



UNITED STATES
 NUCLEAR REGULATORY COMMISSION
 REGION II
 101 MARIETTA ST., N.W., SUITE 3100
 ATLANTA, GEORGIA 30303

Report No. 50-389/81-04

Licensee: Florida Power and Light Company
 9250 West Flagler Street
 Miami, Florida 33101

Facility Name: St. Lucie 2

Docket No. 50-389

License No. CPPR-144

Inspection at St. Lucie site near Ft. Pierce, FL.

Inspectors: <u>J. C. Bryant</u>	<u>4/13/81</u>
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Approved by: <u>J. C. Bryant</u>	<u>4/13/81</u>
J. C. Bryant, Section Chief, Division of Resident and Reactor Project Inspection	Date Signed

SUMMARY

Inspection on March 9-20, 1981

Areas Inspected

This special, announced inspection involved 336 inspector-hours on site in the areas of QA program implementation, on site design control, site management, site procurement, and construction controls and activities. Construction activities inspected included electrical components and systems, civil construction activities, safety-related pipe support and restraint system, and mechanical equipment installation.

Results

Of the five areas inspected, no violations or deviations were identified in four areas; three violations were found in one area (Failure to follow procedures in civil QC inspections, paragraph 9; Failure to follow procedures in installation of pipe supports, paragraph 10, Unauthorized modification of cable tray restraint, paragraph 11).

DETAILS

1. Persons Contacted

Licensee Employees

- *H. J. Dayer, Vice President, EPC
- *W. B. Lee, Director of Construction
- *B. J. Escue, Site Manager
- *A. E. Siebe, Manager of QA
- *W. T. Weems, Assistant Manager QA Construction
- *W. M. Hayward, Supervising Engineer QA
- *D. R. Cooper, Supervising Engineer QA
- *E. W. Sherman, QA Engineer
- *J. L. Parker, Project QC Supervisor
- *J. D. Kirk, Superintendent General Construction
- *J. E. Vessely, Director, Nuclear Affairs

Other licensee employees contacted included 35 construction craftsmen, 20 engineers, 33 QC inspectors, 10 craft supervisors, and 18 office personnel.

Other Organizations (Ebasco)

- *K. N. Flannagan, Project Superintendent
- *R. A. Garramore, Senior Resident Engineer
- P. Sweitzer, Labor Relations
- *G. H. Krauss, ESSE Project Engineer

NRC Resident Inspector

- *S. A. Elrod, Senior Resident Inspector
- *P. Bibb, Resident Inspector

2. Exit Interview

The inspection scope and findings were summarized on March 20, 1981, with those persons indicated in Paragraph 1 above.

3. Licensee Action on Previous Inspection Findings

Not inspected.

4. Unresolved Items

Unresolved items are matters about which more information is required to determine whether they are acceptable or may involve violations or deviations. New unresolved items identified during this inspection are discussed in paragraphs 7 & 9.



5. Project Management - Site

Portions of this inspection were directed toward methods used by site management to assure that a quality product is produced and toward participation of management and the supervisory staff in the handling of site problems.

Discussions were also held with craftsmen, inspectors, and engineers to determine their perception of work quality, availability of technical assistance, access to management, freedom to express concerns and protection from harassment. Results of discussions with craftsmen, inspectors and workers are discussed in several sections of this report.

a. Organization

The overall design is the responsibility of Ebasco Services, Inc. (Ebasco) except for the NSSS scope of work. Ebasco maintains an onsite engineering field office. Approval of major design changes is made through the New York Offices. FP&L manages the site construction program.

The site organizational/functional alignment is a composite structure of FP&L, Ebasco, US Testing and Union Boiler personnel. Overall site construction management and QA/QC functions are manned by FP&L personnel. The site engineering and construction functions are manned by Ebasco personnel under direct supervision of FP&L.

Quality Control Inspection activities are performed by US Testing personnel under direct supervision of FP&L Project QC Supervisor.

The Union Boiler management personnel responsible for piping and instrumentation installation report to the Ebasco Project Superintendent. The NSSS supplier has the normal complement of personnel for technical support and coordination with the home offices. The inspectors were provided with current organization charts which clearly define the lines of authority and communications between the licensee and contracting organizations. The inspectors verified that the onsite organization/functional alignment was consistent with the information provided.

The inspectors conclude that there is a proper balance of work load assigned to lead site supervisory personnel and the span of control for managers and supervisory personnel is within normal management control expectations.

b. Position Descriptions

Positions descriptions for the top four levels of site management and supervision were reviewed. The inspectors conclude that the position descriptions are consistent with the organizational structure and program description. The position descriptions provide sufficient

detail to clearly define responsibilities, authority, and interfacing activities. The QA/QC procedures further define the areas of responsibility and authority within scope of the activity defined by the procedure.

c. Implementation

As a result of the overall review of the QA program, organizational/functional alignment and the QA/QC site implementing procedures, discussions with site personnel, observations of ongoing activities and record examinations, the inspectors conclude that there are adequate provisions in place for control of the following: communications, staffing, reporting of site activities, problems, trending, report analysis, activity planning, stop work, records and record maintenance, and inspection activities.

