U.S. NUCLEAR REGULATORY COMMISSION
REGION 1

Report No. 50-412/83-05

Docket No. 50-412

License No. CPPR-105 Priority -- Category A

Licensee: Duquesne Light Company

Robinson Plaza Building No. 2

Suite #210, PA Route 60

Pittsburgh, Pennsylvania 15205

Facility Name: Beaver Valley Power Station, Unit 2

Inspection At: Shippingport, Pennsylvania

Inspection Conducted: April 11-29, 1983

Inspectors:

N. Blumberg, Reactor Inspector — 6/2/83 date

A. Finkel, Lead Reactor Engineer — 6/3/83 date

J. Grant, Reactor Engineer — 6/9/83 date

H. Gray, Reactor Engineer — 6/3/83 date

L. Narrow, Lead Reactor Engineer — 6/9/83 date

G. A. Walton, Senior Resident Inspector — 6/9/83 date

L. Bettenhausen, Chief, Test Programs Section — 6/9/83 date

Approved by: S. J. Ebneter 6/30/83

S. D. Ebneter, Chief, Engineering Programs Branch — date

Inspection Summary: Inspection on April 11-29, 1983, (Report No. 50-412/83-05)
Areas Inspected: An announced Regional Construction Team inspection of the Beaver Valley Unit No. 2 facility by five regional-based inspectors and the senior resident inspector. The areas of construction management, quality assurance, design control, equipment storage and maintenance, electrical construction, and installation of piping and supports were inspected. The inspection involved 608 hours of direct inspection effort - 432 hours on-site and 176 hours in the regional office.
Results: One violation, one deviation and six unresolved items were identified during this inspection. In addition, two program weaknesses and three program strengths were observed.

Violation: Failure to calibrate a torque wrench calibration fixture within the required due date and use of the uncalibrated fixture. (Section 6.3.5).

Deviation: Failure to comply with the requirements of ANSI-N45.2.11 for design control (Section 5.3.2).

Unresolved Items: Inadequate scheduling and documenting of the quality elements of 10 CFR 50, Appendix B for QA audits (Section 4.3.3).

Lack of a requirement for re-inspection of Hilti bolts after re-torquing (Section 6.3.3).

Lack of conformance of FSAR to Regulatory Guide 1.75 requirement for electrical separation (Section 7.3.1).

Lack of a requirement for verification of raceway fill (Section 7.3.2).

Ineffective supervision of engineering training (Section 9.3.2).

Program Weaknesses: Lack of a charter and program for Engineering Department of DLC Nuclear Division (Section 5.3.6).

S&W design and design control (Section 5.4.1).

Program Strength: Construction management organization and performance (Section 3.4).

Training of construction craft and QC personnel (Section 9.4).

Housekeeping, Storage and maintenance of equipment (Section 8.4).

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DETAILS

1. Persons Contacted

Duquesne Light Company (DLC)

L. E. Arch, Sr. QA Engineer
J. A. Bajuszik, Director Construction Engineering
R. Coupland, Director, QC
H. N. Crooks, Jr., Assistant Director, QC
C. R. Davis, Director Quality Assurance
C. E. Ewing, Manager, Quality Assurance
R. Fedin, Compliance Engineer
H. R. Good, Senior QC Weld Specialist
S. D. Hall, Senior Compliance Engineer
J. A. Hultz, Deputy Project Manager
E. F. Kurtz, Manager, Regulatory Affairs
C. Majumdar, Assistant Director, QC
P. Orr, Deputy Project Manager
H. M. Siegel, Engineering Manager
R. J. Swiderski, Project Construction Manager, BV-2
R. Washabaugh, Project Manager, BV-2
E. J. Woolever, Vice President

Stone & Webster Engineering Corporation (S&W)

C. R. Bishop, Resident Manager
N. F. Kokot, ASME Coordinator
A. C. McIntyre, Superintendent, Site Engineering
J. J. Purcell, Assistant Superintendent - Engineering

The above listed personnel attended exit meetings held on April 15 and/or April 29, 1983. Other personnel; managers, supervisors, engineers, quality technicians and craftsmen were contacted during the inspection.

2. Inspection Scope and Objectives

During April, 1983, a Regional Construction Team Inspection (CTI) of Beaver Valley Power Station, Unit No. 2 (BV-2) was conducted. The team consisted of five regional based inspectors and the senior resident inspector. Following one week of preparation, the on-site inspection was conducted during the weeks beginning April 11th and April 25th with two members of the team continuing their inspection during the week of April 18th.

Duquesne Light Company (DLC) is the licensee for BV-2 and has contracted with Stone and Webster Engineering Corporation (S&W) to provide engineering design and construction management for the project. Westinghouse Electric Corporation (WEC) is supplying the nuclear steam supply system. The principal construction subcontractors are: Schneider Power Corporation (SPC) for piping and heating, ventilation and air conditioning (HVAC), Sargent Electric Company (SEC) for electrical construction, and Dick Corporation for civil and strutural work.

The inspection examined seven aspects of the licensee's program:

-- Construction management,
-- Engineering and design,
-- Quality assurance and quality control,
-- Housekeeping, storage and maintenance of equipment,
-- Electrical construction,
-- Piping and pipe supports, and
-- Training.

The objective of this inspection was to evaluate the adequacy of the licensee's construction and quality assurance programs and their effectiveness in assuring conformance to regulatory requirements and the licensee's commitments during construction of BV-2. The inspection also examined inter-relationships between organizations and interfaces between the activities examined to assess the effectiveness of construction quality assurance and design control.

3. Construction Management

3.1 Organization

Construction management has been delegated to S&W but DLC nevertheless retains responsibility for overall management and direction of construction activities.

DLC is represented on site by the Manager of Nuclear Construction. He is on the staff of the Vice President, Nuclear Construction Division and is also directly responsible for construction of BV-2. He is supported by a staff of approximately 45 engineers and construction specialists of whom about 30 are assigned to construction, construction engineering and construction controls. The remainder are assigned to Unit 1 modifications. There is some interchange of assignments between Unit 1 and Unit 2.

S&W responsibility for construction management is carried out by the Superintendent of Construction who reports to the Resident Manager. His organization includes approximately 35 construction specialists, engineers and supervisors plus approximately 15 engineers assigned to costs and planning. Supervision of construction is organized by work areas under two assistant superintendents. Second shift work is supervised by a third assistant superintendent. Senior supervisors responsible for safety and material control also report directly to the Superintendent of Construction. An important element of this organization is a group of approximately 20 construction specialists in structural, electrical and mechanical disciplines who report to the Superintendent of Construction through a supervisor in each discipline. Their basic responsibility is the resolution of technical problems in their disciplines including identifications of potential problems and assistance in preventing their occurrence.

3.2 Areas Inspected

The inspection included an examination of:

-- Communications and controls within and between DLC and S&W construction organizations.

-- Inter-relationships and interfaces between the construction organization and other functional organization.

The inspector reviewed organization charts, position descriptions, selected personnel qualification records, and selected meeting reports. Management and supervisory personnel in DLC and S&W construction organizations were interviewed for a discussion of both formal and informal controls. Field engineers and construction specialists were interviewed to determine their responsibilities, their interfaces with engineering and Site Quality Control (SQC), and their activities in connection with problems identified in the field and correction of such problems.

