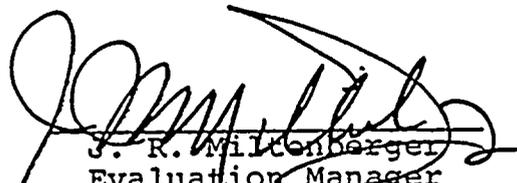


SELF-INITIATED EVALUATION
OF PENNSYLVANIA POWER AND LIGHT'S
SUSQUEHANNA UNIT TWO PROJECT

REPORT


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11/30/82
Date

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SELF-INITIATED EVALUATION
OF PENNSYLVANIA POWER AND LIGHT'S
SUSQUEHANNA UNIT TWO PROJECT

REPORT

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SUMMARY

An evaluation was conducted of design and construction activities at Pennsylvania Power & Light (PP&L) Company's Susquehanna Steam Electric Station Unit #2 during the period of October 18 through 29, 1982. The evaluation was initiated by Pennsylvania Power & Light Company and was conducted by an evaluation team comprised of senior technical and management personnel from PP&L, Gilbert Associates, and R. K. Associates. The evaluation team utilized performance objectives and criteria developed by the Institute of Nuclear Power Operations specifically to support the Institute's sponsoring utilities in this type of evaluation. The plant, which is located on the Susquehanna River in Salem Township, Luzerne County, Pennsylvania, five miles northeast of Berwick, will be a 1100 MWe BWR. It is approximately 76% complete and is scheduled to begin commercial operation in November 1984.

The purpose of this self-initiated evaluation was to facilitate the general upgrading of this plant, and the nuclear industry as a whole, to a higher level, of excellence in the design and construction of new facilities. A true appreciation of this effort can best be achieved by a review of the performance objectives, the results, and the corrective actions specific to this evaluation as contained in the body of this report.

This evaluation indicated that the Susquehanna Steam Electric Station is being designed and built in a controlled manner. The team searched diligently for the two-week evaluation period and found very few significant discrepancies.

The team concluded that the project was well-run by the contractor (Bechtel) and was being closely supervised by the owner (PP&L). Some specific strong points were:

1. Management at all levels from both PP&L and Bechtel was observed to be directly involved in the daily project management and in the resolution of problems.
2. A strong Quality Control Inspection Program implemented by well-trained, competent personnel is being operated by Bechtel and is being closely monitored by PP&L.
3. A strong commitment to industrial safety existed throughout the project. There has never been an accidental death at Susquehanna. On two occasions, the milestone of one million manhours without a lost time accident has been passed.



Several weaknesses were noted that merit prompt attention.

1. The installed length of electrical control cables was observed to be consistently about 40% greater than the scheduled (design) length. Verification calculations have not been performed to ensure that the as-installed cables will meet the design voltage limits. A Deficiency Report (Serial 0141) has been submitted by PP&L directing Bechtel to correct this situation.

The initial Bechtel response is being analyzed by PP&L. As of the date of this report, some questions remain open. No further comment will be made until the Company's analysis has been completed.

2. In the opinion of the evaluation team, the methodology for documenting and analyzing nonconforming conditions found during pipe support final QC inspections may not satisfy all of the detailed requirements found in 10CFR50, Appendix B. This program should be critically reviewed by Bechtel and PP&L management. If, in the judgement of responsible management, the program in fact complies, the rationale should be clearly stated. If discrepancies exist, they should be corrected at once.

The hanger program has been reviewed by Bechtel and PP&L management. The conclusion is that the program meets the requirements of 10CFR50, Appendix B. Details are found in sections CC 5-1 and CC 6-1 in the body of the report.

3. In process inspections of pipe supports (hangers) conducted by production supervision have not been effective in ensuring that an acceptable product is presented to Quality Control for final inspection. An excessive percentage of pipe supports is being rejected by Quality Control.

Bechtel has implemented a program to upgrade the quality of in-process inspections of pipe hangers. Details are found in section CC 5-2 below. PP&L Project Construction will closely monitor the progress of the hanger installations.

4. No formal project-wide program covering both Bechtel and PP&L exists to ensure that changes to Unit One are evaluated for applicability to Unit Two and vice versa. (The analysis is being made individually by the various disciplines without central direction.) No comprehensive set of records exists, showing the precise disposition of each Unit One change with respect to Unit Two or each Unit Two change with regard to Unit One.



The finding is technically correct. Change applicability between the two units is handled by the responsible disciplines and no project-wide program exists. However, PP&L has a high degree of confidence that the functional configuration of the two units is the same. This is based upon an extensive review of all change authorizing documents conducted over the past year, and upon the results of spot checks such as the one made during this evaluation. In the judgement of PP&L, it would not be cost effective to launch a comprehensive change tracking system at this stage of the project.

However, PP&L is in the process of upgrading the NPE Engineering Procedures Manual. Specific provisions are being included to ensure that all modifications are evaluated for unit applicability. The mechanics of tracking the modifications vis-a-vis both units for the long term are being developed. They will be in place by the time that design responsibility for Unit Two is accepted by NPE.

SCOPE

The evaluation was conducted by a team of nineteen people headed by the PP&L Manager of Nuclear Safety Assessment.

The team was composed of fifteen PP&L personnel and four contractor personnel. Sixteen of the nineteen persons were engineers. The other three were furnished by the PP&L Auditing Department.

Nine team members had over twenty years experience in nuclear power, major construction or both. Seven members had between ten and twenty years experience and the remaining three people had between five and ten.

Twelve PP&L persons worked full time on the evaluation. The Manager - Nuclear Fuels and System Engineering and the Construction Superintendent-Susquehanna each contributed one week's effort and the Auditing Supervisor contributed three days.

Consultants included the Manager-Corporate Quality Assurance Program, Gilbert Associates and the retired General Manager, Production Engineering and Construction, Delmarva Power and Light Company. The other consultants were an experienced Quality Assurance engineer and a Quality Control Engineer who has over thirty years experience in welding and nondestructive examination. Both are employees of Gilbert Associates.

Two weeks were spent in preparation by the twelve full-time PP&L employees and by the four consultants. An additional two weeks were spent in planning and preparation by the team leader and three key PP&L team members. Following the evaluation, four PP&L team members spent one week drafting the initial report.

Susquehanna Unit Two is 76% complete. The major procurements have been made and nearly all large equipments have been installed. The design of the Nuclear Steam Supply System and of the Balance of Plant is essentially complete.

The evaluation team concentrated its efforts on observing ongoing work which could affect the quality of construction. In the design area, the major activity is in hangers and small pipe design and in implementing changes to Unit Two dictated by the experience to date with Unit One. Considerable effort was expended in verifying that changes are properly effected in Unit Two. A large effort was also made examining the interface between the Bechtel San Francisco Home Office and the Resident and Field Engineering Groups in the area of pipe hanger design verification.

Construction work observations were concentrated on hanger installations, welding, and cable work. Activities in these areas, ranging from installation by the crafts to final Quality Control inspections, were scrutinized in detail. Other construction work such as machinery alignments, hydrostatic testing, and system flushes, were observed as the opportunity arose.

The areas of project planning, project control, project procurement and contract administration were evaluated for their impact on the quality of construction. The evaluation team is aware of the fact that Unit Two construction is about ten weeks behind the official schedule. The reasons for the delay were not investigated. The purpose of the exercise was to evaluate how well the design is being controlled and if the plant is being constructed as the design specifies. The efficiency of the process was beyond the scope of the investigation.

No startup testing was in progress during the two weeks the team was on site. Therefore, analysis of the test control area was based upon document reviews and interviews with Integrated Startup Test Group Personnel. Some system turnover activity was observed.

REPORT OF RESULTS

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PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area Organizational Structure Objective No. OA-1Evaluator(s) A. Maino, J. MiltenbergerI. 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

Evaluation of organizational structure involved all team members. Approximately 80 hours were expended in the evaluation. In addition to the review of organization charts and policies and procedure manuals, the evaluation consisted of interviews with senior managers, middle managers, and supervisors; plant walk-thrus with site managers and superintendents; observation of daily construction meetings; observation of weekly project status meetings; observation of monthly Executive Review meeting; review of various project status reports and functional organization reports; and review of Project Director meeting reports.

III. Conclusion

Results of this evaluation indicated a well-defined and documented organizational structure which was understood by project personnel.



PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area MANAGEMENT INVOLVEMENT AND
COMMITMENT TO QUALITYObjective No. OA-2Evaluator(s) A. Maino, J. MiltenbergerI. 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

This evaluation involved all team members and represented a total of approximately 80 hours of effort. The method of evaluation consisted of interviews with all levels of management personnel; observation of regularly scheduled daily, weekly and monthly management meetings; review of various reports and follow-up to assess resultant management action; and plant walk-thrus with SSES site personnel.

III. Conclusion

Direct involvement of senior and middle management personnel was evident through regularly scheduled meetings and reports involving both PP&L and Bechtel management personnel. This involvement included active participation of PP&L's Executive Vice President-Operations and Senior Vice President in the discussion and resolution of current problems.

PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area MANAGEMENT INVOLVEMENT & COMMITMENT TO QUALITY Objective No. OA-2Evaluator(s) A. Maino, J. MiltenbergerIV. Areas of weakness and corrective action; Good PracticesGood Practice

Direct involvement of Bechtel and PP&L senior and middle level management personnel was observed in daily management of the project and in resolution of problems.
(Details 1-3)

QUALITY

1. Performance Area: MANAGEMENT INVOLVEMENT & COMMITMENT TO Objective No. OA-2
(title)

2. Provide factual information that supports the Performance Evaluation.
Summary

1. The evaluation teams observed a series of five regularly-scheduled management meetings ranging from the Monthly Executive Review involving top level PP&L and Bechtel Management to the Daily Construction meeting involving Bechtel Lead Discipline and Unit Superintendents. Participants at all levels were well informed. Effective communication was observed up and down the chain of command.
2. Front line supervisors were very much in evidence at the various work activities.
3. Indirect evidence existed of strong supervision.
 - a. Next to zero deficiencies were observed in the administration of key processes such as welding and quality control.
 - b. The job site was neat and orderly.
 - c. The project has an excellent safety record.
 - d. Work crews, with very few exceptions, were well organized and knowledgeable about their tasks.

PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area THE ROLE OF FIRST LINE SUPERVISORS
AND MIDDLE MANAGERSObjective No. OA-3Evaluator(s) A. Maino, J. MiltenbergerI. 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

The scope of this evaluation involved all team members for a total time expenditure of approximately 80 hours. The majority of this evaluation consisted of interviews with first line supervisors/managers (often associated with observation activities) and some procedure/record reviews.

III. Conclusion

In general, the results of this evaluation indicate a very good knowledge and experience level and demonstrated direct involvement in current activities and problems by first level supervisors and managers. However, some minor weaknesses were identified.



Performance Area THE ROLE OF FIRST LINE SUPERVISORS
AND MIDDLE MANAGERSObjective No. OA-3Evaluator(s) A. Maino, J. MiltenbergerIV. Areas of weakness and corrective action; Good Practices

Finding (OA 3-1) Some PP&L personnel are not able to describe their authorities and responsibilities and these are not documented in some cases.

Corrective Action

PLI-14470 contains a broad statement of the NPE Resident Engineering Group's responsibilities. The Group Supervisor-Resident Engineering (referred to in the evaluation as Resident Engineer Supervisor) is a position title in Nuclear Plant Engineering and signature authorities are defined in specific NPE-EPM and NDE procedures. The responsibilities for the Group Supervisor-Resident Engineering will be more specifically delineated and will be included in a procedure. This will clarify the information in PLI-14470 and make it more readily accessible. This procedure will be issued by February 28, 1983.

PERFORMANCE EVALUATION DETAILS

Construction Project

ROLE OF FIRST LINE SUPERVISORS
AND MIDDLE MANAGERSObjective No. OA-3

1. Performance Area:

(title)

2. Provide factual information that supports the Performance Evaluation Summary

1. The PP&L Resident Engineer Supervisor was unable to describe his signature authority for Nuclear Plant Engineering. A review of PLI-14470 revealed that no signature authority was described.

PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area Design Inputs Objective No. DC-1Evaluator(s) R. W. McNamaraI. Performance Objective

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

II. Scope of Evaluation

The evaluation of this area involved approximately 100 manhours of record reviews, interviews, and observations. This consisted of 3 days at the jobsite, 2 days in the PP&L engineering home office and 5 days in the Bechtel engineering home office. Most of this evaluation was concerned with the remaining work on Unit #2, with occasional interface with completed Unit #1 work where this impacted Unit #2.

III. Conclusion

The engineering work evaluated under the design input area was generally well controlled, complete to the point necessary to support the schedule and of satisfactory quality. Some weaknesses were identified.



Performance Area DESIGN INPUTSObjective No. DC-1Evaluator(s) R. W. McNamaraIV. Areas of weakness and corrective action; Good Practices

Finding (DC 1-1) Preliminary Calculations are being performed in the field and structural modifications based upon the preliminary field calculations are being installed. The field calculations are not always referenced by and may not always be considered in the final calculations performed by the San Francisco Home Office (SFHO) engineering groups, (Details 1-3)

Corrective Action

Review and assessment of structures for pipe hanger loads by Civil Group is accomplished in the following manner:

1. An initial structural review based on individual hanger loads is performed prior to approval and issue of the hanger to construction. This review concentrates primarily on checking the structural members for local stresses since all hangers on the member may not yet be known. Required minor structural members are usually made on the hanger drawing as civil comments.
2. Global review of the structural members is performed after the hangers (majority) have been issued. In this review, the overall effect, of individually approved hangers, is combined with other applicable loads in assessing the members. Following this review, structures satisfy FSAR requirements.
3. Final review of the structure is done after all hangers have been installed and the "as-builts" reviewed and accepted by project engineering. Final modifications where necessary, are issued as civil fixes.