d. Management Involvement

The inspectors held discussions with site management, engineers, site QA personnel, QC inspectors, and craftsmen of various disciplines; they reviewed audit reports and findings, CDR's, trending reports, field engineer reports; and other report forms intended for the interchange of information; and attended management assessment meetings. The inspectors conclude that management on this site is aware of the daily on going activities, day to day problems and their resolution. Further, it is quite evident from discussions with site personnel that management is highly visible, accessible and fully involved with the day to day activities and problems.

e. Employee Freedom to Express Concerns and Perception of Management Activities

The site manager has issued a notice and directed that it be placed on all site bulletin boards and that it be presented to all site personnel through stewards or at safety meetings. The notice is entitled, "Reporting of Safety-Related Defects and Noncompliance".

The notice encourages all personnel, in the event that they are aware of such a defect, to talk to their foremen, supervisor or department head. It states that if they still have concerns, they should talk to the services superintendent. As an alternative, it suggests that they call the FP&L QA Manager in Miami and provides his phone number. It then states that if their concerns still are not satisfied, they should call the NRC.

FP&L has no wage roll people on site other than Administrative and, therefore, has no grievance procedures for crafts. The Ebasco labor relations manager stated that a grievance procedure was part of each craft's contract. The inspector reviewed several of these procedures.

There was evidence that employees are encouraged to take any problem to their supervisors and to higher supervision if they feel the need. There was no evidence that there was any suppression of employee concerns by management and the inspectors were assured by on site union officials that employee concerns would be addressed promptly and would receive thorough consideration without recrimination. Employees at all levels clearly stated that harassment of QC personnel for rejecting work or the performance of poor work by craftsmen would not be tolerated at the site.

The site managers and lead superintendents are mature, experienced and knowledgeable people. The confidence shown by these managers permeates the lower levels of supervision. Discussions with craftsmen, QC inspectors, QA auditors and various levels of supervision revealed a unified desire to produce a quality product.

In general, people interviewed at the site appear knowledgeable of requirements and have adequate resources available to produce a quality product.

The inspectors identified no concerns or violations in the area of management controls.

6. Site QA and Construction QA Program Implementation

a. General

The purpose of this portion of the inspection was to complete an overall review of implementation of the FP&L program for control of site QA and construction activities.

FP&L Topical Quality Assurance Report (FPLTQAR 1-76A) Rev. 3 (Topical) is the current document that establishes FP&L QA Program requirements. FP&L submitted Rev. 3 to the Quality Assurance Branch, NRR, (QAB) for review and acceptance via FP&L letter L-79-34 dated February 9, 1979. QAB has not accepted Rev. 3 to the Topical as of the date of this inspection. FP&L has issued and implemented Rev. 3 to the Topical as stated within the February 9, 1979, letter.

b. Documents Examined

- FPLTQAR 1-76A, Rev. 3
- Corporate QA Manual and associated Procedures
- Quality Site Procedures Manual and associated Procedures
- Quality Instructions Manual and associated Procedures

c. QA Program Review

The inspector reviewed the documents listed above and held discussions

with responsible site management, QA, QC, technical support and craft personnel and concluded that the FP&L QA program and supporting manuals contain the following:

- (1) A firm policy statement from upper management supporting the QA program and objectives.
- (2) Adequate definition in the program for control of contractor and subcontractor activities.
- (3) Provisions in the implementing QA manuals for interface control between engineering, QA, construction, consultants, contractors, and procurement.
- (4) A listing of commitments to regulatory requirements.
- (5) Provision for management audits to determine QA effectiveness.
- (6) Clear-cut organizational/functional charts and responsibility definition within the QA program implementing documents.
- (7) Independence of the QA organization from design and construction.
- (8) QA Department direct access to management.
- (9) Complete corporate QA manual and site quality instruction manuals with procedures to implement the scope of work, QA/QC activities and provide interface control with other departments and activities.
- (10) The QA manuals are controlled and contain procedures for change control.
- (11) Stop work requirements are established and provisions provided for implementation.

d. Program Implementation

By observation of ongoing activities, review of reports and discussions with personnel at all levels, the inspector concluded that the FP&L QA program, supporting manuals and organizational/functional alignment are consistent with project status and adequate to monitor project activities in an effective manner. Personnel at all levels were knowledgeable of the QA program and procedural requirements for their particular scope of work.

e. Audits

There is a comprehensive system of audit and surveillance activities which spans corporate, departmental and site QA program activities.

FP&L belongs to a Joint Utility Management Audit Organization which includes seven utilities. This organization performs the corporate audit on an annual basis. The inspector reviewed the JUMA Audit, QAS-QAD-81-1.

The inspector reviewed site audit and surveillance activities being performed by the site QA organization. Site audits are performed in the form of management audits and activities audits. In 1980, there were 10 management audits and 40 activities audits performed. During 1980, there were 350 surveillances performed by the site QA auditors.

At the time of this inspection, there had been 6 audits and 96 surveillances performed in 1981. The inspector reviewed several audit reports and surveillance actions. The inspector concluded that the audit/surveillance system provides for effective evaluation of program performance. Audit plans are tailored to a function and are not superficial check lists.