3.3 Findings

3.3.1 Management Interviews and Documents Reviewed

The inspector interviewed DLC and S&W construction management and supervision to obtain an understanding of the internal functional relationship of their organizations. Planning and coordination with sub-contractors, control and direction of the work, feedback of results and methods of communication were discussed.

The inspector reviewed selected Field Construction Procedures (FCP's), minutes of meetings, meeting agenda and summary reports of job status.

No violations were identified.

3.3.2 Communications and Controls

Formal communication and controls, in addition to engineering documents, are primarily through Field Construction Procedures (FCP's), the Construction Management System (CMS), scheduled meetings and progress reports. Informal communications and controls may vary from face to face discussions between engineer, QC and craft personnel to meetings at the higher levels of management for discussion of specific problems.

The FCP's are controlled documents which provide instructions and procedures for performance of both administrative and technical tasks required for construction of BV-2. In addition to construction control, they provide the basis for training of craft personnel.

CMS is a computer system which accepts reports of work performed and produces a number of reports used for management control. The entire plant is broken down by area and by discipline into work packages and quantities. Each subcontractor reports quantity of work performed by work package on a weekly basis. CMS provides a weekly Activity Analysis Report and Summary Report showing the status of the work on an actual vs. budgeted basis by system/building. Reports are provided to supervisory and management personnel. For active work a similar detailed report by work package is provided weekly to a limited distribution. A monthly report showing system percentage completion by system/building is also produced.

No violations were identified.

3.3.3 Interfaces

Significant meetings which provide interfaces between organizations and between various groups within organizations include:

-- The Bi-monthly Project Status meeting which provides the overall status of the project to the owners (CAPCO) by upper management of DLC and the major contractors.

-- The Monthly Construction Interface Meeting which is attended by DLC and S&W construction, Engineering and QC and the major subcontractors for discussion of interface problems.

-- Weekly staff meetings of Nuclear Construction Division, (NCD) and S&W construction.

-- Joint planning and scheduling meetings conducted by S&W

-- Daily S&W meetings attended by other interested organizations for resolution of problems.

-- Construction "Workshops" in disciplines such as welding, piping, hangers, electrical, instrumentation. These are scheduled on a bi-weekly or monthly basis by construction specialists of S&W construction for prevention or resolution of problems in these areas.

No violations were identified.

3.3.4 Personnel and Qualifications

The inspector interviewed field engineers, construction engineers, construction specialists and supervisors and reviewed selected personnel records and qualifications for the assigned positions. A steady although not rapid increase in personnel was noted. The work force appeared very stable, with some people having been at Unit 1 or at Unit 2 almost since start of construction.

Interfacing at this level is generally during informal discussions, often at the work area and frequently involved construction, engineering and QC. Attendance at construction "workshops" and informal meetings are a means of resolving questions of more importance. If no resolution is reached at the "Workshop" within a reasonable time, the problem is referred to the Weekly Construction staff meeting.

No violations were identified in the area of construction management with respect to communications and control, inter-relationships or qualifications of personnel.

3.3.5 Prevention and Resolution of Problems

S&W construction is organized for scheduling, supervising and controlling construction. In addition, there is a requirement for expertise in construction methods and practices. Organizationally, a group of construction specialists reports directly to the superintendent of construction through a supervisor and provides expertise in mechanical, electrical and structural work to the Assistant Superintendents. In part, they are involved in preparation or review of FCP's. Additionally, personnel in this group are available to assist construction supervisors/ engineers in prevention or resolutions of problems in the field. This group has also established and conducts the construction "workshops" described in Section 3.3.3.

Trending and corrective action have been reviewed with Quality Assurance and are discussed in Section 4 of the report.

No violations were identified.

3.3.6 Significant Construction Deficiency Reports

The inspector discussed notifications to NRC of potentially reportable deficiencies in accordance with 10 CFR 50.55(e) with licensee representatives and reviewed the following documents:

-- 1 BVM-218, "Handling of Nonconformance and Disposition Reports by Site Engineering Office"

-- EAP-15.2, "Handling of Nonconformance and Disposition Reports (N&D's) by Engineering"

-- EAP-16.2, "Notifying Clients of Potentially Reportable Deficiencies under 10 CFR 50.55(e)."

-- Approximately 100 N&D reports prepared during December 1982 and January 1983 were examined.

The inspector was informed that upon receipt of an N&D by Site Engineering (SEG) a preliminary check was made by the responsible engineer and if it appeared to be potentially reportable, SQC would be notified at once. The N&D would not show this preliminary check but when the N&D was dispositioned it would also be marked to show whether it was to be evaluated under 10 CFR 50.55(e). Of the 100 N&D's examined, 7 had not been dispositioned and therefore showed no indication of evaluation for reportability. The nonconformances noted did not appear to be significant deficiencies.

No violations were identified with respect to resolution of construction problems or evaluation of significant construction deficiencies for reportability.

3.4 Conclusions

Construction management is considered to be a strength of this project. Licensee and S&W management are actively involved and aware of work status and problems. Cooperation with SQC was identifiable at all levels. The CMS to be an effective management tool and is obviously being used for that purpose. The specialist group as organized is considered appears to be effective and the use of "workshops" in disciplines where necessary provides an efficient method of identifying and resolving problems.

4. Quality Assurance (QA)

4.1 Organization

The Duquesne Light Company (DLC) QA organization is located onsite and reports directly to the Vice-President, Nuclear Construction Division. The QA organization performs both site and corporate QA functions, provides Site Quality Control (SQC) coverage for Unit 2 construction activities, and QA coverage of Unit 1 operating activities. The Unit 1 QA program was not within the scope of this inspection.

The main functions of Unit 2 QA are to perform audits of construction related engineering activities (both on-site and off-site), construction activities, architect engineer (A/E) and other contractor QA activities, and SQC activities. In some instances, Unit 2 QA and the A/E QA perform joint audits. Occasionally, Unit 1 QA personnel and other DLC personnel support Unit 2 QA activities when requested. In addition, SQC (which is part of the QA Department) performs specific QC inspections and general surveillance of construction activities, receipt inspections of material, and vendor inspections.

4.2 Areas Inspected

4.2.1 References/Requirements

-- ANSI N 45.2 - 1981, Quality Assurance Program Requirements for Nuclear Power Plants.

-- ANSI N 45.2.12, Draft 3, Revision 4 - 1974, Requirements for Auditing of Quality Assurance Programs for Nuclear Power Plants.

-- ANSI N45.2 23 - 1978, Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plants.

-- 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants . . ."

-- Duquesne Light Company, Design and Construction Quality Assurance Program.

4.2.2 Procedures

-- DLC Quality Assurance Instruction Manual, Revision 8, March 31, 1983, (procedures 1.1.1 - 18.3.2)

-- DLC Site Quality Control Manual, February 16, 1983 (Sections 1.0, 3.0, 4.0 and 7.0)

-- Auditor Training Course Syllabus

-- SQC-1.5, Trend Analysis and Corrective Action, September 5, 1978

-- Stone & Webster (S&W) Field Construction Procedure FCP-13, Corrective Action Program Beaver Valley Power Station - 2, Revision 0, December 14, 1977

-- Selected Inspection Plans (IPs) for surveillance activities by SQC

4.2.3 QA and QC Program and Implementation

The DLC QA program, as applicable to construction and engineering at Beaver Valley Unit 2, was inspected for conformance to the standards and procedures referenced in paragraphs 4.2.1 and 4.2.2 above. The inspector reviewed recent audits, audit schedules, QA staffing, QA interfaces with other organizations, and auditor training and qualification. The SQC program was reviewed for performance of general surveillance activities and the trending of identified construction deficiencies. QA management and senior QA and QC engineers were interviewed.