Pipe hanger calculations generated by the Resident Civil Group are labeled preliminary since the review is primarily for local effects as described in (1) above. The calculations are processed and approved by the Resident Group Supervisor in accordance with EDP 4.37. After the calculations are microfilmed, they are transmitted to SFHO Civil for review and incorporation into final calculation package as appropriate.

The preliminary calculation by Resident Civil group for hanger HRC-104-H1, Rev. 3 was reviewed but not incorporated into the final calculations. The reason is that the existing SFHO calculation already had considered hanger HRC-104-H1, Rev. 2 which had a slightly higher loading. To provide documentation for the review of the RE calculation, it will be referenced in the final beam calculation (#93).

1. Performance Area: DESIGN INPUTS Objective No. DC-1
(title)

2. Provide factual information that supports the Performance Evaluation Summary

1. Changes are being made in the field to hanger drawings, based upon preliminary calculations performed by the Resident Civil Group. A review of the SFHO files and discussions with the SFHO Civil Group indicated no evidence that the Preliminary Calculations for Hanger HRC-104-H1, Rev. 3, or subsequent beam modifications, were referenced or included in the final calculations prepared by SFHO Engineering.

PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area DESIGN INTERFACESObjective No. DC-2Evaluator(s) P. Brady, R. McNamara, J. Owens, C. Cole, A. DerkacsI. 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 evaluation of this area involved primarily a five-man design review team. Approximately 70 manhours were expended in records review. As a lead in and then follow-up to the records review, approximately 20 manhours were devoted to discussion with various levels of engineering and supervision.

III. Conclusion

The majority of activity evaluated under this performance objective was satisfactory. However, some weaknesses were identified.



Performance Area DESIGN INTERFACEObjective No. DC-2Evaluator(s) P. BradyIV. Areas of weakness and corrective action; Good Practices

Finding (DC 2-1) Design verification interface within the Bechtel electrical engineering group is not always adequate to assure that the installed cable is properly sized to perform the intended design function with required safety margin. (See Detail 1)

Corrective Action

On November 4, 1982, PP&L issued Deficiency Report Serial No. 0141 to Bechtel requesting resolution of this problem. A preliminary report was received on 11/19/82. Some issues remain open. Final disposition is expected by March 1, 1983.

Finding (DC 2-2) Bechtel engineering does not utilize the actual cable length feedback for verification of design calculations. This could result in voltages which would not meet the design criteria. (See Detail 2)

Corrective Action

On November 4, 1982, PP&L issued Deficiency Report Serial No. 0141 to Bechtel requesting resolution of this problem. A preliminary report was received on 11/19/82. Some issues remain open. Final disposition is expected by March 1, 1983.

1. Performance Area: DESIGN INTERFACES Objective No. DC-2
(title)

2. Provide factual information that supports the Performance Evaluation Summary

1. Installed cable may not be verified to meet design safety margin.
 - a. The Project Engineering Procedures Manual requires that cable verification forms be completed reflecting the installed power and control cables. The cable verification form requires a check calculation to ensure that the voltage margin is adequate.

As of 10/25/82, File E2200 did not contain any cable verification forms for power cables or control cables. Conversations with the Electrical Schemes Leader and the Electrical Group Supervisor confirmed the fact that the forms have not been completed.
 - b. A 10% margin was agreed to by Bechtel Engineering for 120 VAC control circuit cable sizing. (Bechtel letter BLP-14924 dated 5/8/81)

Calculations performed by the evaluation team on circuits from Electrical Schematics E 147, Sh. 15 and E 172, Sh. 4 utilizing the scheduled circuit lengths and Bechtel Calculation E 2010.06, Rev. 0, dated 1/5/81 identified cases where the design was changed but the calculations were not revised to include the change, thus reducing the margin below the required level.
 - c. Cable FK250710K was re-routed. The calculation in Electric Schematic E 147, Sh. 15 was not revised to reflect the additional cable lengths required by the re-route.
2. Actual cable length not used to confirm design calculations.
 - a. Actual cable lengths are reported to San Francisco. In many cases, these lengths exceed the scheduled length by a substantial margin. (See Objective CC 4 for details)
 - b. A review of the files and discussion with the Electrical Schemes Group Leader, the Circuit and Raceway Schedule Group Leader and the Electrical Group Supervisor indicated that the actual lengths are not being used to confirm the design calculations.
 - c. Calculations performed by the inspection team on E 147, Sh. 15 and E 172, Sh. 4 utilizing Bechtel Procedure Cal. #E2010.06, Rev. 0, 1/5/81, showed that if the actual length were substituted for the scheduled length, the design criteria would not be met.

PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area DESIGN PROCESS Objective No. DC-3Evaluator(s) J. Owens, R. McNamara, C. Cole, A. DerkacsI. 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

Evaluation of this area was by the entire design team. It involved three days at the construction site, two days at the Allentown headquarters of NPE and four days at Bechtel SFHO. Time was divided between discussion with project personnel, review of project records and inspections of the work.

III. Conclusion

The design process appeared to be satisfactory. Some weaknesses were identified.



Performance Area DESIGN PROCESSESObjective No. DC-3Evaluator(s) J. OwensIV. Areas of weakness and corrective action; Good Practices

Finding (DC 3-1) Adequate analysis of the effect of changes and of the acceptability of as-built installations has not always been made. (See Detail 1-4)

Corrective Action

Instances have occurred where design changes or as-built installations could have been more thoroughly analyzed as to impact on design intent or criteria. However, based on a review of the examples cited by the INPO team, it was concluded that these are isolated cases and that the design control process and procedures have generally been effectively implemented.

It should be noted that the transition to the revised Bechtel Engineering Procedures Manual on 6/30/82 imposes certain additional design review documentation requirements for Unit 1 operating plant, Unit 2 Construction and GSA activities. These changes include the additions of the design review requirements (DRR) check-list which documents the design review process for each DCP. As a result, the elements of the design review process have much greater visibility than was called for in the previous Engineering Procedures Manual.

Response to Specific Data Items

1. The significance of the change in bypass valve normal position was missed in the design review process. A later Failure Modes and Effects Analyses (FMEA) was conducted of the ESW system as part of an overall design review to confirm that GE safety system support requirements were met. It is expected that this FMEA would have surfaced the ESW single failure problem had there not been miscommunication regarding the bypass valve normal position (Ref. BLP-23427).

It is concluded that the design process itself was adequate, but that a specific breakdown occurred in this case.

2. This is an instance where a change in design was not adequately reviewed with respect to meeting the original design intent. The design concept for the drywell sump system involved the use of $\frac{1}{2}$ in. level instruments offset to accomplish the required accuracy per RG 1.45. Later changes occurred to delete one of the sump instruments. The review of this change did not take into account that the dual level switch design was achieving a greater accuracy than the single switch by itself.

Performance Area DESIGN PROCESSESObjective No. DC-3Evaluator(s) J. OwensIV. Areas of weakness and corrective action; Good Practices

3. It was a conscious decision to issue certain Unit 2 pipe support based on similarity to Unit 1 design in the 1978-1980 timeframe. It was recognized that all pipe supports issued in this manner would require engineering re-evaluation. (Reference - engineering response to QAR H-72, DCC#A039912). The re-evaluation of phase 3 large pipe supports is now complete, and pipe support design changes have been issued where required.
4. Review of this problem to date per DR 141 supports the belief that the cables were being adequately reviewed in the design process and that the problem is mainly one of documentation.

Finding Some weaknesses may exist in administration of the electrical
(DC 3-2) design process. (See Detail 5-8)

Corrective Action

With the exception of failure to complete the required Cable Verification Forms, the items cited are readily explained by circumstances which were not known to the evaluation team. Specifically:

The 11/11/82 printout of the OCL indicated nine (9) NCR's open in the electrical area. Investigation with Field QC showed that eight (8) NCR's actually have been closed out though the CCL indicated that the status of these NCR's is in progress. One NCR is still open for Field QC concurrence; however, no SFHO Engineering action is required for its closure.

Response to QAF 3.9-10 is in process, resolution is expected by 1/15/83.

The deficiency referred to in QAR-F-861 was due to the requirement that all class 1 drawings (electrical schematics) be issued by Unit 1 fuel load. Connection diagrams are class 2 drawings and were issued following the effort to issue all schematics. This QAR was written after the issuance of the schematics but prior to the issuance of the connection diagrams.

The cable verification problem is discussed under item 2 (DC 2-1).

1. Performance Area: DESIGN PROCESSES Objective No. DC-3
(title)

2. Provide factual information that supports the Performance Evaluation Summary

1. In January-February, 1978, a logic change was made to the control circuits of the Emergency Service Water and of the Residual Heat Removal Service Water systems.

In October, 1982, it was discovered that the existing logic arrangement created a condition where a single failure could prevent cooling water flow to the diesel generators.

No records could be found documenting this change except the 1978 revisions to the logic and schematic diagrams (J-111, J-112, E-146 and E-150).

No evidence was produced showing that any analysis had been conducted to ensure that the logic changes did not violate the single failure criterion.

2. No calculation could be found supporting the design of the drywell sump level measurement system described in Bechtel letter EMC-4152. Startup Field Report (SFR) 2452 states that the system does not produce the accuracy required by Reg. Guide 1.45. DCP 628 was issued on December 18, 1981 to correct the problem.
3. Quality Action Request QAR-H-72 (DC #39912), written by Bechtel Home Office QA and dated June 29, 1982, indicated that numerous large pipe support drawings have been issued to construction without making backup design calculations because the designs were considered to be similar to Unit One.
4. Calculations have not been made to ensure that cable modifications and as-built cable installations do not degrade the design margin. See Objective DC-2 for details.
5. Nonconformance Reports (NCR's) are not being closed promptly. A review of the MAPPER (MAPPER is the computer status system) log of open NCR's showed that 18 of the 34 open design NCR's were in the electrical area. Twelve design NCR's remain open from years prior to 1982. All of these are in the electrical area.

1. Performance Area: DESIGN PROCESS Objective No. DC-3
(title)

2. Provide factual information that supports the Performance Evaluation Summary

6. An open QA audit finding (3.9-10) cites the electrical group's failure to prepare Field Change Notices (FCN's) to follow up on Field Change Requests (FCR's).
7. Bechtel QA has identified a deficiency in the translation of design changes in schematics into the applicable connection diagrams. (QAR-F-861, 8/3/82).
8. Cable Verification Forms are not being completed as required by the Project Procedures Manual. (See objective DC-2 for details)



PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area DESIGN OUTPUTObjective No. DC-4Evaluator(s) C. C. ColeI. Performance Objective

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

II. Scope of Evaluation

This area absorbed the full time efforts of one individual for the entire two-week period. Inputs were provided by other members of the design team and from the on-site team who were observing the construction process. Discussions were conducted with Bechtel engineers and engineering supervisors at the site and at the San Francisco Home Office. A sample of design output documents was reviewed at the site, at the PP&L General Office, and at the Bechtel SFHO.

III. Conclusion

Performance in this area was generally satisfactory.



PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area DESIGN CHANGES Objective No. DC-5Evaluator(s) A. DerkacsI. 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

About 150 manhours were spent in evaluation of this area including: review of procedures, documents, and records; and in interviews of and discussions with PP&L, GE; and Bechtel engineers in Construction Startup Testing, and Resident Engineering at Susquehanna SES, and engineers and supervisors at Bechtel's offices in San Francisco and GE's office at San Jose.

III. Conclusion

In general, design changes on the Susquehanna SES project are well identified, tracked, and controlled. Some weaknesses were noted.



PERFORMANCE EVALUATION SUMMARY

Construction Project.

Performance Area DESIGN CHANGES Objective No. DC-5Evaluator(s) A. DerkacsIV. Areas of weakness and corrective action; Good Practices

Finding (DC 5-1) No formal project-wide program exists to ensure that changes made to Unit One are evaluated for applicability to Unit Two and vice-versa. No comprehensive set of records exists showing the precise disposition of each Unit One change with regard to Unit Two. (Details 1-5)

Corrective Action

At the present time, Unit One Design is the responsibility of PP&L Nuclear Plant Engineering while Unit Two design responsibility remains with Bechtel. Nuclear Plant Engineering (NPE) retains effective control over the change process because all Unit Two changes which affect system function must be approved by the NPE Unit Two Project Engineering Supervisor. The criterion are that no Unit Two change will proceed unless it has already been incorporated into Unit One or is budgeted and has been scheduled for incorporation into Unit One. Existing NPE documents require a review of the applicability of each proposed change to the other unit.

Over the past year, an extensive effort has been made by Bechtel to ensure that the functional configuration of Units One & Two are the same. A review of all change authorizing documentations is being performed. The review of DCPs and NCRs is complete.

In the electrical discipline, the design changes were not made concurrently, but the schematic diagram for Unit 2 was updated in late 1981 so that configuration was the same. Subsequent to this update, a tight administrative control has been implemented by the electrical group.

In addition, each discipline is reviewing any change requested for Unit 2 to assure that the change was either implemented or has been committed for Unit 1.

Changes identified by Bechtel are entered into the MAPPER system. This helps ensure that the changes are properly entered into the drawings.

While it is true that no comprehensive list exists showing the disposition of each change, a high level of confidence exists that applicable changes are in fact being incorporated into each unit. Plans are to continue to the present system until both units are under the full design cognizance of NPE.

PP&L is in the process of upgrading the NPE Engineering Procedures Manual. Specific provisions are being included to ensure that all modifications are evaluated for unit applicability. The mechanics of tracking the modifications vis-a-vis both units for the long term are being developed. They will be in place by the time that design responsibility for Unit Two is accepted by NPE.

