SEABROOK STATION

REPORT OF A

SELF-INITIATED
CONSTRUCTION PROJECT EVALUATION

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE

SEABROOK, NEW HAMPSHIRE

PSNH PUBLIC SERVICE
Company of New Hampshire

SEABROOK STATION
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December 7, 1982

SB - 14696
T.S. A.10.8.99

Mr. David G. Smith
Institute of Nuclear Power Operations
1820 Water Place
Atlanta, Georgia 30339

Dear Mr. Smith:

Construction Project Evaluation

Enclosed for your information and review are two copies of the Report of a Self-Initiated Construction Project Evaluation for the Seabrook Station. Also enclosed is one copy of the Observations prepared by assessment team members, documenting pertinent facts observed during the course of the evaluation. The Observations are for your information only, and are not considered part of the Construction Project Evaluation Report.

We propose to submit the report to the NRC for their information following your review and/or by the end of the year.

If you have any questions on the Report, feel free to call A. M. Shepard at (617) 872-8100, Extension 2230.

Very truly yours,

Arthur M. Shepard
Director of Quality Assurance

John DeVincentis
Project Manager

AMS/aed
Enclosure

cc: W. P. Johnson
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I. INTRODUCTION

This report presents the results of a self-initiated evaluation of the engineering and construction activities related to the Seabrook Station, Units 1 & 2 (DN's 50-443 & 50-444), conducted during the period October 25 thru November 5, 1982.

The evaluation was accomplished by the station's principal owner, the Public Service Company of New Hampshire, and the Yankee Atomic Electric Company, acting as agent for the Owner, in a joint-venture arrangement with Northeast Utilities (Millstone III). The evaluation team was independent of the project and was comprised of 15 senior technical and management personnel from Northeast Utilities and Stone & Webster Engineering Corporation. Team coordination was provided by two senior engineering personnel from United Engineers & Constructors, Inc. who took no direct part in the evaluation process.

The station is located in Seabrook, New Hampshire, approximately 40 miles north of Boston, Massachusetts. Both units employ a four-loop 1,198 Mwe Westinghouse pressurized water reactor. Plant construction for Unit 1 and common facilities is approximately 76% complete; Unit 2 is approximately 20% complete. Fuel load for Unit 1 is presently scheduled for November, 1983. Principal parties associated with the project are:

Principal Owner/Licensee	-	Public Service Company of New Hampshire (PSNH)
Agent of Licensee	-	Yankee Atomic Electric Company (YAEC)
Architect-Engineer	-	United Engineers & Constructors Inc. (UE&C)
Construction Manager	-	United Engineers & Constructors Inc. (UE&C)

The high standards contained in the Performance Objectives and Criteria for Construction Project Evaluations developed by the Institute of Nuclear Power Operations (INPO) were used as a basis for the evaluation, although not to the exclusion of any other pertinent industry standard or good practice. The standards set high levels of excellence in the performance of the work, often in excess of those necessary to meet minimum requirements, and this philosophy was endorsed during the evaluation. Accordingly, areas of weakness (Findings) identified as a result of the evaluation are not necessarily indicative of unsatisfactory performance.

II. PURPOSE

The purpose of the evaluation was to assess the project's performance in achieving and maintaining high standards of excellence in the control of engineering and construction activities and to identify and institute appropriate action relating to any areas of weakness. It was also the purpose of the evaluation to recognize good practices, those areas of exemplary performance, or where the project instituted a particularly effective or unique method to perform the work. From a broader viewpoint, the evaluation should contribute towards achieving and maintaining the high standards of quality required by the nuclear industry.

III. SCOPE

The scope of the evaluation (except for areas listed below) included all aspects of the project - from licensing commitment thru engineering implementation, construction, and test and startup. The evaluation was performance-oriented, with considerable emphasis placed upon an assessment of whether appropriate procedures had been developed to control the engineering and construction activities, whether the procedures were being properly implemented, and whether they were effective in assuring a finished product of high quality built in accordance with the design documents.

The following were not evaluated:

A. The adequacy of the construction facilities and equipment (INPO CC.2) because all such facilities were already in place and do not affect the safety or licensability of the station.

B. Industrial Safety (INPO PS.1) was not specifically addressed since it does affect the safety or licensability of the station.

Attachment A presents in greater detail the scope of the evaluation and identifies the organizations evaluated for each Performance Objective.

The evaluation team spent two weeks (1,000 MH) preparing for the evaluation by reviewing pertinent project and contractor work procedures, licensing documents, the organizational structure and other relevant data, and preparing detailed work plans and an overall schedule. In addition, training in the evaluation techniques was provided by the team coordinators. Two (2) weeks (approximately 1,400 MH) were spent actually conducting the evaluation.

IV. SUMMARY

Based on this evaluation, from an overall standpoint the engineering and construction activities are being satisfactorily controlled and the standards contained in the referenced Performance Objectives are being achieved. However, several specific aspects of the project should be strengthened. These primarily relate to:

A. The Piping Contractor's activities - the most significant area of weakness identified during the evaluation.

B. The implementation and/or content of several project procedures.

C. A recommendation to implement or expand job-specific, non-mandatory training.

D. Schedule considerations relating to design verification programs.

The concerns with the performance of the Piping Contractor had been recognized by the project prior to this evaluation, and were also indicated in the NRC CAT Inspection #50-443/82-06 performed in June, 1982. The areas of weaknesses identified by this evaluation reinforce the need for the project to continue to monitor closely work performed by this contractor and to consider other remedial actions that would prove effective in improving work quality and schedule performance. Areas of weakness relate to control of documents, including design changes, work planning and supervision, craft training, and quality control. These concerns are addressed under the Construction Control and Project Support sections of the report.

Several design guidelines for component supports should be upgraded to account more thoroughly or clearly for certain specific load applications, and consideration should be given to developing others to improve the control of several design change and interface activities. These concerns are addressed under the Design Control sections of the report.

While the requirements of mandatory training, principally QA related, are being satisfactorily achieved, more specific job-related training is recommended. This recommendation applies to both craft personnel at the site to improve job skills and productivity and at the A-E office where reinforcement of several work procedures should promote broader understanding and more uniform compliance. These concerns and recommendations are discussed under the Training section of the report.

The various design verification programs planned or underway on the project will upgrade the confidence in the design of the plant. However, it is recommended that related schedules be integrated with the overall project schedule and an assessment made of the potential impact on plant design and construction to assure a timely completion and a cost-effective progression of the work.

V. RESULTS

Conclusions based on information developed during this evaluation, together with specific areas of weakness and Good Practices (Findings), if any, and/or recommendations are presented in the report for each INPO Performance Objective. The "Detail" sheet(s) for each objective present a broader description of the Finding followed by other pertinent facts resulting from the evaluation.

Consistent with the project policy for similar evaluations and audits, each area of weakness will be evaluated for 10CFR50.55e and Part 21 implications and reported to the NRC in accordance with established procedures.

ATTACHMENT A

INPO PERFORMANCE OBJECTIVE	ORGANIZATION EVALUATED: ARCHITECT/ ENGINEER (UE&C)	SITE ORGANIZATIONS (SITE)	OWNER'S AGENT (YAEC OFFICES)	OWNER (PSNH)
Organization & Administration				
OA.1 Organization Structure	X	X	X	X
OA.2 Management Involvement & Commitment	X	X	X	X
OA.3 Role of First-Line Supervisors & Middle Managers	X	X	X	
Design Control				
DC.1 Design Inputs	X	X		
DC.2 Design Interfaces	X	X		
DC.3 Design Process	X	X		
DC.4 Design Outputs	X	X		
DC.5 Design Changes	X	X		
Construction Control				
CC.1 Construction Engineering		X		
CC.2 Construction Facilities & Equipment				
CC.3 Material Control		X (including off-site storage facilities)		
CC.4 Control of Construction Process		X (including second shift work)		
CC.5 Construction Quality Inspections		X		

ATTACHMENT A

INPO PERFORMANCE OBJECTIVE	ORGANIZATION EVALUATED: ARCHITECT/ ENGINEER (UE&C)	SITE ORGANIZATIONS (SITE)	OWNER'S AGENT (YAEC OFFICES)	OWNER (PSNH)
Construction Control (cont'd).				
CC.6 Construction Corrective Actions		X		
CC.7 Test Equipment Control		X		
Project Support				
PS.1 Industrial Safety				
PS.2 Project Planning	X	X	X	X
PS.3 Project Control		X		
PS.4 Project Procurement Process	X	X		
PS.5 Contract Administration	X	X		
PS.6 Document Management	X	X		
Training				
TN.1 Training Management Support	X	X	X	
TN.2 Training Organization & Administration	X	X	X	
TN.3 General Training & Qualification	X	X	X	
TN.4 Training Facilities, Equipment, & Material	X	X	X	

ATTACHMENT A

INPO PERFORMANCE OBJECTIVE	ORGANIZATION EVALUATED: ARCHITECT/ ENGINEER (UE&C)	SITE ORGANIZATIONS (SITE)	OWNER'S AGENT (YAEC OFFICES)	OWNER (PSNH)
Quality Programs				
QP.1 Quality Programs	X	X	X	
QP.2 Program Implementation	X	X	X	
QP.3 Independent Assessments	X	X	X	
QP.4 Corrective Actions	X	X	X	
Test Control				
TC.1 Test Program		X		
TC.2 Test Group Organization & Staffing		X		
TC.3 Test Plan		X		
TC.4 System Turnover for Test		X		
TC.5 Test Procedures & Test Documents		X		
TC.6 System Status Controls		X		

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: ORGANIZATIONAL STRUCTURE — Objective No. OA.1

Evaluator(s) W. Ramsden & W. Willoughby (with Team contributions)

I. Performance Objective

The Owner's corporate organization and all other project organizations responsible for the design, engineering, planning, scheduling, licensing, construction, quality assurance, and testing of a nuclear plant should provide an organizational structure that ensures effective project management control.

II. Scope of Evaluation

The organization and administration of the project, including the standards and criteria contained in Performance Objectives OA-1 thru OA-3, was evaluated by the review of pertinent organizational charts, discussions, and interviews with appropriate management and supervisory personnel, and from the observation of ongoing work, both engineering and construction, from which assessments of the organizational and management effectiveness were derived. The organizations evaluated were UE&C, YAEC, and PSNH. Approximately 45 manhours were expended for OA-1 thru OA-3.

III. Conclusion

The standards of this Performance Objective are being achieved.

Other Information That Supports The Summary

1. PSNH, YAEC, and UE&C all have effective organizational structures to implement their intended functions. Each of the organizations is headed by a qualified Project Manager, who exercises good management control.

2. PSNH and YAEC staffs are closely allied. In fact, many PSNH staff members are integrated into the YAEC staff for Seabrook project activities.

3. Project Managers' relationships with their higher corporate managers was evidenced by the frequency of personal contact and meetings.

4. Reviews of the respective organizational charts indicates clear definition of the relationships and lines of responsibilities/authorities. In addition, integrated charts show the interrelationships between the organizations.

5. The following managers were interviewed to determine their place in the organization, responsibilities, authorities, mode of operation, interface with other organizations and commitment to training:

o	Executive Vice President	PSNH
o	Site Manager	PSNH
o	Project Manager	YAEC
o	Director of QA	YAEC
o	Project Manager	UE&C
o	Construction Manager	UE&C
o	Resident Construction Manager	UE&C
o	Site Engineering Manager	UE&C
o	Engineering Manager	UE&C (home office)
o	Site Support Engineering Manager	UE&C (home office)
o	Deputy Project Manager	UE&C (home office)

The above managers understood their relationship with the project and were aware of their responsibilities and authority.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: MANAGEMENT INVOLVEMENT & COMMITMENT TO QUALITY — Objective No. OA.2

Evaluator(s): W. Ramsden & W. Willoughby (with Team contributions)

I. Performance Objective

Senior and middle managers in the Owner's corporate office, designer's office and at the construction site who are assigned functional responsibility for matters relating to the nuclear project should exhibit, through personal interest, awareness, and knowledge, a direct involvement in significant decisions that could affect their responsibilities.

II. Scope of Evaluation

Refer to OA.1.

III. Conclusion

The Performance Objective is being met. One Good Practice concerning the depth and dedication of senior management involvement in the project was noted.

IV. Areas of Weakness & Corrective Action; Good Practices

Finding (OA.2-1) The following Good Practice was noted. Senior management representing PSNH, YAEC, and UE&C displayed an extraordinary interest and awareness of the project's progress and problems. This awareness is attributed to their direct involvement and first-hand knowledge of the project activities.

PERFORMANCE EVALUATION DETAILS — Construction Project Seabrook Station

Performance Area: MANAGEMENT INVOLVEMENT & COMMITMENT TO QUALITY — Objective No. OA.2

OA.2-1 A. The PSNH Executive Vice President is personally engaged in the following activities:

- Daily contact with the PSNH Project Manager and the YAEC Vice President
- Attended scheduled monthly meetings with the senior management of YAEC and UE&C
- Tours the job site bi-weekly
- Attends quarterly meetings for joint owners, progress and quality review
- Reviews progress reports, reportable items (50.55e) and schedules

B. The PSNH top management also takes an active interest in Quality Assurance. This is demonstrated by attendance at quarterly meetings by the PSNH Chairman of the Board, Executive Vice President, Nuclear Project Manager, and the YAEC Vice President, Director of Quality Assurance, Construction Quality Assurance Manager, and the Field Quality Assurance Manager.

In addition, quarterly Q.A. evaluations are forwarded directly from the YAEC Director of Q.A. to the PSNH Chairman of the Board.

C. YAEC management is very heavily involved with the day-to-day activities, as well as long-range Project direction. The Project Manager displays a keen awareness of the project's status and problems.

PERFORMANCE EVALUATION DETAILS

Construction Project
Seabrook Station

Performance Area: MANAGEMENT INVOLVEMENT & COMMITMENT TO QUALITY

Objective No. QA.2

QA.2-1 D. The UE&C top management is involved and takes an active role in the project. This is evidenced by the following action taken by UE&C. The most critical problems identified by the planning and scheduling monthly analysis are investigated by a team composed of Vice President Power Division, Manager of Planning and Scheduling, and Manager of Cost and Controls. The investigation consists of a site tour of the problem areas/systems and interviews with the appropriate first line supervision. The investigation team recommends resolutions, identifies responsibilities and establishes completion dates. The Vice President Power Division forwards a report of these problems directly to the President of UE&C, with distribution to appropriate managers.

As a result of the above action, the most critical negativity on the schedule has been reduced.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: THE ROLE OF FIRST LINE SUPERVISORS & MIDDLE MANAGERS — Objective No. QA.3

Evaluator(s) W. Ramsden, G. Reardon, B. Gatlin, R. McMellon

I. Performance Objective

The project first line supervisors and middle managers should be qualified by verified background and experience and have the necessary authority to carry out their functional area responsibilities.

II. Scope of Evaluation

Refer to QA.1.

III. Conclusion

Except in one area, the first line supervisors and middle managers are satisfactorily meeting the standards of this Performance Objective.

The supervision of the Piping Contractor's work should be strengthened. Weaknesses in the area of schedule awareness and direct supervision of the work were noted.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: THE ROLE OF FIRST LINE SUPERVISORS & MIDDLE MANAGERS — Objective No. OA.3

IV. Areas of Weakness & Corrective Action; Good Practices

Finding (OA.3-1) Piping Installation Contractor supervisors are not sufficiently involved in the control, performance and direction of project activities. This is evidenced by a lack of schedule awareness and is also supported by the observation of craft personnel requesting and receiving direction from QA/QC personnel regarding performance of work activities.

Corrective Action Project Management is currently restructuring all activities being performed by the Piping Contractor, to address specific weaknesses relating to document control, the development of construction aides, craft supervision and training, work scheduling, productivity and quality control. Corrective actions commensurate with the significant of these weaknesses have been developed and will be implemented as soon as possible.

The Piping Installation Contractor is presently increasing his staff to afford increased surveillance. It will be re-emphasized in a directive from the Construction Superintendent that the piping foremen are responsible for directing, supervising and expediting the work. Progress and results will continue to be closely monitored.

Any direction given to the craftsmen will be through supervision to the general foreman and the foremen. Any direction, other than encouraged communication on acceptance standards, given the craftsmen by QC inspectors will be minimized. A directive will be issued by the contractor's QA/QC Manager to this effect.

PERFORMANCE EVALUATION DETAILS — Construction Project Seabrook Station

Performance Area: ROLE OF FIRST LINE SUPERVISORS & MIDDLE MANAGERS — Objective No. OA.3

OA.3-1 A. The Piping Installation Contractor's supervisors/foremen for pipe support work in the Primary Auxiliary Building are not adequately involved with and directing the work activity in their area.

- Work packages for pipe support installations do not identify an estimated completion date or total time for completion. The foreman assigns a job and permits workers to perform without specific completion requirements. Time management does not exist at the job level. The foreman feels that the work is being done in an expedient manner and, therefore, sees no need to expedite work activities.

- Job direction is available from the foreman and/or the hanger engineer. However, the workers stated that they rely on the in-process "QC Inspector" for direction, because he knows what is required. Both the foreman and the QC inspector verified that this is the accepted work philosophy.

- When a foreman establishes a work team (usually one welder and fitter), he usually matches one "experienced" person with a new or relatively new hire. This is the philosophy for introducing new people to "Nuclear" work and for sustaining work progress with minimal supervision. However, of the six (6) work teams observed during a walk-thru inspection with one foreman, the "experienced" person had, in some cases, less than three (3) months work experience at Seabrook. The foreman stated that experienced people are in short supply, because of a high turnover rate.

- Training for pipe support craft personnel, other than that required by the contractor QAM (i.e., Q.A. and Security Indoctrination Courses 001/002), is provided at the discretion of the foreman. However, the foreman relies upon the in-process Q.C. inspector to identify to him which of his personnel need further job-related training. The foreman and Q.C. inspector agree to this arrangement. The foreman also sees no need to keep training records for his craft people and, instead, relies upon the training department for record keeping.

Other Information That Supports The Summary

1. The following first-line supervisors and middle managers were interviewed:

   - Senior Project Engineer (YAEC)
   - Lead Mechanical Engineer (YAEC)
   - Supervising Nuclear Engineering (UE&C Home Office)
   - Supervising Mechanical Engineering (UE&C Home Office)
   - Manager Planning & Scheduling (UE&C Home Office)
   - Manager Planning & Scheduling (UE&C Site)
   - Supervisor Project Controls (UE&C Site)
   - Area Superintendent (UE&C Site)
   - Construction Training Administrator (PSNH Site)
   - Area Superintendent, Piping Contractor
   - Supervisor Planning & Scheduling, Piping Contractor
   - Foreman, Piping Contractor

   This level of management was found to be generally satisfactory and possessed the authority to carry out their responsibilities.

2. Review of the organizational charts with the supervisors indicated that the supervisors generally were aware of their areas of responsibilities and project relationships, except as discussed in QA.3-1 above.

3. The supervisors were generally qualified thru previous working experience and had received at least the minimum training and indoctrination.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: DESIGN INPUTS — Objective No. DC.1

Evaluator(s) C. Fonseca, M. Biancaflor, H. Sethi, R. Glynn, C. Ashton

I. Performance Objective

Inputs to the design process should be defined and controlled to achieve complete quality designs.

II. Scope of Evaluation

The evaluation of Design Control (DC.1 thru DC.5) involved the expenditure of approximately 400 mannours.

The evaluation of this area extended through the various Engineering and Design disciplines, including On-Project and Off-Project/Staff Groups at the A/E headquarters office and the Site Engineering Organization, as discussed in CC.1. Specific attention was devoted to seismic design, structural design, piping analyses, component supports (including pipe, HVAC, I/C, cable tray, conduit, and equipment), Electrical, HVAC, piping, and I/C systems including in-line equipment and appurtenances.

Discussions were conducted with responsible engineers and designers, their supervisors, and the project and department managers.

A detailed review of applicable documents and procedures was also conducted. This included Corporate and Project Design and Engineering Control Procedures, various Design Documents and Calculations, FSAR Commitments and Regulatory Requirements, and NSSS and other Supplier's Documents, as reflected in the attached Performance Evaluation Details section.

III. Conclusion

The activities evaluated under this performance objective were generally satisfactory. Responsibility for control of design inputs is defined and understood and inputs are controlled and used in a way that is consistent with Corporate and Project Procedures.

Performance Area: DESIGN INPUTS Objective No. DC.1

Evaluator(s) C. Fonseca, M. Biancaflor, H. Sethi, R. Glynn, C. Ashton

Conclusion (cont'd).

A concern was identified (see DC.1-1) that indicates the need to assess the conservatism that is built-in to the structural design bases for embedded plates and pull out capacity of embedded studs.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: DESIGN INPUTS — Objective No. DC.1

IV. Areas of Weakness & Corrective Action; Good Practices

Finding (DC.1-1): Analysis was not evident to justify the conservatism in two (2) procedures contained in the guidelines used for embedded plate and component support design. These procedures relate to a base plate flexibility design and the pull-out capacity of embedded studs.

Corrective Action: Appropriate investigation will be undertaken to evaluate the conservatism of the guidelines and procedures for pipe support design in the above identified areas. If necessary, the guidelines will be modified and appropriate reanalyses undertaken. This will be completed by the end of February, 1983.

DC.1-1 A. The guidelines for pipe support design specify a flexibility factor of 1.2 for tension and moments for both expansion bolts and Nelson studs used for embedded plates. The factor of 1.2 for expansion bolts is justified by finite element analysis and will be further substantiated by tests. Use of the 1.2 factor for embedded studs is not substantiated considering the higher stiffness of studs in the analyses.

B. Design of studs is based on the Nelson stud catalogue, which uses mean value test data. The use of mean value test data is not consistent with the general practice of ACI Code #318 which uses minimum value test data.

Other Information That Supports The Summary

1. Engineering and design information for two (2) representative HVAC systems was reviewed in detail. The two HVAC systems chosen were the Containment Enclosure Cooling HVAC System and the Control Room Complex HVAC System. The Final Safety Analysis Report, System Description, P&ID, ductwork layout drawings, and representative calculations were reviewed for each system. All of these were found to be technically adequate for the intended purpose. Design output via the drawings was consistent with the input.

2. Vendor/UE&C engineering correspondence concerning various centrifugal fans for the project was reviewed. Technical information transmitted via this correspondence was accurate and proper. Fan performance test reports within the files were properly prepared and reviewed. Purchasing documents were revised, as necessary, to reflect technical requirements. All other documentation was properly routed and controlled.

3. The control of design inputs in the I&C discipline was evaluated by reviewing the development of the ESFAS system. NRC "Circulars", "Bulletins", "Information Notices", and the UE&C and client responses were reviewed, as well as the following drawings:

Other Information That Supports The Summary

- o ESFAS "Loop Diagrams"
- o Logic and schematic diagrams of various devices such as containment isolation valve #FV-4609 and pressurizer steam sample isolation valve #FV-2830

The above drawings indicated that the requirements of the NRC IE Information Notice 80-06, "ESFAS Reset Controls", were complied with and appropriate design inputs reflected in the final design.