4.3 Findings

4.3.1 QA Organization and Interfaces

The inspector reviewed the QA organization for the following attributes:

-- QA staff was as specified in the QA program organizational charts;

-- QA staffing was sufficient to perform QA responsibilities;

-- QA auditors were properly trained and qualified;

-- There were adequate interfaces with and audits of other organizations:

-- QA activities received adequate support from upper level management; and,

-- Management of QA activities was effective.

Based on the above reviews, the inspector determined that the QA Organization was performing acceptably within their prescribed charter. QA audits appear to be effective. Lead auditors are qualified to the requirements of ANSI N45.2.23. DLC non-audit personnel who provide support to the audit group are given specific documented training. Training of QA personnel is further discussed in Section 9.3.1.

Interfaces with other organizations consisted of periodic audits and followup, attendance at staff meetings, and QA on distribution for most correspondence. The QA audit group interfaces with and audits A/E engineering and QA, Construction Contractors, DLC construction project organization, SQC, and the Nuclear Steam System Supplier.

The QA Department is currently understaffed by three or four persons. Although this has not affected current audit schedules, it may do so in the future. Transfer between DLC divisions has been restricted so that hiring for the QA Department must take place from outside DLC. Such outside hiring taken three to four months to obtain replacement personnel. This was discussed with the licensee as an area for possible improvement.

No violations were identified.

4.3.2 Audit Program

The licensee's quality assurance program requires that audits be performed in the areas of the eighteen quality criteria of 10 CFR 50, Appendix B, and additional quality elements within each criterion. The inspector reviewed ten QA audits of engineering and construction activities performed since February, 1982 for the following attributes:

-- Audits were conducted to evaluate the quality elements as specified in the construction QA program;

-- Audits performed were in depth;

-- Responses to audit findings were timely and adequate;

-- QA auditors performed followup to determine that corrective actions had been completed;

-- Audit schedules were current and records were complete;

-- Trending of audit findings was accomplished; and,

-- Trending data was used for consideration of future audits.

Based on this review and review of audit responses and followup, the inspector determined that the audit program was acceptable. Responses to audits were timely and QA followed up and verified completion of audit corrective actions. However, the inspector determined that certain areas of the audit program could be improved. These areas are discussed in Section 4.3.3 and 4.3.4.

4.3.3 Audit Schedules and Records

The current audit schedule covers a period of two years and is updated quarterly. Although the QA program requires auditing of the quality elements of the eighteen QA criteria, the licensee's audit scheduling procedure does not provide a method for assuring that quality elements are addressed during audits. In general, audit schedules show the organization to be audited rather than the subject areas to be included in the audit. Although each completed audit identifies, within the audit, each area inspected, overall records of each quality element audited are not maintained.

A licensee representative stated that effective audits could not be performed if all the quality elements were addressed in each series of audits of each organization. The inspector concurred but noted that scheduling of audits should include the quality elements as a positive consideration in audit scheduling and that past audits of quality elements should be documented.

A licensee representative stated that a computer program was in preparation which would provide documentation of quality elements in past audits (starting January 1983) and ensure the consideration of these elements in the two year schedule. Although each quality element would not be audited for each organization, each quality element would be a consideration in the overall schedule and audit planning.

This item is unresolved pending completion of licensee action and subsequent NRC:RI review (50-412/83-05-01).

4.3.4 Trending of Audit Findings

The inspector discussed trending of QA audit findings with licensee representatives. Currently audit findings are not trended; however, the licensee has made some attempts to develop a trending program for audit findings but has not yet implemented a satisfactory trend analysis. The licensee agreed that trending of audit findings would improve the overall audit program and that efforts will be increased to fully implement such a program.

No violations were identified.

4.3.5 SQC Trending Activities

SQC has a Trend Analysis Committee (TAC) which reviews all non-conformance and Disposition Reports, Inspection Reports, Test Reports, NDE Reports, and Receipt Inspection Reports to determine whether there are any recurrent unsatisfactory conditions. Any identified trends are submitted to the S&W Corrective Action Committee (CAC). The TAC is scheduled to meet on a monthly basis. Recently this committee has been relatively inactive and several meetings have been postponed. Prior to this inspection, a new TAC Chairman has been appointed. SQC

management has emphasized the need for a more effective trending program and the need for TAC to more actively participate in this program.

The CAC, which includes a TAC member, evaluates the trends, determines the cause and effect, recommends and requests corrective actions, and evaluates effectiveness of corrective actions taken. Additionally, the CAC also evaluates problem areas not necessarily identified by the TAC. S&W personnel stated that most deficiencies are corrected as they occur; and, if the corrective action is sufficient, they do not become trends which would be evaluated by the CAC.

Both the TAC and the CAC evaluate only deficiencies identified at Beaver Valley Unit 2 construction site. Problems and trends which may be identified at other S&W sites or by the industry are evaluated by separate S&W programs.

Based on review of TAC meeting minutes, CAC records, and discussions with the TAC and CAC chairmen, the inspector determined that the trending program was functioning but its effectiveness was questionable. Recent management interest should increase its effectiveness.

No violations were identified.

4.3.4 SQC Surveillance Activities

General surveillance of site construction activities is performed by SQC. A group of nine SQC inspectors are designated to perform full time surveillances of the following activities:

-- Thermal Insulation;

-- Weld Material Control;

-- Carbon Steel Weld Joint Preheat;

-- Weld Data Sheets;

-- Heating Ventilation and Air Conditioning (HVAC) Activities;

-- Piping Supports;

-- General Construction Activities (Housekeeping and Staging Erection);

-- Turbine Generator Erection; and,

-- Storage Facilities and Items in Storage.

An inspection report which identifies deficiencies and corrective actions taken is issued weekly for each surveillance activity. A separate procedure including an inspection check list has been written to cover each surveillance activity. The inspector reviewed recent inspection reports and determined that all surveillance activities were being acceptably accomplished.

The inspector observed that the surveillance program did not include a number of construction activities. A licensee representative stated that surveillance had not originally been included in the inspection program but had evolved as result of specific problems identified during previous construction activities. Following discussions with the inspector, the licensee representative stated that the establishment of a broader surveillance program would be evaluated.

No violations were identified.

4.4 Conclusion

The QA audit program, SQC surveillance program and trending of deficiencies were inspected with primary emphasis on the audit program. Audit personnel are well qualified, training is adequate, audit findings are effectively followed for corrective actions. The licensee is taking steps to strengthen the trending program and is considering broadening the scope of the surveillance program.

5. Engineering and Design

5.1 Organization

The responsibility for engineering and design of the plant has been delegated by the licensee to Stone and Webster Engineering Corporation (S&W) of Boston, Massachusetts. The major design activities are conducted in Boston, but S&W maintains a staff of engineers onsite to perform design, design changes, project specification and changes thereto, issuance of E&DCRs, disposition of N&Ds and issuance of drawings.

Schneider Power Corporation (SPC), a contractor to S&W, also maintains an engineering staff, Schneider Consulting Engineers (SCE) onsite to translate specification requirements and drawings for small bore piping into isometrics.

Duquesne Light Company (DLC) maintains a staff of engineers whose responsibility includes monitoring the program to assure compliance with commitments. Also, DLC Engineering will perform a Validation Program of the as-installed hardware which will include walk-downs of certain systems to assure compliance with the FSAR.