1. Performance Area: DESIGN CHANGES Objective No. DC-5
(title)

2. Provide factual information that supports the Performance Evaluation Summary

Finding (DC 5-1) No formal program exists to ensure that all changes to Unit 1 are incorporated into Unit 2 and vice-versa.

1. A review of existing Bechtel and PP&L instructions was made and no directives were found implementing a program to ensure that all changes to either unit are evaluated and incorporated into the other unit as appropriate.
2. Interviews with management and technical personnel showed no formal system.
3. No one in either the PP&L or the Bechtel organization could produce a comprehensive list of all changes that had been made to Unit One and documentation showing their disposition with regard to Unit Two. The same was true of Unit Two. No list or index of Unit Two changes could be found that documented applicability and action on Unit One.
4. The lack of a central data file has necessitated numerous reviews to ensure that changes have been properly incorporated. Electrical Design in San Francisco recently reviewed a computer generated list of about 680 Unit 1 DCPs for applicability to and incorporation into Unit Two. Bechtel Resident Engineering is currently reviewing all Unit One SFRs for applicability into Unit Two.
5. A spot check by the evaluation team indicates that most Unit One changes have been incorporated into Unit Two. Twenty-four DCPs, selected at random, were examined. Thirteen of the changes were applicable to Unit Two. All had been incorporated. However, some holes exist. The Electrical Design Review cited above found 6 Unit One DCPs which were applicable to Unit Two but which had not been incorporated. Startup Field Requests SFRs #45 and #90 identify cases where the Unit Two circuit design does not reflect the Unit One design. Design Change Package (DCP) 660.1 shows fuse (F3) on E-154, Sh. 39 as a 3 amp rating. The identical fuse is shown as 10 amps on Unit Two.

PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area CONSTRUCTION ENGINEERINGObjective No. CC-1Evaluator(s) J. StefankoI. 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

Approximately 40 hours were spent by one team member evaluating the small pipe hanger design program. Small pipe hanger design has been delegated to Bechtel Field Engineering.

The methodology was to review the governing documents including the Guide Manual which has been provided to each small pipe hanger design team, job description for key personnel, and the organization chart. Interviews were conducted with supervisory personnel and with design engineers.

The process was checked by a detailed review of two series of small pipe hanger design packages. Both packages included listings of numbers and types of supports; initial and final locations, preliminary calculations and verification of calculations by Bechtel, Gaithersburg, using the ME-101 Computer Code, and final drawings issued to Installation Engineering.

A review was also made of the mechanisms employed by PP&L to monitor the small pipe hanger program. This review was made by observing activities in the field and at the home office and by interviewing key personnel in the PP&L Nuclear Plant Engineering Department.

III. Conclusion

The small pipe hanger design work is conducted in accordance with applicable procedures under the direction of experienced supervision. A detailed review of two design packages indicated that the system as described was indeed in place and was effective.

Limited, if any, monitoring of the Bechtel field engineering design work is done by the PP&L Nuclear Plant Engineering Department.

PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area CONSTRUCTION ENGINEERING Objective No. CC-1Evaluator(s) J. StefankoIV. Areas of weakness and corrective action; Good Practices

CC 1-1 Design activities which have been delegated to the Bechtel field engineering organization at the Susquehanna Site are not being monitored by PP&L Nuclear Plant Engineering.

Corrective Action

Design activities are delegated to the Bechtel Field organization by Bechtel Project Engineering in San Francisco, the organization responsible for detail design of the Susquehanna Units prior to turnover to PP&L. This delegation is accomplished by means of Specifications approved by the Bechtel Project Engineer with the concurrence of the PP&L Susquehanna Project (i.e., concurrence of the PP&L Manager-Nuclear Plant Engineering.) Direct responsibility to ensure that the delegated authority is properly exercised belongs to the Bechtel Project Engineer. There have been indications from experiences on the project that this review and monitoring responsibility have not been properly carried out and Bechtel is in the process of responding to this concern. Two senior design engineers (Group Supervisor level) have been reassigned to the Field Engineering Organization to assist in the field design effort and to ensure adequate quality and control of the design work. Formal technical reviews and surveillance of field design activities will be conducted by Bechtel Project engineering to ensure both technical and programmatic adequacy. PP&L NPE personnel will participate in these reviews. Furthermore, NPE will continue to evaluate Field Engineering design activities by monitoring results and will initiate spot checks of field design activities to provide an in-process sample of both technical and programmatic adequacy.

Field Engineering activities involve a much larger scope than design work. While NPE is responsible for design activities on the project regardless of where they are performed, PP&L Project Construction organization on site maintains a day-to-day involvement and monitoring of Bechtel Construction and Field Engineering activities. The staffing of the Project Construction group is composed primarily of experienced degreed engineers who can effectively monitor all Bechtel technical activities on site.

The combination of all these activities will ensure adequate monitoring of contractor field design activities.



1. Performance Area: CONSTRUCTION ENGINEERING Objective No. CC-1
(title)

2. Provide factual information that supports the Performance Evaluation Summary

Interviews with key PP&L managers and a review of the PP&L organization indicated that:

- a. NPE Resident Engineering at the site is committed to Unit One activities.
- b. No design engineers have been assigned to monitor the Bechtel Field Engineering effort.
- c. There are no NPE design engineers in Allentown committed to Unit 2 activities and problems.
- d. The NPE Unit Two Supervisor has a staff of two personnel. His primary concern appears to be schedule.

Performance Area Construction Facilities and EquipmentObjective No. CC-2Evaluator(s) Saccone, Kruus**I. Performance Objective**

Construction facilities and equipment should be planned for, acquired, installed, and maintained consistent with project needs to support quality construction.

II. Scope of Evaluation

Approximately 5 manhours were spent reviewing site plans and inspecting jobsite facilities. The following facilities were inspected and evaluated:

- Cable cutting facility
- Equipment Maintenance Shop
- Hazardous Waste Facility
- Combination (Combo) Shop
- Laydown area
- Manual workforce changehouse

As a followup, approximately three manhours were devoted to discussions with Contractor personnel in the area of construction facilities, equipment, and temporary power.

III. Conclusion

The construction facilities and equipment onsite generally appear to be located and maintained in such a manner that they support the construction effort. However, one area of weakness was identified.



PERFORMANCE EVALUATION DETAILS

Construction Project

1. Performance Area: Construction Facilities and Equipment Objective No. CC-2
(title)

2. Provide factual information that supports the Performance Evaluation Summary

Unit 2 480V circuit breakers must be taken to elevation 779' of the Unit 1 Reactor Building for testing. This involves crossing the security barrier between units and is very time consuming.

PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area CONSTRUCTION FACILITIES AND EQUIPMENTObjective No. CC-2Evaluator(s) Saccone, KruusIV. Areas of weakness and corrective action; Good Practices

Finding (CC 2-1) Time is wasted transferring 480 V circuit breakers from Unit 2 to Unit 1 for testing.

Corrective Action

Letter PCLBC-5811 dated October 22, 1982, has instructed the Contractor to erect a breaker test area on the south end of the Turbine Building, elevation 729'. PP&L Maintenance will be providing the breaker test equipment for Unit 2. As of November 18, 1982, the breaker test area enclosure has been constructed and supplied with a 480 V feeder. The 120 V feeder will be completed within one week.



Performance Area Material Control Objective No. CC-3Evaluator(s) B. Saccone, P. Brady, J. Kruus, D. Ranstrom, B. Yatko**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 consisted of the expenditure of approximately 13 manhours in the following areas:

- Inspection of warehouse facility and material receiving process.
- Inspection of maintenance of installed equipment.
- Observation of Equipment Maintenance program.
- Observation of installed equipment inspection program.

As a followup approximately six hours were devoted to discussions with various Contractor personnel in the area of Material and Equipment Control.

III. Conclusion

The overall program of material and equipment maintenance and control was satisfactory. There were, however, some deficiencies.

PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area

MATERIAL CONTROL

Objective No. CC-3

Evaluator(s)

Saccone

IV. Areas of weakness and corrective action; Good PracticesFinding
(CC 3-1)

Some installed equipment (Control Panels, Motor Control Centers, Electric Motors) are not being maintained in accordance with equipment maintenance procedures. Some are without covers, heat or both.

Corrective Action

The individual items addressed on the detail sheets have been corrected or resolved to the satisfaction of PP&L Construction. The Bechtel Site Superintendent has issued a memo dated 11/15/82 to all Lead Superintendents and Lead Engineers directing them to upgrade the storage and maintenance practices.

Project Construction will monitor the effectiveness of the corrective action.



1. Performance Area: Material Control Objective No. CC-3
(title)

2. Provide factual information that supports the Performance Evaluation Summary

1. Electrical heaters, quartz floodlights and other electrical equipment were being stored outside with little or no protection. (North side of Combo Shop).
2. Heater indicating light to condensate Pump Motor 2P102A on elevation 656' of Turbine Building was not lit.
3. During an inspection of installed equipment in R. B. Els. 670 and 683, 17 of 36 items were not properly maintained:

<u>Equipment Item 3</u>	<u>Elev/Area</u>	<u>Condition</u>
2C032	683/30	No heat
2B216	683/32	Inadequate heat
2C006	683/32	No heat
2C215A	683/32	No heat
2CB216B	683/32	No heat/cover
2C021	683/33	Partially covered
2C215B	683/33	No cover
2X226	683/33	No heat
2Y226	683/33	No heat/cover
2ATS219 (turned over to PP&L)	670/32	Not covered properly
2B219	670/32	Not covered properly
2C201A	670/32	Inadequate heat
2C201B	670/32	Inadequate heat
2C221	670/32	No heat
2C246	670/32	No heat/cover
2D254	670/32	No heat
2G202	670/32	No heat - Generator only



PERFORMANCE EVALUATION DETAILS

Construction Project

1. Performance Area: Material Control Objective No. CC-3
(title)

2. Provide factual information that supports the Performance Evaluation Summary

4. Control panels - 2C227B - No heat
2C008 - no heat; sheet metal stacked against it.

Motor Control Center - MCC24246 - cover open/torn; No heat

5. Turbine - Generator dehumidifier air intake filters were dirty and in need of replacement.

6. In place maintenance was inspected on 749' of the reactor building. The following cabinets needed their protective covers repaired:

2C235A
2C235B
2C002
2A201
2A202
2C279



PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area Control of Construction Processes Objective No. CC-4Evaluator(s) R. Jensen, J. Kruus, G. Stanley, R. Saccone, A. Maino, T. McKenney,
D. KanstromI. 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 primarily seven (7) people from the evaluation team. Approximately 100 manhours were expended in observing work practices at various locations on the project. Approximately 50 manhours were devoted to follow-up, including discussions with various levels of supervision and in record review.

The following is a sampling of activities observed: installation and inspection of large and small pipe hangers, cable pulling and terminations; hydrostatic testing, system flushes, welding and nondestructive testing, equipment alignment, generator and isolated phase bus erection, and 480V circuit breaker installation and testing.

III. Conclusion

The activities observed were performed in a satisfactory manner. In nearly all cases, the craftsmen performed their tasks competently. Supervision was evident and appeared to be effective. Some weaknesses were observed.

PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area CONTROL OF CONSTRUCTION PROCESSES Objective No. CC-4Evaluator(s) R. Jensen, J. Kruus, G. Stanley, R. Saccone, A. Maino, T. McKearney,
D. RanstromIV. Areas of weakness and corrective action; Good Practices

Finding (CC 4-1) Cable lengths installed in the field exceed schedule length by an average of 40%. One cable was 410% of the schedule length. Actual lengths are fed back to the design office in San Francisco. Bechtel engineering does not use the actual cable length data to verify the design calculations. See finding DC 2-2 for discussion of design implications.

Corrective Action

The cable length shown on the pull card is the measured length of the run which includes allowance for multiple pulls, terminations, etc. When the pulled cables are cut to the proper lengths, the actual lengths on the pull cards are not decreased by the amount cut off each end to reflect the completed length. Project Engineering may request the final installed length if concern over voltage drop exists after they review the measured length inputted on the pull card. (Several such requests were received during Unit 1 cable pulling; none have been received recently.)

Finding (CC 4-2) Equipments and systems were not always properly protected from possible damage or contamination by nearby construction activities.

Corrective Action

On November 18, 1982, a memo was issued by the Bechtel Field Construction Manager to all Lead Superintendents and Lead Discipline Engineers directing them to upgrade the practices employed to protect installed equipments. PP&L Project Construction will monitor the effectiveness of this action.

Finding (CC 4-3) Work was sometimes conducted using drawings that were not up to date or which were not properly controlled.

Corrective Action

On November 4, 1982, a memo was issued by the Bechtel Field Construction Manager directing them to upgrade the practices used to ensure that only properly authorized drawings are used for construction. The information provided by this memo has been incorporated in FP-G-4, Rev. 19 (approved 11/2/82). In addition, specific corrective action has been taken by Peabody & Wind in response to Bechtel QAR-F-895. PP&L Project Construction will monitor the effectiveness of this action.

1. Performance Area: CONTROL OF CONSTRUCTION PROCESSES Objective No. CC-4
(title)

2. Provide factual information that supports the Performance Evaluation Summary

CC 4-1 Cable Pulling

- It was observed that the average actual length was 140% of scheduled length. This is based on a 56 cable sample (see attached list). Observations verified that measured lengths accurately represent the physical length of installed cable, with excess length at termination, points seldom exceeding 5 to 10 feet. If a long piece is created, it is cut off, returned to the cutting shed, and the excess is subtracted from the pull card actual lengths. What scrap is generated (approx. 3000 lb. shipped twice a month) was found to be damaged welding or power supply cards and two to three foot pieces of circuit cable.