No violations or deviations were identified.

f. Deficiencies, Defects and Nonconformances

The purpose of this inspection effort was to perform an in-depth examination of the licensee's/contractor's program for identifying, documenting, evaluating, instituting proper corrective action, determining cause, and detecting trends of identified construction discrepancies. Additionally, the inspectors examined the evaluation and reporting (10 CFR 50.55(e) and Part 21) measures that have been established and implemented.

Documents Examined

- FP&L Topical Quality Assurance Report (FPLTQAR 1-76A) Revision 3
- Q.P. 15.1, Control of Nonconforming Material, Parts or Components - Plants under Construction, Rev. 2
- Q.P. 16.1, Corrective Action, Rev. 2
- Q.P. 16.4, Evaluating and Reporting of Defects and Noncompliances for Substantial Safety Hazards in Accordance with 10 CFR Part 21, Rev 1
- Q.P. 16.6, Reporting of 10 CFR 50.55(e) Deficiencies, Rev. 1
- SQP 21, Corrective Actions, Rev. 1
- QI No. 15.1, Identification and Control of Discrepant Conditions, Rev. 4
- QI No. 15.2, Processing of 10 CFR 50.55(e) Discrepancies, Rev. 1
- QI No. 16.1, Stop Work Instruction, Rev. 1
- QI No. 2.6, Evaluation of Control Effectiveness/Trend Analysis, Rev. 2

Program Review

The inspectors reviewed the above listed documents and held discussions with responsible site management staff, QA management and staff, QC management

and staff, the EPP representative, and contractor personnel. The inspectors conclude that the FP&L implementing procedures provide sufficient measures to control on and off-site identified deficiencies, their corrective actions and the proper evaluation and reporting to the NRC if required.

Implementation

By observation of activities, review of NCR's, IR's, DR's and discussions with personnel at all levels, the inspectors concluded that FP&L has implemented the established QA program and the program as implemented is a viable program. The personnel interviewed were knowledgeable of the program procedure requirements and appeared to be very conscientious. Based on the review of the various documents related to control of site problems, the inspectors conclude that the problems are being adequately described, evaluated, dispositioned and corrective actions verified. The monthly and quarterly problem trending evaluation of site identified problems is one of the better managed systems that the inspector has observed.

No violations or deviations were identified.

7. Design Controls

a. Organization

On site design activities are performed by the Ebasco Site Support Engineering group (ESSE). The group is supervised by the site project engineer who reports to the St. Lucie 2 Project Engineer in the Ebasco home (New York) office. ESSE has design engineers in the following disciplines: Civil, electrical, instrumentation, and mechanical. These design engineers report to the site project engineer. The responsibilities of ESSE are to review and approve field change requests (FCR's) which results in only minor project design changes; disposition nonconformance reports (NCR's); prepare design change notices (DCN's), which are minor design changes; consult with the home office for approval of FCR's which result in major design changes; and coordinate design activities between the home office and onsite construction groups. Ebasco Engineering procedures define a minor change as one which has little or no impact on a safety-related system, or cost less than \$100,000. All other changes are considered major.

b. Review of Design Control Procedures

The inspector examined procedures for on site design activities to determine if the onsite design activities are being controlled as specified in the FSAR and NRC requirements. The following procedures were examined:

- (1) FP&L Site Quality Procedure SQP-17, "Design Control"

(2) Ebasco Engineering Procedures

- (a) E-11, "As-Built Drawings"
- (b) E-30, "Preparation of Calculations"
- (c) E-69, "Design Change Notice, Field Change Request"
- (d) E-82, "Ebasco Site Support Engineering (ESSE) Group"
- (e) E-88, "Preparation, Approval, and Distribution of Engineering and Design Guides"

Review of the above procedures and discussions with ESSE engineers disclosed the following unresolved item: The processing of nonconformance reports (NCR's) in ESSE is controlled by an ESSE standard operating procedure (SOP-5). This procedure is not considered a QA procedure and does not appear to meet the requirements of Criterion V of 10 CFR 50, Appendix B. Discussions with the civil discipline engineers and the site project engineer disclosed that NCR's are dispositioned in a manner similar to field change requests, i.e., approval of NCR's which would result in a minor design change is approved on site by ESSE, while disposition of more significant NCR's is made after consulting with the home office. However, there does not appear to be a formal procedural requirement to consult the home office in disposition of NCR's. The apparent lack of a QA procedure for processing of NCR's in ESSE was identified to the licensee as Unresolved Item 389/81-04-01, "ESSE NCR Control Procedures", pending further review by NRC.

c. QA Audits

ESSE is audited by the Ebasco home office QA Audit group and the FP&L site QA organization. The inspector reviewed audit number QAC-PSL2-80-42, and discussed the audit findings with the licensee's QA engineer who has responsibility for auditing the ESSE group. This audit, which was an indepth audit of ESSE, disclosed several procedural violations which were committed by ESSE in performance of design activities. These audit findings are currently in progress of being resolved.

No violations or deviations were identified.