5.2 Areas Inspected

The inspector reviewed documentation and held discussions with licensee personnel to determine the adequacy of design change control measures implemented on site. The documentation review consisted of random selection of Nonconformance and Disposition (N&D), Engineering and Design Coordination Reports (E&DCR), Advance Change E&DCRs, Project Specification changes, and drawing control and changes.

The responsibilities of DLC engineering and its program for performance and documentation of the work were reviewed.

5.3 Findings

5.3.1 Nonconformance and Disposition Reports

The Nonconformance and Disposition Reports (N&D) are used to accept, repair, rework or scrap work which is not in conformance with the specified design.

The inspector reviewed several N&Ds from different construction activities to ascertain compliance with Engineering Assurance Procedure (EAP) 15.2 and BVM 218 in the following areas:

-- Disposition addressing the required actions to be taken, and need for a specification and/or drawing change

-- Interpretation regarding the reportability to the NRC as specified in 50.55(e)

-- Proper review and approval of disposition

-- N&D disposition and incorporation into drawings and specifications

-- Review of specifications and drawings to verify the incorporation of N&Ds into drawings and specifications

No violations were identified.

5.3.2 Project Specifications and Engineering and Design Coordination Reports

Project Specifications are "key design documents" that provide requirements for erection, construction, or installation activities performed at the construction site and/or identify technical and quality assurance requirements for purchasing equipment, material and parts.

The Engineering and Design Coordination Report (E&DCRs) are used to provide immediate engineering information to site construction, site quality control and procurement inspection offices. E&DCRs also serve as authorization from Engineering to Construction to implement necessary changes to procedures, engineering service scope of work, drawings or specifications.

The inspector reviewed the below-listed documents to ascertain compliance with licensee commitments:

-- PSAR Chapter 17

-- WASH Document 1283

-- Regulatory Guide 1.64, Revision 2

-- ANSI-N45.2.11, 1974

-- Engineering Assurance Procedures 2.4, 4.13, 3.1 and 6.5

-- Specifications BVM 203, 204 and 205

The inspector reviewed numerous specifications and EDCRs in the areas of change control, specification revisions, design inputs and onsite approval of changes. As a result of this review, the inspector found the following deviations.

-- ANSI N45.2.11, Paragraph 7.1 requires identification of personnel/positions responsible for preparing, reviewing, approving and issuing documents and revisions. A discussion with the head of the Site Engineering Group (SEG) disclosed that the names of such responsible engineers had been identified on an engineering organization chart. However, this practice was discontinued on March 31, 1983, and no other system was implemented.

Upon review of this chart against the signatures on several specifications, the inspector found that personnel who had signed the approval blocks were not authorized to do so. As examples, Specification 2BVS-920, Revision 7, dated March 29, 1983 and Specification 2BVS-935, Addendum 1, dated March 2, 1983, had been signed by an unauthorized individual. Further review found that another individual had signed the "Materials Engineer Block" of numerous specifications for approximately 1-1½ years without written authorization or designation as the person responsible for performing the review. The inspector then extended the review to include Engineering and Design Coordination Reports (E&DCRs). Based on the review of a sample of E&DCRs, the inspector found that the same two individuals, prior to being authorized, had signed the following E&DCRs; 2 PS-2448, 2450, 2468, 2483, 2501, 2502, 2503A and 2507.

In both cases, the individuals had received the necessary onsite indoctrination and appeared to be qualified. However, failure to provide an adequate system for identification of designated personnel and/or positions responsible for preparing, reviewing, approving and issuing specifications and E&DCRs resulted in the approval of specifications and E&DCRs by individuals who were not properly authorized. This is a deviation from the commitment to ANSI N45.2.11, 1974.

The Head of SEG has committed to implementing a system which would identify all personnel qualified and authorized to prepare, review and approve specifications.

-- ANSI N45.2.11, Paragraph 4.1 requires that the design activities be documented in sufficient detail to permit verification and auditing as required by this standard. Paragraph 5.2.4 requires interface controls of documents when in the review and approval stages; where it is necessary to initially transmit design information orally or by other informal means, the transmittal shall be confirmed promptly by a controlled document.

Document 2BVM-204, dated August 16, 1979, authorizes an onsite responsible engineer to sign for an offsite (Boston) reviewer by signing the specification addendum or revision with his/her name or initials and then printing the reviewer's name and date of telecon approval. The work "TELECON" must be written above the reviewer's name.

The inspector found numerous specification revisions and addendums signed by individuals who did not perform the review, but who signed for the designated reviewer. The work "TELECON" was written above the reviewer's name and no further controlled documentation of the telephone transmittal was made. (2BVM-204 does not specify requirements that the revised specification be confirmed promptly by a controlled document). As a result there are no confirmed control documents on site that permit verification and auditing. The inspector asked if such documents were available in the Boston office and was informed that they were not maintained in that office either. This is a deviation from ANSI N45.2.11, Paragraphs 4.1 and 5.24.

-- ANSI N45.2.11, Paragraph 3.1 requires that applicable design inputs, such as design bases, regulatory requirements, codes and standards, shall be identified, documented, and their selection reviewed and approved. Paragraph 2.2 states that procedures shall be employed that identify appropriate design input.

From discussions held with the Head of SEG, the inspector found that there is no specific procedure which provides a list of applicable design input commitments for the preparer or reviewer. The PSAR, which lists the commitments made to the NRC, is made available to the designated person. The PSAR does not, however, specify all items necessary for design inputs. As an example, NRC Inspection Report No. 82-11 had an unresolved item regarding shimming of baseplate supports on HVAC supports. Specifications 2BVS-920 and 2BVS-935 did not specify shimming as a requirement, but an Engineering Technical Guidance 2.8.1 states that calculations were valid when the baseplate was within 1/8" of the concrete and that shimming under the baseplate is an acceptable way of controlling the separation to 1/8" or less. This requirement was not included on drawings or applicable specifications. The inspector did note that since Inspection Report 82-11 had been issued the E&DCRs and specifications have been revised to include the shimming requirements.

Failure to provide a procedure which identifies all applicable documents for the engineer during the preparation and review cycle is a deviation from the ANSI requirements. As a result, specifications 2BVS-920 and 2BVS-935 were issued without requiring that construction maintain the 1/8" spacing in order to comply with previously performed calculations.

Failure to identify personnel authorized to review and approve design documents; failure to confirm telephone approval of design changes; and failure to identify applicable design bases are considered to be a deviation from ANSI N45.2.11 (412/83-05-02)

5.3.3 Advance Change Engineering and Design Coordination Reports

The Advance Change Engineering and Design Coordination Reports (Advance Change E&DCRs) are used to provide advance authorization for construction to proceed prior to completion of all required approvals. Advance Change E&DCRs allow work to continue on a "risk" basis, upon approval of a specifically designated engineer/designer. This system is used by SEG on supports designed by S&W for HVAC, large and small bore pipe and instruments and on all pipe supports designed by Power Piping Company and Automatic Sprinkler Company. The system is also used by Schneider Consulting Engineers (SCE) on small bore pipe supports designed by SCE.