The following cable pull cards were reviewed to compare scheduled and actual (cut) lengths. (From 8/18/82 to 10/5/82)

<u>CABLE NO.</u>	<u>SCH. LENGTH</u>	<u>ACTUAL LENGTH</u>
FK2Q6507G	323 ft.	410 ft.
NK2Q0605Z	53	70
NK2Q0606Z	53	70
RK2V4501P	96	155
RK2V4503P	112	180
RK2V4505P	94	160
RK2V4507P	89	150
RK2V4561D	94	155
RK2V4563D	114	180
RK2V565D	104	160
RK2V567D	94	150
RK2Q7002Q	395	560
NK0103B	181	275
PK2V4500P	111	180
PK2V4502P	103	180
PK2V4506P	114	180
PK2V4508P	98	180
PK2V4560D	139	180
PK2V4562D	123	180
PK2V4566D	139	180
NK2V1652D	212	255
NK2V1653D	216	255

PERFORMANCE EVALUATION DETAILS

Construction Project

1. Performance Area: CONTROL OF CONSTRUCTION PROCESSES Objective No. CC-4
 (title)

2. Provide factual information that supports the Performance Evaluation Summary

<u>CABLE NO.</u>	<u>SCH. LENGTH</u>	<u>ACTUAL LENGTH</u>
FK2Q6509G	439 ft.	645 ft.
FK2Q6510G	399	550
FK2Q6511G	309	485
FK2Q6512G	303	485
NKOK0506S	56	230
NKOK0506T	16	25
NKOK0506U	16	25
NKOK0506V	16	25
FK2Q4225D	228	200
FK2Q4226D	243	215
FK2Q4228D	228	210
FK2V2671D	117	160
FK2V2671F	117	160
FK2V2671J	117	160
NP2Q1184A	188	300
NP2Q1185A	77	150
NP2Q1186A	75	150
NP2Q1187A	186	300
NP2Q1188A	70	150
NP2Q1189A	187	300
NK2K0003E	534	685
G	534	685
J	534	685
L	534	685
N	534	685
NK2Q1184C	178	213
85C	71	123
86C	71	121
87C	173	212
88C	72	113
89C	178	200
NP2Y0221D	154	210
RK2Q1508F	236	345
RK2Q1508G	97	140



1. Performance Area: CONTROL OF CONSTRUCTION PROCESSES Objective No. CC-4
(title)

2. Provide factual information that supports the Performance Evaluation Summary

CC 4-2 Equipment not always properly protected.

1. A craftsman was observed grinding a weld on the isolated phase bus ducting. The duct was open and susceptible to contamination from grinding debris.
2. Workers were observed walking on cable tray 2KSF02.
3. Welding activities above penetration box 103A in Area 31 on the 704 elevation of the reactor building were showering sparks in the vicinity of the open box and electrical workers.
4. During the course of pulling cables MM2Q2058P and MM2Q2058E, part of the cables were coiled in a figure eight on the floor. Several workers stepped on these cables.
5. Grinding was observed above open cable tray 2MSE01. Sparks and debris fell into a one-foot open section of the tray. The tray contained cables.
6. Pneumatic tools, air hoses, and sheet metal were observed lying on top of installed cable in cable tray 2MSK01.
7. Ball peen hammer and other hand tools were observed lying on top of installed cable in cable tray F2KH38 (Reactor Bldg. elev. 709').
8. Instruments and instrument lines are susceptible to damage following acceptance inspection. During the course of construction, protection is provided by shielding - usually metal or plywood. The shielding is removed to facilitate hydrostatic testing and acceptance inspections. Following acceptance, the shielding is not replaced. Damage sometime results. For example, an instrument supervisor pointed out a section of core spray instrument line on the 749 elevation of the reactor building that was damaged within 24 hours of removal of the shielding.



PERFORMANCE EVALUATION DETAILS

Construction Project

1. Performance Area: CONTROL OF CONSTRUCTION PROCESSES Objective No. CC-4
(title)

2. Provide factual information that supports the Performance Evaluation Summary

CC 4-3 Drawing problems:

1. HVAC subcontractor personnel were observed using an uncontrolled copy of DCP 20022, Rev. 0 to lay out the location for an anchor bolt core drilling. Also, the required core drilling and excavation check list was not present.
2. During installation of conduit for DCP 652-4, Rev. 0, the foreman was observed using uncontrolled copies of IDCN #1 to Dwg. E-30-3, Rev. 18 and IDCN #1 to E-33-3, Rev. 15.
3. In six instances, the current revision of drawings was not being utilized for production work.



PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area Construction Quality Inspections Objective No. CC-5Evaluator(s) D. Ranstrom, R. Saccone, G. Stanley, R. Jensen, C. Whirl, A. MainoI. Performance Objective

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

II. Scope of Evaluation

The evaluation involved one evaluator full time with contributions from five other evaluators. Approximately 60 hours were devoted to observing QC inspection activities in the areas of hydrostatic testing, large and small pipe hanger installations, installed equipment maintenance, cable terminations & welding. Another 30 hours were spent in interviews, inspections & training document reviews, and program procedure reviews.

III. Conclusion

The performance of Quality Control Inspectors was strong in all areas observed. The inspection team concluded that quality standards are being rigorously enforced.

The possibility exists that some aspects of the program for dispositioning pipe hanger discrepancies may not meet the letter of 10CFR50, Appendix B requirements.

Performance Area CONSTRUCTION QUALITY INSPECTIONS Objective No. CC-5Evaluator(s) D. Ranstrom, R. Saccone, G. Stanley, R. Jensen, C. WhirlIV. Areas of weakness and corrective action; Good PracticesGood Practice

The Quality Control Inspections observed were uniformly of high quality. The evaluation team was very favorably impressed with the professionalism displayed by the Quality Control Inspectors. (Detail 1)

Finding (CC 5-1) The system for documenting nonconforming conditions found during pipe hanger final inspections using Installation Review Forms (IRFs) in lieu of Nonconformance Reports (NCRs) bypasses the normal reporting and control measures associated with nonconformance control.

The program as practiced may not satisfy all of the detailed requirements found in 10CFR50, Appendix B. (Details 2-3)

Corrective Action

San Francisco/Project Special Provision G-3.3 dated February 8, 1977, allows use of a field procedure to establish a program to be used in place of NCR's for general repetitive problems. Accordingly, FP-P-20 institutes use of the IRF in lieu of NCR's and has been approved by Bechtel and PP&L as meeting the intent of PSP G-3.3.

The system of reporting hanger inspection discrepancies via IRF does not bypass the fundamental reporting and control measures associated with NCR's. All IRF's are logged by QC and copies of IRF's are forwarded to QA for trend and corrective action analysis. Discrepancies requiring generic corrective action are subsequently brought to management's attention formally by Bechtel QA (e.g., QA/IOM-2320) in addition to the informal communications among QC, Construction, Engineering and Project Management. IRF's involving Project Engineering Repair or Use-As-Is dispositions require Design Engineering Approval; those involving design authority are dispositioned by Field Engineering and IRF's involving Rework or Documentation dispositions are appropriately processed within Field Construction. (Responsibilities normally associated with formal NCR's have been delegated by the Project Field Engineer, Project Field Quality Control Engineer, and Project Engineer.) In addition, all IRF's require verification and closure by Quality Control and remain part of the permanent QC documentation. In short, all the fundamental characteristics of nonconformance processing are reflected in the program with the exception of tagging, which is considered inappropriate because of the construction and acceptance status of the hangers at the time the IRF is initiated. Consequently, the existing program fully satisfies 10CFR50 requirements.

PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area CONSTRUCTION QUALITY INSPECTIONSObjective No. CC-5Evaluator(s) D. Ranstrom, R. Saccone, G. Stanley, R. Jensen, C. Whirl, A. Maino,

T. McKearney

IV. Areas of weakness and corrective action; Good Practices

Finding (CC 5-2) In process and "final field" inspections of hanger installations conducted by production personnel have not been effective in reducing the high hanger rejection rate experienced during QC final inspections. (Detail 4)

Corrective Action

On November 3, 1982, Bechtel Management issued a memo directing the Field Engineering Audit Program to review hanger rejection discrepancies and establish individual accountability. These data will provide a basis for specialized individual instruction. Specific steps are as follows:

1. All P-20 discrepancies shall be classified into the following categories:

- a. Welding (W.E.)
- b. Hardware (H.E.)
- c. Dimension Errors (H.E.)
- d. Drawing Clarification (H.E.)
- e. Invalid

2. The items will be tracked to the Welding or Hanger Engineer who performed the latest inspection.

3. Personnel with a higher rate of rejection will be audited by Field Engineering Audit Team. Auditing will include observation of actual field work, review of documentation generated by the individual, and applicable P-20 records. An audit report will be issued detailing corrective action as appropriate.

The effectiveness of these actions will be evaluated by closely observing the hanger rejection statistics.



1. Performance Area: CONSTRUCTION QUALITY INSPECTION Objective No. CC-5
(title)

2. Provide factual information that supports the Performance Evaluation Summary

1. Over ninety hours were spent observing inspections and auditing activities and checking QC records. A total of 15 separate inspection activities was observed, including: hanger inspections, cable terminations, hydrostatic testing, maintenance, welding and non-destructive examinations.

The following specific points were noted:

- a. QC inspectors consistently reviewed the document package in detail before leaving for the field to make the actual inspection.
- b. Without exception, the QC inspectors were knowledgeable with the details of the procedures. A strong training program for QC inspectors was evident.
- c. Inspectors worked from the documents. Drawings, procedures and checklists were available and were used.
- d. Inspections were rigorous. In the hanger area, particularly, the rejection rate was high. In the opinion of the four evaluators, (all of whom had extensive QA/QC experience) the observed rejections were justified.
- e. Instruments and gages used by QC inspectors were in calibration. Spot checks showed that the calibration records could be traced.
- f. A vigorous program exists by which the owner (PP&L) monitors the performance of the contractor (Bechtel) Quality Control.

2. Investigations revealed that pipe hanger final inspections are being conducted as follows:

Prior to releasing a pipe hanger for QC final inspection, Field Engineering is performing a "final" inspection as a measure to reduce the QC rejection rate. After the Field Engineer signs off on his "final" inspection checklist, the hanger package is reviewed and forwarded to QC.

If the hanger is accepted by QC, the inspection report is signed off and the inspection is deemed a final inspection. However, if the hanger is rejected, the discrepancies are documented on an Installation Review Form (IRF) as identified in Field Procedure FP-P-20 in lieu of a Nonconformance Report (NCR) and the inspection becomes in effect, an in-process inspection. Upon correction of the discrepancies, QC performs re-inspections. This process may require several re-inspections until the hanger is accepted by QC.

PERFORMANCE EVALUATION DETAILS

Construction Project

1. Performance Area: CONSTRUCTION QUALITY INSPECTION Objective No. CC-5
(title)

2. Provide factual information that supports the Performance Evaluation Summary

The use of the IRF to record hanger discrepancies expedites the process because the necessity to formally clear a large number of NCR's is avoided. The net effect is that the physical work is being properly done before the hangers are accepted. However, the high visibility given to defects and subsequently to the development of corrective action to prevent recurrences by following the NCR process has been eliminated with the use of the IRF.

The evaluation team is concerned that the current practice may not meet the letter of 10CFR50 Appendix B, Criteria XV and XVI as evidenced by the following:

- o Hangers identified as discrepant in IRF's are not being physically identified as such. As of 10/26/82, 202 open IRF's existed. No nonconforming material tags were observed affixed to the hangers.
- o No evidence was found of any systematic evaluation of the discrepant conditions by either QC, QA, construction, or engineering to initiate corrective action and to prevent recurrence.

3. The following observations concerning implementation of Bechtel Field Inspection Manual Procedure 6-3, Rev. 6 and Project Special Provisions SF/PSP 6-3.1 through SF/PSP 6-3.11 with respect to the hanger program are considered pertinent.

- a. The use of the IRF to document nonconforming items is not addressed within FIM 6-3 nor is there adequate procedural guidance within FP-P-20 as to when a Nonconformance Report (NCR) is to be utilized in lieu of the IRF for hanger nonconformances.
- b. Hold tags are not being affixed to nonconforming items (Reference FIM 6-3, Paragraphs 4.4 and 7.3)
- c. No evidence exists that the Project Field QC Engineer is evaluating each IRF for the need to initiate a Management Corrective Action Request (MCAR) per Bechtel Nuclear QA Manual Section V, Number 10 (Reference SF/PSP G-3.5, Rev. 0)
- d. No evidence was found of any evaluation of nonconformance either by QC, QA, Construction, or engineering to initiate corrective action to prevent recurrence of the nonconforming conditions (Reference FIM 6-3, Paragraphs 4.10.1 and 4.10.3)



PERFORMANCE EVALUATION DETAILS

Construction Project

1. Performance Area: CONSTRUCTION QUALITY INSPECTION Objective No. CC-5
(title)

2. Provide factual information that supports the Performance Evaluation Summary

e. IRF's are not being distributed to:

1. PP&L QA for all "repair" and "use as is" dispositioned nonconformance per FIM G-3, Paragraph 4.9.2.
2. The organization responsible for the activity which caused the nonconformance to enable initiation or corrective action per FIM G-3, Paragraph 4.10.1.
3. Bechtel QA for their evaluation and initiation of corrective action to prevent recurrence per FIM G-3, Paragraph 4.10.3.

4. During the four week period ending 10/26/82, a total of 141 hangers was released to QC for final inspection. During the same period, a total of 116 Installation Review Forms was issued by QC identifying unacceptable conditions found during final QC inspections. Note that the 116 IRF's do not necessarily apply to the same 141 hangers released to QC. However, the comparison is reasonable and the implied rejection rate is 82%.