8. Site Procurement, Receiving and Storage

a. General

The bulk of equipment or materials received at the site are either NSSS supplied or Ebasco procured. Site requisitioned items are primarily consumables, standard stock items and replacement items.

b. Documents Examined

- (1) Requisition 115661
P. O. No. 31526-27388S
- (2) Requisition 107531
P. O. No. 93540-23196S
- (3) Requisition 115382
P. O. No. 68921-26991S
- (4) Requisition 115878
P. O. No. 79827-28217S
- (5) Requisition 150959
P. O. No. 05972-25338S
- (6) Requisition 113883
P. O. No. 82029-24482S
- (7) Site Quality Procedure, SQP-11 Procurement
- (8) Quality Procedure, Q.P. 4.1, Control of Requisitions and Issuance of Purchase Orders for Spare Parts, Replacement Items and Services.

c. Program Implementation

The inspectors examined the above noted requisitions, purchase orders and controlling procedures. Discussions were held with site QA personnel, site engineering personnel, warehouse QC personnel and warehouse personnel. A walk through inspection of the warehouse and storage facilities was performed. The inspectors observed receipt inspection activities in progress and determined that the receipt inspectors had the appropriate receipt inspection checklists, specifications, drawings, and purchase documents to perform this task.

The inspectors concluded that:

- (1) The procurement documents examined included the applicable technical, QA, Code, Standards and 10 CFR 21 requirements.
- (2) The materials were ordered from suppliers which are on the licensee's approved vendor list.
- (3) The procurement documents specify packaging, handling, storage and documentation requirements.

- (4) The receiving QC technicians have access to the procurement documents at the warehouse.
- (5) Site personnel were knowledgeable of site procurement, receiving and storage policies, procedures and activities.
- (6) The site receiving, inspection, nonconforming, tagging, storage, records and transfer activities are being handled in a controlled manner.
- (7) Class A, B, C and D storage facilities have been established.

No violations were identified.

9. Civil Construction Activities

a. Review of Civil Construction and Quality Control Instructions and Procedures

The inspector examined specifications, instructions, and procedures to determine if work activities and quality control and quality assurance functions were provided for as stipulated in the FSAR and NRC requirements. The following procedures and specifications were examined:

- (1) EBasco Specifications
 - (a) FLO-2998.471, "Excavation and Backfill"
 - (b) FLO-2998.473, "Concrete"
- (2) FP&L Site Quality Procedures
 - (a) SQP-2, "Concrete and Grout Placement"
 - (b) SQP-34, "Excavation and Backfill"
 - (c) SQP-35, "Structural Steel Erection"
 - (d) SQP-45, "High Strength Bolted Field Connections for Structural Steel"
 - (e) SQP-46, "Fabrication of Class 1 Structural Steel"
 - (f) SWP-60, "Repair of Concrete Using Shotcrete"
- (3) FP&L Construction Quality Control Instructions
 - (a) QI 10.2, "Batch Plant Inspection"

- (b) QI10.3, "Inspection of Placing and Consolidating Concrete"
- (c) QI 10.4, "Post-Placement Concrete Inspection"
- (d) QI 10.5, "Structural Steel Inspection"
- (e) QI 10.6, "Inspection of Concrete, Formwork, and Reinforcing Steel Installation"
- (f) QI 10.7, "Evaluation of Compression Test Results of Field Concrete"
- (g) QI 10.10, "Soils Testing and Surveillance of Excavating, Backfilling and Compacting Operations"
- (h) QI 10.11, "Inspection of Embed Items"
- (i) QI 10.70, "In-Process Testing of Concrete Materials"
- (j) QI 10.71, "Field Inspection of Structural Concrete"
- (k) QI 10.72, "Periodic Inspection of Concrete Production Facilities and Concrete Mixer Uniformity"
- (l) QI 10.77, "Testing of Reinforcing Steel Bars"

In addition to the above specifications, procedures, and instructions, the 50 Field Change Reports (FCR's) and 8 Design Change Notices (DCN's) applicable to either specification FLO 2998.471 or specification FLO 2998.473 were reviewed.

b. Concrete Materials Receiving Inspection Program

The Civil QC Group is responsible for performing receiving inspections on concrete materials (cement, aggregates, and admixtures). The inspector examined FP&L specification COP-3-1, "Batch Plant Operations", Ebasco specification FLO 2998.473, "Concrete", and FP&L Construction Quality Control Instruction QI 10.70, "In-Process Testing of Concrete Materials", to determine if the concrete materials receiving inspection activities were provided for as stipulated in the FSAR and NRC requirements.