The inspector reviewed a sample of Advance Change E&DCRs to ascertain compliance with licensee commitments. The following documents were reviewed:

-- Engineering Assurance Procedure (EAP) 6.5

-- Site Specification BVM-203

-- Schneider, Inc. Engineering Procedure (SIEP) 3.7

-- Engineering Service Scope of Work (ESSOW) 979

-- Field Construction Procedure (FCP) 36

The inspector reviewed the following areas for compliance:

-- Preparation, review and approval of Advance Change E&DCRs

-- Reason for Advance Change E&DCRs

-- Interfaces between SEG and SCE

In particular, the inspector reviewed a sample of Advance Change E&DCRs to determine that authorized personnel were initiating and approving them; the system was not being used for changes required to be dispositioned by N&Ds; changes to drawings were being incorporated within the procedure's 30-day time limit; review was being conducted commensurate with that required for regular E&DCRs and within the 30-day time limit; and SCE's use of this system was being controlled by S&W.

The inspector found all areas acceptable, and noted that both S&W and SCE were trending the Advance Change E&DCRs on a monthly basis to assure the system was working within the controls outlined in the procedures.

No violations were identified.

5.3.5 Drawing Control

The inspector reviewed documentation and held discussions with licensee personnel to determine the adequacy of drawing control. The following documents were examined:

-- Stone and Webster Engineering documents BVM 98, 139, 203, 212 and Site Specification 229

-- Field Construction Procedures (FCP) 30 and 503

The review included the guidelines for revision update, methods used to incorporate N&D changes into the drawings, distribution and recall of drawings, control of drawings in the field, risk release of drawings, interface with Schneider isometric drawings, and interface with the Boston office to periodically incoporate field revisions.

No violations were identified.

5.3.6 DLC Engineering

In December, 1982, Nuclear Construction Division formed a new engineering department (NCED) located in the Robinson Plaza office complex approximately twenty miles from the site. The NCED was formed to provide engineering support to construction activities. The inspector discussed with the Manager of NCED their current activities and support of the following commitment from the PSAR, Section 17.2.1.3A, "Design Control":

". . . DLC engineers review on a selective basis the design of certain components, systems, or structures. These reviews are documented in accordance with established procedures. Similar reviews are made of significant design changes which occur during the construction of the station . . .".

Based on the above discussion, the inspector determined the following:

-- Prior to formation of NCED, design reviews were performed by the DLC Engineering and Construction (E&C) Division. E&C is to complete reviews already started and to ensure previously identified deficiencies are corrected. Completion of this work was to be reported to NCED. To date, the NCED Manager has not received reports as to the status of the E&C design reviews.

-- New design reviews are to be performed by NCED. The NCED Manager stated that some reviews had been conducted but were not documented. Additionally, procedures to accomplish these reviews had not been established but were in preparation.

-- The NCED was not performing design change reviews. The NCED Manager stated that their participation in the design review process was still under evaluation.

-- A charter for the NCED had not yet been established.

The NCED manager stated that since its formation, the Department has spent much of its time in organizing and updating the FSAR. Further, he stated that procedures were in preparation and should be issued within three months.

No violations were identified, but lack of a charter for this organization and inadequate performance of design review is considered to be a significant weakness (412/83-05-03)

5.4. Conclusions

5.4.1 S&W Design Control

This inspection found several deficiencies in design control which are attributed to S&W engineering. They are discussed in this section of the report and in the sections on electrical construction and training. They include the following:

-- Deviation from Paragraph 3.1 of ANSI N45.2.11 requiring identification and documentation of applicable design inputs (Section 5.3.2)

-- Deviation from Paragraph 7.1 of ANSI N45.2.11 requiring identification of personnel or positions reponsible for preparing, reviewing and approving documents. (Section 5.3.2)

-- Discrepancy between engineering documents (BVM) and specifications relating to specified electrical grounding requirements. (Section 7.3.3)

-- Lack of control of SEG training program and training results. (Section 9.3.2)

During this inspection a review was made of recently identified violations and questions (unresolved items) from other onsite inspections to determine the extent of engineering responsibility. The following items are attributed to engineering weaknesses.

-- Violation 82-02; failure by engineering to provide adequate weld dimensions on drawings

-- Violation 82-11, HVAC supports installed without proper design considerations, also drawings did not show the actual as-built condition.

-- Unresolved items 82-11; drawings were incorrect, confusing and conflicting with each other. Specifications failed to address the shimming requirements of baseplate supports of HVAC, and piping systems.

-- Unresolved items 83-02; confusing requirements for shimming of electrical supports.

-- Unresolved Item 83-02; failure to incorporate E&DCR changes into specifications or isometric drawings which resulted in a needless weld repair.

-- Unresolved Item 83-02; failure to include requirements for temporary pipe supports when piping is released for construction without permanent supports.

-- Violation 82-14; engineering specification failed to specify correct nondestructive examinations of electrical penetrations.

In view of the engineering deficiencies identified during this inspection and engineering responsibility for deficiencies identified during recent inspections, on-site engineering is considered to be a significant program weakness. (412/83-05-04)

5.4.2 DLC Engineering

This group was formed in December 1982 but still lacks a charter and clear direction of its activities.

6. Piping and Pipe Supports

6.1 Organization

Piping and Pipe Supports are field installed by the Schneider Power Corporation (SPC) in accordance with the requirements of Field Construction Procedures (FCP) and drawings prepared and controlled by the Stone and Webster Engineering Corporation (S&W). Quality Control inspection of piping and pipe supports is provided by Site Quality Control (SQC) inspectors to the requirements of Dusquene Light Company (DLC) inspection procedures and under DLC supervision. Direct engineering interaction with field construction on pipe supports including engineering changes is provided by the Advance Change E&DCR Group of S&W. This group provides necessary changes to pipe support drawings thru review of construction problems and issuance of Advance Change E&DCR's to provide for timely input to construction. The applicable pipe support drawing is revised after engineering review. Training of Q.C. inspectors is provided by the DLC Training Department. Training of craft workers and engineering personnel is coordinated by the S&W Training Department.

6.2 Areas Inspected

The inspector interviewed construction supervisors, craft workers and quality control inspectors to determine the overall effectiveness of training and management in implementing procedural requirements as necessary to install and inspect safety related piping and pipe supports and to document these activities in accordance with ASME and ANSI requirements. The inspection of pipe supports also included review of the activities and training of the field advance change engineering pipe support group. Interviews and discussions were conducted with responsible persons in the training, records management, purchasing, SQC, QA and engineering departments. Work in progress on piping and pipe supports which was inspected included welding, fitup, inspection, handling and storage of material and control of records and documents.

6.3 Findings

6.3.1 Supervision and Control of Q.C. Inspection

During examination of SQC inspection activities on piping and pipe supports and review of the applicable inspection procedures, the inspector noted that no actual rechecks or measurements were made to verify performance of SQC inspections.

This observation was reviewed with SQC management. After consideration of this observation, instructions were issued on April 27, 1983 providing for a documented sampling inspection program to be conducted

by Lead Inspectors (Supervisors) in both mechanical and electrical areas. This overcheck of SQC inspections will consist of random verification of at least two previously inspected items (attributes) per inspector on a weekly basis.

The inspector had no further questions in this area.