Final hanger inspections by Quality Control Inspectors are conducted by well-trained, well-qualified personnel who carefully follow documents and check lists. The inspection team observed a sufficient number of QC inspectors in action to be satisfied that quality standards are indeed being rigorously enforced. Inspections observed included hydrostatic testing, hanger acceptance inspections (large and small pipe), welding NDE, radiography, cable termination, welding fit up and equipment maintenance. An over-inspection of Bechtel QC work by PP&L QC personnel was also observed. All were professionally done.

"Final field" inspections of two small pipe hangers by a field engineer were observed. In contrast to the QC inspectors, who, without exception, carefully followed the check lists and used the drawings extensively, the field engineer performed the inspection from memory. After the inspection had been completed, he checked off and signed the check list. At no time did he carefully review the check list. He did occasionally refer to the drawing.

PERFORMANCE EVALUATION DETAILS

Construction Project

1. Performance Area: CONSTRUCTION QUALITY INSPECTION Objective No. CC-5
(title)

2. Provide factual information that supports the Performance Evaluation Summary

The observed sample of final field inspections was too small to be meaningful. However, the following statistics are of interest. A sample of 24 Installation Review Forms (IRF's) was reviewed. (Data are found under objective CC-6). A total of 116 discrepancies was noted on the IRF's by the Quality Control inspectors. Of these, 50 were either weld discrepancies or dimensional discrepancies. Finding this type of nonconformance requires no esoteric knowledge of quality control standards. It does, however, require careful attention to detail. The statistics support the observation that rather casual field inspections by production personnel are fairly common.

PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area Construction Corrective Actions Objective No. CC-6Evaluator(s) D. Ranstom, C. WhirlI. 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 of this performance objective involved the accumulation of applicable data during the evaluation of Construction Quality Inspections (CC-5) and Corrective Action (QP-4) with only approximately 6 hours spent exclusively evaluating this performance objective. QC/QA deficiency reporting mechanisms and Construction responses were reviewed to evaluate Construction's attention to timely resolution and action taken to minimize or prevent repetition of problems. (See CC-5 and QP-4 for related evaluations.)

III. Conclusion

The Bechtel program of corrective action to items identified via Nonconformance Reports (NCRs) was found to be functioning well. Some weaknesses were observed in other areas.

Performance Area CONSTRUCTION CORRECTIVE ACTIONObjective No. CC-6Evaluator(s) D. Ranstrom, C. WhirlIV. Areas of weakness and corrective action; Good Practices

Finding (CC 6-1) The current use of Installation Review Forms (FP-P-20) to document hanger installation deficiencies found during QC final inspections in lieu of the Bechtel NCR (FIM procedure G-3) does not ensure timely tracking and close out of the conditions, trending for generic problems, and reporting of problems to upper management. (See evaluation details 1-4).

Corrective Action

This finding essentially repeats finding CC-5. The response to CC-5 noted the fact that IRF's are being logged by Quality Control and that all of the essential elements of nonconformance processing are in place. It also notes that Bechtel and PP&L analyzed the situation and made a joint decision that nonconformance tags would not be used for routine hanger problems.

PP&L Project Construction is closely monitoring the Bechtel hanger program. While it is true that the tracking mechanisms are not as formal as those used for NCR's, an effective program to identify and correct hanger problems is in existence. It is important to note that the issue raised here is not the quality of the final product. The issue is the formality of the corrective action process. In the opinion of Project Construction, a reasonable balance exists between productivity and formality. Project Construction will continue to monitor the hanger program on a daily basis.

Finding (CC 6-2) Bechtel Quality Action Requests (QARs) issued by QA to solicit corrective action from Bechtel Construction and/or QC are not being responded to in a timely manner to provide either interim or final corrective action taken to resolve the conditions identified. (See evaluation detail 5).

Corrective Action

Investigations and action necessary to respond to QARs is initiated immediately upon their receipt by both Field Engineering and Quality Control. Tracking of these items, including regular followup is accomplished via FP-G-6. The nature of a few of these items does not permit a quick response or corrective action, and often the people responsible for action will not respond until corrective action is complete. In order to improve the timeliness of responding to future QAR's of this nature, a Bechtel Interoffice Memorandum has been issued (11/18/82), advising responsible personnel to provide a response to all QARs by the required date and to state when corrective action(s) will be complete if the action cannot be complete at the time the QAR is due for response. The effectiveness of these actions will be evaluated during the course of normal Quality Assurance Audits.

Performance Area CONSTRUCTION CORRECTIVE ACTIONObjective No. CC-6Evaluator(s) D. Ranstrom, C. WhirlIV. Areas of weakness and corrective action; Good Practices

With reference to the specific items cited, the following is the current status:

- QAR-F-792: Response submitted 11/13/82
- QAR-F-834: Response submitted 10/13/82. This response was rejected by QA/IOM 2336. An additional response will be provided upon review of this rejection.
- QAR-F-835: The original draft response was lost, a response is presently being prepared again.
- QAR-F-859: Response submitted 11/2/82
- QAR-F-871: Response submitted 9/17/82
- QAR-F-874: Response submitted 11/5/82

Finding (CC 6-3) Bechtel Construction has not taken sufficient corrective action to eliminate the cause of repeated violations of the installed equipment maintenance program. (See evaluation details 6-7)

Corrective Action

The following activities have been initiated to eliminate future repeated violations of storage and maintenance procedures:

1. A new Lead Storage & Maintenance Engineer has been assigned to the group and given specific direction to ensure prompt followup on all storage discrepancies identified.
2. Daily review of discrepant storage conditions by the DSC originators with the superintendent responsible for correcting the condition.
3. A letter has been issued by the Bechtel Field Construction Manager (dated 11/15/82) to inform and to re-emphasize to all personnel the responsibilities for Storage & Maintenance.
4. Presentations are planned at various discipline training sessions to educate all field engineering personnel on Storage & Maintenance procedures and to encourage reporting of discrepant conditions as soon as discovered. These sessions will be completed by December 31, 1982.

PP&L Project Construction will monitor the effectiveness of these corrective actions.

PERFORMANCE EVALUATION DETAILS

Construction Project

1. Performance Area: CONSTRUCTION CORRECTIVE ACTION Objective No. CC-6
 (title)

2. Provide factual information that supports the Performance Evaluation Summary

1. Bechtel QC final inspections of pipe hangers are being documented on Installation Review Forms (IRFs) in accordance with Field Procedure FP-P-20 in lieu of Nonconformance Reports. The use of these IRFs is bypassing the established nonconformance reporting, trending, and control processes because FP-P-20 does not require:
 - a. Logging of IRFs to enable tracking
 - b. Items found to be nonconforming to be tagged or segregated
 - c. Trend analysis of deficiencies and subsequent reporting to upper management
2. Discussions with Bechtel QA and Field Engineering personnel responsible for control of IRFs revealed that no formal tracking mechanism is currently employed.
3. A review of all IRFs issued as of 10/26/82 on both small and large pipe hangers revealed a total of 452 IRFs had been issued with 202 of these still open. This indicates a large number of nonconforming items in the field that are not physically identified as nonconforming.
4. A review of 12 closed IRFs issued between 8/13/82 and 10/12/82 identified the following nonconformances:

No.	No. of Discrepancies Noted	Weld Disc.	Dimen. Discr.	Sketch Discr.	Misc. Discr.
GBC-201-8(H298)	9	1	3	1	4
M213-SP-DCA-228-16(H5045)	3	1		2	
SP-DCA-236-6(H5006)	4	1	2	1	
HRC-216-1(H2)	8	1		6	1
GBC-201-4(H297)	5	1	1	3	
GBC-201-10(H36)	15	2	4	5	4
SP-DCA-222-3(5011)	2	1		1	
DCA-217-3(H5004)	2		1	1	
GBB-210-H21	4	1	2	1	
GBB-202-2(6)	4	2	1		1
HBB-213-1(H13)	9	4	1	2	2
HCC-201(25)	2			1	1
	12	15	15	24	13



PERFORMANCE EVALUATION DETAILS

Construction Project

1. Performance Area: CONSTRUCTION CORRECTIVE ACTION Objective No. CC-6
(title)

2. Provide factual information that supports the Performance Evaluation Summary

On 10/28/82 an additional sample of 12 recent IRFs were reviewed and revealed the following:

<u>No.</u>	<u>No. of Discrepancies Noted</u>	<u>Weld Disc.</u>	<u>Dimen. Discr.</u>	<u>Sketch Discr.</u>	<u>Misc. Discr.</u>
HBB-208-1(H10)	8	3	5		
HRC-224-1(H5)	4			4	
HBB-213-(H8)	4	2	1		1
GBC-205-1(H6)	4			4	
GBB-202(H51)	4		1	2	1
HRC-201(H8)	4	1	1	1	1
HBB-210(H30)	1			1	
HRC-233-1(H4)	1			1	
GBB-210-1(H27)	2			2	
HBB-247(H52)	1				1
DBB-221-2(H23)	8	1	1	5	1
DCA-208-1(H3)	8	4		4	
12	49	11	9	24	5

This review indicates recurrence of problems similar to those identified in the original sample of closed IRFs.

5. A review of quality Action Requests issued by Bechtel QA revealed the following remain unresolved by either Field Construction or QC as of 10/19/82:

<u>QAR#</u>	<u>Originated</u>	<u>Response Due Date</u>
QAR-F-792	2/24/82	3/24/82
QAR-F-834	5/11/82	5/26/82
QAR-F-835	5/14/82	5/28/82
QAR-F-859	7/30/82	8/16/82
QAR-F-871	9/1/82	9/14/82
QAR-F-874	9/10/82	9/20/82

6. During an inspection of installed equipment maintenance in R.B. Els. 670 & 683, 17 of 36 items were not being properly maintained: (Bechtel QC is formally reporting this condition.)



1. Performance Area: Construction Corrective Action Objective No. CC-6
(title)

2. Provide factual information that supports the Performance Evaluation Summary

6. con't

<u>Equip. Item No.</u>	<u>Elev./ Area</u>	<u>Condition</u>
2C-032	683/30	No heat
2B-216	683/32	Inadequate heat-intermittant exposure
2C-006	683/32	No heat
2C-215-A	683/32	No heat
*2CB-216-B	683/32	No heat-no cover
2C-021	683/33	Partially covered-not sealed
2C-215-B	683/33	Not covered
2x-226	683/33	No heat
2y-226	683/33	No heat-not covered
2ATS-219	670/32	Not covered properly
2B-219	670/32	Not covered properly
*2C-201-A	670/32	{Inadequate Heat - bulb in one compartment only
2C-201-B	670/32	
*2C-221	670/32	No heat
*2C-246	670/32	No heat-not covered
2D-254	670/32	No heat
2G-202	670/32	No heat-generator only

*Addressed previous week.

7. A review of Bechtel QC initiated weekly inspection reports covering the inspection of installed equipment maintenance over a 4 week time period and an interview with the lead Mechanical QC engineer in charge of equipment maintenance inspection indicated that equipment maintenance deficiencies are not resolved in a timely manner by Construction personnel. Numerous weekly inspection reports and Inprocess Rework Notices indicated that the same maintenance deficiency is encountered and reported by inspection personnel 2 or more consecutive times.

Performance Area Test Equipment Control Objective No. CC-7

Evaluator(s) _____

I. Performance Objective

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

II. Scope of Evaluation

The evaluation of this area consisted of the expenditure of approximately eight manhours in the following areas:

- Witnessing the calibration of ASME pressure gages.
- Inspection of the Instrument Calibration Lab.
- Review of calibration procedures.
- Observing use of calibrated instruments in tests.

As a followup to these observations, approximately five manhours were devoted to discussions with personnel responsible for the use and calibration of test equipment and calibrated tools.

III. Conclusion

The majority of activity evaluated under this performance objective was satisfactory. However, one area of weakness was noted.

PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area TEST EQUIPMENT CONTROLObjective No. CC-7Evaluator(s) SacconeIV. Areas of weakness and corrective action; Good Practices

Finding (CC 7-1) Calibrated instruments/tools are not all being returned to the Instrument Calibration Lab by their expiration date.

Corrective Action

Quality Control furnishes a list of items that are overdue for recalibration. Field Engineers and Superintendents are notified by the Office Engineer of tools that are approaching the date when recalibration is required. Field Engineers and Superintendents are also notified of calibrated tools that were not returned for recalibration by inter-office memo and corresponding form issued by the Office Engineer. This is followed up until the required action has taken place.

These actions, initiated only about a month previous to the audit, have significantly reduced the quantity of equipment overdue for calibration; and we feel these actions will continue to reduce the tardiness in the return of such equipment for recalibration. We do not expect, however, to reduce the unreturned quantity to "zero", since a calibrated tool may legitimately be used up until its expiration date.



Saccone

PERFORMANCE EVALUATION DETAILS

CONTRACT NO. 100-100-100-100
SSES

1. Performance Area: Test Equipment Control Objective No. CC.7
(title)

2. Provide factual information that supports the Performance Evaluation Summary

Calibrated tools/instruments are issued and signed for by Bechtel Superintendents. Recall sheets kept in the Instrument Calibration Lab indicated that the tools/instruments are not always returned by the expiration date.

On 10/26/82 it was noted that for the period from 10/10/82-10/25/82, 20 tools and/or instruments were in the field beyond their expiration dates. Eight of these 20 were torque wrenches.

PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area Industrial SafetyObjective No. PS-1Evaluator(s) Entire TeamI. Performance Objective

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

II. Scope of Evaluation

The evaluation of this area was performed by all members of the team. The observations were made during walk-throughs of the plant and support facilities and during the course of observing construction activities. Specific attention was paid to "Control of Hazardous Material - Fire Protection - Rigging and Lifting and Housekeeping."

In-depth interviews were conducted with the Safety Supervisor and others from the above-noted activities.

Safety related documentation was reviewed including Safety Meeting agendas and attendance lists, accident records and trend analysis and safety procedures.