The inspector discussed the inspection requirements with civil quality control inspectors and batch plant operating personnel. These individuals were cognizant of the receiving inspection requirements for concrete materials. The inspector examined quality records pertaining to receiving inspection of concrete material. Records examined were as follows:

- (1) Certified Material Testing Reports for cement received on the project site in January and February 1981.
- (2) Certified Material Testing Reports for coarse aggregate received on site in February 1981.
- (3) QC Inspection Reports for January - February 1981, pertaining to receiving inspection of concrete materials
- (4) Audit Number QAC-PSL2-80-31, "Batch Plant Operations"

c. Observation of Work and Work Activities

- (1) The inspector observed placement of concrete in pour numbers 9, 10, 15, 18, part 19 and deck 11 in the diesel oil storage tank building and placement of concrete in strut numbers 53D-F, and 54C-D on the elevation 23 level of the reactor containment building. Acceptance criteria examined by the inspector were procedures pertaining to concrete placement inspection listed in paragraph 9.a, and the following documents:
 - (a) Drawing number 2998-G-687 501 and 502, "Diesel Oil Storage Tank Foundation and Missile Protection STR-R-SH1 and SH2"
 - (b) Drawing number 2998-G-495, "Reactor Building Interior Base Concrete-Plan-Masonry"
 - (c) Drawing number 2998-G-497, "Reactor Building - Interior Base Concrete-Plan-Reinforcing - Sheet 1"
 - (d) Field Change Requests (FCR's) and Design Change Notices (DCN's) applicable to the above drawings.
 - (e) Ebasco specification FLO-2998.473, "Concrete, and FCR's and DCN's" applicable to this specification.

Forms were tight, clean and level. Rebar was properly installed and clean. Placement activities pertaining to delivery time, free fall, flow distance, layer thickness, and consolidation conformed to specification requirements. The inspector noted that concrete placement activities for the pours listed above were monitored by QC inspectors. Examination of the concrete batch plant indicated materials were being controlled and accurate batch records were being generated. Storage of materials (aggregates, cement, and admixtures) were observed to be in accordance with specification requirements. Batch plant activities were continuously monitored by a QC inspector.

Examination of testing of plastic concrete and QC inspection

activities during these placements disclosed the following violations: Quality Control Instruction QI 10.71 states that water is not to be added to any concrete batch after making in-process tests for slump, air, unit weight and compressive strength. Contrary to this requirement, water was added to concrete which was placed in reactor building struts 53 D-F and 54 C-D after making the in-process tests for air, unit-weight, and compressive strength. The in-process tests were not repeated after addition of the water.

In addition, following completion of the concrete placement, the inspector noted that craft personnel were carrying buckets of concrete away from the pour area to another area in the reactor building. Discussions with these individuals disclosed that the concrete was being used to repair a honeycomb area on the exterior surface of the primary shield wall at azimuth 0°, elevation 36. The inspector accompanied the craft personnel to this area to witness the concrete placement in the repair area. Upon his arrival at the location where the concrete repair was being made, the inspector observed that no QC inspection personnel were present to inspect the concrete repair activities as required by Quality Control Instruction QI 10.4.

The above two examples of failure to follow instructions and procedures, i.e., addition of water to concrete after making in-process tests, and failure to inspect a concrete repair activity, were identified to the licensee as Violation item 389/81-04-02, "Failure to Follow Procedures in Performance of Civil Quality Control Inspections".

- (2) The inspector examined the soils and concrete materials testing laboratory and the currentness of calibration of laboratory testing equipment. The inspector observed unconfirmed compression testing of concrete cylinder numbers 6796 through 6798. Quality Control Instruction QI 10.71, states that concrete compressive strength specimens are to be tested in accordance with ASTM C-39. ASTM C-39 requires that the rate of loading during testing of the concrete cylinders be applied within the range of 20 to 50 psi per second. Observation of testing of the above concrete cylinders disclosed that the load was being applied in the range of 60 to 70 psi per second. This was identified to the licensee as another example of failure to follow instructions and procedures as stated in Violation item 389/81-04-02.
- (3) The inspector observed placement of reinforcing steel in the reactor building ring girder and in the elevation 96.5 roof (pour number FHB-94) of the fuel handling building. Acceptance criteria examined by the inspector were QI 10.6 and the following

drawings, including FCR's and DCN's, which were applicable to them:

- (a) Drawing number 2998-G-601-SH-1, "Fuel Handling Building Roof E1 62 and E1 96.5 - Masonry"
- (b) Drawing number 2998-G-601-SH-2, "Stay In Place Form Framing and Details"
- (c) Drawing number 2998-G-602, "Fuel Handling Building - Plan at E1 72 and 96.5 - Reinforcing"
- (d) Drawing number 2998-G-511, "Reactor Building Dome Plan and Sections - Masonry"
- (e) Drawing numbers 2998-G-512 and G-513, "Reactor Building Dome Reinforcement - SH1 and SH2"

The inspector discussed the in-progress inspection of the reinforcing steel with Civil QC inspectors. The inspector reviewed inspection reports pertaining to the in-progress inspection of the reinforcing steel in the reactor building ring girder and the elevation 96.5 fuel handling building roof. The inspector observed that the rebar placed in the above locations, as of the inspection date, conformed to specification requirements. Details examined by the inspector included bar size and grade, bar spacing, location of splices, and length of splices.

- (4) The inspector reviewed the post-placement concrete inspection program. This program includes inspection of curing, inspection of form removal, inspection of concrete surfaces for defects (e.g., honeycombs) and inspection of concrete repairs. The inspector discussed the post-placement inspection requirements with Civil QC inspectors. Acceptance criteria examined by the inspector were Ebasco specification FLO-2998.473, and FP&L Quality Control Instruction QI 10.4.