6.3.2 Identification of Retightened Bolts

The inspector observed that after Hilti Bolts has been retorqued by construction in the Auxiliary Building, they are identified by a paint stripe. This favorable practice or a suitable alternative is not covered in the specification or field procedure for pipe support installation and is not in use in the other two main plant areas. A uniform method for identification of retightened anchor bolts is under consideration by the licensee. Since a large number of bolts are involved, a thorough investigation of this matter is underway by a team of senior DLC, S&W and SPC personnel. A plan will be available by June 10, 1983. This is an Inspector Followup Item pending report by DLC of the action to be taken. (412/83-05-05)

6.3.3 QC Inspection After Retightening Anchor Bolts

The inspector examined construction practices for setting of anchor bolts in concrete and SQC inspections of this work in accordance with Inspection Procedure IP-9.4.6 "Hilti Concrete Expansion Anchors". The applicable Field Construction Procedures (FCPs) frequently require that these bolts be loosened after the initial setting during performance of other construction activities. In those cases the bolts are required by specification and FCP to be retorqued by construction. The inspection procedure required inspection of the initial bolt tightening. After retorquing of the bolts however, there was no requirement for QC inspection of bolt tightness except that they be checked for "finger tightness".

The inspection requirements are considered to be inadequate since they do not verify conformance to specifications and procedures. After consideration of this question, the licensee agreed with the need for QC inspection after final tightening of the bolts by construction. A QC inspection plan will be provided by June 20, 1983, after a plan for identification of retightened anchor bolts has been prepared.

This item is unresolved pending NRC review of the revised SQC program and corrective action. (412/83-05-06)

6.3.3 Construction Records

During observation of piping and pipe support work activities, the inspector noted the status of construction generated records as well as interim storage and final site storage conditions of these records. The flow of construction records was traced through construction, records review, microfilming and final storage. While no violations were observed, the inspector discussed with DLC-QC management the risk of inadverent loss or destruction of records during interim storage while work was still in construction status. Records stored in construction trailers without fireproof file cabinets are particularly vulnerable. Of particular concern were single copy construction records of completed work with signoffs by supervision and inspection. Following notification of the inspector concern, DLC-QC reviewed the situation with the affected site departments. A decision was made by DLC-QC to have interim records storage upgraded to minimize the risk of loss or damage to records during the time between drawing issue and completion of the work.

The inspector was informed during a telephone discussion on May 6, 1983 that a survey of interim storage areas on site had identified one area in which storage was considered to provide adequate protection; the SPC ASME Group in the SPC office building. Seven other interim storage areas in which upgrading of storage conditions is required were identified. Two areas are located in the SPC office building offices; S&W Document Review Group and SPC Document Control Group. Five areas are located in temporary offices; weld issue station, weld supervisors field office, NDE laboratory, office of SPC Chief Welding Engineer, and office of SPC QA Manager.

The need for interim storage of in-process documents in all of these areas will be reviewed and the number reduced if doing so will not unduly handicap the work. Fireproof cabinets will be provided for all remaining interim storage of document which are not duplicates. These are primarily Weld Data Sheets and travelers. Starting immediately, the Weld Data Sheets will be reproduced on a weekly basis until such time as they are stored in fireproof cabinets. The Travelers will not be reproduced since there is sufficient information available on other documents to replace them if necessary.

The inspector had no further questions concerning this item.

6.3.5 Calibration of Measuring and Test Equipment (M&TE)

The SPC tool room maintains approximately 400 calibrated gauges and testing equipment devices. The inspector observed the calibration stickers on a sample of gauges and examined calibration due dates for approximately 100 items of testing equipment. Except as shown below, these items were within the calibration cycle. The inspector noted

that Torque Tester number two was in regular use on April 28, 1983 with an outdated calibration sticker. The calibration due date was April 22, 1983. This piece of Measuring and Test Equipment (M&TE) was immediately recalibrated and found to have been reading accurately. The use of M&TE after expiration of the calibration due date is a violation of the field construction procedure (FCP-501) and 10 CFR 50, Appendix B, Criterion XII, Control of Measuring and Test Equipment. (412/83-05-07)

6.3.6 Observation of Work

The NRC inspector observed work in progress and completed work during both dayshift and offshift hours on piping, pipe supports, pipe hangers and pipe anchors at approximately 28 work stations in various parts of the auxilliary building, fuel building and reactor containment building. This field inspection included observation of work, examination of completed welds and assemblies, review of procedural requirements, records of work completed, records of QC inspections and discussions with personnel associated with design, fabrication, installation, welding, inspection and testing. Specific job related drawings, records and instructions were up to date with the work status and readily available in the work area. Craft workers, QC inspectors and supervisors showed evidence of knowledge and training necessary for satisfactory completion of job tasks.

No violations were noted.

6.3.7 Construction Materials for Independent Analysis

Samples of pipe and welding materials typical of those used in safety related pipe systems were obtained for independent analysis. The materials include:

Carbon Steel Pipe 1½" and 3" Diameter
Stainless Steel Pipe 1½" and 3" Diameter
Carbon Steel and Stainless Steel GTAW weld filler wires
Carbon Steel and Stainless Steel SMAW weld electrodes

These materials are intended for chemistry analysis and comparison to the applicable specification. Should deviations be found, these will be reported at a later date in a separate report.

6.4 Conclusions

Construction supervision craft and QC personnel show evidence of training and knowledge of good working practices. Conformance to regulatory requirements is acceptable. Suggestions for improvements as a result of observations during the inspection were given serious considerations by management, and when warranted were actively pursued.

7.0 Electrical Construction

7.1 Organization

Sargent Electric Company (SEC) is the electrical contractor responsible for installation of the safety-related electrical systems under contract to Stone and Webster (S&W). Quality control inspection is the responsibility of Duquesne Light Company (DLC) and is provided by Site Quality Control (SQC) to the requirements of DLC inspection procedures and under DLC supervision.

7.2 Areas Inspected

The inspector reviewed the requirements stated in the PSAR to assure that these requirements were transcribed into site documentation such as specifications, drawings, inspections, procedures, training instructions and field construction procedures. During the last week of the inspection the Final Safety Analysis Report (FSAR) was docketed and the inspector used both the PSAR and FSAR for evaluating the licensee program.

The inspector reviewed the safety-related electrical specifications; performed inspections of installed electrical equipment, raceways and cable terminations; and observed training of personnel. Storage of equipment and general housekeeping of the site was inspected as the inspector toured the various areas.

7.3 Findings

7.3.1 Preliminary Safety Analysis Report (PSAR)/Final Safety Analysis Report (FSAR)

The inspector reviewed the documents listed below for compliance with the PSAR/FSAR criteria and also for consistency with each lower tier document:

-- 2BVM-41, Criteria for Design and Identification of Electrical Cable and Raceway Systems,

-- 2BVS-931, Specification for Electrical Installation,

-- Field Construction Procedure (FCP) 403, Cable Tray Installation, and

-- Inspection Procedure (IP) 8.3.4, Cable Tray Installation.

These documents reflect the PSAR/FSAR criteria. However, the PSAR/FSAR does not comply with the separation criteria of Regulatory Guide (RG) 1.75, Revision 2, 1978 entitled "Physical Independence of Electrical Systems" and the Institute of Electrical and Electronics Engineer Standard (IEEE) 384-1974 entitled "IEEE Standard Criteria for Independence of Class 1E Equipment and Circuits."

The differences between the PSAR/FSAR separation criteria and those of RG 1.75-1978 and IEEE 384-1974 have been listed in table 7-1.