III. Conclusion

The plant's safety record has been good. On two (2) occasions, the milestone of one million manhours of work without a lost time accident has been passed. Safety has high visibility and an overall commitment to safety exists. Some minor violations were observed indicating that the program is not always 100% effective.

PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area INDUSTRIAL SAFETYObjective No. PS-1Evaluator(s) (See next page for list)IV. Areas of weakness and corrective action; Good Practices

The following good practice was noted:

A strong commitment to safety was observed. The project has compiled an impressive safety record. On two occasions, the milestone of one million manhours without a lost-time accident has been passed. There has never been a fatal accident at Susquehanna. The following findings are, in the opinion of the evaluation team, exceptions to an excellent program. They highlight the adage that "Eternal vigilance is the price of safety."
(See Detail 1)

PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area INDUSTRIAL SAFETY Objective No. PS-1Evaluator(s) T. McKearney, J. Kruus, J. Shana, R. Saccone, P. Brady, J. Stefanko,
D. Jensen, A. Derkacs, C. Cole, C. Whirl, G. StanleyIV. Areas of weakness and corrective action; Good Practices

- Finding (PS 1-1) Conditions exist in the Hazardous Waste Storage area that can contribute to unsafe conditions as noted below:
- a. Access not controlled except on day shift.
 - b. Gates in fence have been removed.
 - c. There is no phone in the area to summon aid in case of emergency.
 - d. Waste oil storage tanks are in close proximity to heavy crane lifts. Failure of the crane could result in rupture to the tank and allow stored oil to leak into the sediment pond. (See Detail 3)

Corrective Action

A space allocation request has been filed by PP&L Project Construction to upgrade the hazardous waste storage area. The above problems will be corrected when funding is authorized by the General Office. Action will be taken by Dec. 31, 1982

- Finding (PS 1-2) Personnel safety procedures are not always strictly adhered to. Nine (9) examples of personnel failing to wear protective equipment (safety glasses and hard hats) were noted. (See Detail 2)

Corrective Action

By frequent walk-through inspections of all construction areas, the Safety Department enforces personnel safety procedures. Personnel who fail to comply with protective equipment requirements are instructed immediately to adhere to the prescribed safety procedures. Diffident and/or consistently negligent individuals are subject to formal punitive procedures.

- Finding (PS 1-3) Some facilities were not maintained in accordance with good safety practices. Nine (9) examples of tripping hazards, protrusions into walkways, and inadequate lighting were noted. (See Detail 3)

Corrective Action

Procedures regarding unsafe practices such as tripping hazards, protrusions into walkways and inadequate lighting are focus of attention at numerous safety meetings and walkthrough inspections. During construction activities, occasional violations of these procedures are necessitated by the nature of the work being done. Any unsafe practices noted by the Safety Department in walkthrough inspections or reported to the Safety Dept. by other personnel are promptly corrected.

1. Performance Area: INDUSTRIAL SAFETY Objective No. PS-1
(title)

2. Provide factual information that supports the Performance Evaluation Summary

1. A strong commitment to safety was observed.
 - a. A monthly safety inspection of the project is made by the Insurance Underwriters, the Pennsylvania Manufacturer's Association. The duration is normally 1½ days. A formal exit interview is conducted and a formal report is issued. PP&L and Bechtel respond to the report findings in writing.
 - b. PP&L Project Construction conducts a daily safety and housekeeping inspection. Two persons are employed full time every day on this task. The assignment is rotated among the engineers and construction inspectors.
 - c. Bechtel employs a full time safety staff of nine people including two nurses and a paramedic.
 - d. Bechtel conducts a weekly safety meeting for supervisory people. An evaluation team member attended one of these meetings and observed that it was well conducted.
2. Observations were conducted of many construction activities. Industrial safety requirements are well covered by procedures and policies; however, a limited number of personnel were observed not conforming to procedure requirements.
 - a. Electricians were noted meggering a cable, without first checking to ensure that the circuit was not energized.
 - b. The Combo Shop and Reactor Containment areas are posted as requiring "Eye Protection." Other areas in the plant are posted as requiring "Ear Protection."
 - o Personnel were observed not wearing eye protection during CRD flush inside the containment.
 - o Three (3) pipefitters were observed in the Combo Shop without Eye Protection.
 - o Several pipefitters were observed in the containment without Eye Protection.



1. Performance Area: INDUSTRIAL SAFETY Objective No. PS-1
(title)

2. Provide factual information that supports the Performance Evaluation Summary

- o Craft personnel working on the reactor feed pump lube oil flush were observed without Ear Protection.
- c. Most areas of the plant require that Hard Hats be worn.
 - o 3 electricians were observed without hard hats in the area under the reactor pressure vessel.
 - o Welder was observed grinding on a flexible expansion joint without hard hat. He was wearing safety glasses.
- d. Unguarded openings on the floors require barriers or safety chains.
 - o An open grating near the RHR heat exchanges was observed without the required safety chains.
- e. Flushing procedures require posting of the activity area, the signs are designed to control access and provide warning to others of the existing hazards.
 - o Adequate warning signs were not posted in the vicinity of a CRD flush.

3. Shortcomings on Physical Facilities were noted.

- o Lack of emergency telephone in the Hazardous Waste Storage Area.
- o Lack of access control to Hazardous Waste Storage Area.
- o Waste oil storage tanks not enclosed or located in a manner that would prevent leaks from going into the sediment pond.
- o Lack of safety marking on 2x4's on floor grating used as temporary piping supports presents a tripping hazard.
- o Lack of safety marking on pipe protruding through the floor presents tripping hazards.
- o Welders failing to erect protective barriers around work area that would prevent welders flash.
- o Lack of adequate lighting in several areas.

1. Performance Area: INDUSTRIAL SAFETY Objective No. PS-1
(title)

2. Provide factual information that supports the Performance Evaluation Summary

- o Electrical cables (welding and power) running across floors presents a tripping hazard.
- o Craftsmen observed working without adequate protective gear on ventilation in areas where point fumes are present.

The following housekeeping deficiencies were noted:

- o The exit door from 4 KV Switchgear Room Elevation 719 was blocked by a tool box.
- o 15 to 20 trash bags observed in the entry to the drywell.

PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area Project Planning Objective No. PS-2Evaluator(s) B. Yatko, H. Palmer, M. MormakI. Performance Objective

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

II. Scope of Evaluation

The evaluation involved three individuals who spent approximately 31 manhours. The evaluation consisted primarily of interviews of Bechtel field personnel and PP&L scheduling personnel (General Office, Integrated Startup Group and Field Scheduling). Reviews of project scheduling techniques and various detailed schedules were performed.

The investigation team is aware of the fact that the Unit Two Construction Project is about ten weeks behind schedule.

The reasons for this delay were not investigated. The purpose of the exercise was to evaluate how well the design was controlled and if the plant is being constructed as the design specifies. The efficiency of the process was beyond the scope of the investigation.

III. Conclusion

The methodology for scheduling appeared to be satisfactory. Nothing was found that adversely affected the control of the design or the quality of construction.



PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area Project ControlObjective No. PS-3Evaluator(s) B. YatkoI. 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

This evaluation involved primarily one individual who spent approximately 10 manhours. Methods of tracking and reporting construction progress on both the project and system schedules were reviewed. Members of the evaluation team attended PP&L and Bechtel scheduling status meetings. PP&L and Bechtel methods for cost control were reviewed; particularly as they relate to identifying and reporting deviations from current plans.

III. Conclusion

Project scheduling work planning and coordination appeared to be satisfactory.

PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area. Project Procurement ProcessObjective No. PS-4Evaluator(s) B. YatkoI. 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

Evaluation of this area was performed by one team member who spent eight manhours. The major procurements at Susquehanna have been made and for the most part, the equipment has been installed. This investigation concentrated on field procurement. Particular emphasis was placed on determining that only properly approved suppliers were used for "Q" listed products. Field purchase orders were also checked for compliance with the requirement to report defects in accordance with 10CFR-21.

III. Conclusion

This activity appears to be satisfactory.



PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area Contract Administration Objective No. PS-5Evaluator(s) B. YatkoI. 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

Evaluation of this area was performed by one team member who spent four manhours with Bechtel subcontract administrative personnel discussing how quality control and quality assurance requirements were addressed in subcontract documents. Other topics included the engineering approval process for subcontractor changes and the approval and incorporation of financial changes.

III. Conclusion

This activity appears to be satisfactory.



PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area Documentation Management Objective No. PS-6Evaluator(s) B. Yatko, A. Maino, C. Whirl, D. Jensen, R. SacconeI. 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

Evaluation of this area was essentially performed by one evaluator but all team members provided inputs resulting from their respective evaluation areas. Approximately 70 hours were expended in observing work practices; discussions with supervisory personnel; discussions with craftsmen, engineers and inspectors; and in reviewing records. The technique utilized in performing this evaluation was to observe construction work in progress and note the documents being utilized, followed by discussions with personnel involved with the use or control of these documents, and then checking with appropriate Document Control Status lists to ascertain the latest applicable revisions.

III. Conclusion

Essentially, Document Management on the project was found to be satisfactory. There were, however, a number of weak areas that need further attention.

PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area

DOCUMENT MANAGEMENT

Objective No. PS-6

Evaluator(s)

B. Yatko, A. Maino, C. Whirl, D. Jensen, R. Saccone

IV. Areas of weakness and corrective action; Good Practices

Finding (PS 6-1) Managers and Supervisors are not always enforcing requirements for the control and use of appropriate design documents during construction. Several instances were identified where drawings used for construction were either uncontrolled copies, were not for construction use as defined by procedure or were not the latest design revision. (See Evaluation details 1-3)

Corrective Action

A memo dated November 4, 1982 was issued to remind personnel of drawing control requirements. (Refer to response to CC 4-3). PP&L Project Construction will monitor the effectiveness of this action.

Finding (PS 6-2) Procedural control of interim revisions to Field Procedures needs to be strengthened. No time limits, or number of interim memo revisions to procedures is specified before the revisions must be incorporated. As a consequence, many revisions have not been incorporated for periods of a year or more with one revision being outstanding for 2½ years. In addition, the memo index utilized to advise users of applicable memo revisions was found to be in error in two cases. (See evaluation detail 7)

Corrective Action

A review of all Field Procedures was begun during the first part of October to incorporate interim revisions that had been issued for a significant period of time and had not been incorporated through regular revisions to the Field Procedure. In the future, the following guideline will be used for revising a Field Procedure to incorporate interim memo revisions which were not incorporated through regular revision:

- a. Revise Field Procedure to incorporate all outstanding interim memos after a period of one (1) year from date of issue.
- b. Revise Field Procedure after five (5) interim memo revisions have been issued.

The interim memo index has been checked for accuracy and the necessary corrections have been made.



Performance Area DOCUMENT MANAGEMENT Objective No. PS-6Evaluator(s) B. Yatko, A. Maino, C. Whirl, D. Jensen, R. SacconeIV. Areas of weakness and corrective action; Good Practices

Revision to FP-P-1 incorporating the interim memos is now approved. Revision to RP-P-15 will be made after approval of an in-process interim memo revision. All other Field Procedures referenced were already in the cycle for approval of the revisions incorporating the interim memo revisions.

Finding (PS 6-3) Procedural definition is needed to describe the usage and control of the "MAPPER" and "SYSTEM 38" Systems presently utilized for status reporting of design documents, equipment status, etc. Numerous instances of inaccurate or incomplete data have been identified and the relationship of the two systems is not defined. (See evaluation detail 8)

Corrective Action

The following documents define the use and control of the two systems:

SYSTEM 38

Supplier Document Register ADP (3.40-1) Rev. 1
ADI (3.4.1) Rev. 1

Bechtel Design Documents ADP (3.3) Rev. 0.

MAPPER

Project Configuration Management Procedures
Manual Revision dated 11/8/82

The project recognizes that inaccurate data exist in MAPPER and a continuing program exists to review and correct the data. The recent issuance of the Project Configuration Management Procedures Manual is one outgrowth of the program to achieve accurate MAPPER data. We believe the data is 95-98% accurate and the effort to achieve greater than 98% is not cost effective. We acknowledge a Drawing Control Log problem that is currently under investigation by the Configuration Management Supervisor. We expect this problem to be resolved by 12/31/82.

Performance Area DOCUMENT MANAGEMENT Objective No. PS-6Evaluator(s) B. Yatko, A. Maino, C. Whirl, D. Jensen, R. SacconeIV. Areas of weakness and corrective action; Good Practices

Finding (PS 6-4) A number of design documents in the PP&L General Office were found which lacked applicable design change attachments (DCN's, FCN's & FCR's). (See evaluation detail 6)

Corrective Action

The specific discrepancies have been corrected. The problem of timely receipt of design documents has been discussed with the Bechtel Project Administrator SFHO and with the Bechtel Site Print Room Supervisor.

Finding (PS 6-5) The current Bechtel Project Administration Program for the distribution of design documents for both plant site and the PP&L general office is not ensuring that the issued documents are being received by the appropriate personnel. (See evaluation detail 11)

Corrective Action

A desk procedure has been implemented to resolve this issue. Transmittals are processed daily and filmed. Monthly a list of missing (unacknowledged) transmittals is prepared and sent to the client and field to verify receipt. A followup is done if required.