The inspector reviewed the post-placement inspection reports for several concrete placements which had recently been made. Discussions with Civil QC inspection personnel and review of the post placement inspection reports disclosed the following: QC Instruction QI 10.4, requires that concrete surfaces be inspected after the concrete forms are removed and documented in Part III of the Post Placement Concrete Inspection Report (Attachment 1 to QI 10.4). Contrary to this requirement, the post placement inspections had not been performed on pour numbers 4, 5, 6, 8A, 8B, 12 and 13 in the Diesel Oil Storage Structure and the fact that these inspections had not been performed was documented informally. This was identified to the licensee as another example

of failure to follow procedures as stated in Violation item 389/81-04-02.

d. Review of Quality Records

The inspector examined quality records pertaining to civil construction activities. Acceptance criteria examined by the inspector are those procedures listed in paragraph 9.a. Records examined were as follows:

- (1) Results of Class 1 fill stockpile qualification tests performed in 1979 and 1980.
- (2) Results of relative density correlation tests performed on Class 1 fill in 1980.
- (3) Results of In-Process tests performed on concrete placed in pour numbers 9, 10, 15, 18, part 19 and deck 11 in the diesel oil storage tank building.
- (4) Concrete preplacement inspection records for concrete placements listed in paragraph 9.c.(1).

Review of the relative density tests and qualification test on Class 1 fill disclosed the following unresolved item: FCR 058 deleted the requirement of Note 2 to ASTM D1557, which calls for replacing the plus 3/4 inch material with #4 to 3/4 inch material in performance of modified proctor tests. The inspector questioned the ESSE soils engineer concerning the engineering justification for deleting this requirement from the test method. This information was not available on site since this FCR had been approved by the Ebasco New York office.

In review of the relative density test results, the inspector noted that the relative density tests were being performed using the dry method only. The relative density tests are performed in an off-site commercial testing laboratory. The description of the test methods and the justifications for using only the dry method in the relative density tests were not available at the project site. This was identified to the licensee as Unresolved Item 389/81-04-03, "Soil Testing Methods", pending further review by NRC in a subsequent inspection of modified proctor and relative density test results and procedures.

e. Personnel Interviews

The inspector conducted informal interviews with craftsmen, craft supervisory personnel, QC inspectors, civil area (field) engineers, and civil office engineers. These discussions disclosed that all personnel felt that there was good cooperation between craft, QC, and engineering personnel. Craft and QC personnel stated that technical assistance

from engineering personnel in resolution of problems and interpretation of requirements was available whenever they requested it. There did not appear to be any animosity or resentment between craft and QC personnel. Craft personnel were aware of the requirements to do the work properly and recognized the importance of QC inspectors performing inspection of their work. QC inspectors stated that craft personnel and their supervisors cooperated with them when they performed their inspections, and corrected work which did not meet requirements when directed to do so by QC personnel.

The area and office engineers stated that they received assistance from design engineering personnel in resolution of problems whenever they requested it. All personnel interviewed were aware that safety concerns could be carried to the highest level necessary to obtain satisfactory answers and resolutions.

f. Conclusions

The inspector concluded that, with the exception of the examples of failure to follow procedures discussed in paragraph 9.c, civil construction activities are being conducted on the site in compliance with NRC QA requirements. All personnel were knowledgeable of the need to perform, inspect and document all work properly. There is good cooperation between craft, QC and engineering personnel in completing the work in accordance with project requirements.

QC personnel are knowledgeable of civil inspection requirements which they are certified to perform. However, the inspector expressed concern to licensee site management personnel regarding the occasional failure of civil QC inspectors to pay close attention to inspection requirements and details as noted in the examples of failure to follow civil QC inspection procedures and instructions discussed in paragraph 9.c.

No deviations were identified.

10. Mechanical Construction Activities

The objective of this portion of the inspection was to determine the adequacy of the licensee's mechanical construction activities. For the purpose of this inspection, safety-related pipe supports and safety-related components were chosen as the specific areas to be inspected.

a. Design Control

- (1) The on site organization is composed of several engineering offices that are responsible for the various facets of plant construction. The day to day construction activities are performed under the technical cognizance of area engineers. The

containment building, auxiliary building, turbine generator building and the other outside facilities each have area engineers assigned. Each area engineer has field engineers in the various disciplines; i.e., civil, mechanical, electrical. Technical control of the field engineers is maintained by the Field Resident Engineer and the Senior Resident Engineer (SRE). The Resident Engineer's office is comprised of various discipline engineers. An onsite Power Production Engineering (EPP) office is also maintained by the licensee. The A/E maintains a Site Project Engineers Office (ESSE) to provide onsite liaison with the A/E's New York office. The Nuclear Steam Supplier (NSSS), Combustion Engineering (CE), also maintains a site representatives office.