Discussions were held on the above subject with the licensee and with NRC, Office of NRR. On April 26, 1983 the licensee presented a plan for compliance with the NRC criteria referenced in the RG and IEEE documents, including the following:

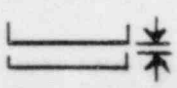
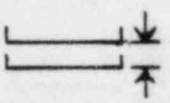
> "BVPS-2 will meet Reg. Guide 1.75 Rev. 2. BVPS-2 will conform to Reg. Guide 1.75 minimum free air space separation requirements (where possible) or will provide tests and/or analyses to show that the BVPS-2 separation dimensions are equivalent to R.G. 1.75, (IEEE-384 1974) dimensions. If analyses and tests can't show equivalence, then a physical barrier will be installed to the degree necessary to obtain equivalence with the R.G. 1.75 minimum free air space separation criteria."

The licensee schedule for the above will be submitted to the NRC by the end of May, 1983.

This item is considered unresolved pending NRC review and evaluation of the licensee submittal. (412/83-05-08)

TABLE NO. 7-1

RACEWAY SEPARATION CRITERIA DIFFERENCE

	NRC-Regulatory Guide (RG) 1.75 Rev. 2, 1978 & IEEE 384-1974	Beaver Valley Power Station, Unit 2 PSAR/FSAR
Cable Spreading Area		
Minimum Vertical Raceway Separation Distance	36 inches	30 inches
General Plant Area		
Minimum Vertical Raceway Separation Distance	5 feet	4 feet
Non-Class IE Circuits		
Minimum Horizontal Raceway Separation Distance	12 inches	6 inches
Minimum Vertical Raceway Separation Distance	36 inches	16 inches
Method of Measuring Vertical Raceway Separation Distance		

7.3.2 Raceway Fill

The inspector verified that the maximum fill requirement for power and instrumentation cables in the K, C and X sizes is defined and specified in the engineering documentation as:

"Maximum fill for the K, C and X trays occurs when the sum of the cable cross-sectional areas is equal to 50 percent of the available cross-sectioned area of the raceway."

This requirement for tray fill has been stated in both the PSAR and the FSAR, but the licensee has not identified how this requirement will be verified in his site documentation.

This item is considered unresolved pending NRC review and evaluation of the licensee's proposed method for verifying tray fill. (412/83-05-09).

7.3.3 Raceway Grounds

The inspector reviewed the requirements for installation of electrical raceway grounds in the documents listed below:

-- 2 BVM-38, Grounding Criteria

-- 2 BVS-931, Specification for Electrical Installation

-- FCP-421, Field Construction Procedure for Installation of Permanent Plant Grounding System.

The inspector discussed raceway grounding requirements with licensee and A/E representatives. Since the documents were not in agreement, 2 BVM-38 will be revised to conform to BVS-931 which provides the grounding requirements for BV-2 as established by engineering.

A review of FCP-421 and the training lesson plan provided to craft personnel indicates that there was a misunderstanding concerning interpretation of the requirements of engineering specification 2BVS-931 by SEC when they prepared FCP-421. The licensee stated that a review by the electrical engineering organization would be performed and the necessary changes would be made to correct the information in FCP-421 and the training lesson plan. The engineering review of the above documentation was started during the inspection period.

An inspection of the grounding installation by the inspector verified that the craft personnel installed the grounding system as interpreted by the SEC and indicated in FCP-421. The grounding installation had not been inspection by SQC as of this inspection period.

No violations were identified.

7.3.4 Electrical Cable Termination

The inspector observed work performance, partially completed work and completed work on selected cables, raceways and terminations to determine whether the requirements of applicable specifications, work procedures and inspection procedures are being accomplished in accordance with NRC requirements and licensee commitments.

The inspector witnessed the installation of cable terminations and determined that they were being installed per the FCP and that the craft personnel were knowledgeable in the installation tasks they were performing. The inspector also verified that the attributes being used by the quality control inspectors were those defined in the inspection plan for this type of installation.

No violations were identified.

7.3.5 Field Construction Procedures (FCP's)

The inspector reviewed the FCP's associated with the electrical installation of the safety-related equipment for compliance with the engineering specifications listed in the design manual for this site. The FCP's were compatible with the engineering specifications except for the problems identified in paragraph 7.3.3 of this report.

No violations were identified.

7.4 Conclusions

Construction supervision, craft and QC personnel are well trained and are knowledgeable of good construction practices. Conformance to regulatory requirements is acceptable. Electrical separation does not conform to licensee commitments, although the installation is in accordance with the approved design. The licensee has stated that commitments will be met.

8.0 Housekeeping, Storage and Maintenance of Equipment

8.1 Organization

S&W construction is responsible for storage, protection and maintenance of equipment from its receipt at the site until turnover to test and startup. They are also responsible for housekeeping and cleanliness of the area. DLC Site Quality Control (SQC) is responsible for inspection of storage and maintenance of equipment and for surveillance of housekeeping.

8.2 Areas Inspected

8.2.1 Background

During the Systematic Assessment of Licensee Performance (SALP) for the period December 1, 1981 through November 30, 1982 housekeeping, storage and maintenance had been identified as an onsite weakness.

As of January 15, 1983, the licensee implemented major changes in this program in order to correct the identified concerns. These included:

-- Consolidation of the storage program under a supervisor with a team of craft personnel responsible for storage and with the authority to immediately correct improper storage.

-- Identification, control and maintenance of storage areas inside and outside the construction area.

-- Consolidation and segregation of storage areas in the plant buildings.

-- Removal of voided material from all buildings and limiting incoming material to one month before usage. Increased clean-up of the general plant areas.

-- Increased management inspections of storage areas from every other month to monthly. Increased QC surveillance.

-- Establishment of special cleanness zones for items requiring special attention when performing construction work near sensitive equipment.

8.2.2 Inspection

This inspection included:

-- Review of the revised storage and maintenance program;

-- Review of selected maintenance records;

-- Interviews with responsible supervisory and management personnel, and;

-- Observation of housekeeping and equipment storage conditions.

8.3 Findings

8.3.1 Program

The inspector interviewed supervisory and management personnel and reviewed recently revised specifications, FCP's and internal correspondence concerning the program. The program outlined above has been implemented and has been assigned to a construction supervisor. A senior construction engineer has been assigned direct responsibility for the program. A tour of storage areas is performed bi-weekly by supervisory personnel of DLC, S&W and the major sub-contractors. The entire area is covered by two bi-weekly tours. Following each tour, a meeting is held for discussion of problems identified. Responsibilities for corrective action are assigned and shown on meeting notes. Corrective action is followed by the storage coordinator and inspected by SQC. The inspector was informed that cooperation by personnel from all organizations involved was excellent.

No violations were identified.

8.3.3 Program Implementation

The inspector reviewed selected inspection reports, notes of Management Committee Review of Storage, records of maintenance of selected items of electrical equipment; Equipment storage and housekeeping conditions in the electrical, piping and pipe hanger areas were observed. In addition general tours of the site were made for observation of storage conditions.

Storage areas are identified and components and equipment are segregated. Unused material has been removed from construction areas. The buildings and equipment are being kept clean and orderly and storage instructions are being complied with. Management is involved and performs periodic inspection of the construction areas. Special cleanness zones have been established for items requiring special attention such as sensitive electrical equipment.

No violations were identified.

8.4 Conclusions

Storage and maintenance is considered now to be a strength of the project. A strong program has been established and is being implemented effectively. Management is actively involved.