1. Performance Area: DOCUMENTATION MANAGEMENT Objective No. PS-6
(title)

2. Provide factual information that supports the Performance Evaluation Summary

1. During observation of electrical conduit installation, the foreman was utilizing two uncontrolled copies of Interim Drawing Change Notices (IDCN's). The foreman indicated that controlled drawings are not being updated frequently enough to support construction schedules. This position was supported by the Seismic Support Engineer who added that the field work locations are the last to receive updated design documents. Also during an observation of a layout for core drilling for anchor bolts (by HVAC subcontractor Peabody & Wind), an uncontrolled copy of DCP 20022 Rev. 0 was being utilized.
2. During observations of various work locations, 11 instances of drawings identified as "Record Copy" were being utilized for construction. The current Field Procedure provides for utilization of "Record Copy" for construction but does not allow the use of drawings identified as "Record Copy." Some examples are drawings:
 - a. SP-HCV-233-3, Rev. 6R1
 - b. SP-DCA-237-5, Rev. 0
 - c. SP-DCB-212-11, Rev. 0
 - d. SP-EBC-203-1, Rev. 0
 - e. SP-GBB-211-1, Rev. 4R1
 - f. SP-HCC-232-6, Rev. 2

It is further noted that some of these deficiencies were previously identified in Bechtel's QA Audit PFA 9-2-12 Finding QAF-2, dated 8/30/82.

3. Observation of various work locations resulted in the identification of six instances where the current revisions of drawings were not being utilized. These included electrical drawings used in conduit installation, drawings in production files, drawings utilized for hanger installation and drawings utilized by the ductwork subcontractor.
4. Five instances were noted where Field Change Requests (FCR's) and Field Change Notices (FCN's) were not incorporated into drawing revisions in a timely manner. Bechtel Procedures EDP 4.62, MED 4.62.0 and EDPI 4.62.1 requires FCR's & FCN's be incorporated into drawing revisions no later than 90 days after issue. The following instances were noted:

PERFORMANCE EVALUATION DETAILS

Construction Project

1. Performance Area: DOCUMENTATION MANAGEMENT Objective No. PS-6
 (title)

2. Provide factual information that supports the Performance Evaluation Summary

<u>Drawing</u>	<u>Revision</u>	<u>Date</u>	<u>FCR/FCN</u>	<u>Date</u>
E-33-3	16	--	FCN #E-1074	12/10/79
E-25-1	1	--	FCR #D-5080	11/17/81
E-32-3	15	8/11/82	FCR #E-2146	02/18/82
E-32-3	15	8/11/82	FCR #E-5659	08/25/81
E-33-1	19	8/20/82	FCR #E-3080	07/14/80

In addition to the FCR's/FCN's not being incorporated in drawing revisions within 90 days, it was also noted that, in most cases, drawings had been revised since the applicable FCR/FCN was issued but did not include incorporation of the subject field changes. The Supervisor of Print Control stated that the untimely incorporation of FCR's, FCN's and DCN's is a common practice and has existed for the five years he has been involved with the project.

5. In a review of documents utilized by QC Termination Inspection personnel, FCR #E-7749 issued 10/8/82 was not referenced on or attached to Connection Diagram #E-354-2, Rev. 7.
6. In a review of 47 drawings located in the Nuclear Plant Engineering Section of PP&L's General Office 17 were found to lack attachment of applicable design change documents (DCN's, FCN's, & FCR's). Examples of these are:

<u>Drawing</u>	<u>Applicable Design Changes Not Attached</u>
E-25-7, Rev. 11	FCN #E-2824 dated 03/29/82 FCN #E-2481 dated 06/23/82
E-27-4, Rev. 28	FCN #E-1739 dated 07/07/81 FCR #E-3191 dated 08/11/80 FCR #E-3200 dated 08/11/80
C-1138, Rev. 10 C-1193, Rev. 6	FCR #C-4065 dated 02/02/81 FCN #C-769 dated 07/16/82 FCN #C-787 dated 07/27/82
C-368, Rev. 6 E-30-3, Rev. 18	FCR #C-5443 dated 04/23/82 FCN #E-3647 dated 08/10/82 FCR #E-7563 dated 08/04/82

1. Performance Area: DOCUMENTATION MANAGEMENT Objective No. PS-6
(title)

2. Provide factual information that supports the Performance Evaluation Summary

7. The Procedure for revision of Field Procedures (FP-G-1) is weak in that it does not provide for timely incorporation of interim memo revisions into procedures. Also, there is evidence that the control of interim memos is not always effective in providing procedure users with latest memo revision status. Major observations are as follows:

- a. There are currently 20 unincorporated interim memos, affecting 11 different Field Procedures, which are more than one year old. Of these, four (4) apply to FP-E-7; three (3) apply to FP-E-2 and FP-G-19; and two (2) apply to FP-E-8 and FP-P-1.
- b. There are currently four (4) Field Procedures which have five (5) or more unincorporated revision memos. These are:
 1. Ten unincorporated memos on FP-E-2.
 2. Eight unincorporated memos on FP-E-7.
 3. Seven unincorporated memos on FP-P-11.
 4. Five unincorporated memos on FP-G-26.

In the most severe case, the ten memos affecting FP-E-2 involve 15 pages that must be used along with the basic procedure.

- c. The three oldest unincorporated revision memos have been outstanding for two years or more, as follows:
 1. Memo dated 03/05/80 against FP-P-15
 2. Memo dated 09/22/80 against FP-E-2
 3. Memo dated 11/26/80 against FP-E-2
- d. Control of interim memo revision status to advise users of latest outstanding memos is accomplished by issue of a Memo Index which is issued to all controlled manuals. A random sampling of approximately 50% of the procedures against the Memo Index dated 10/07/82 revealed the following discrepancies:
 1. Memo revision dated 07/29/82 against FP-E-8 is not listed on the index.
 2. Field Procedure FP-C-4 Revision 7 was issued on 10/01/82 and is so identified in the procedure index dated 10/01/82. However, the memo index still lists memo of 10/31/80 against procedure revision 6 as outstanding.



PERFORMANCE EVALUATION DETAILS

Construction Project

1. Performance Area: DOCUMENTATION MANAGEMENT Objective No. PS-6
(title)

2. Provide factual information that supports the Performance Evaluation Summary

8. Bechtel Engineering utilizes a computerized printout ("MAPPER") as the official Document Control Register for the Project. In addition, a computerized Design Document Register (System 38) is utilized by Project Administration for control and distribution of design documents. No procedures exist to define the use and control of either system or to define their relationship. Bechtel Field Document Control personnel perform a comparison evaluation between the two systems every six months and this activity was observed during this evaluation. The review revealed numerous instances of outdated information on the "MAPPER" System. In particular, large numbers of DCN's which had already been incorporated in the drawings are being listed as unincorporated by "MAPPER". Also "MAPPER" lists drawings which do not exist as evidenced by the "MAPPER" printout of 09/15/82 which lists drawings #25-8 and 51 through 66. The inaccuracies of the "MAPPER" Drawing List were previously identified by Bechtel QA Audit PFA 9-2-12 in finding QAF-3, dated 8/28/82.

In a discussion with PP&L's Supervisor, Nuclear Records System at the General Office it was acknowledged that "MAPPER" is the official Document Record, but its effectiveness may be degraded due to the errors which have been identified.

9. A review of Bechtel's procedure for control of documents issued to PP&L and Bechtel Field personnel indicated that Bechtel Administration Department Instruction 3.10.1, Revision 2, Figure 1 was being utilized. This procedure identifies forms BTP and E15 for use in transmitting correspondence. However, these forms are also being used for transmittal of project documents such as Drawings, Specifications, Material Requests, Purchase Orders, etc. It is not clear as to whether this procedure applies to documents or only to correspondence.
10. In the above review, it was noted that neither Form BTP nor E15 are included as exhibits in the Bechtel Administrative Department Instruction Manual.
11. Bechtel Project Administration personnel are required to perform audits of transmittal files every 30 days to assure that acknowledgement receipts have been received from document recipients. These audits are not being performed at all. Therefore, no assurance is being provided to indicate that designated users of controlled documents are in fact receiving them.

Performance Area Quality ProgramsObjective No. QP-1Evaluator(s) C. Whirl, A. MainoI. Performance Objective

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

II. Scope of Evaluation

The evaluation included Bechtel and PP&L QA program documents and supportive procedures covering activities performed by site and corporate organizations. Approximately 32 manhours were expended in discussions with quality assurance management and in reviewing program documents and records.

III. Conclusion

The majority of activities evaluated under this performance objective objective was generally satisfactory. Weaknesses were identified that indicate a need for additional procedures.

Performance Area QUALITY PROGRAMSObjective No. QP-1Evaluator(s) C. Whirl, A. MainoIV. Areas of weakness and corrective action; Good Practices

Finding (QP 1-1) Not all activities being performed under the Bechtel quality program are adequately addressed in procedures and instructions: (Details 1-2)

Corrective Action

(Detail 1)

A revision to Field Procedure FP-M-4, for Field Design of Seismic Class 1 HVAC Duct Supports was approved on 11/2/82 which resolved this issue. This revision contains a form used to identify duct support modifications and also a log for control.

Note: An informal punchlist is initially used by Field Engineering to identify remaining work activities to the subcontracts department. Any unresolved items are added to the official room turnover punchlist in accordance with field procedure FP-G-24 (Facility Turnover) at the appropriate time.

(Detail 2)

The Quality Engineering group does not need formal procedures for monitoring project operations as it is not part of the Quality Assurance Program. The group operating under the direction of the Project Engineer, monitors engineering activities against procedures to anticipate problems and correct them before they become significant. This is a service to the project, and as such, it must be kept flexible and informal. We see no need nor desire to develop procedures.

Finding (QP 1-2) Not all activities being performed under the PP&L quality program are adequately addressed in procedures. (Detail 3)

Corrective Action

The function of the PP&L Construction Surveillance Group has been added to Rev. 2 to NDI QA 1.1.1, Charter-Nuclear Quality Assurance.

1. Performance Area:

QUALITY PROGRAMS

Objective No. QP-1

(title)

2. Provide factual information that supports the Performance Evaluation Summary

1. No procedure to address the generation and control of punchlists issued by Bechtel Field Engineering-Seismic Support Group to identify deficiencies in HVAC supports found during engineering walkdown of installed supports. A similar condition was reported by Bechtel QA via QAR-F-834.
2. Bechtel Quality Engineering is performing monitoring activities of Bechtel Engineering for compliance to the Project Engineering Procedures Manual and Engineering Department Procedures Manual without procedural guidance for the scheduling, performance, reporting and followup of such activities.
3. The PP&L Senior Project Engineer-NQA Construction Surveillance is responsible for providing surveillance over Bechtel's QC activities. This organization consists of approximately 25 PP&L and subcontract personnel and represents a significant portion of the Nuclear Quality Assurance Groups total on-site personnel associated with construction activities. Although this position is shown on the latest issued organization chart and has existed since 1980, the duties, responsibilities, and authorities of this organizational unit are not defined in PP&L's Quality Assurance Manual, Nuclear Quality Assurance Procedures, Nuclear Department Instructions or NQA Charter.

PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area Program Implementation Objective No. QP-2Evaluator(s) C. Whirl, D. Ranstrom, A. MainoI. 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

The evaluation included Bechtel QA, Bechtel QC, and PP&L QA organizations at the plant site in corporate offices, as well as the GE QA site organization. Approximately 90 manhours were expended in observing inspection and auditing activities, in discussions with numerous QC and QA personnel and managers, and in reviewing associated program documents.

III. Conclusion

The activities checked under this performance objective were found to be satisfactory.



PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area Independent Assessments Objective No. QP-3Evaluator(s) C. Whirl, A. MainoI. 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 Bechtel and PP&L QA auditing activities by both site and home office organization. Approximately 24 manhours were devoted to discussions with various levels of supervision and management and review of quality assurance and independent audit reports and associated followup documentation.

III. Conclusion

The activities evaluated under this performance objective were found to be satisfactory.

Performance Area Corrective ActionsObjective No. QP-4Evaluator(s) C. WhirlI. Performance Objective

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

II. Scope of Evaluation

The evaluation involved primarily one evaluator with input from two others. Approximately 20 hours were expended in reviewing Bechtel Quality Action Requests, Nonconformance Reports, audit reports, and trend reports both in the field and at the corporate headquarters.

III. Conclusion

Bechtel QA's audit and trending programs appear adequate to identify quality problems that require corrective action. However, in some cases, the corrective action program could be more effective. PP&L needs to develop and implement a trending program to identify quality problems.

Performance Area _____ CORRECTIVE ACTION _____ Objective No. QP-4
Evaluator(s) _____ C. Whirl _____

IV. Areas of weakness and corrective action; Good Practices

Finding (QP 4-1) Corrective action responses for quality problems identified by Bechtel QA are not always furnished in a timely manner. Also, the Bechtel program does not provide guidance on what action is to be taken by QA (i.e., issue memo to project management, issue MCAR, issue stop work) when required corrective action responses are not received by due date. (Details 1-4)

Corrective Action

Delinquent open items are currently brought to management's attention through the "Delinquent Open Items Report" which becomes part of the "Quality Assurance Activity Report." This report is issued monthly and is distributed to upper management personnel on the project such as the Project Manager, Quality Assurance Manager Projects, Chief Field Quality Control Engineer, Field Construction Manager, Project Engineer, etc. This is the method prescribed by Program to provide Quality Assurance followup for overdue open items (see QADM, Section C. No. 9).

Further, the Bechtel Program does provide for the issuance of an MCAR when repeated failures to implement corrective action by the commitment date may contribute to a failure of the quality program (see NQAM, Section V, No. 10, Paragraph 2.5.c).

Finding (QP 4-2) Bechtel's trending program does not include Installation Review Forms (IRFs) and Quality Action Requests (QARs). (Detail 5)

Corrective Action

The Bechtel Quality Assurance trending program currently addresses trending of QARs for design deficiencies (See QADM, Section C, No. 20). Installation Review Forms are not part of the formal QA trending program. However, they are reviewed and analyzed by production personnel. The basis of finding QP 4-2 regarding IRFs was observation of the hanger program. Subsequent to the INPO evaluation, a joint effort was instituted by Bechtel and PP&L to identify and correct problems with hangers. A Bechtel Hanger Program Manager has been named and he has been provided an assistant from PP&L. These persons are conducting a detailed analysis of the reasons hangers are being rejected. This analysis includes review of the IRFs for trends and for root causes. Initial results are encouraging. The hanger reject rate has been improved. PP&L Project Construction will monitor the effectiveness of this program.