4. The seismic monitoring system was reviewed to determine how design inputs such as R.G. 1.12, 1.69, and IEEE 344-1975 were incorporated into the design documents. Detailed review of SD-92 and Specification 259-19 indicated that these design inputs were adequately controlled. The format of the system description and the standard specification were effective in ensuring the inclusion of all design input information.

5. The PAB drawings used for the development of the ARS were compared with the current drawings and found to be consistent, with one exception. Figure 8 on Page 53 of 65, of Calc. 5B-SAG-8PB & 9PB, attached to Memo #8638A dated 3/3/82, shows an erroneous dimension when compared to the drawings. Further review of the calculation showed that the properties were calculated with the correct dimensions. Figure 8 should be corrected, however it has no effect on the results.

   The design input was clear, in sufficient detail, and consistent with current documents.

6. The input for pipe support/design was reviewed starting with a load sheet from the Piping Group, the associated support detail drawings and several support calculations. The design input was provided with sufficient detail and clarity to be useable and understandable by persons using the input.

7. The ARS input related to the design of HVAC duct and I&C tray design was reviewed. A controlled ARS document was in use.

   The values of the maximum span of the duct to meet 33 Hz frequency was received from MAG and was being used.

Other Information That Supports The Summary

Design input was detailed and clear enough to be properly used by the responsible persons and input was being properly used in the calculations.

8. A report was submitted to the NRC in April, 1982 covering Branch Technical Position APCSB 9.5-1, position C.4.3(1). The P&ID's have been color-coded, marked to indicate Train "A" & "B", as have fire zone plans, electrical schematics, and one lines. Computer printouts were then generated listing, among other things:

   - o Raceways and their associated fire zones
   - o Safe shutdown raceways and associated cables by fire zones

   These lists indicated 710 cables would have to be analyzed. They were analyzed by fire zones and by fire area (which could cover multiple fire zones). This is an ongoing program which is well documented. The methodology is prescribed in "Procedure for Review and Report Preparation for 10CFR50 - Appendix R". Fire protection of safe shutdown capability is being satisfactorily implemented.

9. System descriptions are used to translate the requirements of SAR, Reg. Guides, design criteria, etc. These are reviewed and stamped by affected project personnel, as well as independently reviewed by the Chief Engineer or his appointee, according to procedure. Cable Trays, and conduit were examined at length. They were checked against the following documents:

   - o Cable Tray Systems - notes and typical details
   - o Conduit Systems - notes and typical details

   Such things as acceptable methods and materials are delineated in great detail. Cable tray splice plates, clamps, support designs, means of attaching to supports, bracing, slip-fits, flexible connections, and requirements for connecting conduit to cable tray or tray supports, etc. are among those details.

Other Information That Supports The Summary

These documents were found to be well defined, complete, ongoing documents, generally current, and are being followed diligently.

10. The primary component cooling system requirements, design commitments, and limitations were reviewed with the Project Supervising Nuclear Discipline Engineer (SDE) and the Rsponsible System's Engineer (RE). This review included:

- o System Description SD-23, Revision 4
- o FSAR Sections 7.1.1, 7.4, 6.2.4, & 9.2.2
- o Regulatory Guide 1.48
- o General review of reference calculations "Project File #4.3.7, Calcs. #F01 thru F23"
- o P&ID #9763-F-805016

Except for the weaknesses identified, the reviewer found that design inputs such as codes, standards, Regulatory Commitments and requirements, criteria, and design bases are properly identified, clearly defined, and well documented. Calculations were found to be concise, clear, and easy to follow, with conclusions that are consistent with items listed above, and fully supportive of the Primary Component Cooling System design.

11. Pipe stress analysis design criteria is governed by Detailed Procedures DEDP-2607, "Procedure for Computerized Piping Analysis", DEDP-2609, "Procedure for Simplified Piping Analysis", and Mechanical Analysis Technical Document, "Qualification of Lug Attachments on Straight Sections of ASME Class 1, 2, & 3".

These documents were reviewed for compliance with the FSAR commitments, applicable ASME Section III, B31.1 Code requirements, and Regulatory Guides and standards.

Except for weaknesses identified under DC.3-4 & DC.3-5, these documents satisfy the FSAR commitments and comply with applicable requirements of the ASME Section III and B31.1 Codes. These procedures are generally very good and complete.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: DESIGN INTERFACES — Objective No. DC.2

Evaluator(s) C. Fonseca, C. Asnton, M. Blancaflor, R. Glynn, H. Sethi

I. Performance Objective

Design organization external and internal interfaces should be identified and coordinated to ensure a final design that satisfies all input requirements.

II. Scope of Evaluation

The scope of the evaluation is defined under DC.1, and was accomplished by conducting interviews, review of procedures, calculations, drawings, and specifications to assess the degree to which external and internal interfaces were coordinated, understood, and implemented.

III. Conclusion

Based upon the items evaluated for this Performance Objective, internal and external design interfaces are defined and understood by all engineers, designers, and their supervisors. In one instance a design interface with an outside organization had not been performed (see Finding DC.2-1).

Performance Area: DESIGN INTERFACES Objective No. DC.2

IV. Areas of Weakness & Corrective Action; Good Practices

Finding (DC.2-1) In one instance, the design interface with an outside organization (valve manufacturer) had not been performed. The manufacturer's concurrence of restraint loads imposed on the valve operator had not been documented.

Corrective Action It is the policy of UE&C to contact equipment manufacturers for concurrence when loads are applied to their equipment. The valve manufacturer referenced in the above Finding will be contacted for loading concurrence and a review completed to assure compliance with similar situations.

Performance Area: DESIGN INTERFACES Objective No. DC.2

DC.2-1 As a result of the pipe stress analysis effort for the small bore piping, the stress analyst had specified that the operator of motor-operated or control valves be seismically restrained. The restraints were designed by the Pipe Support Group (PSG). The valve manufacturer had not been contacted to obtain his concurrence, to ensure that the operator casing and valve performance would not be affected by the loads imposed by the restraint.

Other Information That Supports The Summary

1. The limits of responsibility and authority are well defined in "Design Guide of Electrical Organization, Responsibility Assignments, & Filing Systems", Rev. 7.

   Several documents were reviewed from receipt/conception to acceptance/issue and found in accordance with Administrative Procedure #29 (except for the four week turnaround date of document control receipt to issuance in case of vendor prints). The four week requirement is probably unrealistic, but provides a target.

   Examination of several design review logs revealed adequate control and documentation of the flow of information.

2. Correspondence related to the Containment Enclosure Cooling HVAC and Control Room Complex HVAC Systems was reviewed. Meeting notes, client comments on engineering documents, various transmittals, and other information was included. It was noted that a system of controlled correspondence distribution exists and is effectively used. This shows that interfaces are properly controlled and changes are coordinated effectively with all disciplines. Interviews with the Supervising Discipline Engineer and responsible engineers and designers, within the Mechanical Services Group (HVAC), tended to confirm this observation.

Other Information That Supports The Summary

3. About 50 representative Engineering Change Authorizations (ECA's) from the HVAC area were reviewed. The design change information was found to be effectively coordinated and controlled. Proper interdisciplinary review and approvals were obtained from the affected interfacing groups in accordance with Procedure #AP-15. Transfer of documents from the site to the home office was shown to be proper. An effective means of tracking status for incorporation of change information into final project drawings exists and is used to establish priorities. The overall interface process is good.

4. The ARS controlled document was compared against the actual calculation output in SAG's calculations for the PAB at three (3) elevations, i.e., elev. 108, N-S-SSE; elev. 81, N-S-OBE; and elev. 108, Vert. SSE, and found to be consistent.

   Revised loading diagrams issued for revision of the ARS were compared with those actually used and found to be consistent.

   The flow of design information between internal groups was controlled and timely.

5. MAG activities concerning the handling and distribution of interim issue of revised ARS were reviewed. These revised ARS are distribution to the lead engineers by the CSD by controlled memoranda and are filed in books with the supervisor, for record purposes. This record is maintained until a new revision of the controlled ARS document, implementing those revisions, is issued. Two (2) recently issued revised ARS were tracked through the system and found to be properly filed and controlled. The transfer of design information from one group to another was orderly and maintained in such a way that it was available to persons working in the group.

6. The specific functions and breakdown of responsibilities of the Piping Group were reviewed in detail. The Piping Group was selected due to its various and complex interfaces, both internal (with the various projects and staff groups), and external (with the various Piping, pipe supports, and piping appurtenances, fabricators, and suppliers).

Other Information That Supports The Summary

Discussions were held with the Supervising Discipline Engineer (SDE) and various piping engineers (RE's) responsible for the various specifications, interface control, and contract management. These discussions (reviews) included the following:

- o Review of Piping Specifications 9763-006-248-1, 9763-006-248-43, & 9763-006-248-51.
- o Transmittal of Isometric Dwgs./Piping Dwgs. and recommended support locations to the stress analysis group.
- o Review of stress analysis results with the Pipe Support Group.
- o Review of vendor interface (Grinnell, Corner & Lada, and Bravo), including foreign print review, documentation, and transmittal of design and fabrication information to vendor.
- o Control of changes both internally (UE&C) originated or vendor request for deviation and/or design changes.
- o Review of field originated change process and control including interfaces with appropriate design disciplines.
- o Review of latest ARS information and comparison with that used by MAG for the pipe stress analysis, including documentation of compliance or request for reanalysis.

The reviewer found that the functions performed by the Piping group were very complex and numerous. The SDE and RE have been in the group for five (5) or more years and the process has become routine. A procedure, however, documenting the design interfaces and responsibilities would be helpful.

7. A valve and pump specification were reviewed. Emphasis was placed on the interfaces between the various project and staff groups, as well as applicable interfaces with the various manufacturers. These reviews included:

Performance Area: DESIGN INTERFACES Objective No. DC.2

Other Information That Supports The Summary

- o Compliance with General Procedure GEDP-0015
- o Review of comment sheets and verification of incorporation/resolution
- o Proper format, including P.E. stamp
- o Design conditions, including seismic/environmental requirements
- o Vendor interface, including review and documentation of foreign prints, manufacturer's stress and seismic reports.

It was found that these specifications are consistent with Procedure GEDP-0015, that design conditions had been clearly identified, and that all inputs and comments had been properly reviewed and incorporated.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: DESIGN PROCESS — Objective No. DC.3

Evaluator(s) C. Fonseca, C. Ashton, M. Blancaflor, R. Glynn, H. Sethi

I. Performance Objective

The management of the design process should result in designs that are safe, reliable, verifiable, and in compliance with the design requirements.

II. Scope of Evaluation

The scope is defined under DC.1 and was accomplished by selected, review of design activities, from inception thru implementation. This review included evaluation of the design process logic, implementation of this process, methods of reviewing design, resolution of design problems, proper use of inputs, generation of outputs, and proper documentation and distribution of drawings, calculations and specifications.

III. Conclusion

The majority of the activities evaluated under this Performance Objective were satisfactory and the standards of the Performance Objective were being met. The work performed was professional, complete, and consistent with project requirements. There were several areas of weaknesses identified that indicated a need to strengthen certain procedural implementation and enforcement aspects and to improve a specific General and Detailed Design Procedure by providing additional details/direction to ensure consideration of all pertinent design parameters

Performance Area: DESIGN PROCESS Objective No. DC.3

IV. Areas of Weakness & Corrective Action; Good Practices

Finding (DC.3-1) Detailed adherance to all the requirements of the project procedure controlling the preparation of design calculations was not evident. Numerous instances of primarily administrative violations were noted. This finding also relates to training, TN-3.

Corrective Action The importance of proper references and detail in calculations has been discussed with supervising engineers and will be emphasized again with the supervising engineers at the project meeting November 24, 1982.

In one instance of calculation PIN-9763-SQ-120-1-2007, the necessary horizontal "g" values will be reviewed and corrected, if necessary, by December 21, 1982.

The cover sheet for MCD #550.15 indicates the enclosures in the package and functions as an index of the package contents. This will be reviewed to determine adequacy by December 21, 1982.

Training and emphasis in the preparation of calculations has been discussed above.

Finding (DC.3-2) The qualifications required by 10CFR50, Appendix B, of the independence of individuals who check and verify drawings, calculations, and specifications is not clearly defined in the related project procedures.

Corrective Action The project has committed in the FSAR to comply with R.G. 1.64, "Quality Assurance Requirements for the Design of Nuclear Power Plants", which references ANSI N.45.2.11. These documents define clearly the independence of the checker/reviewer and the project is complying with these requirements. Accordingly, revision to the referenced GEDP's is not considered necessary.

Performance Area: DESIGN PROCESS Objective No. DC.3

IV. Areas of Weakness & Corrective Action; Good Practices

Finding (DC.3-3) Although an approved controlled issue of a procedure for the design of HVAC duct supports has been developed, an uncontrolled copy was being used by the design supervisor and designers doing the work. An unapproved, uncontrolled guideline was being used in the design of I&C supports.

Corrective Action Approved, controlled procedures will be issued and used for the design of HVAC duct support and I&C supports by mid-January, 1983.

Finding (DC.3-4) The Detailed Engineering and Design Procedure relating to the design of piping systems (DEDP-2607) is an excellent document. However, it is not always being followed as it concerns location of lumped masses for dynamic analyses.

Corrective Action UE&C has conducted an extensive review of the analytical techniques presently being followed and is satisfied that they are proper and correct. The procedure GEDP-2607 will be modified to reflect current techniques by the end of March, 1983.

Finding (DC.3-5) DEDP-2607 could be improved by providing additional direction to address several areas of piping analysis. These areas relate to handling of jet impingement loads, decoupled seismic analyses at code boundaries, and wording clarifications.

Corrective Action DEDP-2607 will be reviewed and revised as appropriate considering the above mentioned recommendations. The review will be accomplished by the end of February, 1983.

IV. Areas of Weakness & Corrective Action; Good Practices

Finding (DC.3-6) Some discrepancies and non-uniformities were noted in the design of embedded plates. The provisions in the design guidelines were not always being followed.

Corrective Action These discrepancies or deviations from the design guidelines will be evaluated for their significance and impact on the design of embedded plates. Designs will be revised, as necessary, and a more thorough implementation of the guidelines stressed during future training sessions. The proximity effects of embedded plate design will be addressed during the Embedded Plate Verification Program (as-built).

Finding (DC.3-7) There was a concern for the acceptability of procedures being used during the Seismic Design Verification Program. The concern relates to peak spreading criteria for modified Amplified Response Spectra (ARS).

Corrective Action The Seismic Design Verification Program will be re-evaluated relating to the above concern and appropriate action taken if necessary. UE&C presently considers the procedure being followed in this regard to be acceptable.

Finding (DC.3-8) HVAC duct design procedure does not provide complete direction relative to duct stiffener design requirements.

Corrective Action The effects of axial forces in the design of HVAC duct stiffeners and local stresses at probe or other penetrations will be evaluated, the guidelines modified as required and design revised if necessary. The effects of these forces and stresses on the design is considered negligible and redesign is not anticipated.

Performance Area: DESIGN PROCESS Objective No. DC.3

DC.3-1 A. Several cable tray, conduit support, and equipment qualification calculations were reviewed:

- o All pages were not identified by calculation set numbers
- o References were not always identified, such as ARS table and revisions
- o Microfilming was not always done per procedure
- o Damping values were missing in Spec. 9763-SD-120-1
- o An unqualified computer program was being used to combine other computer output stresses (output was checked manually, however) and justification was lacking for the selection of the maximum stressed member which was the basis for design of non-individual designed members.
- o Adequate backup data defining the source of seismic amplified response spectra data relating to conduit and cable tray support and equipment qualification calculations was not consistently presented or referenced on the calculations.
- o In one (1) instance, the seismic criteria used in the design of a conduit support was incorrect. The horizontal "g" value was less than that actually required. The vertical "g" values were correct. Reference PIN-9763-SQ-120-1-2007.

B. Pipe stress calculations MCD #573.20 and MCD #550.15 were reviewed. While clear, complete and easy to follow:

- o The calculation index had not been prepared
- o Pages were not sequentially numbered

DC.3-1

- Results of certain calculations relating to some stress combinations and lumped mass determinations were presented in tabular form and backup calculations were not present in calculation package.

C. Several HVAC calculations relating to heat loads, pressure drop, and fan sizing were reviewed:

- Many calculation steps did not identify the revision of referenced drawings or applicable technical books
- Some calculations did not reference the design drawing on which the calculation was based
- Not all indicated the method used to develop the calculation (e.g., equivalent pressure drop, Darcy formulation, etc.).

D. All Final Primary Component Cooling Water System reference calculations (Calcs. #4.3.7.F01 thru 4.3.7.F23) were reviewed. Calcs. 4.3.7.F07, F09, F.14, & F15 had been voided and were not reviewed.

- Calc. 4.3.7.F22 was not listed in the index. The status, contents, or its existence, could not be determined.
- Calc. 4.3.7.F01 identified information received from individuals by name; it did not define the document number, document status, or revision that supported this information.
- Calc. 4.3.7.F11 referenced foreign print #50576 without addressing the issue/revision number.
- Calc. 4.3.7.F13 referenced preliminary Calc. 4.3.7.P04. This calculation had been superseded.
- Calcs. 4.3.7.F16 and F17 referenced the use of:
  - Computer program "LIQSS" without any identification of program version, level, status, run number, or date.

PERFORMANCE EVALUATION DETAILS — Construction Project
Seabrook Station

Performance Area: DESIGN PROCESS — Objective No. DC.3

DC.3-1

- Foreign prints and NSS documents without defining the applicable issue/revision number.
- Heat Load Tables without specific reference to their source or how they were developed.

DC.3-2 There appears to be incomplete qualifications of the independence required of the design verifier responsible for design verification.

- Criterion III of 10CFR50, Appendix B, requires that design adequacy of safety-related structures, systems, and components be verified. Consistent with these requirements, UE&C's Topical Report, Amendment 5, Section 17.1.3.4 commits to "design verification is performed by an independent design verifier (not the designer's supervisor) who is a technically competent individual not directly involved in the design task under verification review".

  Procedures GEDP-0013, 0005, & 0015 define the process used for checking drawings, calculations, and specifications. These procedures address independent review without adequately defining the reviewers qualifications for independence.

DC.3-3 Details not considered necessary.

DC.3-4 A. Procedure DEDP-2607 establishes the criteria for placing lumped masses along pipe runs for the dynamic analysis structural model representation. This criteria requires that "masses shall be lumped at piping directional changes".

B. Contrary to this requirement, the review of calculations MCD #573.20 & MCD #550.15 indicated that masses have not been lumped at the directional changes. The closest lumped mass points to the directional change point ranged from 3" to 5'-0".

DC.3-5 A. Procedure DEDP-2607 does not have provisions for incorporation of jet impingement load effect upon the piping in the piping stress analysis. Handling of this effect, required inputs, load and stress combinations criteria and output format and distribution to other disciplines is not defined.

Performance Area: DESIGN PROCESS Objective No. DC.3

DC.3-5 B. A more detailed discussion and direction, perhaps with some examples, is required in Procedure DEDP-2607 to define the acceptable procedure, including load and stress combinations, bending, and torsional affects and pipe support load development, when using the common overlap option for decoupling two (2) dynamic stress models. Similarly, more direction is required to decouple a seismic pipe run from a non-seismic continuation of the same run where the three (3) restraint (x, y, & z) option is used.

C. Procedure DEDP-2607 makes clear distinction between supports, restraints, hangers, anchors, springs, etc. These terms, however, are used indiscriminately in the body of the procedure. A review of this procedure is in order to ensure usage of proper terminology and avoid potential confusion. In one case, the procedure requires that..."at least one lumped mass shall be placed between any two (2) restraints", when it obviously means that it shall be placed between any two (2) support points.

DC.3-6 The design guideline relating to embedded plates was reviewed for consistency with design calculations. The following was noted:

- A discrepancy was noted regarding the consideration of the worst location of support attachment for design of studs. Calc. Nos. 1307RG-55 & M/S 366-SG-8 were reviewed, and the worst location of the attachment was not considered.
- Some non-uniformity in the use of lever arms for determining the tension in the studs due to applied moments was noted in Calc. Nos. 1307 RG-55, 1307-SG-56, 1307-RM-53, and SV-54. The lever arm used was not consistent with guidelines with respect to "2t" provision.
- The affect of close proximity of other embedment plates was not being taken into account in all cases. Proximity may reduce stud allowable values.

Performance Area: DESIGN PROCESS Objective No. DC.3

DC.3-6 o A criteria for defining the allowable tolerance (1/2") in locating pipe supports in the field, from the centerline of the embedment plate, is being developed. At the present time, the calculations for embedment plates do not consider the effect of this tolerance in the design. In addition, supports installed prior to this criteria will require verification of their location and subsequent embedded plate review for adequacy.

DC.3-7 The ARS used in the design of the plant are systematically being verified to account for actual as-built equipment weights, locations, and structural masses. This is being done as part of the Seismic Design Verification Program. The verification spectra is compared to that used in the present design, which includes peak spreading, to confirm the acceptability of the plant design. Prior to this comparison, the peaks of the verification ARS are not being spread. The verification (unspread) spectra is considered acceptable providing it is enveloped by the spread ARS used in the present design.

DC.3-8 A. The HVAC duct plate is designed for buckling. Stiffeners, however, are being designed for moments only without consideration of axial forces for loading pressure. Stiffeners axial force stress should be checked against allowable buckling stress.

B. Localized stiffening of ducts at in-line velocity probe locations has not been considered or evaluated.

Other Information That Supports The Summary

1. P&ID's, ductwork layout drawings, specifications, and calculations in the HVAC discipline were reviewed. Items were properly reviewed, checked, approved and properly verified in accordance with project procedures.

2. Personnel from the HVAC discipline including the Supervising Discipline Engineer (SDE), Responsible Engineers and a designer were interviewed. From the discussions and work being reviewed, it was evident that personnel were adequately qualified to perform HVAC engineering and design. Both supervision and designers exhibited a high degree of involvement in the design quality and timeliness of engineering and design response to project needs.

Performance Area: DESIGN PROCESS Objective No. DC.3

Other Information That Supports The Summary

3. To assess the awareness of the I&C personnel regarding the use of project procedures, the Power Engineering Department Manual, Administration procedures, GEDP's, and DEDP's were examined with selected personnel. Discussions with the SDE's and RE's as to how they utilize and keep abreast of these procedures revealed the following:

   - o A controlled set of procedures was in the SDE's office.
   - o Changes to procedures are communicated to the group through meetings.
   - o The design process is well documented. The I&C personnel had a good knowledge of the existence of these procedures and, in general, follow them.

4. The development of Specification 173-1 "Specification for Control Valves", from initial issue to present revision, was traced to assess how well a specification was prepared and reviewed. The following observations were made:

   - o Specification was in accordance with the GEDP-0015 format.
   - o Interdiscipline comments were well documented in the "Document Review Request for Comment" forms.
   - o Calculations for valve sizing were done in accordance with GEDP-0005.
   - o Random samples of vendor calculations were compared with A/E's calculations and were found to be consistent.
   - o Interdiscipline comments that were accepted were included in the revised specification.

   Based on the above observations, the control for this design process appeared adequate.