- (2) The control of construction activities is maintained originally by the issuance of specifications and drawings by the A/E. Changes to the drawings or specifications, identified by Nonconformance Reports (NCR) or Field Engineer observations, are originated by field engineers on Field Change Requests (FCR). FCR's are subsequently evaluated by the discipline engineers and approved for transmittal to the A/E by the SRE. The FCR's are subsequently evaluated by the A/E's site organization, ESSE. When applicable design information necessary for the evaluation is not available on site, the FCR's are forwarded to the A/E's Design Office or, on urgent items, the A/E's design office is contacted by telephone.
- (3) For pipe supports greater than 2" IPS, B. F. Shaw Company and Bergen-Patterson provide the original design drawings. FCR's for these pipe supports are forwarded to both the A/E's design office and Bergen-Patterson. For pipe supports 2" IPS and smaller, ESSE provides the design drawings and corresponding design change action, when required.
- (4) Several design calculations for 2" IPS and smaller pipe supports were inspected. Design calculations for pipe support SI-89-R7 were specifically inspected for design input data, independent review, and completeness of design documentation. FCR 2-2623U, Revision 1, was inspected for compliance with design control requirements.

b. Safety-Related Pipe Supports

- (1) Detailed fabrication drawings are provided by Bergen-Patterson or the A/E for each safety-related pipe support. Ebasco Project Specification FLO-2998.099 provides the specifications for the fabrication and erection of safety-related piping and pipe supports. Site Quality Procedure (SQP)-16 Revision 1 provides the pipe support erection instructions. Quality Instruction (QI) 10.14 Revision 0, provides the quality control (QC) inspection procedure for pipe supports. A review of QI 10.14, Revision 0, revealed

that although the procedure requires verification that the erected pipe support assembly is in accordance with current approved drawings at the time of the inspection, a specific dimensional inspection of the erected pipe support components is not required. In addition, it was also noted that QI 10.14, does not provide any verification that the as-built pipe supports are be in accordance with the final issued revision of the pipe support drawing.

- (2) The following pipe supports were inspected for compliance with their respective drawings and Ebasco Specification FLO 2998.099:
- Safety Injection System Pipe Supports SI-2401-310, SI-2407-40, SI-2412-31
 - Component Cooling System Pipe Supports CC-2063-22, CC-2063-7437, CC-2063-6421

The following items were noted:

- (a) SI-2407-40 - Revision 1 of the detailed pipe support drawing was used by QC for the Phase I inspection of the pipe support. Rev. 4 of the Drawing was on file and was used for the NRC inspection, Pc.4, a W6X15 x 3 foot long structural member, was not installed. Pc.6, a rigid shock and sway arrestor, was required to be installed perpendicular to the wall. It was installed more than 5 degrees off perpendicular. FLO 2998.099 allows a 3 degree tolerance. One of the fasteners for pipe attachment Pc.1 had been installed with insufficient thread engagement. None of the above noted conditions were identified on the QC inspection report. No record existed of an engineering evaluation of the above noted discrepant condition.
- (b) SI 2412-31, Rev. 3 - The drawing requires a 1/16 inch clearance between the top and both sides of the pipe and the box type pipe support. FLO-2998.099 did not provide tolerances for this requirement. The inspected pipe support had no clearance on the west side of the pipe, 3/32 inch clearance on the east side of the pipe, and 3/16 inch clearance on top of the pipe. The above noted conditions had not been identified by QC on the inspection report and no documentation of engineering evaluation was available on record. An interoffice memorandum from the SRE to the Project QC Supervisor provided ESSE interpretation of the drawing requirement. This interpretation allowed any gap to a 1/16 inch maximum on top of the pipe and any combined gap on the side that would "be some fraction greater than zero". This interpretation had not been documented on an FCR.

- (c) CC-2063-22, Rev. 2 - The detailed pipe support drawing required a 12 to 9 slope for structural member Pc.4 and a 1 to 1 slope for structural member Pc.5. FLOW-2998.099 did not provide tolerances for this requirement. Pc.4 had approximately a 6 to 4 slope and Pc.5 had approximately a 5.3 to 4.6 slope. These conditions had not been identified on the QC inspection report. No documented engineering evaluation of the noted condition was available.