9.0 Training

9.1 Organization

Training is conducted by both DLC and S&W. DLC-QA provides and conducts a training program for QA auditors. DLC-QC provides and conducts training programs for Site QC (SQC) personnel. S&W provides and conducts training programs for construction craft personnel, engineers and supervisory personnel. In addition, S&W distributes, monitors, and documents training for Site Engineering Group (SEG) personnel. Each of the major subcontractors has a training coordinator, reporting directly to the site manager, who determines the training needs for that organizations personnel and coordinates training with the S&W Training Supervisor.

9.2 Areas Inspected

The inspector reviewed training requirements and records of training for DLC-Auditors, DLC-SQC, S&W Construction and S&W SEG personnel. Interviews were conducted with DLC and S&W management and Training Supervisors. Classes for training of Auditor, SQC and craft personnel were monitored.

9.3 Findings

9.3.1 DLC - QA Training

The inspector reviewed the training and qualification program for QA auditors and determined that it was in compliance with the requirements of ANSI N42.2.23. The training was well documented. On a sampling basis, the inspector reviewed training records of auditors who had participated in audits which had been reviewed by the inspector. Their training was acceptable for the tasks performed. Indoctrination records are maintained for non-QA auditors who had participated in their audits.

The inspector reviewed a recently started training program. Training is conducted by QA personnel and consists of classroom training, reading assignments, and training tapes obtained from a consultant.

The inspector reviewed a test given to a lead auditor and noted that it did not cover all of the areas specified in ANSI N45.2.23. It covered primarily auditing techniques and the general requirements of ANSI N45.2 and 10 CFR 50, Appendix B. This observation was discussed with the licensee's representative. He stated that the tests were changed for each course and that he felt that they were adequate. However, based on the inspector's comments, he agreed that tests would be reviewed for comprehensiveness.

The inspector had no further comments concerning this matter.

9.3.2 S&W - SEG Training

Indoctrination and continuing education of personnel performing Engineering Department work is provided to develop understanding and use of the procedures and systems developed to govern and support a nuclear project. Indoctrination consists of activities conducted to familiarize new employees or newly assigned personnel with basic policies and requirements associated with the functions they perform. Continuing education of engineering personnel consists of training to develop proficiency of personnel in activities affecting quality and to increase their knowledge of the Stone & Webster Engineering Corporation (S&W) quality assurance programs for engineering and design. The SEG Training Program consists of a combination of taped and classroom sessions and a reading program.

The inspector reviewed the SEG Training Program to ascertain compliance with licensee commitments contained in Engineering Assurance Procedure (EAP) 2.4 and Project Specification 2BVM-225. The inspector reviewed the program's compliance in the following areas:

-- Establishment of minimum requirements

-- Development of training matrix for engineering personnel

-- Coordination of the program between Engineering and Training

-- Course content and method of presentation

-- Awareness of engineering personnel training status

-- Applicability of courses to the work being performed.

Based on the review of EAP 2.4, 2BVM-225, computer printouts of individual training, and discussions with Engineering and Training personnel, the inspector found the SEG Training Program adequate except in the following areas:

(1) Engineering supervision was not using feedback from Training to determine the status of an individual's training or to control or improve training results.

(2) Correlation between training and actual work requirements was lacking. The inspector compared the training matrix; (a plan of training requirements) for Field Pipe Support Engineers with the basic documents, procedures, specifications and other references applicable to pipe supports. Only a small portion of the references pertaining to pipe supports were included in the training matrix. This question was discussed with SEG

supervision who agreed to review and revise each engineering training matrix to better reflect the specific requirements of the engineering tasks. They also committed to improve supervisors' attention to the training status of their personnel.

This item is unresolved pending compliance with the above commitments and review by NRC. (412/83-05-10)

9.3.3 DLC - SQC Training

The training program for SQC personnel is on video tape with classroom examples (where practical) given by the instructor. The training courses are updated as required to remain current with engineering specification changes.

The DLC training supervisor maintains a file on each quality control inspector with a history of the required courses and the courses taken to date. The records are complete, showing for each inspector: course taken, date, length of time, instructor, pass/fail results, and rescheduling for courses missed. Discussions with inspectors verified that they have received the training documented in their records or that they were rescheduled to take courses missed.

The inspector reviewed six training course sections of the approximately forty sections on tape in the electrical training course. They reflect the requirements of the electrical FCP's and provide detailed criteria for QC inspection. The inspector also examined selected portions of the course on pipe hanger installation. In addition, ongoing courses on electrical and pipe hanger installation were audited by the inspector.

In addition to the continuing training in technical disciplines discussed above, indoctrination is provided for new personnel.

The training program, based on review of the electrical and pipe hanger courses, is complete, thorough, detailed, well controlled and well managed. Training records are complete and followed to assure that the required training is provided.

No violations were identified and training of SQC personnel is considered to be a program strength.

9.3.4 Construction Training

Training of contractor and major subcontractor personnel is provided by S&W to craft and supervisory personnel in accordance with FCP-17, Construction Training Program, . The S&W Training Supervisor provides overall direction and coordination of the program. He is responsible for schedules, records, facilities and evaluation of the

program. Each subcontractor's training representative, who reports directly to the site manager, is responsible for establishing his training needs and for coordination with the S&W training supervisor.

Each newly hired employee is indoctrinated concerning site orientation, craft orientation, QC program and nuclear requirements. Thereafter, training is provided for first time performance of complex and quality sensitive tasks, to update performance requirements due to engineering changes or to correct deficiencies, if appropriate. Training consists of informal "tool box" sessions by craft supervisors or formal classroom sessions. The formal training courses are generally based on FCP requirements. They include input from craft supervisors (subcontractors and S&W) and are reviewed and approved by the S&W Training Supervisor.

The inspector reviewed several lesson plans and audited training in electrical grounding, electrical separation and pipe hanger installation. The training accurately reflected the FCP requirements in these areas and provided sufficient detail for performance of the required tasks. The inspector reviewed selected training records and verified their correctness by discussions with the personnel receiving training.

Training of construction craft and supervisory personnel is well controlled and well managed. It is exceptionally detailed and thorough for a construction training program.

No violations were identified and this area is considered to be a program strength.

9.4 Conclusions

Training of SQC and construction personnel is considered to be a strength of this project.

Training of SEG personnel is considered to be a program weakness; this is discussed in this section of the report and is also identified as a weakness of SEG in Section 5.4.1.

10. Summary

It is concluded that the licensee's construction and quality assurance program are effective in assuring conformance to regulatory requirements and licensee commitments. Construction management, storage and maintenance, and training of construction and QC personnel are considered to be significant strengths of the project. The strength of the storage and maintenance program is a commendable improvement and is attributable to strong management interest.

Two significant weaknesses were identified as a result of this inspection. One was the lack of a charter for DLC Engineering Department of the Nuclear Construction Division and its role in performance of design reviews. The other was ineffectiveness in many aspects of design control by S&W site engineering. These weaknesses should be subjected to management attention.

11. Unresolved Items and Program Weaknesses

Unresolved items are matters about which more information is required to ascertain if it is acceptable, a violation, or a deviation. Unresolved items are discussed in paragraphs 4.3.3, 6.3.3, 7.3.1, 7.3.2 and 9.3.2.

A program weakness is not a violation, deviation, or unresolved item. It represents a condition which, if left uncorrected, could contribute to the violation of a regulatory requirement. Program weaknesses are discussed in paragraphs 5.3.6 and 5.4.1.

12. Exit Interview

Exit interviews were held on April 15 and 29, 1983 with the members of the licensee's staff denoted in paragraph 1. The inspectors discussed the inspection scope and presented their findings.