Performance Area: DESIGN PROCESS Objective No. DC.3

Other Information That Supports The Summary

5. During a review of structural calculations, it was noted that the containment internal concrete floor was assumed in rigid range and, thus, no floor amplification considered. The assumption was verified from the ARS curves developed to evaluate frequency characteristics of concrete floors. The calculations and analysis clearly specified the assumptions and they were verified from generic referenced material.

6. No masonry walls are being used in any of the safety-related structures.

7. Calculation PB-14 for PAB floor elev. 53 was checked. The input from SAG matches that used in the calculation (though latest SAG results received in 3/82 have not been incorporated). Floor amplification is taken into consideration and reinforcing steel designed accordingly.

8. Calculation PB-51, SB TK.40 for a flash tank in PAB was checked. Loads issued by MAG were used in the design of foundation and anchor bolts. Anchor bolts were designed by criteria other than Appendix F (reference DC.5-4) and, to date, no check has been made for compliance.

   The calculations were developed and checked with proper references to the appropriate computer run used.

   Based on the above, the calculations were judged to be complete and understandable, performed by technically qualified personnel; however, design changes are not being implemented in timely manner and implementation is not being ensured (reference DC.5-1).

9. Several pipe support calculations were reviewed. The stiffness and frequency criteria given in guidelines was being used, as was the appropriate design check list.

   Friction forces were being used as required by the criteria. Design control, in cases such as procedures and check lists, were being followed, except for the critical location and lever arm criteria (see DC.3-7).

10. Calculation M/S-328-SH-07 and ECA-2510534F were checked. The design was found in order.

Performance Area: DESIGN PROCESS Objective No. DC.3

Other Information That Supports The Summary

- o Supplementary steel for pipe support and duct support was being designed based on frequency and stiffness guideline criteria requirements.
- o Class 2 & 3 duct supports were being designed for a frequency 33 Hz. Category 1 ducts were being designed for actual frequency and correct ARS "g" values.
- o A duct support frame was analyzed by a computer program which also checked member stresses (except torsional), weld checks, and NF code checks.
- o A Class 2 duct support was reviewed and found to be in order. The design of an embedment plate was reviewed and was being done in accordance with the guideline/procedures using appropriate tables.

Based on these observations and reviews, the related calculations and analyses clearly show assumptions, inputs, references, and methods and results in a manner that can be followed by a technically qualified person.

11. The I&C tubing tray and support design criteria was reviewed and compared with calculations. The designs were consistent with the criteria. Assumptions, inputs, methods, and results were clearly stated.

12. A detailed review of a calculation of voltage regulation indicated conformance with procedures but was still "Preliminary", although seven (7) years old. The Responsible Engineer pointed out that in order to be truly final, a voltage regulation calculation requires test data of transformers and other final vendor information. A check of inputs to several computerized calculations revealed no mistakes.

Performance Area: DESIGN PROCESS Objective No. DC.3

Other Information That Supports The Summary

13. The activities of the Failure Modes and Effects Analysis (FMEA) group were reviewed. The group has been charged with a detailed review and documentation of the pipe break postulation effort and other responsibilities, including concerns identified at Diablo Canyon. A detailed examination of the FMEA Groups' responsibilities, plans, approach, proposed documentation format, and work completed to date was conducted. It was concluded that FMEA's methods, criteria, approach, and documentation plans (including proposed interdiscipline review and approval) will provide the project with a design effort that is consistent with the SAR commitments and NRC Standard Review Plan requirements. A manpower concern was identified, reference PS.2-1.

14. A detailed review of stress analysis calculations #573.20 and 550.15, for compliance with procedure DEDP-2607 was performed. The following was reviewed with the SDE.

- Nature and contents of inputs received from the Piping group.
- Development of dynamic structural model -
  - placing of lump masses
  - location and stiffness representation of supports
  - beginning and end of problem
  - decoupling criteria and application, including common zone definition and representation
  - boundary restraint concept at seismic to non-seismic boundary
  - jet impingement effects on pipe stresses and support loads
  - stress and supports design confirmation and "as-built" verification programs

Performance Area: DESIGN PROCESS Objective No. DC.3

Other Information That Supports The Summary

- pipe break restraint effects on pipe stress (zero [0] gap restraints, dual function supports)
- small bore stress analysis
  - ASME Section III lines
  - Non-ASME seismic lines
  - Non-ASME, non-seismic
  - handling of motor-operated and control valves in small bore analysis
  - vents, drains, and test connections
- nozzle loads, valve loads, valve seismic qualification confirmation
- load and stress combinations
- use of nominal pipe wall thickness vs. minimum wall thickness
- handling, documentation of assumptions, manual calcs, preliminary/unconfirmed input
- interfaces with Piping Group, PSG, FMEA, Piping Design, and project

Except for the weaknesses identified (see Finding DC.3-4), it was concluded that the work done by the MAG Pipe Stress Analysis Group was professional, complete, and consistent with project requirements. Generally a very good effort.

The organization and general breakdown of responsibilities for the Nuclear Discipline Group was reviewed and found to be adequate.

Specific detailed review was made of the following:

- Corporate procedures (GEDP's & DEDP's) and Project Administrative Procedures

Performance Area: DESIGN PROCESS Objective No. DC.3

Other Information That Supports The Summary

- Piping drawings #F805214, F805215, F805230, F805295, and F805296
- Foreign Prints #20430, 50218, & 52238

It was concluded that the above were properly documented and controlled, had received appropriate and required reviews, and were consistent with procedures and design criteria.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: DESIGN OUTPUT — Objective No. DC.4

Evaluator(s) C. Fonseca, C. Asnton, M. Blancaflor, R. Glynn, H. Setni

I. Performance Objective

Project design requirements should specify constructable designs in terms of complete, accurate, and understandable design requirements.

II. Scope of Evaluation

The scope of the evaluation is defined under DC.1, and was accomplished by a detailed review of various design output documents. These included drawings, calculations, and specifications.

III. Conclusion

Based upon the activities evaluated for this performance objective, the design outputs were complete, clear, easy to follow, understandable, compatible with applicable inputs, and consistent with the design criteria and project requirements. Two (2) constructability concerns were identified; one relates to cable termination difficulties at the containment electrical penetrations, and the second to inconsistencies between the various construction tolerances and minimum clearances requirements. An additional weakness and a Good Practice have also been identified.

IV. Areas of Weakness & Corrective Action; Good Practices

Finding (DC.4-1) Examination of cable tray and support design at two containment electrical penetrations raised questions about constructability, operability, and maintainability. The design does not appear to allow for cable terminations and/or cable bends without great difficulty or removal of some trays or tray supports.

Corrective Action The area near the Electrical Penetration Bank in the Containment that is referred to in this Finding is generically a congested area. Optimum space cannot be obtained. Available space is governed by the layout of the penetrations through the Containment wall.

Cable terminations will not be extremely difficult because the covers on the penetrations are removable on all sides. In addition, the two horizontal trays below the referenced penetrations are being lowered to provide more space for cable pulling and terminations.

Finding (DC.4-2) There is not a uniform procedure or requirement for all site contractors to follow relating to minimum erection clearances between adjacent components and component supports. It was evident that the lack of such a requirement is causing some construction interference problems and the potential for seismic clearance requirements to be violated.

Corrective Action General Specification TP-8 "Separation Criteria" will be issued for all Contractors by the end of January, 1983 and a backfit program instituted to assure required clearances are maintained on all completed work.

IV. Areas of Weakness & Corrective Action; Good Practices

Finding (DC.4-3) There is an inconcistency between a note on the Cable Tray Support Guideline and the related design calculations. The general note indicates the supports are designed for a 10'-0" span while several support calculations are based on an 8'-0" span. Also, the general notes do not define the structures, or seismic zones, where the guidelines are applicable.

Corrective Action The inconsistency on the general notes will be clarified and support calculations reviewed and modified as necessary to assure consistency with the guidelines. This will be completed by the end of January, 1983.

A reference indicating where the guidelines are (seismically) applicable will be added.

Finding (DC.4-4) The following Good Practice was noted. The project has instituted a number of design verification programs relating to seismic design, structural design, equipment qualification, piping analyses, steam line breaks, embedded plates, and anchor bolts. The completion of these programs will increase the design confidence and enhance the reliability of the plant.

PERFORMANCE EVALUATION DETAILS — Construction Project Seabrook Station

Performance Area: DESIGN OUTPUT — Objective No. DC.4

DC.4-1 A. Examination and consultation with field supervision confirmed constructability concerns in the area of the "A Train" Penetration Room - Level 0'-0", and the "B Train" Penetration Room - Level 26'-0". At the "A Train" Penetration Room, there appears to be no room for an electrician to terminate cables at penetrations H28, H29, H30, & H31. At the "B Train" Penetration Room, the same condition exists at penetrations H01, H02, H03, & H04.

B. Because of this problem, further investigation was conducted at other potential problem areas. In all other areas covered, the constructability was found to have been well thought out and implemented. The designers exhibited knowledge of, and concern for, the problems of constructability and maintainability and worked towards that end. It appears that this finding was an isolated case.

DC.4-2 A. The HVAC Installation Specification #9763-006-45-15 specified a recommended minimum clearance of 1-1/2" between HVAC ductwork and supports, and all seismic equipment, including cable trays, cable tray supports, piping, etc. Other trades such as electrical and piping do not have the same 1-1/2" clearance requirements, thus they are not prevented from locating their components closer than 1-1/2" to erected ductwork. Deviation from this requirement must be approved via Engineering Change Authorization (ECA) originated by the HVAC contractor.

B. Fifty (50) recent HVAC non-conformance reports were reviewed. Four (4) out of the fifty (50) were caused by the 1-1/2" minimum clearance requirements.

C. A general specification, #TP-8, has been under development for some time to invoke standard clearance requirements for all contractors and is currently issued for review and comment. There is no evidence, however, that it will be issued in a timely manner to support construction or to remedy resultant constructability problems.

DC.4-3 Details not considered necessary.

DC.4-4 Details not considered necessary.

Other Information That Supports The Summary

1. Project design drawings, including P&ID's, ductwork layout, ductwork support drawings, and logic diagrams for HVAC work were reviewed. The designs were prepared in sufficient detail and reflected constructable designs. Drawings were kept up to date using a controlled process.

2. Several I&C output documents were reviewed to determine clarity, logic, and completeness of design information.

   - Specification 46-1 w/attachments, an I&C installation specification which gives the generic requirements for installation such as: slopes of pipes, seismic data, support details in every area of the plant, thermal expansion, and other standard methods of installation.

   - The Standard Instrument Schedule (SIS) - a computerized list of all instruments with information such as: manufacturers, types, reference drawings, etc.

   - Installation details - standard schematic drawings showing the basic components of an instrument loop.

   - Specific drawings such as the physical arrangement and tubing routes.

   The above drawings gave sufficient information and detail for the contractor to prepare his Installation/Fabrication package. Constructability was considered by allowing the contractor to route tubings where there are no interferences. In special cases where the routing and support locations are specified, interference drawings ("hit squad drawings") are prepared.

3. Specification SD-90 and Specification 172-1 (including attachments for the "Radiation Data Management System") were reviewed. The specification was prepared in accordance with GEDP-0015. The technical requirements for each component were stated; the environmental and seismic conditions were specified; the qualification requirements properly specified and pertinent standards referenced. The specification had sufficient information and detail to allow a vendor to supply the system.

Other Information That Supports The Summary

4. To evaluate the completeness, clarity, and logic of control loop diagrams, logic diagrams, and schematic diagrams, sample drawings of the Feedwater system were reviewed. These drawings were found to be complete, systematic, and could be understood by a qualified engineer/designer.

5. The ARS document was reviewed. The document is controlled, kept current, is complete and understandable without need for interpretation.

6. A detailed review of the piping design functions was performed. The effort concentrated on the design process and, in particular, on the products (output) generated. Various safety and non-safety related work packages were reviewed. Each item was checked and tracked to its source.

   It was concluded that all inputs were checked and were based on controlled information.

   The piping isometric drawing, with support locations, coupled with the applicable work package information provides all necessary inputs for the piping analysis effort and, subsequently, the pipe support effort. The reviewer was highly impressed by this excellent approach. The piping designer must obtain and use this information to perform his work. This input is then checked and passed along to the interfacing disciplines - Piping, Pipe Stress (MAG), Pipe Supports - insuring consistent design inputs throughout the design process.

   The process itself is a very complex one and has evolved through the years to what it is today. The Design Supervisor and Lead Designers seem knowledgeable and at ease with all the steps. However, there was not a related written procedure or detailed description of work, or road map to follow which would be helpful in ensuring that all steps are properly understood and applied, both within the group and interfacing disciplines.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: DESIGN CHANGES — Objective No. DC.5

Evaluator(s): M. Whitelaw, W. Rotherforth (with contributions from the rest of the team members)

I. Performance Objective

Changes to released project design documents should be controlled to ensure that constructed designs comply with the most recent design requirements.

II. Scope of Evaluation

The scope of the evaluation is defined under DC.1 and was accomplished through a detailed review of the various design change processes and confirmed by examining the appropriate design change documents.

III. Conclusion

The standards of this Performance Objective are being met. There were four (4) areas of weaknesses identified that indicated the need to streamline Administrative Procedure AP-15, consider expanding the scope of the Site Engineering Group, and to implement a more effective control of two (2) design change procedures.

IV. Areas of Weakness & Corrective Action; Good Practices

Finding (DC.5-1) The Engineering response to requested design changes is not always timely, due to apparent difficulty in implementing Administrative Procedure 15 (AP-15). Contributing factors appear to be the restricted scope of the Site Engineering Group and the priorities of the Site Support Engineering (SSE) Group in the UE&C Home Office.

Corrective Action The latitude of work assigned to the Site Engineering Group to independently resolve ECA's will be periodically evaluated as the size and capabilities of the group continue to increase in accordance with scheduled plans.

The priorities of the Site Support Engineering (SSE) group have been structured to address the concern for prompt incorporation of ECA's onto design drawings, and significant progress is being made in this area. The concern is expected to be resolved by December, 1982 at which time the priorities of the group will be shifted toward greater support to field concerns.

Finding (DC.5-2) The present AP-15 requires that Engineering include all affected documents on the ECA. A situation was discovered where an affected Foreign Print was not referenced on the ECA.

Corrective Action There is a specific requirement in Administrative Procedure 15 that all affected documents be listed in the applicable section of the form. Engineering personnel are sufficiently knowledgeable to identify and list the foreign prints as affected documents. This Finding will be investigated to determine if it represents an isolated case or is indicative of a more widespread concern.

In the meantime, increased attention and a specific management directive will be issued to ensure that the requirements of AP-15 are being implemented.

A continuation sheet will be issued for the referenced ECA to incorporate the missing affected documents.

IV. Areas of weakness & Corrective Action; Good Practices

Finding (DC.5-3) There is not an effective method to control the status of allowable pipe support location tolerances. In various instances, a portion of the allowable tolerance was used during the design of the support, and no method was evident to prevent the same allowable tolerance from being used again during the erection of the support.

Corrective Action The pipe support locations on the analysis isometric will be compared with the "As-Built" support locations. This is currently specified in the "As-Built" procedures. The procedures used by the Pipe Support Group to relocate supports will be reviewed by the project for consistency with the intent of the "As-Built" review and appropriate changes made as required.

Finding (DC.5-4) There is not a formal procedure or method to ensure that all changes resulting from modifications to the structural Amplified Response Spectra (ARS) are tracked thru implementation of design review. The current system uses controlled inter-discipline memoranda, which may be effective if actively tracked by the responsible engineers, but a more positive, controlled method, such as an action log, would provide greater visibility and assurance that the changes have been considered in the final design.

Corrective Action The project will evaluate whether a more formal procedure is required in this regard and take appropriate action.

All equipment foundation bolts are presently designed in accordance with general industry standards and practice to meet the design load requirements. As a uniform design approach, Appendix F (presently in draft form) will be formally incorporated into the Structural Design Criteria, SD-66. Then all equipment foundation designs will be verified per Appendix F.

PERFORMANCE EVALUATION DETAILS — Construction Project Seabrook Station

Performance Area: DESIGN CHANGES — Objective No. DC.5

DC.5-1 A. Discussions with site contractors, UE&C site engineering, construction management personnel, and YAEC site personnel resulted in a recurring comment that UE&C engineering resolution of construction problems was not always timely to support construction. Although the discussion presented herein should be tempered with the understanding that it is based on interviews with site personnel who have an obvious set of priorities not necessary in concert with overall project priorities, it appears that the following items bear consideration.

- Implementation of Administrative Procedure 15 (AP-15), which controls engineering design changes, is proving to be difficult. All UE&C site engineering groups with a heavy workload expressed this concern.

- Improper implementation of AP-15 may be occuring as evidenced by the number of Engineering Change Authorizations (ECA's) which are generated (approximately 300 per week).

- The latitude provided to the UE&C Site Engineering Group to generate ECA's without Home Office concurrence and/or action, as permitted in AP-15, may be restrictive. This includes the limitations on the "Minor ECA" list and the excessive number of "Generic Major ECA's" which must be issued by the Site Support Engineering (SSE) group.

- The priorities of the Site Support Engineering (SSE) group are not necessarily ordered to support construction. This is evidenced by the large number of drawing revisions to incorporate outstanding ECA's. Although this is recognized as a critical project activity, the work effort to support these drawing revisions utilizes the same people who have the responsibility to support construction by interfacing with the Site Engineering group. Statistics were studied which indicated that 50% of the ECA's sent to the SSE group for action prior to issue of the ECA had a turnaround time in excess of 26 days. In many cases, questions must be referred back to project engineering by SSE contributing to the turnaround time.

DC.5-1 B. To illustrate the above concerns, the interface links between the contractor, the UE&C site engineers, and the UE&C home office engineers relative to the HVAC portion of the project were reviewed.

- o Contractor personnel, including the Project Manager, Assistant Project Manager, Area Supervisors, and foremen indicated that work has been delayed by unresolved engineering problems and administrative delays. They indicated that the average delay was about 4 weeks. This makes effective work planning difficult. A subsequent review of about 50 completed ECA's confirmed that an average of 4 weeks were required to resolve typical ECA's.

C. A review of the Engineering Change Authorization (ECA) and Request For Information (RFI) logs on site indicate a substantial number were in violation of Procedure AP-15, Section 5.62, "the Home Office SSE shall, within 10 working days (auditable goal 30 calendar days), perform sufficient analysis to establish whether the ECA is reasonable, and provide a forecast date of when the ECA will be officially concurred with, or replaced by, a corrected/revised ECA".

DC.5-2 A. During an evaluation of QA/QC aspects of structural steel erection, it was found that ECA #01/2793E did not list the affected foreign prints as required by Procedure AP-15.

As a result, at the drawing control area in the field, the UE&C drawings correctly listed the ECA on the drawings, but the fabricator (Cives) drawing, also found in the Drawing Control Area, did not reference the ECA.

Both sets of drawings were applicable to the same construction process.

Discussion with the UE&C site engineering personnel and the contractor's personnel indicated that this was a weak area with regard to use of erection drawings.

DC.5-2 B. UE&C Administrative Procedure AP-15 requires that UE&C engineering reference the affected foreign prints on the ECA. For cases where the design change is initiated by engineering, rather than the contractor, there is concern that all affected foreign prints will not be referenced. The Finding describes a situation where a UE&C foreign print (structural steel fabrication erection drawing) was not referenced on an ECA.

- o Review of the HVAC Contractor procedure DP-1 indicates that their Document Control Center does not incorporate ECA's unless an affected foreign print (cut sheet) is referenced on the ECA. The same concern expressed above exists for this situation.

DC.5-3 Details not considered necessary.

DC.5-4 A. Changes in structural response issued by SAG, via SB SAG-988 & 989 on 3/82, for the PAB, have not been evaluated or implemented by the structural discipline in the design of the PAB. This was verified by reviewing calculations PB-14 for Elev. 53'-0".

B. Slab thickness changes at Elevation 25' in the Reactor Containment Building have resulted in a slab weight about 20% larger than the weight used in the analysis. This weight increase has not been evaluated or implemented to date by SAG to determine the impact on the ARS and their use.

C. Appendix F to the Structural Design Criteria was issued (draft) for the design of anchor bolts. There are no systems or methods to track the status of design review of all equipment foundations designed prior to the issue of this Appendix. This was verified by reviewing one (1) foundation in PAB building calculation #PB-51 for tank SB-TK-40.

D. The current ARS controlled document is Revision 5. Additional ARS have since been generated. MAG is committed to assess the impact of all ARS issued since Revision 4 for electrical tray and conduit supports. This effort is to start in January, 1983, and formal tracking of this effort is appropriate.

PERFORMANCE EVALUATION DETAILS

Construction Project
Seabrook Station

Performance Area: DESIGN CHANGES

Objective No. DC.5

Other Information That Supports the Summary

1. A major design modification to the Unit I computer room air conditioning system was reviewed. The modification involved the design and installation of additional cooling equipment due to revised equipment requirements. Design change documentation, including drawings, applicable Engineering Change Authorizations (ECA's), calculations, and correspondence were reviewed and found technically adequate. The scope of work was discussed with the Lead Mechanical Services Site Engineer and the Responsible Engineer at the home office. Responsibilities of each discipline were well-defined and implemented in a timely fasnion to meet a tight construction schedule. Design Change Procedure #AP-15 was adhered to. The coordination effort and final results were very good, based on discussions in field and home office.

2. Several Engineering Change Authorizations (ECA's) were reviewed. All dispositions were technically adequate, properly reviewed, approved, and incorporated into project documentation. Requirements of Procedure #AP-15 were also followed. Several Design Change Notices (DCN's) were reviewed. Preparation, review, approval, and incorporation of these DCN's into final drawings meeet project requirements.

3. The designer from the Site Support Engineering group who was responsible for incorporation of HVAC-relatred ECA's and DCN's was interviewed. The designer was knowledgeable about all aspects of the design change process. The method used to ensure proper control and timely incorporation of changes on documents was effective.

4. Several upgrade programs exist in the HVAC discipline, including:

   o A program to reexamine welds in approximately 600 ductwork supports for unacceptable undercut with engineering disposition, as required.

Other Information That Supports The Summary

- o Upgrade of ductwork in several areas from Seismic, Non-Safety Classification to Seismic, Safety Class 3.
- o Beam verification program for ductwork.

From discussions with responsible engineers and review of sample documents, HVAC design personnel provide timely technical response.

6. To evaluate how effectively design changes are controlled, several DCN's and ECA's in the I&C discipline were examined. The changes were controlled in accordance with the GEDP-0032 and AP-15. The use of the forms and the project log #4 appears to adequately control design changes.

7. Design Change Notice (DCN) 63/0042A, "add new MCC to Control Bldg., Elev. 21'-6"," was traced from first indication of need to final disposition, an undertaking covering approximately five (5) weeks. On 9/22/82, motors were added to the load because of a client change and a meeting was held with affected discipline. On 9/27/82, a letter requesting client concurrence with adding a new MCC on 10/13/82 (client concurred letter 10/21/82). The DCN inter-discipline review was initiated on 10/15/82 and returned on 10/22/82; purchase requisition issued on 10/22/82; the DCN signed out on 10/27/82; and the incorporation of the DCN completed on 10/29/82. All steps were performed satisfactorily.

