1
81-14	2
81-15	2c, 3
81-16	2
82-1	2a, 2b, 2c, 2d
82-4	1, 2, 3
82-5	1, 4, 6
82-6	3, 5
82-7	4a, 4b, 4f, 5
82-8	3
82-9	1, 3, 4
82-10	1, 2, 3, 4, 5, 6, 7
82-12	1, 3, 4, 5
82-13	1, 4, 5, 6, 7, 8, 11, 12
82-16	2
83-1	1, 3, 4, 6, 7, 8, 9, 14
83-2	11, 13
83-5	7
83-7	7, 8
83-8	4, 5, 6, 9, 10, 12
83-9	1, 2, 8, 9
84-1	2, 4
84-2	1, 2, 7, 8
84-3	1, 2, 5
84-4	1
84-5	1, 3, 4, 5
84-6	1, 5, 6

The following recommendation needs further review:

SOER Number	Recommendation Number
83-9	4

An update on the status of each recommendation listed in the "pending - awaiting decision," "pending - awaiting implementation," or "needs further review" categories shown above is requested in the six-month follow-on response to this report. In addition, the status of each red-tab SOER recommendation received subsequent to this evaluation should be included in the six-month follow-on response. A tabular summary, similar to that above, is requested.

APPENDIX I

Summary of Outstanding Response Action from Previous Evaluation (1983)

DESIGN INPUTS

Finding (DC.1-1)

A more effective system is needed to ensure all dynamic fluid transients are considered and translated to the final design documents. Piping analysis work request (PAWR) packages were reviewed for some of the safety-related fluid systems. The documents reviewed did not show that fluid transients were considered in the pipe stress analysis. Also, the documents did not reflect consideration for building settlement loads and stress-range reduction factors. The effects of seismic acceleration on pipe supports have not been addressed and documented.

Corrective Action

The following actions were taken:

a. Those transients that are expected to happen with a reasonable frequency and have potential for significant effects were considered and are being evaluated.

To improve the program that ensures dynamic fluid transients are considered in the final piping design, a generic list of events for fluid transient considerations has been formalized. Program improvements were incorporated into Project Procedure AP-31, "Development of Pressure/Temperature Data Sheets," in February 1984.

Further the architect-engineer (A-E) analysis will include documented verification for each system to establish which postulated transient is applicable, not applicable, or covered by a more severe bounding condition. Transients for which pipe stress analyses are not performed will be discussed to define system features that preclude the occurrences. The associated piping analysis will be rechecked for the applicable transient effect to ensure that the impact is within the margin of design. These actions will be completed by April 1985.

b. Procedure DEDP-2607, "Computerized Piping Analysis," was revised to clarify the requirements for documenting the considerations for building settlements. The code in effect (1971 Code, Winter Addenda of '72) does not contain a specific requirement on building settlement loads. Building settlements are insignificant at Seabrook because the plant foundations rest on bedrock. Therefore, no changes in the Seabrook piping specification to address this condition were required.

c. Systems in PWRs generally experience less than 7,000 cycles. Therefore, a stress-range reduction factor of 1.0 is used. The A-E has reviewed the systems with a potential for a high number of equivalent full-temperature cycles over the expected years of service and verify the adequacy of the assumption made for the "f" value. In addition, AP-31, "Development of Pressure/Temperature Data Sheets," was revised to emphasize this requirement.

d. A sampling of 25 supports was chosen and analyzed, using criteria based on a worst-case selection of pipe size, geometry, type, location, and support load condition.

The results of the analyses indicate that the effect of seismic accelerations on supports need not be considered. This is primarily due to the stiffness and frequency criteria, which provide sufficient design margin to allow for the stresses produced by these effects. Therefore, the A-E does not plan any calculation retrofitting. However, the Pipe Support Design Guidelines was revised in February 1984 to specifically address these effects in future designs.

Status

Fifteen of 24 safety class systems have been evaluated. Hydraulic analyses have been completed for five of 16 systems expected to experience hydraulic transients. Completion of the hydraulic transient analysis for remaining systems is scheduled for May 1985. Completion of piping analysis is forecasted for August 1985.

Finding (DC.1-2)

The requirements for single-failure criterion need to be considered when establishing the bounding design conditions for the ASME Section III pipe stress analysis. Some minimum and maximum fluid temperature excursions resulting from single component failures exceed the values utilized in the pipe stress analysis.

Corrective Action

The maximum temperature condition is given more emphasis regarding single failure since this condition typically results in worst-case thermal stress condition. It appears that the identified inconsistencies are confined to the identification of the minimum rather than the maximum temperature condition.

A comprehensive review of all the systems that have the potential to be exposed to temperatures lower than the normal piping erection temperature will be performed. As part of this review, the A-E will confirm that the maximum fluid temperature (alarm setpoint) is equal to or less than the maximum

temperature utilized in the pipe stress analyses. The associated pipe stress analyses will then be reviewed to ensure their adequacy and revised for completeness. The foregoing actions will be complete by July 1985.

AP-31, "Development of Pressure/Temperature Data Sheets," was revised in February 1984 to emphasize the single-failure criterion requirement.

Status

This concern is limited to minimum temperature conditions. Design changes have been proposed to reduce the range of Primary Component Cooling Water (PCCW) temperature swings to which other systems are exposed. These changes are currently under management review. Other systems will be reviewed subsequent to completion of PCCW changes.

Finding (DC.1-3)

Some additional thermal operating modes need to be considered in the ASME III Pipe Stress Analysis. Use of fluid minimum temperatures in some operating modes is neither defined nor included as the bounding condition for equipment nozzle thermal displacement. Cold water injection results in pipe contraction and affects the pipe stress analyses for several safety-related systems.

Corrective Action

As stated in the response to Finding DC.1-2, a comprehensive review of all the systems that have the potential to be exposed to temperatures lower than the normal piping erection temperature will be performed. The associated pipe stress analyses will then be reviewed to ensure their adequacy and revised for completeness. These actions will be completed by July 1985.

Status

Improvements in PCCW temperature control are being imposed to reduce the range of temperature swings to which systems are exposed. Other systems will be reviewed subsequent to acceptance of PCCW improvements. See status for DC.1-2 for additional detail.

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December 18, 1987

Mr. Robert J. Harrison
President and CEO
Public Service Company
of New Hampshire
P. O. Box 330
Manchester, NH 03105

Dear Mr. Harrison:

This letter forwards the recommendations and good practices identified during INPO's preoperational review and assistance visit to Seabrook during the weeks of November 2, and 9, 1987. The attached document is a refined version of the material presented and discussed at the exit meeting on November 24, 1987.

We ask that you review this report and provide responses to the recommendations by January 30, 1988. Separate responses are requested for each recommendation noted in the report. Concise statements describing your actions are desired. A general response to each of the important areas noted in the Summary section of the report is also requested.

In accordance with INPO policy, this letter and the attached report are provided only to you. If you should decide to provide copies to the NRC, or to otherwise release the report outside your organization, we request that you notify INPO in advance.

We appreciate the excellent cooperation and positive response from all levels of your organization.

Sincerely,

Zack T. Pate
President

ZTP/sap
Attachment
cc: E. A. Brown
G. S. Thomas
D. E. Moody