Performance Area CORRECTIVE ACTION Objective No. QP-4
Evaluator(s) C. Whirl

IV. Areas of weakness and corrective action; Good Practices

Finding (QP 4-3) PP&L has not implemented a formal trending program to identify quality problems. (Detail 6)

Corrective Action

Paragraph 4.2 of Quality Assurance Manual Procedure 3.1, Managerial Reporting of Quality Assurance Status states that NQA-Supervisors are responsible for reporting to the Manager-NQA on a monthly basis, the status of QA activities, including the development of any quality trends that may affect program effectiveness. Trend analyses are performed and frequently appear in the Quality Assurance Monthly Report. However, no definitive instruction for trend analysis exists. NQA has been aware of this need for some time and is developing a trend analysis program as resources permit. Completion is expected by April 30, 1983.

Back to NQA

1. Performance Area: Corrective Action Objective No. QP-4
(title)

2. Provide factual information that supports the Performance Evaluation Summary

1. A review of the Bechtel NCR Log on 10/19/82 revealed the following issues NCRs had not been dispositioned:

<u>NCR #</u>	<u>Date originated</u>
8997	3/24/82
9009	3/30/82
9178	4/29/82

2. A review of open Bechtel Quality Action Requests (QARs) issued by Bechtel QA to identify quality problems and solicit corrective action revealed the following remain unresponded to by actionee as of 10/19/82:

<u>QAR #</u>	<u>Originated</u>	<u>Response Due date</u>
QAR-F-792	2/24/82	3/24/82
QAR-F-834	5/11/82	5/26/82
QAR-F-835	5/14/82	5/28/82
QAR-F-851	7/8/82	7/22/82
QAR-F-859	7/30/82	8/16/82
QAR-F-860	8/2/82	8/20/82
QAR-F-871	9/1/82	9/14/82
QAR-F-874	9/10/82	9/20/82
QAR-F-875	9/10/82	10/8/82
QAR-F-884	10/6/82	10/15/82

3. The following Bechtel QA audits reveal evidence of untimely corrective action by actionee in that as of 10/20/82 no response was received by QA:

PFA 16.1-10, QAF 4	response due 8/20/82
PFA 19.3-7, QAF 1	response due 9/17/82
PFA 19.2-8, QAF 4	response due 9/10/82
PFA 9.2-11, QAFs 1-12	responses due 9/24/82

4. The Bechtel corrective action program does not provide guidance on what action is to be taken by QA (i.e. issue memo to project management, issue MCAR, issue stop work) on items requiring corrective action responses that are overdue from the actionee.
5. The Bechtel trending program does not include Inprocess Rework Notices (IPRNs) Installation Review Forms (IRFs) and Quality Action Requests (QARs).

PERFORMANCE EVALUATION DETAILS

Construction Project

1. Performance Area: Corrective Action Objective No. QP-4
(title)

2. Provide factual information that supports the Performance Evaluation Summary

6. There is no evidence of a formal trending program in place and in use by PP&L QA to identify generic quality problems.



Performance Area Training Management Support Objective No. TN-1Evaluator(s) J. Shane, G. Stanley, B. YankoI. Performance Objective

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

II. Scope of Evaluation

This effort included three team members and consumed approximately 50 hours. When formalized training programs existed, the indoctrination, qualifications and training programs, training records and procedures were reviewed, and discussions with training personnel were held. Where informal training existed, discussions were held with supervisors and subordinates.

Review of the following work groups' training efforts was conducted:

Bechtel

- Field Supervision
- Field Engineering* (Electrical, Mechanical, Piping and Instrument Control)
- Craft Labor (including foremen and general foremen)
- Welding*
- Quality Assurance*
- Quality Control*
- Document Control*
- Safety*

*Formal training programs

PP&L

- | | |
|--------------------------------|-------------------------------|
| - Project Construction-Site | - Quality Assurance |
| - Project Management-Allentown | - Nuclear Planning & Controls |
| - Nuclear Plant Engineering | |

III. Conclusion

There were no deficiencies observed in the quality of the work which could be specifically traced to lack of training.



Performance Area Training Organization and Administration Objective No. TN-2
Evaluator(s) J. Shane and A. Derkacs and T. McKearney

I. Performance Objective

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

II. Scope of Evaluation

Evaluation of this area was conducted by several team members. The instructions and records associated with the training programs for:

Bechtel Quality Assurance
Bechtel Field Engineering
Bechtel Quality Control
Bechtel Safety
Bechtel Welding
PP&L Quality Assurance
PP&L Project Construction

were reviewed.

Discussions were held with training administrators. Procedures, attendance records, and other records used to control, implement and document the training program, were reviewed.

III. Conclusion

The areas observed were generally satisfactory.

Performance Area General Training and Qualification Objective No. TN-3

Evaluator(s) _____

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

This part of the evaluation was done in conjunction with Objective Number TN-1. See TN-1 for Scope of Evaluation and Conclusions.

III. Conclusion



PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area Training Facilities, Equipment and Material

Objective No. TN-4

Evaluator(s) _____

I. Performance Objective

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

II. Scope of Evaluation

This evaluation was made by one team member who spend approximately 8 hours touring the training facilities and attending training sessions.

III. Conclusion

Training facilities, equipment and material were satisfactory.

PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area Test Program Objective No. TC-1Evaluator(s) H. PalmerI. 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

Evaluation of the Test Program, including Performance Objectives TC-1 through TC-6, was performed by review of the Startup Program Manual, Plant Administrative Procedures, Project Procedures Manual, and selected Construction Field Procedures. Additionally, discussions were held with key staff members in the Integrated Startup Group (ISG) including the ISG Supervisor, Assistant ISG Supervisor, Records Control Group Supervisor, ISG Coordinator, Group Leader, and Others. Approximately 40 manhours were devoted to the testing program. Actual startup testing by the ISG was not observed because only about 10% of the Unit 2 systems have been turned over and no testing was in progress.

III. Conclusion

The test program as presently structured appears to be capable of meeting the objectives specified in the FSAR.



Performance Area Test Group Organization and Staffing Objective No. TC-2
Evaluator(s) H. Palmer

I. Performance Objective

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

II. Scope of Evaluation

Organization and staffing of the Integrated Startup Group (ISG) was evaluated through review of appropriate administrative procedures, the organization chart, qualifications of personnel, and discussion with key staff members. The ISG reports through the Assistant Plant Superintendent-Outages to the Plant Superintendent. The major units within ISG are Records Control Group, Scheduling Group, Coordination Group, Special Projects, and Startup Engineers Group.

III. Conclusion

The ISG is sufficiently staffed (about 105 people) with experienced and qualified personnel to discharge their responsibilities. The organizational responsibilities are well defined and understood. One weakness was identified in this area.

PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area TEST GROUP ORGANIZATION AND STAFFINGObjective No. TC-2Evaluator(s) H. PalmerIV. Areas of weakness and corrective action; Good Practices

Finding (TC 2-1) The ISG Supervisor does not maintain nor periodically issue a list of certified Test Directors. (Detail 1)

Corrective Action

Administrative Procedure AD 10.1 has been revised to include the requirement that a current list of certified Test Directors be maintained with the ISG Training File. The list will be approved by the ISG Supervisor and the qualification will be based on the requirements set forth in the FSAR 14.2, 423.1 and AD 10.1.



PERFORMANCE EVALUATION DETAILS

Construction Project

1. Performance Area: TEST GROUP ORGANIZATION & STAFFING Objective No. TC-2
(title)

2. Provide factual information that supports the Performance Evaluation Summary

1. The ISG Supervisor stated that a list of Test Directors has not been maintained. Qualification records are kept and qualified system engineers are normally used as test directors.



Performance Area Test PlanObjective No. TC-3Evaluator(s) H. PalmerI. 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

Development of the startup schedule, test procedures, resource planning and individual equipment testing was reviewed. The "100-line" startup milestone schedule usage by project personnel was evaluated as a tool for planning. The detailed computer scheduling via Project 2 and detailed equipment status/testing data base via MAPPER were reviewed for effectiveness.

III. Conclusion

The Integrated Startup Group is making effective use of state of the art scheduling and planning techniques. The methods used should ensure a close coordination of efforts within the ISG. There were no findings in this area.

PERFORMANCE EVALUATION SUMMARY

Construction Project

Performance Area System Turnover for Test Objective No. TC-4Evaluator(s) H. PalmerI. Performance Objective

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

II. Scope of Evaluation

Plant, Startup, and Construction Administrative Procedures were reviewed. Discussions were conducted with key staff members. Observation was made of a two-week walk-down to evaluate the effectiveness of the turnover process. Turnover documentation was reviewed along with the retest program.

III. Conclusion

System turnover processes appear to be satisfactory. One weakness was observed in the area of retest.

PERFORMANCE EVALUATION SUMMARY

Construction Project.

Performance Area SYSTEM TURNOVER FOR TEST Objective No. TC-4
Evaluator(s) H. Palmer

IV. Areas of weakness and corrective action; Good Practices

Finding (TC 4-1) The possibility exists that test or retest requirements may be missed when work is done on systems turned over to the ISG. No mechanism exists to ensure that all Work Authorization Documents involving an ISG system are reviewed by the cognizant ISG System Engineer. (Detail 1)

Corrective Action

The problem associated with this finding is not the possibility of completed work activities not being evaluated for retest but rather the fact that work activities can be accomplished without the knowledge of the cognizant ISG system engineer.

Two work documents are used for performing work on systems under ISG control. The SWA (AS 6.4) which is an ISG document used when Bechtel is to perform the work, and the WA (AD-QA-502) which is a PP&L document used to document PP&L work on ISG systems.

The ISG engineer must approve the SWA prior to issuance. The SWA has a retest requirement block and a Startup Restesting Completed signature block which must be completed prior to closure.

AD-QA-502 (PP&L WA) does not require notification to the cognizant system Startup Engineer unless the WA does not have a need date or priority code (paragraph 6.2.1).

AD-QA-502, paragraph 6.8.6 requires PMIS as part of the closeout cycle to forward Part 2 of the WA on all WA's written on systems under ISG control to the ISG Coordinator for retest evaluation. The retest evaluation then occurs in accordance with AD 6.16 (Startup Retest Control). It should be noted that in this closure cycle, all WA's identified to be on ISG systems whether or not directly approved by the ISG will be sent to ISG for retest evaluation.

AD 6.17, PP&L SWA procedure, is currently in draft form. When issued, this procedure will be used in lieu of the WA for PP&L work on ISG systems during the Unit 2 startup. This procedure will require the cognizant system startup engineer to approve the work prior to issue and also evaluate all work performed for retest requirements.

1. Performance Area: SYSTEM TURNOVER FOR TEST
(title)

Objective No. TC-4

2. Provide factual information that supports the Performance Evaluation Summary

1. A review of plant documentation governing control of work showed that it is possible for a work authorization to be written against a system under control of the ISG without approval by the cognizant ISG engineer. For example, the operating crew may execute a work authorization to correct an equipment malfunction.



Performance Area Test Procedures and Test Documents Objective No. TC-5
Evaluator(s) H. Palmer

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

Evaluation of Test Procedures, Procedure Development, Review, and the Test Review Board was conducted by review of Procedures, Administrative Controls and discussion with appropriate staff members.

III. Conclusion

The startup test procedure development and program appears to be capable of satisfactorily meeting the FSAR requirements. Some weaknesses were observed.



Performance Area TEST PROCEDURE & TEST DOCUMENTSObjective No. TC-5Evaluator(s) H. PalmerIV. Areas of weakness and corrective action; Good Practices

Finding (TC 5-1) During conduct of a test, there is only one "controlled" Official Test Copy of the Preoperational Test while there may be a large number of information copies distributed. Temporary change notices are not distributed, by program requirements, to information copy holders even on a limited basis. For example, copies are not provided to the operating crew. (Detail 1)

Corrective Action

The Integrated Start Group has reviewed the Test Directives and has decided to continue the practice of maintaining only one controlled copy of the test. The following points are considered pertinent:

- a. Uncontrolled copies are provided to the Operating Crew.
- b. TCN's which modify the test are signed by the Supervisor of Operations or his designee. At this point, Operations has the opportunity to make a copy and update the operating crew's copy.
- c. Prior to conducting the test, a briefing is conducted by the Test Director for all appropriate test personnel.
- d. All TCN's must be signed by the Shift Supervisor.

In the opinion of the Integrated Startup Group, the above measures are sufficient to ensure that all involved personnel are adequately informed of any modifications which may impact on testing.

Conduct of the Preoperational Test Program will be closely monitored. If experience shows that more controlled copies of procedures are required, the necessary direction will be issued at that time.

PERFORMANCE EVALUATION DETAILS

Construction Project

1. Performance Area: TEST PROCEDURE & TEST DOCUMENTS Objective No. TC-5
(title)

2. Provide factual information that supports the Performance Evaluation Summary

1. Review of the Startup Manual showed that procedures require that only the official test copy of a preoperational test procedure must be maintained current.

Performance Area System Status Controls Objective No. TC-6Evaluator(s) H. Palmer**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 Administrative Systems for Status Control and Work Control were reviewed. This includes the Construction, Startup, and Plant Work Authorization systems, the Safety Tagging and Permit Systems, Temporary Modification Systems, Boundary Tagging Systems, and Startup Blue Tagging System. Discussions were held with appropriate members of plant and startup staffs.

III. Conclusion

The administrative status control systems are satisfactory to exercise effective control. No deficiencies were detected at this early stage of turnover.