There is a program for alerting all projects of inherent or generic problems called Electrical Technical Bulletins. These may or may not be incorporated into existing procedures, spec guides, etc., but are available for reference as appropriate.

Coordination with other disciplines is inherent within the DCN process as is the consideration of cost & schedule impact, safety, and quality.

Other Information That Supports The Summary

8. ECA 73/3949A, requested a change in a base plate and the location of the concrete anchors. PSG recalculated the stresses in the plate and the anchors and approved the proposed change.

   ECA 05-07982A & RF1-760284A requested by the field to allow additional single tubing in addition to two (2) trays on Type R support for Control Bldg. were reviewed. The necessary calculations were adequately performed.

   The design changes were controlled properly by the ECA procedure. The response was timely and effective.

9. Various discussions were conducted with the Nuclear Project Group (both Engineering and Piping design), the Piping group, MAG, and the Site Engineering organization, including a detailed review of various DCN's, ECA's, and NCR's.

   Except for weakness found as a result of verbal-undocumented changes (see Finding CC.4-6), it was concluded that design changes are properly handled and documented. This coupled with the various design verifications and as-built programs will ensure that final installations are consistent with, and supported by, the design documents.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: CONSTRUCTION ENGINEERING — Objective No. CC.1

Evaluator(s): M. Whitelaw, W. Rotherforth, and other team members

I. Performance Objective

Engineering and design performed under the authority of the construction organization should be controlled as to consistency with the basic design criteria to ensure compliance with applicable codes, standards, and regulatory commitments.

II. Scope of Evaluation

The evaluation of this area involved the review of applicable documents (i.e., drawings, specifications, calculations, engineering change authorizations, requests for information) and procedures, a review of the interface between the construction management and the various contractors, and interviews at all levels with personnel from the Owner's Agent, the Construction Manager, and the various contractors. The evaluation included essentially the entire team at the job site and required the expenditure of approximately 98 manhours.

III. Conclusion

In general, the activity evaluated under this Performance Objective is satisfactory. There is, however, an area of weakness related to contractor incorporation of design changes that needs to be strengthened in order to provide greater assurance of adequate control of drawings used for construction.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: CONSTRUCTION ENGINEERING — Objective No. CC.1

IV. Areas of Weakness & Corrective Action; Good Practices

Findings (CC.1-1): Contractor engineering field change control does not always assure that engineering requirements (design changes) are incorporated into the drawings used for construction and final sign-off. A concern was identified for construction aides used by the piping contractor and the structural steel erection contractor (program for construction aides not yet approved).

Corrective Action: For concerns regarding construction aides used by the Piping Contractor, refer to PS.6-1.

The Structural Steel Erection Contractor has developed a program which utilizes construction aides (weld maps) as part of the system for tracking the status of work in process and final sign-off. The UE&C specification now allows the use of these construction aides (composite drawings) as a final checkout vehicle. They will be so utilized as soon as the applicable Contractor Procedure (AP 3.1) is approved. This procedure will include provisions to control the incorporation of UE&C design changes onto the construction aides.

PERFORMANCE EVALUATION DETAILS

Construction Project
Seabrook Station

Performance Area: CONSTRUCTION ENGINEERING

Objective No. CC.1

CC.1-1 A. For piping installation, the contractor's erection drawings (construction aides) are not adequately controlled to assure that they incorporate the latest revision or changes to the appropriate UE&C design drawings in a timely manner.

- o When design changes or piping drawing revisions are received from UE&C, the piping contractor prioritizes the change for incorporation onto his construction aides. The priority given to that incorporation may not coincide with the priority of the area engineer in the work area.

- o For a concern relating to the control of hanger installation drawings, refer to PS.6-1.

B. The Structural Steel Contractor is presently developing a program which permits use of construction aides during erection of structural steel. These aides are not presently approved for final sign-off. The presence of aides in the field raises the concern that two (2) sets of drawings (aides and UE&C drawings) are in the work area. Since there is no apparent control mechanism to incorporate UE&C design changes onto the aide, a concern exists that the latest design information may not be consistently used for work activities.

PERFORMANCE EVALUATION DETAILS

Construction Project
Seabrook Station

Performance Area: CONSTRUCTION ENGINEERING

Objective No. CC.1

Other Information That Supports The Summary

1. The UE&C site engineering group was recently expanded.

2. It was noted during an interview with the Systems Engineer that the Site Engineering Library does not contain many HVAC standards.

3. The HVAC support systems section of the site Mechanical Services engineering group seems to have an above average procedural system for controlling engineering and design processes.

4. Discussion with site area engineering and contractor engineering personnel indicate the turn-around on ECA's is too slow, in many cases, to properly support construction. This is discussed further in Finding DC.5-1.

5. Site Field Engineering (UE&C) feels it is necessary to develop a process for more direct engineering resolution in the field on major items, while running a check (and processing the paper work) thru the Home Office. This is discussed further in Finding DC.5-1.

6. Field engineers for Site Engineering and the contractor felt that there were not enough people in the Philadelphia SSE group to efficiently do the work.

7. The following samples of documentation from the Mechanical Services site engineering group were reviewed:

   - o Engineering Change Authorizations (ECA's)
     - contractor-generated
     - construction engineer/management-generated
   - o Contractor Request For Information (RFI)
   - o UE&C Fire Protection Reports (relative to HVAC items)

Other Information That Supports The Summary

ECA's and RFI's prepared and processed in accordance with applicable procedures, specifically Administrative Procedure #AP-15.

8. A review of deficiency reports of the Piping Installation Contractor indicated no pattern of continuous repetition.

9. The Lead Mechanical Services Engineer, Lead HVAC Support Engineer, and responsible site engineers and designers within these groups were interviewed. All personnel were found to be adequately qualified with between 5 and 15 years of HVAC related experience. These personnel demonstrated that change control is maintained and implemented in a timely manner, within procedural constraints.

10. The Lead Mechanical Services Engineer provided a summary of guidelines used in performing work within the Site Mechanical Services Group. The guidelines provide useful information which effectively describes responsibilities and interface requirements and guidance relative to use of design criteria.

11. The following samples of documentation were reviewed at the site Mechanical Services group office:

    - o Contractor-generated Request For Information (RFI)
    - o Engineering Change Authorizations (ECA's)
    - o UE&C's Fire Protection Report

    The ECA's and RFI's were properly prepared, reviewed, and approved in accordance with Administrative Procedure #AP-15. Problem resolutions and reviews were satisfactory. It was noted that UE&C had addressed HVAC considerations in the fire report addressing 10CFR50 Appendix "R".

Other Information That Supports The Summary

12. Conduit supports are located in the field by the contractor. Supplementary steel, if required, is erected by the contractor and an ECA is issued showing location of supplementary steel. Standard support types are used by contractors to determine beam sizes. This supplementary steel is eventually shown on structural drawings when the ECA is incorporated. Field engineers are required to verify use of correct type of support and size of supplementary steel.

    An ECA giving supplementary steel information to the home office was reviewed and found to be satisfactory.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: MATERIAL CONTROL — Objective No. CC.3

Evaluator(s) D. Hoisington, C. Ashton, R. McMellon, B. Gatlin .

I. Performance Objective

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

II. Scope of Evaluation

The evaluation of this area involved the following activities:

- Review of applicable procedures.
- Observations at the site of in-place installations, fabricating facilities, bulk storage, warehouse storage, storage in work areas, and handling by craftsmen.
- Interviews/discussions with personnel at all levels of responsibility from the Owner's Agent, the Construction Manager, and the various Contractors.
- Review of documentation (i.e., completed construction process forms, inspection reports, drawings, equipment maintenance files and reports, engineering change authorizations, and non-conformance reports).

The evaluation included the entire team at the job site and required the expenditure of approximately 110 manhours.

III. Conclusion

The activities evaluated under this Performance Objective were, for the most part, satisfactory. There were two (2) "Good Practices" observed, namely the assignment (full time) of an individual to monitor all equipment on the site for cleanliness control and the very professional manner in which the site central weld rod station is maintained by the Piping Contractor. Areas of weakness identified include security in the bulk storage areas, storage of piping materials within the permanent plant structures, bulk storage of HVAC equipment, the limited space allocated to the HVAC Contractor, and storage in the work areas.

IV. Areas of Weakness & Corrective Action; Good Practices

Finding (CC.3-1) The following Good Practice was noted. An individual is appointed by the construction manager to specifically monitor cleanliness of in place equipment, including piping. This practice enhances the protection of equipment throughout the construction process from the effects of temperature, humidity, and dirt.

Finding (CC.3-2) The storage of material and equipment is not always controlled effectively to preclude damage or improper application. This is evidenced by identification of several cases of inadequate storage area or use thereof, and questionable practice regarding separation of material (ASME III vs. non-ASME III) stored in work areas in the permanent plant structures.

Corrective Action Additional HVAC site storage area is being made available to ease the present congestion inside the shop.

All storage areas of permanent and plant material and proper energizing of motor heaters are routinely monitored and any occasional unsatisfactory conditions that exist are promptly corrected.

The recommended segregation of ASME III material will be completed by November 30, 1982 and within two weeks thereafter, all other safety-related areas will be investigated and corrective action initiated as required.

Finding (CC.3-3) The following Good Practice was noted. Weld rod material is issued to most site contractors by the piping installation contractor, from a central location. In addition to security advantages, this enhances control of issuance of correct material to the welders. The area was maintained by personnel who were knowledgeable and aware of operational procedures.

CC.3-1 UE&C has a designated cleanliness coordinator who is dedicated to monitoring equipment protection and system cleanliness during construction. This is a good practice.

- This individual tours the entire site looking for such things as uncapped pipes, hazardous or dirty operations adjacent to equipment, or any condition which could compromise system operability.
- He notifies appropriate area supervision of unsatisfactory conditions and follows up to insure correction of the problem.
- A tour of the site with the cleanliness coordinator indicated that this job is performed in an orderly and effective manner. Problem areas related to equipment protection were encountered and appropriate steps were taken to correct the situation.

CC.3-2 A. The facilities provided to the HVAC Contractor for prefabrication activities and temporary material storage are cramped and cause concerns regarding efficiency and safety of the prefabrication operation.

- A review of the HVAC Contractor's prefabrication facility was performed. It was noted that the building was cramped and congested. Ductwork and hanger prefabrication are both performed in this shop. Welding, grinding, and assembly operations were performed in close proximity to each other, with limited personnel protection. Safety hazards from flying metal chips and welding areas were evident.
- Limited storage area exists for partially or fully complete work items. Several pieces of ductwork and hangers were temporarily placed on the floor or in a small storage area, causing added congestion and safety hazards.

B. Material and equipment storage, handling, and security in the outside HVAC storage area are not adequately controlled to protect items from damage, contamination, or tampering.

CC.3-2

- Several pieces of prefabricated HVAC ductwork assemblies and hangers were stored out of doors, without proper coverings or security measures. Several ductwork pieces were stacked upon each other and some were damaged. Rust was evident on many hangers. Cartons containing small ductwork access doors were broken with contents strewn on the ground.

- The storage location was protected by a roped off area, for security. Tampering or unauthorized removal of materials is possible.

C. Storage of permanent plant material on site is not always adequate to protect material.

- Reinforcing steel and embed plates were off dunnage in numerous storage areas.

- Reinforcing steel and other material stored close to roadways are splashed with large amounts of mud. Little effort is made to eliminate this situation and Q.C. no longer identifies deficiencies in this area.

D. Piping materials are being stored within the permanent plant buildings without adequate regard for separation of ASME-III material from non-ASME-III material.

- At elevation (-7'), in the Primary Auxiliary Building, ASME-III material and non-ASME-III materials are stored intermixed on the same shelves.

- The area around the component cooling water pumps in the Unit-1 PAB is extremely congested with piping material, and no attempt has been made to separate ASME-III material from non-ASME-III material in the pipe rack near the component cooling water pumps.

- The upper elevation of the North RHR heat exchanger cubicle has ASME-III and non-ASME-III pipe, valves, and fittings mixed and stored together.

CC.3-2 E. On-site outdoor storage areas are not being controlled as required by ANSI standards

- o ANSI Standard N45.2.2-1972, Section 6.2.1, states that access to storage areas shall be controlled and limited only to personnel designated by the responsible organization.
- o There is no method to control access to the outside level D storage areas. Anyone admitted beyond the access road gate could enter the outlying storage areas.
- o One contractor procedure which was reviewed specified a random challenge program to control access. During this evaluation the evaluator was not challenged, nor was anyone else observed being challenged.

F. During a walk-thru in the PAB, it was noted that motor heaters for 1-CC-P-11B & 1-CC-P-11D were energized and those for 1-CC-P-11A & 1-CC-P-11C were not energized.

- o Most motor heaters in the Equipment Vault Building (North), on large motors, are not energized (charging pump motors, RHR pump motor, and many large valve motors).
- o Subsequent investigation indicated the above condition may have been the result of the temporary outage of certain electrical circuits.

CC.3-3 Additional details are not required.

Other Information That Supports The Summary

1. The UE&C receiving program was reviewed and determined to be effective in properly receiving, identifying, and storing material and equipment. The manufacturer's requirements are identified prior to receipt and storage level is determined for each piece.
2. Equipment location and inspection status is kept in a file and also entered into a computer. This system proved to be effective.

Other Information That Supports The Summary

3. Personnel interviewed expressed an understanding of the program requirements and were properly implementing them.

4. Small items on hold were kept in separate hold areas while larger items on hold are identified by hold tags.

5. Tours of storage areas on site showed that material was properly stored on dunnage marked and segregated, with the exception of the Findings in CC.3-2.

6. A tour of the off-site storage area in Newington, where a large amount of NSSS components are stored, showed that equipment was stored properly on dunnage, with some enclosures protecting Level D stored equipment. Level B and C areas, at this facility, afforded proper protection, temperature and humidity control, and access control through locked buildings.

7. On-site Level A, B, & C areas were locked with access control with a log for visitor sign-in. Badges were issued to visitors so authorized people could be readily identified. Temperature and humidity controls were adequate to meet equipment requirements. All storage areas observed were clean and well maintained.

8. Storage by contractors in permanent plant buildings was less controlled and, in some areas, was marginal in keeping material out of walkways. Some discrepancies were observed in the area of equipment protection, but the program in place, whereby the cleanliness coordinator tours the areas, has been effective in minimizing these and providing timely correction (see Finding CC.3-1).

9. There is an adequate preventive maintenance program in place in which vendor requirements are identified, placed in folders for each piece, and also noted in a card file with frequency requirements. The card for each week identifies what maintenance is due on each piece of equipment. This group is responsible for ensuring heaters in electrical equipment are energized; however, several pieces of equipment in the PAB and equipment vault were observed with the indicator lights out.

Other Information That Supports The Summary

10. It was identified to the evaluators that the piping contractor had installed some spool pieces and backfilled over them while they were on hold by UE&C. Since the UE&C QA program is tracking the problem, no further review was undertaken in this evaluation. The response to the corrective action request was not available from the contractor, so the effectiveness of their action could not be assessed to determine if the problem is generic.

11. A tour of the batch plant showed that material receipt procedures and storage facilities adequately controlled receipt and storage of batch plant material. Interviews with UE&C and contractor personnel indicated that they understood requirements and were properly implementing them.

12. The following batch plant records were reviewed:

    - NRMCA checklist
    - Calibration data sheet
    - Form CT-13
    - PTL QC-FSTC-1
    - Drum Blade Wear Sheet

    All indicated that the checks and verifications were performed and recorded at proper intervals.

13. The HVAC contractor's shop fabrication facility was reviewed. Welding, grinding, and fabrication operations for assembly of ductwork and hangers were witnessed. In spite of limited space availability identified in Finding CC.3-2, the work process was observed to be well planned and performed. Flow of material and inspection of work in process was well controlled. Personnel morale was very good.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: CONTROL OF CONSTRUCTION PROCESSES — Objective No. CC.4

Evaluator(s): R. McMellon, C. Ashton, G. Reardon, D. Hoisington, M. Whitelaw, W. Rotherforth, A. Cooper, A. Colello

I. Performance Objective

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

II. Scope of Evaluation

The evaluation of this area involved the following activities:

- Review of applicable procedures of the Owner's Agent, the Construction Manager, and all Contractors on the site.
- Observations at the site of all Contractors in the performance of their various construction processes.
- Interviews/discussions with personnel at all levels of responsibility from all organizations on the site.
- Review of documentation (i.e., completed and in-progress construction process forms, inspection reports, drawings, specifications, performance reports, non-conformance reports, and engineering change authorizations).

The evaluation included the entire team at the job site and required the expenditure of approximately 385 manhours.

III. Conclusion

Most of the activity evaluated under this performance objective was generally satisfactory. There was one "Good Practice" observed which involves the method used to locate rebar within completed concrete structures. There were several areas of weakness identified effecting supervision of work, deviations from approved procedures, availability of necessary tools, and possibly excessive inspections.

IV. Areas of Weakness & Corrective Action; Good Practices

Finding (CC.4-1) The guidance provided during work assignments by the Piping Installation Contractor fails to provide adequate instruction and detail to assure efficient completion of the work effort. This is supported by the observation of craft personnel requesting and receiving direction from QA/QC personnel regarding performance of work activities.

Corrective Action As was pointed out in the response to QA.3-1, the Piping Contractor is presently hiring more Field Engineers who will aid craftsmen in the sequencing of welds and/or general installation of piping systems by work packages.

The referenced Hilti Instruction (FI-177) is a controlled, handwritten instruction and is used for Hilti bolt installation until Project Procedure IX-1, Rev. 13 is approved. Project Procedures are referenced on all process sheets and are available for craft use.

Finding (CC.4-2) A concern was identified with the method of acceptance of work performed by the Piping Installation Contractor. This is evidenced by the duplication of in-process Q.C., engineering, and final Q.C. inspections for pipe support installations. This method does not provide for timely completion of the work effort. Proper planning, supervision, and in-process inspection should enhance acceptance of completed work, rather than duplication of post-installation inspection efforts.

Corrective Action Reference Corrective Action QA.3-1.

IV. Areas of Weakness & Corrective Action; Good Practices

Finding (CC.4-3) Construction activities are not always performed in accordance with approved work procedures. This was noted during installation of Hilti bolts by several site contractors.

Corrective Action All Contractors' Hilti procedures have been reviewed by Project Engineering and found to be satisfactory.

Scheduled training sessions will be strengthened, employing uniform methods and teaching aides to instruct all affected craft personnel in the proper implementation of the procedures.

Finding (CC.4-4) The following Good Practice was noted. UE&C personnel locate reinforcing bars for all contractors to minimize the incidence of reinforcing bar interference during hole drilling operations. The personnel are knowledgeable, the equipment of good quality, and the program is successful.

Finding (CC.4-5) Proper tools are not always available when required to assure timely completion of the work effort. This is evidenced by several cases of equipment unavailability or use of improper equipment.

Corrective Action The Contractors are constantly reviewing tool inventories and order required tools on a daily basis. The concern will be further investigated by the Contractor's Construction Superintendents.

Apparent misuse of a grinding tool was caused by the development of an unexpected problem. The foreman has been instructed to requisition and have available proper tools for whatever conditions may exist.

Performance Area: CONTROL OF CONSTRUCTION PROCESSES Objective No. CC.4

IV. Areas of Weakness & Corrective Action; Good Practices

Finding (CC.4-6)	Construction activities are not always performed in accordance with the current revision of drawings approved for construction. A situation was discovered where work was being performed using a handwritten annotated drawing without evidence of an official design change document (ECA) or Request for Information (RFI).
Corrective Action	The Piping Contractor will reinforce the program requirements through a directive to the Field making it understood that changes to design documents or deviations from procedures and/or UE&C specifications are not permitted without official design change documents.

PERFORMANCE EVALUATION DETAILS — Construction Project Seabrook Station

Performance Area: CONTROL OF CONSTRUCTION PROCESSES — Objective No. CC.4

CC.4-1 A. The Piping Installation Contractor's pipe support installation procedures do not provide adequate detail (e.g., work sequence, technique, etc.) to insure timely and quality construction.

- Each pipe support installation job has an associated work instruction package that typically consists of a pipe support drawing/isometric and applicable process sheets. Process sheet usage is defined in Spec. JS-IX-6. The most commonly used process sheet for pipe supports is Form 19C (weld process). However, Form 19C does not provide a sequence of work to be performed but, instead, relies upon the worker's experience and judgement to properly and efficiently sequence the work. The need for a work sequenced process sheet became apparent during an observation of installation work for pipe support 797-SG-05/5A (ASME Class 3) in the PAB. This particular support required over 500 field welds, yet the associated weld process sheet did not sequence the work. Instead, the process sheets listed the field welds in a numerical sequence that had no relationship to the assembly sequence. Proc. JS-IX-6, Section 6.4.1, allows for this without regard to work sequence. Observed evidence of this situation was noted by random completion or partial completion of the work package weld process sheets (Form 19C). The above approach (work sequenced process sheet) requires careful planning by the workers prior to job initiation, to avoid fit-up problems later on. Since the lead hanger engineer initiates all process sheets, it would appear prudent to apply the job planning (ie., work sequence) at this stage, via the weld process sheet rather than burden the worker during the installation phase. As an added note, the installation effort for pipe support 797-SG-05/5A began approximately two months ago and current completion is estimated at 50-60%.

CC.4-1

- Sub-process sheets (e.g., expansion anchors, snubbers, sway struts) generally provide a sequence of work but sometimes lack sufficient detail to effect a quality installation. This situation was observed during expansion anchor installations for pipe support 879-SG-201R (NNS-1) in the PAB. In this instance, the process sheet sequences the work but did not detail the technique that should be used for anchor installation. Instead, the workers refer to a handwritten, uncontrolled instruction for Hilti installation.

- As noted in QA.3-1, Item A, the workers stated that they rely on the in-process Q.C. Inspector for work direction. This is further evidence that proper guidance is not provided to the craftsperson.

CC.4-2 A. The Piping Installation Contractor's procedures governing Q.C. inspections and engineering verification of pipe supports results in an excessive duplication of work. These procedures are not reviewed by UE&C to determine acceptability.

- Procedures JS-IX-6, VI-4, and X-4 all contain information regarding the requirements for inspections/verification of pipe support work. However, a recent "draft procedure", in response to UE&C Procedure AP-39 for as-built drawings, entitled "Acceptance, Preparation, and Issuance of Certified Pipe Support As-Built Drawings" summarizes, in detail, the inspection/verification responsibilities of both contractor Q.C. and engineering. This "draft" identifies duplication of inspection/verification work that is excessive. The "draft" has not been reviewed by UE&C for appropriateness of the inspection/verification duplication. Because of a modification in Revision 3 to UE&C Procedure AP-39, Section 4.2.2 now requires the contractor to develop a method rather than a procedure. UE&C does not review and approve contractor methods.

CC.4-2

- The duplicative inspection/verification effort detailed in the draft method is intended to reduce the high rate of rejection of pipe supports experienced during the final contractor Q.C. inspection phase. However, the Q.C. records indicate that the root cause of the problem is due to poor in-process contractor Q.C. inspections. The duplicative final inspection and engineering verification effort will not improve upon the root cause problem which occurs during the work process.

- The Piping Contractor recognizes the root cause problem and is taking corrective action by retraining in-process inspectors and attempting to hire additional qualified in-process inspectors. However, Q.A. documentation indicates that poor in-process control has been an identified problem since January, 1981.

CC.4-3 A. Observation performed 10/27/82 on the installation of four (4) 1" diameter Hilti bolts, by the Piping Installation Contractor, indicated that the top of the bolt is generally below the top of the nut, prior to torquing the bolt. This was a violation of the work process sheet in the work package that required that the top of the bolt and the top of the nut be flush prior to torquing. The process sheet was included in procedure JX-IX-6, entitled "Installation and Inspection of ASME Section III Component Support and NNS Critial Plus NNS-1 Seismic Supports". The process sheet was entitled "Expansion Anchor Process Sheet". Training sessions were attended in which the workers were instructed to maintain the nut flush with the head of the bolt prior to torquing. UE&C Specification 18-17 requires the top of bolt be flush with the top of the nut prior to torquing.

B. An observation performed 11/4/82 on the torquing of two (2) 3/4" diameter Hilti bolts, by the Instrumentation Contractor, indicated that the Q.C. inspector did not check to determine if the top of the nut was flush with the top of the bolt prior to torquing. The wrench was removed and it was found that the bolt extended beyond the nut. The bolt was driven flush prior to torquing. For the first bolt, which had already been torqued, it was not possible to determine if the same problem was encountered. The contractor procedure and training, as well as the UE&C specification 18-17 requires the top of the bolt to be flush with the top of the nut.

CC.4-4 UE&C has instituted a program to locate rebar prior to drilling into reinforced concrete. This is a "Good Practice".

- The program consists of a procedure which covers use of radar rebar detectors by UE&C technicians whose sole function is to locate reinforcing steel for all contractors prior to drilling into the reinforced concrete surface.
- The radar rebar detector is a "State-of-the-Art" piece of equipment which locates rebar more accurately than any other commonly used piece of equipment.
- Records kept on success rates show a 75% success rate inside containment and an 88.5% success rate in other areas.

CC.4-5 A. Tool availability was inadequate for Pipe Support Installation work in the PAB.

- Several pipe support installation workers stated that the store-room frequently "ran out of tools". Because tools are checked out/in on a daily basis, the workers try to get to the store-room "early", before "tools are gone".
- Once the store-room supply is gone, the job is delayed while a worker checks the area to locate and borrow a needed tool from another work team. This practice was observed on several occasions while making observations of pipe support installation work during which other craftsmen would stop by to borrow tools.

B. Concrete pumps were inoperable and unavailable for several scheduled concrete placements. A cadweld crew had to borrow a pouring basin.

C. Apparent misuse of tools was observed when a worker was using a grinder to cut a web section from a structural beam to provide clearance for a pipe support to be installed. He used a mini-grinder for the effort which took excessive time. This could also be symptomatic of lack of proper training or supervision (see TN.3-1).

CC.4-6 A YAEC Q.A. surveillance of the Piping Installation Contractor's activities during a pipe hanger installation was observed. The YAEC Q.A. engineer reviewed the procedure with the observer, and proceeded to perform the surveillance utilizing his checklist and the document package for the job. All items were checked off satisfactorily on the checklist. Although the surveillance was accomplished per the prescribed checklist, the Contractor's Q.C. and YAEC's Q.A. personnel involved were not effective in implementing the Q.A. program requirements, as evidenced below.

- The YAEC Q.A. Engineer was not overly concerned that the working drawing included a handwritten note. When the evaluator asked several questions about this practice, the Q.A. Engineer indicated we could check with the Piping Contractor's engineering department.

  The non-conforming condition dealt with a plate on the restraint which was 5/8" off location.

  Subsequent investigation with the Piping Contractor's engineering department indicated that neither an RFI (Request For Information), ECA, nor NCR had been written. The YAEC Q.A. Surveillance Report on this activity is Q.2.6.14.3206 dated 11/2/82.

- An NCR was subsequently generated to stop the work. However, it is not known whether this problem existed for previous work without being identified by QA/QC personnel.

B. The Piping Contractor's engineering department was asked whether the above practice was allowed by procedure. They indicated that a formal change notice should have been processed prior to performance of work. In any case, engineers are not permitted to make field changes on items similar to those identified above.

Other Information That Supports The Summary

1. HVAC Contractor -

   - o A field inspection of various Unit 1 building areas was conducted by the UE&C HVAC construction supervisor. The areas covered included the Containment, Primary Auxiliary Building, Control Building, and Waste Disposal Building. The HVAC installation is approximately 40% complete according to the supervisor. He also indicated that significant delays are occurring due to major design changes and delays in processing ECA's. The time required to obtain resolution to field problems averaged approximately 4 weeks. The general quality of the work observed was good.

   - o Discussion with the UE&C Construction Manager indicated that the previous HVAC contractor was replaced due to inadequate performance and inadequate controls and quality programs for nuclear work.

   - o The HVAC Contractor's revised quality assurance manual and related construction, administrative, design, and quality assurance procedures were reviewed. They were revised to be consistent with the new contractor's operations. The new procedures were found to be satisfactory and should provide the means to implement good quality HVAC work. Discussions with the QA managers on site confirmed this observation.

   - o Several randomly sampled Non-Conformance Reports (NCR's), Material Receipt Inspection Reports, hanger and ductwork installation packages, and YAEC surveillance reports were reviewed with the HVAC contractor Quality Control Supervisor. Material receipt inspection reports and installation packages were thorough and complete. This conclusion was confirmed by the surveillance reports. Control and disposition of NCR's may be a problem area, as discussed in Finding QP.1-1.

Other Information That Supports The Summary

2. Electrical Contractor -

- The Construction Manager (Electrical discipline) was interviewed. It was evident that he was familiar with the applicable procedures and processes governing his work. He displayed an awareness of ongoing costs and schedules. His relationships with Site Engineering contractors and his own personnel seemed efficient and productive.

- The Site Engineering Lead Discipline Engineer (Electrical) was well qualified for his position. He was conversant with the procedures, including the latest revisions, that affect his work. Both he and his people attend training courses regularly and seem to be performing adequately.

- It was observed that instrumentation cable drums are being stored inside the control building, but the storage area is neither marked nor roped off.

- The Electrical contractor has an adequate system for controlling and calibrating tools and test equipment.

- The contractor's program includes ongoing training programs for QC inspectors, with good attendance at meetings.

- The Turnover Supervisor has developed a system for tracking progress and inspection of cable trays based on the CASP system. The system uses sepias to mark up the status of cable tray nodes (hangers, bracings, grounding, etc.). The sepia is kept up to date and can eventually be used as the "as-built" sepia. Interim and final prints can be obtained readily. Information is then used to check off the status of sub-groups in BIP's. Double entries on computer read-out sheets provide additional information or reasons for current status. This method was effective for tracking cable tray status.

Other Information That Supports The Summary

3. Civil/Structural Contractor -

- The UE&C Civil/Structural superintendent and concrete supervisor were interviewed and found knowleageable of requirements. The concrete supervisor has the responsibility to select the concrete mix design based on conditions, i.e., rebar and embed congestion, type of equipment used, pump, bucket, etc. The engineers specify design strength. The use of superplasticizer and mixture is a good way to minimize concrete voids and is used 40% of the time.

- The backfill program was reviewed and the backfill supervisor was interviewed. Procedures are being followed and storage requirements are being met. The testing agency checks in place density on the 2nd lift and takes samples from the first lift to run a one point proctor test for use on the next in place density test. This method minimizes in place density measurement problems due to slight non-uniformity of material as placed. They are successful in achieving the 95% compaction requirement. The equipment used was adequate to efficiently place and compact the structural backfill.

- The testing laboratory was toured. The personnel were qualified and the facilities adequate to perform the required testing of concrete, reinforcing steel, and backfill.

Other Information That Supports The Summary

4. Installation of Component Supports -

- o Construction activities in the pipe support area are identified in advance. The Piping Installation Contractors process for installing pipe supports in the PAB was reviewed. The field engineer explained that by using the 12 month and 12 week look ahead schedules issued by UE&C, and by closely coordinating with UE&C's Construction Management, he issues drawings and material for pipe support work. The field engineer, after walking down the system intended to be worked on, develops job instruction packages for each pipe support. Job instruction packages were observed to contain insufficient detail to ensure timely and quality construction. These job instructions are used by work teams (typically one welder and one pipefitter) to obtain necessary job materials and guide the installation activity. The concern regarding insufficient detail is summarized in Finding CC.4-1.

- o The current drawings and latest specification revisions are being used for construction, except as noted in Finding PS.6-1. In one instance, it was noted that the process sheet for Hilti bolt installation was not being followed (see Finding CC.4-3).

- o The contractor has a system established to control rework activities. No specific observation was made in this area. However, a review of the QA records indicates that the rework is being controlled.

- o The pipe support work in the PAB is being performed with minimal supervision. The philosophy is to issue the work package and let the craftsman work at their own pace. However, some work teams have limited experience with nuclear work and turn to the QC inspector for job guidance (see Finding QA.3-1).

Other Information That Supports The Summary

- Tools were observed to be in limited supply. Frequent and, in some cases, extensive job delays result. Many of the workers complained about this situation (see Finding CC.4-5).

5. Installation of Major Equipment -

- Construction activities related to installation of major equipment are identified well in advance to allow for adequate preparation and staffing for the job.

- The contractor's effort in erecting the refueling water storage tank was reviewed. The Construction Superintendent showed evidence that the tank erection schedules had been forwarded to UE&C well in advance of the job initiation. The schedule was then factored into UE&C's 12 month integrated construction schedule which gets wide distribution. As the job neared the scheduled start date, a 12 week look ahead schedule issued by UE&C provided further advance notice to all concerned that final preparation for this job must be completed. The 12 week look ahead schedule also signals the UE&C Construction Management Group to begin close job coordination with the contractor. The Contractor Construction Superintendent showed evidence that the tank job had been added to the 12 week look ahead schedule. All site contractors and UE&C Construction Management groups received the 12 month and 12 week schedules that identify all site work activities.

- Contractor work procedures and drawings displayed adequate detail to meet UE&C's engineering requirements for the refueling water storage tank (1-CBS-TK-8). The procedure detailed and sequenced the tank erection work. This work sequence cannot be deviated from without QA approval. All the procedures and drawings reviewed for the tank erection had been reviewed and approved by UE&C.

Other Information That Supports The Summary

- o In order to assure that the tank erection was performed to work procedures and drawings, the contractor provided direct and continuous supervision of the job. Work procedures and drawings were found to be current with UE&C Specification 9763-006-246-1, Revision 5. The contractor and YAEC's QA records for the tank erection did not contain any references to problems with deviation from specified work or the use of outdated drawings. The Fabrication Check List (FCL) used to outline the work process and identify the QA hold points was approved by QA and the ANI.

- o The contractor performed rework activities using a Fabrication Check List Addition (FCLA) that details the rework in steps for QA hold and approval. However, not much rework is performed, which demonstrates good control of work activities. The YAEC QA record from July to October, 1982 showed that only one weld repair was performed on the tank erection job.

- o The training records showed that all supervision and labor involved in the tank erection job were provided training in all the applicable job requirements. It was noted that supervision and QA worked well together. All the QC inspectors were qualified to ANSI Level II. The job supervisors had considerable experience. Both the job supervision and QA stated a philosophy to do the job right the first time.

- o During a walk-thru inspection of the job, no deficiencies were noted regarding correct usage of tools.

6. Piping Installation -

- o Work status meetings are held daily between UE&C and the contractor. The UE&C Piping Superintendent has a good grasp of the day-to-day work of the Piping Contractor.

PERFORMANCE EVALUATION DETAILS — Construction Project Seabrook Station

Performance Area: CONTROL OF CONSTRUCTION PROCESSES — Objective No. CC.4

Other Information That Supports The Summary

- Contractor's QA force is approximately 150 personnel.
- The average weld rejection rate is approximately 24%.
- UE&C's Piping superintendent believes that many of the current difficulties are due to the inexperience (interpreting results) of the contractor's QA personnel.
- The organization of the UE&C Piping group was reviewed and it appears adequate.
- The UE&C Piping superintendent is familiar with, and has an adequate working knowledge of, the procedures in effect at the site for the accomplishment of the work.
- There is no Contractor Design group on-site.
- Approximately 200 Engineering Change Authorizations (ECA's) are processed per week.

- The Contractor's organization chart was reviewed. Staffing appears to be adequate. QA reorganization and expansion is currently underway.
- The contractor's Assistant QA Manager is well qualified for the position and very knowledgeable of the procedures established for the site. He explained the current QA reorganization to better separate records functions from production functions.
- Welding work at two (2) different locations was observed. In each case, the work had just been completed and the craftsmen were getting ready to call for the QC inspector. Both welders had the required and correct documents in their possession for the welds being made and the process data sheets were correctly annotated to the current progression of work.

Other Information That Supports The Summary

- Craftsmen were familiar with procedures controlling the working documents that they were using (i.e., Weld Rod Requisition, Process Data Sheet, Construction Aide, & Isometrics).

- All four (4) Component Cooling Pumps in the PAB pumps were covered, however extreme amounts of debris were thrown under the covers between the pumps and the motors and pipe spools were laying on the top of pumps 11C & 11D.

- The contractor's QA staffing is currently 159 people which is the same as it was in February, 1982.

- A review of the NCR log indicates that the contractor is generating approximately 1,700 non-conformance reports per year.

  - A significant number of these NCR's are caused primarily by questionable craft personnel work habits (approximately 33%); i.e., missed hold point, used wrong weld rod, exceeded minimum wall thickness.

  - A review of closed NCR's, from January thru March of 1982, indicated a number of NCR's were originated as a result of cold springing of piping. At the present time, there is no trend analysis of NCR's by the Piping Contractor, at the site.

  - The NCR coordinator could not provide the reference in contractor procedure XV-2, which permitted NCR's to be "voided". This practice is being followed as discussed in Finding QP.1-1.

  - A review of NCR #1892 showed that after QA sign-off of the NCR, a memo was issued which changed the reportability status of the NCR from "not applicable" to a "potentially reportable" 10CFR21. The original copy of NCR #1892 was not changed to "potentially reportable". This practce is in accordance with present project procedures.

PERFORMANCE EVALUATION DETAILS — Construction Project Seabrook Station

Performance Area: CONTROL OF CONSTRUCTION PROCESSES — Objective No. CC.4

Other Information That Supports The Summary

- As a follow-up, this situation was discussed with the UE&C Site Engineering QA supervisor. He produced the documentation (letters) verifying a timely review and investigation of the "potentially reportable" situation. Handling of "potentially reportable" concerns appears to be well controlled.

- The contractor's method for filing completed production documents (i.e. Process Data Sheets) was reviewed. They are filed by systems. Several were randomly reviewed and then the RHR system folder was reviewed. All documentation in the folder was completed correctly.

  - The folder for the Component Cooling System was reviewed and all documentation was completed correctly.

  - Documentation for rework is kept in the same folder but is not attached to the documentation for the original work.

  - Large bore ASME-III pipe spools are being modified on site. However, separate files for tracking of ASME-III spool modifications are not being maintained. The documentation relative to ASME-III spool modifications are being kept (randomly) in the appropriate System folders. Current status of modifications to large bore ASME-III pipe spools is not available and would be very difficult to compile in a reasonable time frame.

Other Information That Supports The Summary

- Copies of the monthly summary of NCR's for the months January thru September 1982 were obtained. A trend analysis was performed and it was determined that a total of 975 NCR's were written (which includes 107 "voided" NCR's). 438 NCR's were attributed to contractor cause codes, 24 to vendor supply problems, and 34 indeterminate/unknown. Of the "valid" NCR's (975 - 107 = 868), the Contractor's cause codes account for 50% of all NCR's written. Of this 50% of all NCR's written, approximately 75% (326 NCR's) were assigned to vendor supply problems; however, the only corrective action ever indicated on the NCR's was "Construction Manager to Contact Vendor". A stronger effort should be made to assign the 112 NCR's in Cause Code 34 (indeterminate/unknown) to a definitive cause code.

- A discussion with the contractor's Engineering Change Authorization (ECA) coordinator took place. Approximately 200 ECA's are processed per week.

  - 20% to 40% of the ECA's are initiated by Pullman-Higgins

  - 60% of the approximately 200 ECA's pertain to hangers/supports and 40% pertain to piping

- The processing of ECA's was discussed with the Drafting Supervisor for piping. ECA's are logged in and scheduled on a "systems" priority basis for incorporation into the construction aide (ISO's) drawings (see Finding CC.1-1 for further discussion).

- The processing of ECA's was discussed with the Drafting Supervisor for hangers/supports. ECA's are logged in but not scheduled for incorporation at that time. The ECA's are incorporated into the hanger/support drawings when the Pullman-Higgins field engineer notifies them that he will be working on specific hangers/supports in the near future (see Finding CC.1-1 for details).

Performance Area: CONTROL OF CONSTRUCTION PROCESSES Objective No. CC.4

Other Information That Supports The Summary

- The Pullman-Higgins QC supervisor was accompanied on the 2nd shift. No QC inspections occurred while with the 2nd shift, since no ASME-III pipe welding was performed. Second shift work is somewhat limited to pipe hangers/support installation and B31.1 pipe work. Availability of QC inspectors on the 2nd shift appears adequate.

- Pipe storage in the South 40 & West 40 storage yards was reviewed. Storage of pipe spools in both yard areas is good. All piping is on dunnage and completely off of the ground, and all piping had end caps securely in place to protect the pipe.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: CONSTRUCTION QUALITY INSPECTIONS — Objective No. CC.5

Evaluator(s) A. Cooper, W. Rotherforth, A. Colello

I. Performance Objective

Construction inspections should verify and document that the final product meets the design and quality requirements.

II. Scope of Evaluation

The evaluation included a review of several contractors' QC Inspection Programs. The purpose was to verify that QC Inspections are: conducted in accordance with approved procedures; performed by qualified inspectors; supported by upper management; and identify substantiative problem areas.

This included interviews with construction site managers, supervisors, and both QC and non QC personnel. Various inspection related documents were reviewed to determine the depth and adequacy of the inspections. In addition, observations were conducted of inspectors performing inspection activities. Approximately 90 manhours were expended.

III. Conclusion

In general, Construction QC Inspections meet the requirements of this Performance Objective. The inspection packages contain adequate detail and inspection personnel qualifications to meet ANSI standard requirements. An area of weakness was identified relating to the inspection process.

IV. Areas of Weakness & Corrective Action; Good Practices

Finding (CC.5-1) The inspection process does not always assure that procedural requirements of the project are satisfied. This was noted in several cases; one where work was performed to an annotated drawing, and other cases where Hilti bolts were not installed in accordance with approved procedures.

Corrective Action The basic function of the inspection process is to assure full compliance that the procedural requirements of the project are being invoked and are totally satisfied. Each contractor has this primary responsibility. In cases where full compliance is not achieved, Contractors generate either an inspection report or a non-conformance report depicting the non-conformance condition.

Each Contractor will be required to upgrade his process control during installation, to assure compliance with procedures. Surveillance activities will be performed to assure implementation of the upgraded program.

PERFORMANCE EVALUATION DETAILS — Construction Project Seabrook Station

Performance Area: CONTROL OF CONSTRUCTION PROCESSES — Objective No. CC.5

CC.5-1 A. The Piping Installation Contractor was observed installing a pipe hanger using a drawing which was marked based on verbal input from UE&C Site Engineering. The contractor Q.C. personnel allowed work to proceed without correcting the unacceptable condition. For details of this finding, see Finding CC.4-6.

B. Several Hilti bolt installations by the Piping Installation and Instrumentation Contractors were observed. Bolts were not installed in accordance with approved procedures. In all cases, the Q.C. inspector allowed work to be performed in a manner which was not prescribed by the procedure. For details of this finding, see Finding CC.4-3.

C. For additional evaluations of the Construction Quality Inspection Program, see QA.3-1 (QA/QC functioning in a production capacity), and CC.4-2 (duplication of inspection efforts).

Other Information That Supports The Summary

1. Contractor's QC managers, inspectors, procedures, and records were assessed in the performance of this evaluation.

2. The managers and the inspectors had a good understanding of their QC program and their responsibilities in the overall project structure.

3. The procedures that were reviewed defined the inspection process in detail, and appeared to include those requirements necessary to meet the project requirements.

4. The QC inspectors observed did not appear to be influenced by the construction management or crafts in the performance of their inspections. The inspections observed were performed in accordance with written procedures.

Performance Area: CONTROL OF CONSTRUCTION PROCESSES Objective No. CC.5

Other Information That Supports The Summary

5. Records of inspections that were reviewed were clearly identified to type, scope, persons involved, and definitive description of results.

6. The systems for reporting degraded quality are clearly in place and understood. The system provides for tagging work in process with "Hold Tags", to indicate that a problem exists which cannot be resolved prior to proceeding with work.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: CONSTRUCTION CORRECTIVE ACTIONS — Objective CC.6

Evaluator(s) G. Reardon (with input from several team members)

I. Performance Objective

The construction organization should evaluate audits, inspections, and surveillances; process replies and follow-up; and take corrective action to prevent recurrence of similar problems.

II. Scope of Evaluation

The evaluation included a review of YAEC, UE&C, and various contractor's construction corrective action systems. The purpose was to verify that construction corrective action systems, such as NCR, audit/inspection/surveillance deficiencies, CAR, and tracking and trend reports are effective in identifying problems and providing corrective action to prevent reoccurrence.

This included interviews with construction site managers, supervisors, and QA/QC personnel, as well as a review of selected documents to ensure the system was functioning properly. Approximately 20 manhours were expended in this evaluation.

III. Conclusion

In general, the construction corrective action program appears to be satisfactory. Tracking and reporting systems appear effective and personnel were knowledgeable of the system.

No areas of weakness or strength were identified for this Performance Objective.

PERFORMANCE EVALUATION DETAILS — Construction Project
Seabrook Station

Performance Area: CONSTRUCTION CORRECTIVE ACTIONS — Objective No. CC.6

Other Information That Supports The Summary

1. The site contractors contacted in the assessment of corrective action were very involved in adequate review, follow-up, and analysis of deficiencies for corrective action to prevent recurrences. The actual tracking of the corrective action items was accomplished by the QA/QC groups and the follow up was by the construction department.

2. The contractor's organizations have NCR tracking reports that can be readily understood and the personnel interviewed had a good working knowledge of the system.

3. The contractor organization reports are used to develop and track trends. All reports are identified on a monthly tracking report with the scheduled corrective action date. If the date for the corrective action is long-term, it is carried on the report until the action date and then tracked. However, if a significant trend is discovered over a short period of time, a "Corrective Action Report" is generated, to effect prompt corrective action.

PERFORMANCE EVALUATION SUMMARY

Construction Project
Seabrook Station

Performance Area: TEST EQUIPMENT CONTROL

Objective No. CC.7

Evaluator(s) A. Cooper (with selected team input)

I. Performance Objective

Measuring and test equipment should be controlled to support construction testing effectively.

II. Scope of Evaluation

The evaluation included a review of the UE&C construction gauge facility and program. The purpose was to verify that UE&C and contractors' measuring and test equipment is: calibrated in accordance with approved procedures; calibrated by qualified personnel; adequately documented; and issued properly.

This included interviews with the UE&C gauge facility supervision and lab personnel. Several measuring and test equipment calibration records were reviewed for frequency and adequacy. Approximately 5 manhours were expended in this evaluation.

III. Conclusion

In general, the UE&C measuring and test equipment program meets the requirements of this Performance Objective. Standards used to calibrate equipment were adequately controlled and personnel performing calibrations were suitable qualified.

One area of weakness was identified regarding control of calibration to contractor's requirements.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: TEST EQUIPMENT CONTROL — Objective No. CC.7

IV. Areas of Weakness & Corrective Action; Good Practices

Finding (CC.7-1): Measuring and test equipment is not always uniquely identified. There is no program to control or limit the use of equipment calibrated to specific contractor requirements from being used in applications requiring calibration to more stringent manufacturer specified tolerances.

Corrective Action: This problem will be investigated and appropriate action will be taken to assure that equipment calibration limitations are clearly understood by the user. This will be completed by the end of January, 1983.

PERFORMANCE EVALUATION DETAILS — Construction Project Seabrook Station

Performance Area: TEST EQUIPMENT CONTROL — Objective No. CC.7

CC.7-1 The existing program for calibration of measurement and test equipment permits contractors to specify accuracy requirements that may differ from the manufacturer's accuracy requirements, with no method of limiting the use of the device.

- Contractor's submittal forms for M & TE have a block entitled "Contractor's Accuracy Requirements". Two (2) of the contractor's procedures and UE&C procedures were reviewed, and there was no requirement to identify, on the device, that the accuracy requirements were different than those of the manufacturer, when this is the case. When accuracy requirements less stringent than those of the manufacturer's are specified for a device, then the usage should be limited to areas of work where the modified accuracy requirements are acceptable. There is no evidence that this is identified on the contractors submittal form or the calibration sticker on the instrumentation.

Other Information That Supports The Summary

1. Measurement and Test Equipment Control procedures and "gauge facility" activities were assessed in the performance of this evaluation. The gauge facility operation is presently undergoing a change in organization, whereby certain instruments and standards will be separated from construction equipment and will be controlled by a standards lab. For purposes of this evaluation, there was more concentration on the lab section that calibrates and controls construction measurement and test equipment.

2. Test equipment was checked in the field for valid calibration information and compared with the gauge facility calibration records. The examples selected had up-to-date records of calibration in the gauge facility files. If equipment is found to be out of tolerance when it is recalled to the facility for calibration, the information is furnished to the contractor for evaluation of work activities associated with the equipment and required corrective action.

Other Information That Supports The Summary

3. The test equipment examined in the field was in excellent condition and properly protected when not in use.

4. The calibration of M.&T.E. is being accomplished by written procedures generally based on manufacturer's recommended calibration instructions. The site procedures require the use of certified standards or methods in the performance of the calibrations.

5. The qualification records of the individuals involved in calibration were reviewed and appeared to be adequate.

6. A question arose regarding calibration of dynamometers used during cable pulling operations. It was established that the dynamometer vendor is not qualified to calibrate dynamometers at his local outlet. Consequently, dynamometers have to be sent away for calibration to a qualified laboratory. Dynamometers are calibrated monthly. Further inquiries regarding other equipment used for cable pulling revealed that the proper type and range of straight blocks, sheaves, and rollers were used depending on the size and type of cable being pulled.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: PROJECT PLANNING — Objective No. PS.2

Evaluator(s) W. Ramsden, W. Willoughby, C. Fonseca (with contributions from entire team members)

I. Performance Objective

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

II. Scope of Evaluation

Discussions were held with UE&C Project Management and site Planning and Scheduling (P&S) supervisors, the YAEC P&S Engineer, and the Piping Contractor's P&S supervisor. P&S documents providing policies and procedures and various project schedules were reviewed. Approximately 20 manhours were devoted to this evaluation.

III. Conclusion

In general, the Project Planning appears to be satisfactory. However, one (1) weakness was identified in that it is not apparent that design verification programs have been integrated into the overall project schedule.

IV. Areas of Weakness & Corrective Action; Good Practices

Finding (PS.2-1) While the various design verification programs (Ref. DC.4-4) will upgrade the confidence in the design and enhance the reliability of the plant, it was not apparent that the schedules developed for these programs had been integrated with the overall project schedule and the potential impact on the plant design and construction adequately assessed. Program procedures should be developed or reviewed to ensure they clearly define interface responsibilities. Present manpower allocations should be appraised consistent with cost-effective schedule requirements.

Corrective Action The project will reassess the potential impact of the various verification programs on the plant design, integrate to a greater extent their related schedules into the overall project CPM schedule, and institute appropriate action to assure effective scheduling and implementation of the programs.

PERFORMANCE EVALUATION DETAILS — Construction Project
Seabrook Station

Performance Area: PROJECT PLANNING — Objective No. PS.2

PS.2-1 Several scheduling concerns became evident relating to the implementation of the design verification programs, recognizing their scope and that some work has not yet started (see DC.4-4).

- o Reactions of cable tray, conduit, and pipe supports, whether attached to supplementary steel, building steel, or embedment plates, are not consistently being generated and/or transmitted to the structural discipline for review.

- o Lack of timely approval and a program for implementation of the design criteria for anchor bolts (Appendix F to the Structural Design Criteria (draft issue), dated 3/82). Chief Engineer's comments have not been reviewed and incorporated, although the draft is being used in design.

- o Concern for the lack of timely evaluation of ARS revisions as they relate to structural and equipment qualification reviews.

- o A concern for the manpower applied to the Failure Modes and Effects Analyses design confirmation. The scope includes a review of postulated pipe break effects, pipe whip/target effects, jet impingement analyses, and Reg. Guide 1.29 considerations.

- o UE&C's Project Manager stated that the engineering design confirmation and verification programs, except for piping related programs, are scoped out and will get underway shortly. The piping programs are waiting input feedback from the "As-Built" program, prior to initial scoping. However, according to the Project Manager, presently none of these programs are specifically incorporated into the project planning networks.

Other Information That Supports The Summary

1. The following planning & scheduling documents were reviewed with the Supervisor of P&S at UE&C's home office:

   - o CPM master schedule - latest and one year old

Other Information That Supports The Summary

- o Twelve (12) week schedule
- o Twelve (12) month schedule
- o Various schedule sorts available
- o General Administrative Procedures & Policies
- o Schedule analysis reports

These schedules and documents appear to be consistent with industry practices and provide an effective management control tool.

2. The following subjects were discussed with the UE&C Supervisor of P&S at the site:

   - o Planning organization and manpower
   - o Procedures and policies
   - o Interfaces and inputs from other P&S groups
   - o Progressing
   - o Schedule analysis

3. The project is presently re-estimating the master schedule which may impact the estimated percent completion. Current percent completion is based on an estimate and schedule prepared in 4/81.

4. The YAEC P&S engineer attends the regular weekly schedule update meetings with UE&C and provides the necessary input relative to YAEC's scope of work. YAEC monitors all of UE&C's scheduling activity and provides direction when necessary.

5. The following subjects were discussed with the Piping Contractor Planning & Scheduling Supervisor:

PERFORMANCE EVALUATION DETAILS

Construction Project
Seabrook Station

Performance Area: PROJECT PLANNING

Objective No. PS.2

Other Information That Supports The Summary

- Organization
- Number and qualification of personnel
- Procedures and guidelines
- Methods of developing Level 4 plans
- Interfaces with P.C.S. (UE&C), construction, and construction turnover
- Material shortages

The piping contractor's planning & scheduling group provides the Level 4 planning activities to UE&C to be incorporated into the master CPM and work incentive programs. This is considered to be effective.

PERFORMANCE EVALUATION SUMMARY

Construction Project
Seabrook Station

Performance Area: PROJECT CONTROL

Objective PS.3

Evaluator(s) W. Ramsden

I. Performance Objective

Project scheduling and work planning and coordination should ensure that the objectives of the project plan are met through effective and efficient use of project resources.

II. Scope of Evaluation

Project Control was evaluated by interviews with the UE&C Project Controls Group and Contractor's Planning & Scheduling Group, reviews of the schedules developed by these groups, and assessment of the effectiveness of the interface between these groups to develop consistent project work scheduling.

Approximately 10 manhours were devoted to this evaluation.

III. Conclusion

The standards of this Performance Objective are being achieved.

Performance Area: PROJECT CONTROL

Objective No. PS.3

Other Information That Supports the Summary

1. Project scheduling for manageable work units is handled by the Project Controls group of the UE&C Planning & Scheduling section. This group develops, with the appropriate contractors, the Level 4 planning effort. The Project Controls group appears to be operating satisfactorily and is adequately staffed.

   The Project Controls group provides the interface between the contractors' Level 4 schedules and the input to the UE&C construction schedules. Basically, this group monitors, updates, evaluates, and develops preventive and corrective action; plans and feeds information back to the contractors' and UE&C area superintendents. In addition, this group establishes the basis for the contractor incentive program.

2. The piping contractor's Planning & Scheduling supervisor indicated that the Level 4 planning (Project Controls) system is functioning adequately. A contractor, upon direction from the Project Controls group, initiates a detailed (Level 4) plan for a specific area/system. This plan is reviewed by the Project Controls group and adjusted, if necessary, to integrate with other contractors. A review of a submitted and later issued plan shows that any changes required to reduce impact on other trades are minimal and thus the contractor is essentially scheduling his own work.

3. Much of the scheduling is initiated after the actual work has commenced. The reason appears to be that the scheduling system has been under development and is changing frequently. The system turnover is just now being integrated into the schedules. Project Management is aware of this problem.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: PROJECT PROCUREMENT PROCESS — Objective PS.4

Evaluator(s) G. Reardon

I. Performance Objective

The project procurement process should ensure that equipment, materials, and services furnished by suppliers or contractors meet project requirements.

II. Scope of Evaluation

The project procurement process was evaluated by interviewing personnel in both the UE&C Home Office and site Purchasing Groups, and Quality Assurance and Home Office Project Engineering groups; reviewing procedures to which the work is performed, reviewing the sign-off of purchasing documents, and reviewing the process for developing list of Approved Bidders.

Approximately 20 manhours were expended for this effort and PS.5 in which Change Orders to the contracts were evaluated in a similar manner.

III. Conclusion

The standards of this Performance Objective are being achieved.

Other Information That Supports The Summary

1. There is an adequate documented program for the procurement process at the UE&C home office. This program encompasses engineering, purchasing, and quality assurance procedures which are being implemented for the preparation, review, and approval of procurement documents.

   - o Technical requirements are developed, prepared, reviewed, and approved and technical portions of the proposals are reviewed by the Project Engineering group. Procedures provide for resolution of comments on technical requirements from other engineering disciplines, Quality Assurance, and YAEC.

   - o Quality requirements are identified, prepared, reviewed, and approved and quality portions of the proposals are reviewed by the Project Quality Assurance group.

   - o Commercial and administrative requirements are developed, prepared, reviewed, and approved and these portions of the proposals are reviewed by the Project Purchasing group.

   - o Recommendations and approval of purchase awards are documented on a signed-off Bid Evaluation Sheet. All comments and questions related to the recommended proposal are resolved prior to formal purchase award.

2. There is an adequate documented program at the site for the centralized purchasings by UE&C Field Purchasing of material, supplies, services, and rentals for UE&C and all contractors with field labor contracts. The centralized field purchasing procedure which is being implemented provides for the preparation, review, and approval of procurement documents.

   - o Technical requirements are developed, prepared, reviewed, and approved by the requesting organization.

Other Information That Supports The Summary

- o Quality requirements are identified, prepared, reviewed, and approved and the proposals for safety-related items are reviewed by the requestor's QA organization. UE&C site QA provides additional review.

- o Commercial and administrative requirements are provided by the UE&C Field Purchasing group.

- o Recommendations and approval of purchase awards are documented on a signed-off Bid Evaluation Sheet.

3. Approved bidders lists are reviewed by UE&C home office QA group and for field purchases by UE&C field QA and requestor's QA organizations. Procedures are provided to insure inquiries are issued only to bidders on the approved list or those who are capable of being approved by a QA facility survey. This procedure is satisfactory.

4. Satisfactory verification of field purchase approval signatures is provided by a signature and initials book maintained by UE&C Field Purchasing of all persons authorized to approve procurement documents.

5. Historical vendor performance evaluations are based on experience of procurement personnel and QA files. This is a satisfactory method.

6. Section IV in UE&C's Manual of Procedures, Revision 8/29/75, Purchasing Seabrook Project, does not specifically identify the actual requirements for QA review of bidders lists and purchase recommendations, although a general reference to procedures for "N" and "S" transactions is made. This is considered minimally adequate for an overview procedure.

PERFORMANCE EVALUATION SUMMARY

Construction Project
Seabrook Station

Performance Area: CONTRACT ADMINISTRATION

Objective PS.5

Evaluator(s) G. Reardon

I. Performance Objective

Methods for administering and controlling contractors and suppliers and for managing changes to their contracts should ensure effective control of performance.

II. Scope of Evaluation

Refer to PS.4.

III. Conclusion

The standards of this Performance Objective are being achieved.

PERFORMANCE EVALUATION DETAILS

Construction Project
Seabrook Station

Performance Area: CONTRACT ADMINISTRATION

Objective No. PS.5

Other Information That Supports The Summary

1. In general, contracts involving field labor are administered by a Contract Administration group located at the site. Purchase orders involving only materials are administered by the Buyers in the UE&C home office purchasing group. All written Change Orders are issued by UE&C home office purchasing.

2. Review of change order procedures and change orders for selected purchase orders and contracts showed that the following criteria are being met:

   - o Change preparation, review, and approval is in compliance with procedures and consistent with the original requirements.
   - o Justification is provided for the changes which consider quality, safety, cost and schedules as appropriate.
   - o Verbal changes are confirmed in writing.
   - o Change orders are supported by approved requisitions and bid sheets, which provide approval by appropriate levels of management and provide the information above.

3. A program is in place, at the site, which effectively monitors contractor performance.

4. Programs for initial contractor interviews and briefings, and for the close out of site contractors, are in place. These programs appear to be adequate for these site/contractor interfaces.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: DOCUMENTATION MANAGEMENT — Objective No. PS.6

Evaluator(s) W. Willoughby, R. McMellon, & C. Ashton

I. 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.

II. Scope of Evaluation

Control of engineering documents related to preparation, document control center processing of documents, change control, distribution, and records management both at the site and the UE&C home office were evaluated. The UE&C project groups evaluated were Home Office Project Engineering, Site Support Engineering, Project Purchasing, and Document Control Center; Site Engineering, Site Change Coordinator, Field Purchasing, and Document Control Center. Contractors' site groups evaluated were the electrical and piping contractors' engineering, document control center and document distribution, and the HVAC contractor's Non-Conformance Report records. Discussions were held with supervisory and working level personnel of these groups. Document records were examined and document handling was witnessed. Approximately 75 manhours were devoted to this evaluation.

III. Conclusion

In general, the documentation management is satisfactory. However, there were a number of weaknesses identified that indicated a need to strengthen contractor programs and update UE&C document status logs.

IV. Areas of Weakness & Corrective Action; Good Practices

Finding (PS.6-1) The latest revision of project documents is not always incorporated into the Piping Contractor's installation drawings available in the work area. For example, it was found that pipe support drawings available for issue by the rod room are an earlier revision than the revision in the DCC. Also, programs to assure the inclusion of the latest design requirements in installation drawings should be strengthened.

Corrective Action All ECA's are transmitted by the Contractor to the applicable Field Engineer within one to two days from time of receipt and controlled according to Project Procedures. The Field Engineer is, therefore, made aware of pending changes. However, due to the large number of backlogged ECA's, a problem does exist in the timely incorporation of these changes to installation aid drawings. This situation was known and addressed prior to receipt of this Finding.

A corrective action program has been implemented which includes a reassessment of all work priorities and increased engineering and drafting personnel to assure the incorporation of ECA's in accordance with those priorities. Work will be continued only after full assurance that applicable ECA's are included on construction aides used in the Field.

Finding (PS.6-2) The records management system does not always identify the current status of project documents. Several cases were discovered where the Drawing Task System (DTS) and the Engineering Purchasing Schedule did not identify the latest drawings and specifications in the DCC.

Corrective Action Training sessions will be held to reinforce the proper method and importance of identifying the current document revisions in the Engineering Purchasing Schedule and the Drawing Task System.

IV. Areas of Weakness & Corrective Action; Good Practices

Corrective Action

The depth of the training session will extend through all parties and organizations necessary to arrive at a thorough understanding of responsibilities. Project Procedures will be reviewed and revised as necessary.

Scheduled internal audits will be conducted to assure that document revisions are incorporated into the Engineering Purchasing Schedule (status log for specifications) and into the Drawing Task System (status log for specifications/drawings) in a timely manner. Management follow-up will be maintained to assure prompt corrective action is taken whenever necessary.

The training sessions will be initiated in December, 1982 and the internal audits in January, 1983.

Finding (PS.6-3)

HVAC Contractor accountability of NCR's has a weakness. A situation was discovered where the HVAC contractor transmitted Non-Conformance Reports to YAEC for microfilming without maintaining a log to track document status.

Corrective Action

To avoid recurrence of non-documented NCR transmittal to YAEC's Document Control Center, the Contractor's QA records clerk will retain a copy of package contents in a working file, pending return receipt indicating YAEC DCC verification. Contractor Procedure QP-10 will be revised accordingly.

PS.6-1 A. The program used by the piping contractor to control the transfer of UE&C design drawing information and changes/revisions, to UE&C drawings, to the contractor's installation drawings does not provide an adequate cross-check between contractor's installation drawings (construction aides) and UE&C drawing revisions or ECA's. There is no convenient and timely method to determine which revisions or ECA's affect a contractor's drawing until the prioritized design change is formally addressed. It is not possible to determine what outstanding ECA's exist against a particular contractor drawing used for installation until the change is incorporated.

B. Pipe hanger/support installation drawings marked approved for construction (erection) at several Piping Contractor locations were checked against the appropriate UE&C design drawing revisions. The following cases were noted where the contractor's drawings did not include the latest revision of the UE&C design drawing.

- Seawall Rod Room - 2 discrepancies for 2 drawing sheets checked:

  M-800044S, Sheet 13
  M-800158S, Sheet 19

- Central Rod Room - 1 discrepancy for 5 drawing sheets checked:

  M-801818S, Sheet 3

- PAB Tank Farm Rod Room - 2 discrepancies for 5 drawing sheets checked:

  M-800838S, Sheet 8
  M-801806S, Sheet 3

- Stick files with the piping hanger/support installation drawing group - 3 discrepancies for 8 drawing sheets checked:

  M-800202S, Sheet 9
  M-800217S, Sheet 4
  M-800219S, Sheet 3

PS.6-2 The document status logs do not adequately reflect the issued document status. There does not appear to be a formal system to assure that a document revision, when issued by UE&C home office, has that revision incorporated into the status logs. Documents in the files at the UE&C site DCC were compared with their respective status logs.

- Specifications were compared with the E-P Schedule dated 9/24/82. Twelve (12) specifications were checked and three (3) discrepancies (25%) were found:

Specification	Site DCC File	E-P Schedule
(1) 5-11	Rev. 2, 06/30/82	Rev. 1, 03/21/79
(2) 18- 2	Rev. 4, 09/24/82 & Rev. 3, 02/21/82	Rev. 3, 04/07/82
(3) 33- 5	Rev. 0, 01/05/82	Rev. 2, 08/28/81

- UE&C drawings were compared with the DTS dated 10/08/82. Thirty-seven (37) drawings were checked and four (4) discrepancies (11%) were found:

Drawing	Site DCC File	DTS
(1) 104076	Rev. 14, 08/31/82	Rev. 12, 05/26/81
(2) 222443	Rev. 3, 06/29/82	Rev. 2, 02/08/82
(3) 301252	Rev. 11, 09/22/82	Rev. 10, 07/27/82
(4) 309721, Sheet 1	Rev. 3, 01/18/82	Rev. 2, 05/16/79

- Although the DTS was dated 10/08/82, it reflected the drawing revision status of 09/24/82. The actual revision status date was not shown on the DTS sheets.

PS.6-2 o Four (4) foreign prints were checked against the foreign print log and no discrepancies were found.

o The responsible discipline engineers are responsible for providing a monthly status update for the E-P schedule and DTS. The engineer is required to provide a marked-up status output/input sheet for DTS showing changes during the month. The engineer is requested to provide a marked-up E-P schedule, monthly, showing changes during the month. There appears to be no formal programmatic check of the engineer's status input to assure the accuracy of the various status logs.

PS.6-3 Non-Conformance Reports are not always properly controlled and transmitted by the HVAC contractor to YAEC.

o Approximately fifty (50) completed Non-Conformance Reports (NCR's) were reviewed at the HVAC Contractor's site office. Approximately ten (10) out of fifty (50) NCR's listed in the index were not on file. According to the contractor's quality control supervisor, the completed NCR's had been delivered to YAEC for microfilming and incorporation into permanent plant records. There was no record to document this transmittal in the contractor's office. The quality control supervisor indicated that YAEC sends an acknowledgement of NCR transmittals back to the contractor, but it usually takes two (2) days for receipt by the contractor. Additional copies of these NCR's were not available. The possibility exists that NCR's could be lost and not be traceable. This item was subsequently reviewed and confirmed with the YAEC Quality Assurance Manager.

Other Information That Supports The Summary

1. The UE&C Document Control Centers (DCC), both in the home office and in the field, provide adequate controls for the receipt, logging, limited distribution, and storage of the following project documents:

Other Information That Supports The Summary

- o correspondence
- o design drawings
- o specifications
- o system descriptions
- o vendor drawings/manuals
- o project manuals and procedures

2. The responsibility for maintenance and storage of the UE&C official master copies of documents is satisfactorily identified and understood. The UE&C DCC satisfactorily provides for storage in lockable containers and for limited access to these files.

3. UE&C has established procedures for changes to project documents (AP-15 & AP-46). These procedures provide for appropriate levels of review and approval, to assure that changes are reviewed and approved in a manner consistant with the original design. In general, change documents are adequately prepared, reviewed, approved, logged, and monitored. However, based on review of project tracking logs, the following weaknesses were noted:

   - o Review of the disposition time for fifty-four (54) ECA's showed approximately 50% took longer to resolve than the indicated resolution needed date. The average excess time was ten (10) days, as determined by a sample of twenty (20) which had been resolved.

   - o An SSE group status report showed that approximately 50% of the ECA's which required SSE concurrence review had been issued "Approved for Construction" by the Site Engineering group, for greater than 30 days. The SCC logs showed very few forecast dates, as required by AP-15, for concurrence review ECA's older than 30 days.

   - o There was no tracking system to flag concurrence review ECA's older than 30 days, either in UE&C's home office or in the field. The need was recognized and systems were being developed.

   (The above concerns are discussed in Finding DC.5-1).

Other Information That Supports The Summary

4. There is a large backlog of UE&C documents which must be revised to incorporate approved changes from ECA's. Since July, 1982, significant progress has been made by the UE&C in the reduction of this backlog.

5. Problems with the piping contractor's document control are discussed in Findings CC.4-1 & PS.6-1. However, the electrical contractor has an adequate system for receipt, change incorporation, and distribution to the work site of UE&C design drawings and the system is being satisfactorily implemented.

6. UE&C document status logs for project correspondence, controlled manuals, and vendor drawings/manuals which were reviewed showed satisfactory updating of these logs to reflect the latest information for these documents.

7. The records management plan and schedule, as delineated in AP-2 and Project QAP-17, appears to be a program which is the minimum to meet the regulatory requirements.

8. The UE&C procedure for handling vendor prints/manuals from field purchases (AP-14) does not reflect present UE&C site organization procedures or method of handling these documents.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: TRAINING MANAGEMENT SUPPORT — Objective TN.1

Evaluator(s) G. Reardon

I. Performance Objective

Management should ensure that an effective program exists for indoctrination, training, and qualification of personnel involved in the project.

II. Scope of Evaluluation

The Training Program was evaluated by reviewing the programs at UE&C (Home Office and Site), PSNH/YAEC, and the Contractors. Specific responsibility for administration of the program was assured and the adequate implementation of the program was substantiated. Qualification of instructors was reviewed, along with the available facilities and training material. A walk-thru was made of the site training facilities.

Approximately 15 manhours were devoted to the effort for TN.1, TN.2, & TN.4.

III. Conclusion

The standards of this Performance Objective are being achieved.

PERFORMANCE EVALUATION DETAILS — Construction Project Seabrook Station

Performance Area: TRAINING MANAGEMENT SUPPORT — Objective No. TN.1

Other Information That Supports the Summary

1. The following Training Programs were evaluated:

   - o UE&C (Home Office)
   - o UE&C (Site)
   - o PSNH/YAEC (Site)
   - o YAEC (Home Office)
   - o Piping Contractor (Site)
   - o Union-Operated Welding School (Off-Site)

   All of the above programs had the support of Management.

2. The UE&C home office had management support, although the program was somewhat fragmented. Each department kept their own training records and, except for QA (see QP.1-4), had provided the minimum training in basic QA within the prescribed time frame.

3. Training programs at the site for non-nuclear safety aspects are the responsibility of PSNH/YAEC, in collaboration with UE&C. The minimum required programs covered site indoctrination, industrial safety, and basic QA requirements. All personnel working on site were required to attend these training sessions prior to the start of work. In addition, PSNH/YAEC provided all the training facilities and equipment. Management support is evidenced by the fact that 59,000 manhours were expended on training.

4. The off-site welder training school is sponsored by the United Associated National Contractors Association. PSNH management supports this activity by providing the welding equipment, consumables, and testing personnel.

5. Training of project and support engineers at the YAEC home office is provided in accordance with their procedures. It is the responsibility of the Project Manager to assure that training is provided for project personnel and of the department manager to provide training for support personnel. Approximately one (1) full week of training is initially provided to all the engineering personnel.

PERFORMANCE EVALUATION DETAILS

Construction Project
Seabrook Station

Performance Area: TRAINING MANAGEMENT SUPPORT

Objective No. TN.1

Other Information That Supports the Summary

6. Training of contractor personnel at the site is the responsibility of the contractors. Subjects included in their training programs are for the enhancement of skilled performance. Major contractors have provided full-time qualified instructors.

PERFORMANCE EVALUATION SUMMARY

Construction Project
Seabrook Station

Performance Area: TRAINING ORGANIZATION & ADMINISTRATION

Objective TN.2

Evaluator(s) G. Rearoon

I. Performance Objective

The training organization and administration should ensure effective control and implementation of training activities.

II. Scope of Evaluation

The training Program was evaluated by reviewing the programs at UE&C (Home Office & Site), PSNH/YAEC, and the Contractors. Specific responsibility for administration of the program was assured and the adequate implementation of the program was substantiated. Qualification of instructors was reviewed along with the available facilities and training material. A walk-thru was made of the site training facilities.

III. Conclusion

The standards of this Performance Objective are being achieved.

PERFORMANCE EVALUATION DETAILS — Construction Project Seabrook Station

Performance Area: TRAINING ORGANIZATION & ADMINISTRATION — Objective No. TN.2

Other Information That Supports The Summary

1. The administration of training programs at the job site is the responsibility of PSNH. The implementation of the training programs is carried out jointly by PSNH and the contractors organizations. Effective control of the training is maintained by the PSNH Training Administrator, as follows:

   - The training manual defines the organization goals, objectives, and qualifications for instructors. Discussions with the Training Administrator substantiated the implementation of the manual requirements.

   - PSNH and contractor procedures require instructors to have a minimum of 1-1/2 years as a practicing teacher plus graduation from a qualified college of teaching. Working experience in the crafts is desired. All the instructor's records reviewed showed compliance with the minimum qualifications.

   - The Training Administrator adequately provides for instruction and testing of instructors. Instructors must pass the test in accordance with the training manual requirements.

   - The Training Administrator has an acceptable formal program to evaluate instructors and their effectiveness.

2. The UE&C home office effectively controls the training program for project personnel through the designated Training Administrator, who is also the Assistant Project Engineering Manager. The following items were reviewed with him:

   - Management support of training
   - Facilities
   - Training schedules
   - Attendance
   - Course content for mandatory training

   This is consistent with the requirements of QA.2-2 and ASME III.

Performance Area: TRAINING ORGANIZATION & ADMINISTRATION

Objective No. TN.2

Other Information That Supports The Summary

3. The YAEC training organization and administration was reviewed and found to be adequate. This is evidenced by their implementation of the Corporate Training Manual.

   Although the project team at YAEC is small and does not have a full-time dedicated training organization, the program is effectively implemented. The Project Manager has clearly delegated responsibility for training to the Project Administrator and maintains authority to assure implementation.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: GENERAL TRAINING & QUALIFICATION — Objective No. TN.3

Evaluator(s) W. Ramsden, G. Reardon, & A. Cooper (with contributions from rest of the team members)

I. 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.

II. Scope of Evaluation

Discussions were held with UE&C, YAEC, and Contractor personnel responsible for training, and their training records were reviewed. A site training session was observed. Engineering, design, quality assurance, and craft personnel were interviewed. Approximately 15 manhours were devoted to this evaluation.

III. Conclusion

In general, the training and qualifications of project personnel are satisfactory. However, there were three (3) areas of weakness related to job specific training and training of Calibration Lab personnel necessary to ensure their ability to perform effectively.

IV. Areas of Weakness & Corrective Action; Good Practices

Finding (TN.3-1) The piping installation contractor supervisors are not utilizing the available non-mandatory training programs to maintain the employee's ability to perform consistently and effectively and, in some cases, were not aware of their responsibility to schedule such training. This is supported by the small numbers of craft personnel who have attended the non-mandatory sessions contrasted with the performance concerns detailed under other Performance Objectives.

Corrective Action An investigation will be conducted of the training records to determine the extent to which available, non-mandatory training programs are being used to upgrade job skills and productivity. Weaknesses will be corrected with increased training, where appropriate. Supervisors will be directed to participate and become actively involved in the selection of personnel who require additional training.

Finding (TN.3-2) In all cases, both on the job and formal training is not adequate to maintain the employee's ability to perform consistently and effectively. An instance was found where calibration lab personnel did not receive adequate training in QA/QC requirements related to measurement and test equipment.

Corrective Action The Gauge Facility personnel attended training sessions on QA procedure for calibration and control of measurement and test equipment on November 16 & 17, 1982 and the training records will become part of their personnel file. The training sessions will be scheduled on an on-going basis for proper instruction of appropriate procedures and manuals.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: GENERAL TRAINING & QUALIFICATION — Objective No. TN.3

IV. Areas of Weakness & Corrective Action; Good Practices

Finding (TN.3-3): The General Training Program at UE&C's office is in compliance with corporate commitments and procedures. However, the job specific training program, structured to provide the employees with indoctrination and training appropriate to their designated responsibilities, could be strengthened.

Corrective Action: The project training program for 1983 will be structured to address the areas listed in this item. Attendance will be monitored and make-up sessions scheduled to assure attendance. The program for 1983 is scheduled to be issued by December 30, 1982.

TN.3-1 The piping installation contractor's first line supervisors were not always aware of their responsibility to schedule appropriate non-mandatory training for assigned craft personnel.

- Site Indoctrination, QA Program, and Industrial Safety training is provided to all craft personnel on their first day of employment, on a mandatory basis.

- Craft training specific to "on the job" operations, is not consistently applied by the area foreman. This statement is substantiated by a comment of the supervisor that he relies upon the QC Inspector to identify the personnel who need specific training.

- The Contractor QAM requires that every new hire attend a Quality Assurance Indoctrination (Course 001). A review of the training record for eight (8) pipe support installation personnel working in the PAB showed that they all have attended 001 and also 002 (Welder QA Indoctrination), 005 (Safety Indoctrination), and 101 (Basic Rigging). However, job specific training courses such as 201 (Weld Symbols) and 203 (Hanger Tolerance) were attended by only one (1) out of the eight (8) personnel training records reviewed. The majority of the eight (8) had less than six (6) months on the job.

- The job supervisor is responsible for providing training for craft personnel, as he deems necessary, beyond the QAM requirement. However, the supervisor does not maintain a plan, schedule, or record for craft training. This situation leads to corrective training rather than preventive training.

- The relatively new craft personnel interviewed had previous work experience in their discipline area (i.e., welders or fitters), but admitted that nuclear work requirements were new to them. The nuclear aspects of the job are learned on-the-job.

TN.3-2 The training records of the individuals assigned to the Gauge Facility (Calibration Lab), did not show evidence of training in the UE&C corporate, project, and ASME QA manuals. Sections of these manuals describe calibration and control of measurement and test equipment.

In the review of the records of the above individuals, it was noted that the QA manuals were on the required reading list. Reading of manuals is satisfactory for general information, but does not assure that the individuals have the proper understanding of the program requirements.

TN.3-3 Only two (2) Quality Assurance training sessions are mandatory for engineering and design personnel. Other training sessions covering UE&C working procedures, such as Specification Development, Performance of Calculations, etc., are offered based on identified need or problem areas. Based upon the discussions held with various engineering and design personnel, and the findings reported under DC.3, additional formal training, at UE&C's Headquarters Office, should be conducted in the following areas:

- o Project specific Administrative Procedures
- o UE&C General Procedures
- o UE&C Detailed Design Procedures

Other Information That Supports The Summary

1. The training programs, as implemented at the job site, meet the mandatory requirements set forth by the PSNH Training Program. A review of training records indicates tht all craft personnel have received the minimum site indoctrination courses. Additional contractor training of craft personnel varies somewhat with each contractor. Generally, the craft personnel are qualified in their trade prior to being hired.

Other Information That Supports The Summary

2. The following items were discussed with the Piping Contractor training instructor:

   - o Qualification
   - o Instructions provided by Contractor
   - o Attendance

   The instructor was well qualified. He was a former teacher and had also worked in the trades at the Seabrook site. The program includes mandatory training in site/company indoctrination and the QA programs. Additional training is provided in Hilti bolt installation, rigging practices, weld symbols, plan reading, NCR's, material identification, and other work-related operations. The non-mandatory training of workers is initiated upon request of the craft supervisor. Additional discussion regarding problems with the implementation of the non-mandatory program is included in Finding TN.3-1.

3. The field fabricated tank installer has hired welders who have proven their ability on other projects. The welders who are hired locally are extensively tested on production welds prior to being issued qualification certifications. Work assignments are tailored to best utilize the welder's ability.

4. Implementation of the training program at the UE&C home office is carried out by the designated Training Administrator for engineering and purchasing, and by the QA Indoctrination and Training Coordinator for the QA Department (see Finding QP.1-4). A review of the engineering training records indicated that all project engineering personnel received the minimum required training. No log/list of purchasing personnel training is maintained, but rather the attendance sign-in sheet at the training session serves as the training record.

Other Information That Supports The Summary

5. The UE&C home office HVAC Supervising Engineer was interviewed regarding training. He indicated that there was a need for formal training programs for administrative procedures (such as the UE&C General Engineering and Design Procedures - GEDP's). It was his opinion that adequate formal company programs do not exist for indoctrination training or continued training of employees to ensure familiarity with engineering and design practices (see Finding TN.3-3).

6. A review of the training records at the YAEC home office indicates that the training program is being adequately implemented.

   - A review of the project records, kept by the Project Administrator, indicated that all personnel had the required training and, in most cases, had received many additional courses to enhance their job skills.

   - Review of the off-project support personnel training files confirmed that all personnel had received the required Seabrook Project Training, even when they were not assigned work on the project.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: TRAINING FACILITIES, EQUIPMENT, & MATERIAL — Objective TN.4

Evaluator(s) G. Reardon, W. Ramsden

I. Performance Objective

The training facilities, equipment, and material should support and enhance training activities.

II. Scope of Evaluation

The training Program was evaluated by reviewing the programs at UE&C (Home Office & Site), PSNH/YAEC, and the Contractors. Specific responsibility for administration of the program was assured and the adequate implementation of the program was substantiated. Qualification of instructors was reviewed along with the available facilities and training material. A walk-thru was made of the site training facilities.

III. Conclusion

The standards of this Performance Objective are being achieved.

PERFORMANCE EVALUATION DETAILS — Construction Project Seabrook Station

Performance Area: TRAINING FACILITIES, EQUIPMENT, & MATERIAL — Objective No. TN.4

Other Information That Supports The Summary

1. A tour of the site training facilities was conducted and found to be adequately equipped and well supplied with training materials. The adequacy of the Site training facilities is evidenced by the following:

   - o Six (6) dedicated class rooms were available and a review of the training schedule indicated that spare facilities exist.
   - o The equipment available for use included overhead projectors, video cameras and screens, black/white boards, desks and chairs.
   - o An adequate supply of paper, manuals, and reference materials was available.

2. Dedicated facilities at UE&C and YAEC were not available, however, the use of existing conference rooms provided adequate classroom space. Overhead projectors, screens, and video equipment was made available, when necessary. Proper scheduling of conference rooms minimized any disruption of scheduled classes.

PERFORMANCE EVALUATION SUMMARY

Construction Project
Seabrook Station

Performance Area: QUALITY PROGRAMS

Objective No. QP.1

Evaluator(s) A. Colello, A. Cooper, C. Ashton, R. McMellon

I. Performance Objective

The quality assurance program scope, content, and applicability should be appropriate, defined clearly, and understood.

II. Scope of Evaluation

The evaluation included a review of the overall Owner's Agent, A/E, and various Contractors' Quality Assurance Programs. The purpose was to verify the adequacy of these QA Programs through: compliance with Regulatory Guide/ANSI commitments; review of necessary program elements; observation and verification of day-to-day QA/QC activities; relationship between manuals and procedures; review of audit and surveillance programs; effectiveness of stop work authority; and implementation of a QA indoctrination and training program.

This included interviews with corporate and site managers, supervisors, and both QA and non QA personnel. Observations of QA/QC activities and verification of quality related documents were utilized to determine the adequacy of the overall QA Program. Approximately 60 manhours were devoted to the effort for QP-1 thru QP-4.

III. Conclusion

In general, the overall Quality Program meets the requirements of this performance objective. Quality documentation reviewed contained adequate detail, and audit/surveillance personnel were suitably qualified to procedures and standards.

However, several weaknesses were identified that indicated a need to strengthen certain aspects of this activity. These relate to contractors' handling of NCR's, incorporation of A/E QA documents in a contract, the Owner's Agent QA Manual, Regulation Guide references, A/E QA training, and A/E QA review of ASME III drawings.

IV. Areas of Weakness & Corrective Action; Good Practices

Finding (QP.1-1) The contractor's procedures relating to Non-Conformance Reports (NCR's) do not define the authority of organizations to void NCR's. In several instances, contractors were unilaterally voiding NCR's without specified authority.

Corrective Action Engineering Change Authorization #100105A has been issued to change the Site Contractors' QA Program for non-conformances. The applicable paragraphs of UE&C Standard Documents QAS-1, QAS-3, and QAS-5 shall state, "Non-Conformance Procedures shall include provisions and authority for voiding Non-Conformance Reports". However, the reason shall be clearly documented on the Non-Conformance Report.

Finding (QP.1-2) The changes to QA requirements are not always imposed on contractors in a timely manner. An example is that the piping installation contractor is working to an outdated revision of UE&C Specification QAS-1.

Corrective Action The Site Contractors have been issued the latest revision of the applicable standard documents such as QAS-1. However, the Purchase Orders have not been changed to show these latest revisions. Change Orders to all Site Contractors are being developed to show the latest revisions and make them part of the contract. Change Orders will be issued for each new revision of the standard documents.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: QUALITY PROGRAMS — Objective No. QP.1

IV. Areas of Weakness & Corrective Action; Good Practices

Finding (QP.1-3) — The YAEC Seabrook QA Manual does not include all requirements in the SAR. For example, the Manual's reference to applicable Regulatory Guides does not include all Regulatory Guides listed in the SAR.

Corrective Action — Table 1.1-3 of the YAEC Seabrook QA Manual lists quality related Regulatory Guides applicable to the Seabrook Project. A Manual Procedure Change is being prepared to update the table to the Regulatory Guide revisions and dates, to conform to those listed in Section 1.8 of the FSAR. This Procedure Change is to be implemented by the end of December, 1982.

Finding (QP.1-4) — There are weaknesses in the UE&C Corporate QA training program schedule implementation. The training sessions are not being provided in a timely manner, as evidenced by training sessions which were scheduled but did not take place.

Corrective Action — The R & QA Training Schedule is being revised. Necessary make-up sessions will be conducted and attendance monitored. The next session is scheduled for November 23, 1982.

Finding (QP.1-5) — Procedures related to the UE&C QA Engineer's review of ASME III Drawings are not in sufficient detail to assure than an adequate review is performed. This is supported by the lack of instructions and/or checklists in the procedures.

Corrective Action — The typical R & QA checklist for review of UE&C Drawings for ASME Section III will be included in the Project QA Procedure QA-3. Advanced Change Notice #83 has been issued.

PERFORMANCE EVALUATION DETAILS — Construction Project Seabrook Station

Performance Area: QUALITY PROGRAMS — Objective No. QP.1

QP.1-1 Various contractor's quality programs should be improved to ensure proper identification, resolution, and disposition of non-conforming conditions. Voiding of NCR's is not presently permitted by the contractor's or UE&C's procedures, however instances were noted where this was being done.

- Fifty (50) Non-Conformance Reports (NCR's) were reviewed at the HVAC Contractor's quality control office. Approximately four (4) out of fifty (50) NCR's were marked void and noted as resolved, referencing contractor Request For Information (RFI) or Engineering Change Authorization (ECA). This process of voiding NCR's is not addressed in the contractor's or UE&C's procedures. The 4 NCR's in question dealt with violation of a 1-1/2" clearance requirement for seismic HVAC ductwork stated in UE&C's Specification #9763.006-45-15. The specification was subsequently revised to relax the clearance requirement. The NCR was voided. The procedure requires that the NCR be dispositioned. The procedure would have been satisfied if the NCR were dispositioned in accordance with the revised specification.

- The Piping Installation Contractor personnel are not following the approved procedure for handling of Non-Conformance Reports. NCR's are being "VOIDED" and procedures do not address authorization to "VOID" NCR's.

  - Reviewed NCR log from January 4, 1982 thru October 27, 1982 (NCR #1821 thru NCR #3714).

  - 157 NCR's (8%) have been "VOIDED".

  - The contractor's procedure has no authorization for "VOIDING" of NCR's (XV-2, Rev. 13).

PERFORMANCE EVALUATION DETAILS — Construction Project
Seabrook Station

Performance Area: QUALITY PROGRAMS — Objective No. QP.1

QP.1-2 The system for ensuring all contractors will comply with the latest Regulatory Guides and standards was found to be ineffective at times, as evidenced by the following example.

- o In trying to verify that the Piping Installation Contractor was committed to ANSI N45.2.6-1978, it became apparent, during conversations with various QA/QC personnel, that the 1973 version was being used.
- o The same observation can be made for other recent standard updates (see changes in S.A.R., February, 1982).
- o No change in purchase order has been issued by UE&C concerning this item. A revision was made to UE&C's specification QAS-1, however it was not incorporated into the contractor's contract.
- o In general, the adequacy and timeliness of this system is weak.

QP.1-3 Several quality-related Regulatory Guides/ANSI Standards referenced in the Seabrook S.A.R. are not adequately reflected in the YAEC Seabrook QA manual and contractor's QA procedures.

- o Regulatory Guides 1.58, Rev. 1, 1.144, Rev. 1, and 1.146, Rev. 0 are not listed in the Seabrook QA Manual (Table 1.1-3). In addition, the requirements of these Regulatory Guides are not included in the appropriate manual sections.

QP.1-4 The Corporate UE&C QA training schedule for 1982 is behind by three (3) sessions. The Indoctrination & Training Coordinator may not have adequate time allocated to perform this function.

- o The 1982 QA training schedule listed three (3) sessions that have not been performed.
- o No change in the schedule was issued.
- o The Coordinator could not produce a list of QA personnel who have attended the mandatory QA Indoctrination Program. No such list or matrix exists at the present time.

QP.1-4 o A possible reason the Coordinator has not kept up to date is that he is committed to other important project assignments.

QP.1-5 There were insufficient instructions/checklists in the procedures to perform reviews of ASME III drawings and specifications by the UE&C Quality Assurance Engineer (QAE).

- o Procedure QA-3, Revision 10, 12/17/77, Paragraph IV.E.3.d. delineates the instructions for the QAE drawing review. It does not provide adequate detail to perform this review. The completeness of the drawing review is dependent on the individual's experience and knowledge of the necessary review items. A prescribed checklist would provide uniformity of reviews and identity of problem areas generally found in the drawing reviews.

- o Procedure QA-3, Revision 9, 8/16/76, Paragraph E.2.e.4 delineates the instructions for the QAE specification review. It does not provide adequate detail to perform this review. The completeness of the specification review is dependent on the individual's experience and knowledge of the necessary review items. A prescribed checklist would provide uniformity of review and identity of problem areas generally found in the specification reviews.

Other Information That Supports The Summary

1. All QA/QC programs included the appropriate program elements. Procedures are written for items such as audits, inspections, surveillances, non-conformances, corrective action systems, management assessments, and training.

2. Personnel throughout the system were asked about the procedures that govern their job. In general, personnel were able to identify the procedures that apply to their work function. QA personnel were able to describe the hierarchy of QA documents.

Other Information That Supports The Summary

3. QA/QC personnel continually monitor contractor workmanship. Surveillance programs by YAEC & UE&C were observed and found to meet procedural requirements. Problems were identified and corrected through this system. Personnel performing surveillances, for the most part, are well qualified. The surveillance schedules are being met and are modified when work or problems indicate an increase in surveillance activity is necessary (one finding concerning surveillances was identified in QP.1-2).

4. Daily activities were discussed with QA/QC personnel. Items discussed included procedure reviews, specification reviews, drawing reviews, non-conformance processing, surveillances, audits, and inspections. Most personnel had a clear understanding of what was required of them both from a management standpoint as well as a procedural standpoint.

5. The QA classification of systems, structures, and components was discussed with personnel from various departments. Even though the system for classification appears complex, personnel were able to understand the methods of classification.

6. The audit system was reviewed for completeness and effectiveness. Audit reports contained good detail and identified problem areas. Audit schedules are being met and are sufficient to cover the appropriate program elements. Lead auditors are adequately trained and certified to conduct audits.

7. Indoctrination in the QA program was conducted by all evaluated organizations. The indoctrination program provides an understanding of quality requirements.

8. Stop work authority was examined with various QA personnel. All people interviewed understood how a stop work order operates. Several stop work orders have been written. In most cases, YAEC and UE&C try to get the contractors to initiate the stop work order. No problems were identified in this area.

PERFORMANCE EVALUATION SUMMARY

Construction Project
Seabrook Station

Performance Area: PROGRAM IMPLEMENTATION

Objective No. QP.2

Evaluator(s) A. Colello, A. Cooper

I. Performance Objective

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

II. Scope of Evaluation

This evaluation examined the implementation of the overall Owner's Agent, A/E, and various Contractors' Quality Assurance Programs. The purpose was to verify the implementation of the QA Programs through: a review of QA/QC interfaces with project personnel; an examination of QA/QC organizational "independence" and freedom from harrassment and intimidation; and a review of Contractors' QA Program for adequate implementation.

This included interviews with corporate and site managers, supervisors, and both QA and non QA personnel. Numerous quality documents were reviewed in the performance of this evaluation.

III. Conclusion

In general, the implementation of the QA Programs is satisfactory. The QA Programs adequately defined the independence of QA/QC personnel. QA/QC personnel had sufficient interfaces established and were free from harrassment and intimidation. One Good Practice related to A/E Vendor Surveillance and a weakness related to Owner's Agent Surveillance was identified for this performance objective.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: PROGRAM IMPLEMENTATION — Objective No. QP.2

IV. Areas of Weakness & Corrective Action; Good Practices

Finding (QP.2-1) — The following Good Practice was noted. The UE&C Home Office Vendor Surveillance group supervisor effectively coordinates with the Vendor Surveillance Representatives. This was evidenced by the use of "Vendor Surveillance Directives" to the Representatives.

Finding (QP.2-2) — The Second and Third Level surveillance process does not always assure that requirements of the project are satisfied. This is evidenced by numerous concerns with the Piping Contractor which were not corrected as a result of the Surveillance Program.

Corrective Action — The second and third level surveillance program has been effective in identifying the concerns related to the Piping Contractor. The finding may be indicative that positive corrective actions have not been implemented in a timely fashion to correct identified or potential deficient conditions. In this vain, management action has been taken to strengthen the project corrective action programs as evidenced by the response to QA.3-1 and the following management actions:

a. A program for escalation of corrective action reporting to executive levels of contractor management via an Immediate Action Request (similar to NRC Immediate Action Letters).

b. Management directives to construction management personnel reiterating the roles, duties, and responsibilities of those parties responsible for the direction of construction activities.

IV. Areas of Weakness & Corrective Action; Good Practices

Corrective Action

c. Implementation of single project installation and inspection procedures to be utilized by all contractors, i.e., Hilti Bolt installation.

d. Directives to surveillance and audit personnel to remain cognizant of untimely or ineffective remedial actions and report same to higher levels of management for action.

PERFORMANCE EVALUATION DETAILS — Construction Project Seabrook Station

Performance Area: PROGRAM IMPLEMENTATION — Objective No. QP.2

QP.2-1 The UE&C QA Vendor Surveillance section has developed "Vendor Surveillance Directives".

- The purpose of these directives is to inform vendor surveillance representatives of changes in code requirements/interpretations, recent problem areas, or changes in the way surveillances are conducted.
- Each vendor surveillance representative has a controlled directive copy for reference. These are utilized during department training sessions.
- This system should be a benefit in the performance of vendor surveillances.

QP.2-2 Many concerns related to the Piping Contractor are discussed in other sections of this report. While each isolated Finding cannot be attributed to Second and Third Level surveillance activity, and it is recognized that the Contractor is responsible for First Level QA/QC, the large number of concerns may be symptomatic of a general concern with the effectiveness of the Surveillance Program. The following concerns are listed for background instruction to support the above Finding.

- QA.3-1 & CC.4-1 (QA/QC providing direction)
- CC.1-1 (Incorporation of ECA's onto Construction Aides)
- CC.4-2 (Redundant pipe support inspections)
- PS.6-1 (Availability of updated documents at Rod Room)
- QP.1-1 (Voiding NCR's)
- CC.4-6 (Pipe hanger installation to annotated drawings)
- CC.4-3 (Hilti bolt installation problems)

Other Information That Supports The Summary

1. During this assessment, it was apparent that the overall QA/QC functions were performed in a manner that was conducive to controlling and improving the quality of the project.

2. The organizational responsibilities were discussed with management personnel throughout the project. There is adequate freedom from cost and schedule pressures. These responsibilities are written up in sufficient detail to ensure their independence.

3. In all cases, it was observed that QA/QC personnel received a cooperative attitude from project personnel. In several cases, it was noted that QA people have received project support when problems arose with contractors.

4. During discussions with QA/QC personnel throughout the project, it was evident that harrassment and intimidation does not exist.

5. The QA/QC departments function in a manner that supports management. Problems are identified and corrective actions taken to preclude reoccurrence during audit, surveillance, and inspection activities (see concern in QP.2-2). Trend analysis reports have been written by corporate and site QA/QC organizations and forwarded to upper management for evaluation.

6. For the most part, manpower and budgets appeared adequate. Where manpower requirements were less than adequate, contractors have been instructed to increase their staff. It appears that the number of UE&C corporate QA personnel required to support the project may be marginal. This is supported by the findings against QA training (QP.1-4) and the changes to QA requirements (QP.1-2).

PERFORMANCE EVALUATION SUMMARY — Construction Project
Seabrook Station

Performance Area: INDEPENDENT ASSESSMENTS — Objective No. QP.3

Evaluator(s) A. Colello, A. Cooper

I. Performance Objective

Management should provide an effective, independent assessment of project activities affecting the quality of the project.

II. Scope of Evaluation

The evaluation included a review of the Owner's Agent and A/E independent management assessments. The purpose was to verify that these assessments are: scheduled and planned on a periodic basis; performed by individuals who are suitably qualified and are independent of areas assessed; and utilized to improve the overall quality program.

This included interviews with Owner's Agent and A/E corporate managers. Management assessment packages were reviewed to determine the depth and adequacy of the assessments.

III. Conclusion

In general, the independent management assessments meet the requirements of this Performance Objective. The assessments have been scheduled on a yearly basis and personnel performing them have sufficient independence. However, the effectiveness of these assessments to improve the overall quality program was marginal.

One (1) area of weakness was identified in the area of Owner's Agent management assessments, that indicated a need to strengthen this aspect of the activity.

IV. Areas of Weakness & Corrective Action; Good Practices

Finding (QP.3-1) The results of YAEC management assessments do not adequately address substantive issues, in all cases. An example was noted where the documented scope of the evaluation was too narrow to adequately determine the effectiveness of the QA program.

Corrective Action The scope of the management assessment of the Seabrook Construction Quality Assurance Program will be increased to provide an adequate overview of Program adequacy and implementation. This will be provided:

- o through participation by management staff personnel (as observers), on a quarterly basis, in internal and/or external audits, and
- o by expanding the areas and broadening the scope of the annual management audit.

PERFORMANCE EVALUATION DETAILS — Construction Project Seabrook Station

Performance Area: INDEPENDENT ASSESSMENTS — Objective No. QP.3

QP.3-1 The management assessment performed by the YAEC management team did not contain sufficient objective evidence to verify the depth and thoroughness of the assessment.

- Management Report 82-1, dated 5/26/82, indicates that a small percentage of procedures were reviewed. The checklist utilized to perform this evaluation was only three (3) pages long.
- No objective evidence was included in the assessment package to verify acceptable or deficient areas.
- The scope of the assessment appeared to be too narrow. Only a portion of the design control program was evaluated.

Other Information That Supports The Summary

1. The results of independent assessments conducted by YAEC and UE&C were evaluated for their effectiveness. The YAEC assessment was weak regarding depth and thoroughness (as indicated in Finding QP.3-1). The UE&C assessment showed that the programatic requirements as defined in their "Topical Report" were met. However, specific "how to" details on the conduct and reporting of management assessments were not well defined.

2. Both the YAEC & UE&C assessments for 1982 were performed by management individuals who were independent of the areas to be evaluated. These individuals were suitably qualified to perform independent assessments.

3. The assessment reports were sent to senior management for their review and approval. Corrective action letters were issued by senior management to the responsible supervisor for dispositioning. All items were properly addressed and closed out.

4. In general, the assessments identified weak areas, and corrective actions were taken. However, it was difficult to determine whether or not the results are used to improve the effectiveness of the quality program.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: CORRECTIVE ACTIONS — Objective No. QP.4

Evaluator(s) A. Colello, A. Cooper

I. Performance Objective

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

II. Scope of Evaluation

The evaluation included a review of the Owner's Agent, A/E, and Contractors corrective action systems. The purpose was to verify that corrective action systems: identify and report conditions adverse to quality in a timely manner; involve management when corrective action is required; are effective in resolving reported items in a way that ensures quality of future activities; and include trend analysis as a means of addressing generic problems.

This included interviews with managers, supervisors, and QA/QC personnel, as well as a review of selected documents to ensure the system was functioning properly.

III. Conclusion

In general, the corrective action program is satisfactory. Tracking and Reporting systems appear effective and personnel were knowledgeable of the system.

One Good Practice regarding Owner's Agent tracking of reportable items was identified for this performance objective.

PERFORMANCE EVALUATION SUMMARY

Construction Project
Seabrook Station

Performance Area: CORRECTIVE ACTIONS

Objective No. QP.4

IV. Areas of Weakness & Corrective Action; Good Practices

Finding (QP.4-1)

The following Good Practice was noted. YAEC tracking of reportable deficiencies (10CFR50.55e and 10CFR21) is performed in a controlled and effective manner. Assurance is provided that all items will be addressed in a timely manner.

PERFORMANCE EVALUATION DETAILS

Construction Project
Seabrook Station

Performance Area: CORRECTIVE ACTION

Objective No. QP.4

QP.4-1 YAEC tracks all reportable deficiencies (10CFR50.55e and 10CFR21) by utilizing a "Future Verification List", that records all communications along with the status of each item. This list provides a chronological history of the processing of each item, and it is updated quarterly. This action exceeds the program auditing requirements of the YAEC Quality Assurance Organization.

Other Information That Supports The Summary

1. Various organizations were assessed in the performance of this evaluation. The organizations directly interviewed were UE&C Quality Assurance (Philadelphia), UE&C Quality Assurance (Seabrook), YAEC Quality Assurance (Framingham), YAEC Quality Assurance (Seabrook), and various contractor's Quality Assurance organizations.

2. All the above organizations demonstrated their knowledge and understanding of corrective action systems. All of the tracking and trending methodologies were similar and appeared to be working.

3. Based on interviews and management reports, it was determined that management is advised of items requiring corrective actions and is actively involved in directing resolution of identified problems.

4. The Civil/Structural contractor has a reporting system that provides a status report to the project manager on a monthly basis regarding items requiring corrective action . The project manager replies to the QA department, addressing the action taken, or to be taken, on an item by item basis.

5. The YAEC QA department maintains a tracking list on all significant deficiency reports on the project, documenting all communications and corrective action on the part of all contractors.

6. For the most part, trend analysis reports generated by the contractors and YAEC appear to be adequate in addressing generic problems and requiring corrective action.

PERFORMANCE EVALUATION SUMMARY

Construction Project
Seabrook Station

Performance Area: TEST PROGRAM

Objective No. TC.1

Evaluator(s) G. Reardon

I. Performance Objective

The test program should verify the plant's full capability to operate as intended by testing the plant's systems functionally.

II. Scope of Evaluation

The test program was evaluated by performing a detailed review of the Preoperational Test Program manual, a select sample of test procedures and Test Program Instructions, and interviews with key test and startup engineering personnel. Approximately 20 manhours were expended evaluating the Test Control Performance Objectives.

III. Conclusion

The standards of this Performance Objective are being achieved.

PERFORMANCE EVALUATION DETAILS

Construction Project
Seabrook Station

Performance Area: TEST PROGRAM

Objective No. TC.1

Other Information That Supports The Summary

1. A Preoperational Test Program Description manual has been developed and approved by the appropriate construction and station managers (i.e., UE&C, YAEC, & PSNH). The manual was developed per the requirements of FSAR Chapter 14 and NRC Reg. Guide 1.68, Revision 2. The manual clearly identifies the test organization's responsibilities and was given wide distribution within the construction management organization.

2. A sampling of test procedures were reviewed and indicated that the principal design organizations are involved in the development and review process. Test Program Instructions (TPI's) 61 & 62 provide the guidance in this area.

3. Section 4.0 of the test manual fully describes the scope of system testing. Detailed guidance for test conduct and evaluation of results are provided by TPI's 64 & 65.

4. A system and procedure for identifying, tracking, and resolving any nonconforming and deficiency conditions is established and defined in TPI-31.

5. A sampling of test procedures reviewed showed that station procedures are referenced and used to the extent practicable to perform tests.

6. Section 7.0 of the test manual fully describes the interrelationsnips between the Test and Quality Assurance Programs.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: TEST GROUP ORGANIZATION & STAFFING — Objective No. TC.2

Evaluator(s) G. Reardon

I. Performance Objective

The test group organization and staffing would ensure effective implementation of the test program.

II. Scope of Evaluation

The evaluation of the test group organizational structure and staffing adequacy consisted of a review of organization charts, the Preoperational Test Program Description Manual and several Test Program Instructions, a review of personnel and qualification records and key position descriptions, interviews with lead engineers, and a walk-thru plant inspection.

III. Conclusion

The standards of this Performance Objective are being achieved.

Performance Area: TEST GROUP ORGANIZATION & STAFFING Objective No. TC.2

Other Information That Supports The Summary

1. The Test Group organization and interface with the Construction Organization is clearly defined in the "Preoperational Test Program Description" manual. The manual was reviewed and approved by the Construction and Station Management (i.e., YAEC, UE&C, & PSNH) and was given wide distribution. Several Test Program Instructions (TPI's) existed, to provide further definition of responsibility and jurisdictional areas. All TPI's are reviewed and approved by representatives from the YAEC, PSNH, & UE&C organizations.

2. A sampling of the Test Department training and qualification records confirmed that personnel at all levels are qualified and trained to perform their assigned tasks. Qualification and training requirements are defined in the "manual" and TPI-81.

3. At present, the test activities were limited to primarily Phase 1 Construction Verification. The organizational chart and walk-thru inspections confirmed that the test staff and construction support were adequate to support the existing and near term activities. The Test Department is continuing to increase their staff to accommodate longer term work loads as more equipment/systems become available for Phase 1 and subsequent phase testing. No evidence was found in a record search or during walk-thru inspection that testing had or was being delayed due to inadequate staffing.

4. The test department organization includes operations and maintenance personnel from PSNH Seabrook Station staff. Also, the station staff is becoming more actively involved in the testing process as evidenced by PSNH memo #SS7202, dated 9/20/82. In this memo, the Seabrook Station Management has agreed to get involved in the Startup Preventive/Corrective Maintenance effort prior to turnover of equipment/systems to them from the test group.

5. Test department key position descriptions exist and the personnel records confirm that personnel who fill these positions meet the experience and qualification requirements as written.

6. Test department personnel training and qualification records are maintained and stored in the YAEC QA record vault.

PERFORMANCE EVALUATION SUMMARY

Construction Project
Seabrook Station

Performance Area: TEST PLAN

Objective No. TC.3

Evaluator(s) G. Reardon

I. Performance Objective

The test organization should prepare a plan and a schedule that describe the sequence of system or component testing to support major schedule milestones.

II. Scope of Evaluation

The test plan was evaluated by conducting interviews with appropriate scheduling engineers, an inspection of scheduling activities performed to date including evidence of proper interface with overall project schedules and identification of appropriate hold points, and a review of related documentation.

III. Conclusion

The standards of this Performance Objective are being achieved.

Other Information That Supports The Summary - TC.3

1. The test department organization has a distinct group assigned to develop and maintain a test schedule. This group reports directly to the test department manager. This group was presently working on a revised test schedule which detailed the sequencing and appropriate hold points for all phases of startup testing. The scheduling engineer interviewed demonstrated knowledge in schedule preparation and stated previous job-related experience from another job site.

2. The test plan and schedule are identified in the UE&C 12 month and 12 week "Look Ahead" schedules. Bi-weekly meetings are held with UE&C's Construction Management and contractor representatives to review status of Boundary Identification Packages (BIP's), well in advance of the scheduled turnover from construction to the test department.

3. BIP's are prepared by the Test Department to define a testable portion of a plant system. The BIP's are packaged by technical disciplines (i.e., Mechanical, Electrical, I&C, etc.) and forwarded to the appropriate contractor and UE&C's Construction Management well in advance of the scheduled turnover.

4. A review of the Test Schedule under revision indicated that it contains detail identifying all phases of startup testing. The required test elements are further detailed in the system test index, as defined in TPI-51.

5. The status of testing is monitored by a test chronological log that is defined in TPI-64.

PERFORMANCE EVALUATION SUMMARY

Construction Project
Seabrook Station

Performance Area: SYSTEM TURNOVER FOR TEST

Objective No. TC.4

Evaluator(s) G. Rearoon

I. Performance Objective

The construction testing and turnover process should be controlled effectively to ensure that program objectives are met.

II. Scope of Evaluation

The evaluation was performed by walk-thru inspections of the test activities, interviews with responsible personnel, and review of related manuals and procedures.

III. Conclusion

The standards of this Performance Objective are being achieved.

PERFORMANCE EVALUATION DETAILS

Construction Project
Seabrook Station

Performance Area: SYSTEM TURNOVER FOR TEST

Objective No. TC.4

Other Information That Supports The Summary

1. The test department "manual" and various TPI's detail jurisdictional areas regarding construction turnover and succeeding testing by the startup group. Responsibilities are clearly defined in the Boundary Identification Package developed by the startup group and given to UE&C's Construction Management and appropriate contractors.

2. Tests are performed and the results evaluated for conformance to design requirements, per the requirements of TPI's 61 (Preparation of Test Procedures), 64 (Test Performance), and 65 (Test Completion Review & Approval).

3. TPI-12 identifies the requirements for retesting and the conditions that require a retest. No review of test records or walk-thru inspection was performed to confirm that the new test instructions were being followed. However, the YAEC QA record did not reveal any problems in the retest area.

4. Once a contractor has completed a BIP for turnover, UE&C's Construction Management and the startup engineer perform a walk-thru of the system/equipment. This process is not specifically stated in the test manual or TPI's, but reportedly is performed as a general practice.

5. The turnover process is clearly defined in various TPI's and the BIP package.

6. Turnover documents contained in the BIP and various TPI forms identify material and equipment boundaries and provide for identifying exceptions/deficiencies existing at the time of turnover.

7. Various TPI's define established methods for effectively tracking and correcting turnover exceptions/deficiencies.

8. The bi-weekly BIP status meetings, attended by UE&C Construction Management, contractor, and test department representatives serves to ensure timely turnover of equipment/systems as scheduled.

Performance Area: SYSTEM TURNOVER FOR TEST

Objective No. TC.4

Other Information That Supports The Summary

9. Walk-thru inspections of test activities indicated tht tagging and controlled access methods are effectively employed to insure area cleanliness. Maintenance is being performed and a new TPI is being developed to accelerate the involvement of station staff personnel in equipment/system maintenance of the initial construction turnover.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: TEST PROCEDURES & TEST DOCUMENTS — Objective TC.5

Evaluator(s) G. Reardon

I. Performance Objective

Test procedures and test documents should provide appropriate direction and should be used effectively to verify operational and design features of respective systems.

II. Scope of Evaluation

The primary emphasis in evaluating this performance objective was on the review of documents for adequacy and a walk-thru inspection to assess conformance to procedural requirements.

III. Conclusion

The standards of this Performance Objective are being achieved.

PERFORMANCE EVALUATION DETAILS — Construction Project Seabrook Station

Performance Area: TEST PROCEDURES & TEST DOCUMENTS — Objective No. TC.5

Other Information That Supports The Summary

1. A sampling of test procedures reviewed indicated that appropriate technical data is referenced and factored into the procedure. The requirements that this be done are defined in TPI-61.

2. A review of test procedures being used during walk-thru inspections indicated that they had been prepared and approved well in advance of the testing in progress. Further, review indicated that test procedures are prepared in draft form and finalized (reviewed/approved) at time of turnover (i.e., Phase V testing). In support of this practice, it was noted that Phase 2 procedure drafts are 47% complete and Phases 4-6 drafts are 35% complete. All of these drafts are being prepared well in advance of their testing schedule need.

3. A sampling of the test procedures was reviewed and indicated that the test objectives, pre-requisitions, test boundaries, acceptance criteria, etc. were clearly defined.

4. Test procedures being used in the field were observed to be appropriately reviewed and approved per TPI-62 (Review & Approval of Test Procedures).

5. A review of the testing in progress compared well with the applicable test procedure. The test log coincided with the testing stop being performed.

6. Retesting was not observed in the field. However, TPI-12 (Retest Requirements) clearly defines conditions and requirements for retesting.

7. The "test index and test results" defined in TPI-51 are given an independent review and approval by the Systems Lead Engineer and Test Group Supervisor. TPI-65 provides further guidance for test completion review and approval.

PERFORMANCE EVALUATION SUMMARY — Construction Project Seabrook Station

Performance Area: SYSTEM STATUS CONTROLS — Objective TC.6

Evaluator(s) G. Reardon

I. Performance Objective

A method should exist to identify the status of each system or component and the organization holding control or jurisdiction over that system or component to prevent interference and ensure equipment and personnel safety.

II. Scope of Evaluation

The primary emphasis in evaluating this performance objective was on the review of documents for adequacy and a walk-thru inspection to assess conformance to procedural requirements.

III. Conclusion

The standards of this Performance Objective are being achieved.

Other Information That Supports The Summary

1. For systems/equipment under Test Department jurisdiction, TPI-23 (Safety Tagging) defines a system for assuring personnel and equipment safety and identifying system/equipment status. Appropriate tagging was noted during walk-thru inspections of testing work in progress.

2. Tagging and test logs are being used to insure up to date status of a system test.

3. The test director is the authorizing agent for test status changes which are documented in the test chronological log. TPI-64 defines this process. A walk-thru inspection confirmed that the test status log was up to date.

4. Two (2) tagging systems are used at Seabrook. A jurisdictional tagging system uses color-coded tags or stickers to "identify what organization (test or station staff) has responsibility for equipment/systems". Jurisdictional tagging is defined in TPI-21 and is being implemented as defined.

   A safety tagging system defined by TPI-23 is being used by the Test Department while the equipment/system is under their jurisdiction. Once jurisdiction is transferred to the station staff, their procedure for safety tagging will be employed.

5. Control of temporary field modifications, control of construction work after initial turnover, and the requirements for assembling a complete and documented system test package are all clearly defined in various TPI's. However, verification that these controls and requirements were being implemented was not pursued, because all testing to date has involved only Phase I (Construction Verification Testing), and only 10% of that program has been completed or is in progress.