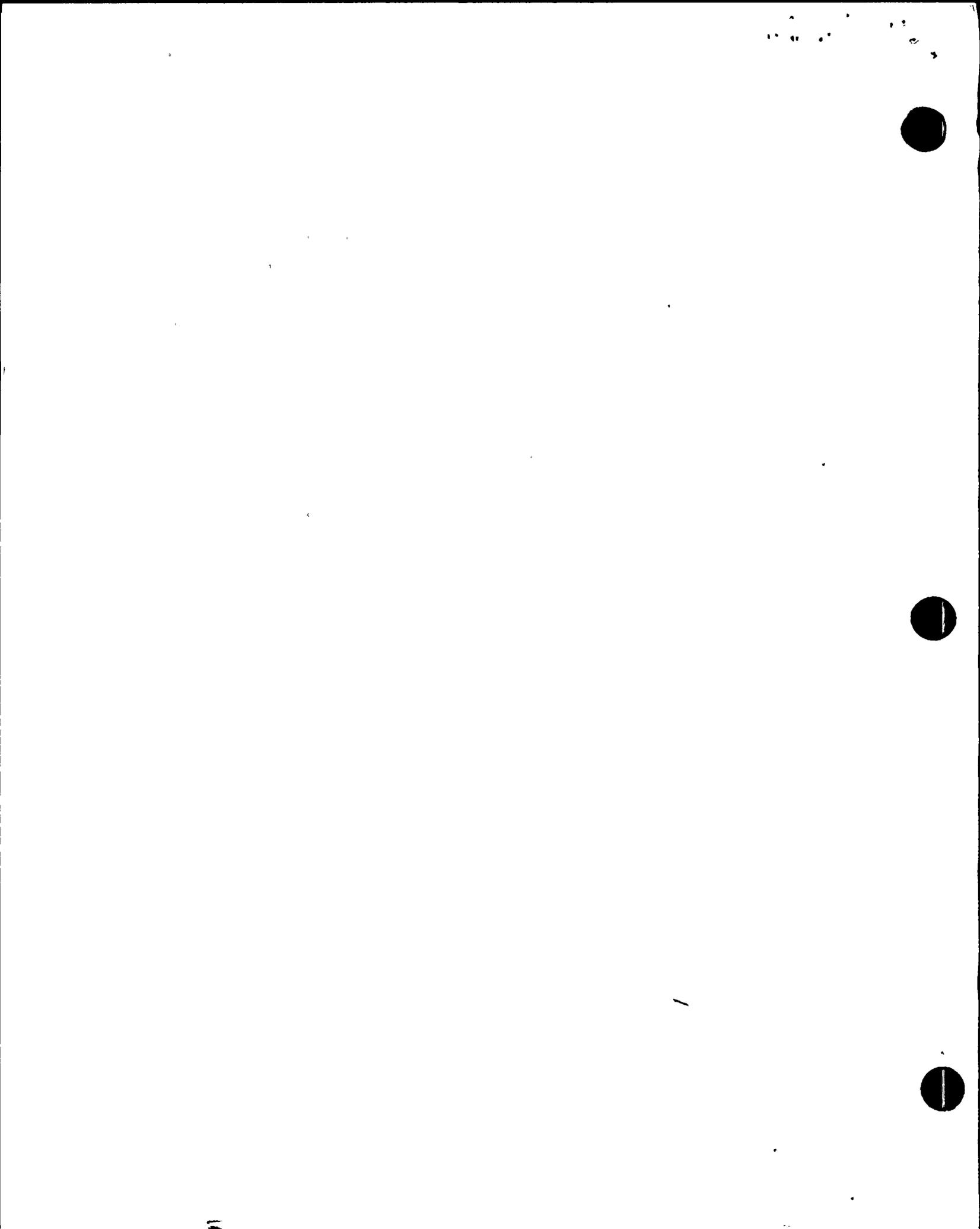
The differences between the as-built Phase I QC inspected pipe supports and their corresponding detailed drawings appear to be a violation of 10 CFR 50 Appendix B Criterion V, as implemented by Florida Power and Light Company (FP&L) Topical Quality Assurance Report (TQR) 5.0, and shall be identified as examples of Violation 389/81-04-04, "Failure to Follow Piping and Pipe Support Installation Procedures and Drawings".

- (3) The receiving inspection and storage areas for pipe supports were also inspected. Identification of each pipe support was noted. Segregation of nonconforming material was observed.

c. Safety-Related Piping and Components

Installation of portions of the Containment Spray, Main Steam and Safety Injection Systems in the Reactor Containment Building were observed. Installation of a portion of the Chemical and Volume Control System Piping in the Auxiliary Building was also observed. Fabrication and inspection of various safety-related piping assemblies in the fabrication shop was observed. The following items were noted:

- (1) Valve 2500, a 3" IPS diaphragm actuated Fisher control valve, of the Chemical and Volume Control System, was being installed. The bottom nozzle of the valve had an internal 90° counterbore. The valve assembly drawing 52A8659D required the nozzle to have an internal 60 degree counterbore. This appears to be a violation of 10 CFR 50, Appendix B, Criterion V as implemented by FP&L TQR 5.0 and shall be identified as another example of Violation 389/81-04-04, "Failure to Follow Piping and Pipe Support Installation Procedures and Drawing".
- (2) During assembly of 34" IPS Main Steam piping in the containment building, another NRC inspector noticed that the piping was being positioned by means of a jack. Further inspection by QC resulted in the pipe being released from its restraints and being verified to show no signs of cold springing. Additional inspection of Safety Injection (SI) piping in the containment building, and subsequent discussions with QC inspectors, revealed that SI pipe 458 had been installed and field weld 1 of the pipe was presented for fitup with the other end of the pipe known to be located such



that fitup for field weld 2 would require either cold springing or other corrective action. A QC inspector stated that he had identified the condition verbally to the mechanics and their supervisor but field weld (FW)-1 was made anyway. Subsequently, due to the misalignment of piping, SI pipe 458 was pulled into line and presented for fitup of FW-2. QC noted the condition and issued Nonconformance Report 1711M. Subsequently, the pipe was released from restraints at FW2 and it returned to its original position, indicating that the pipe had not been cold stressed. The NCR has not yet been dispositioned.

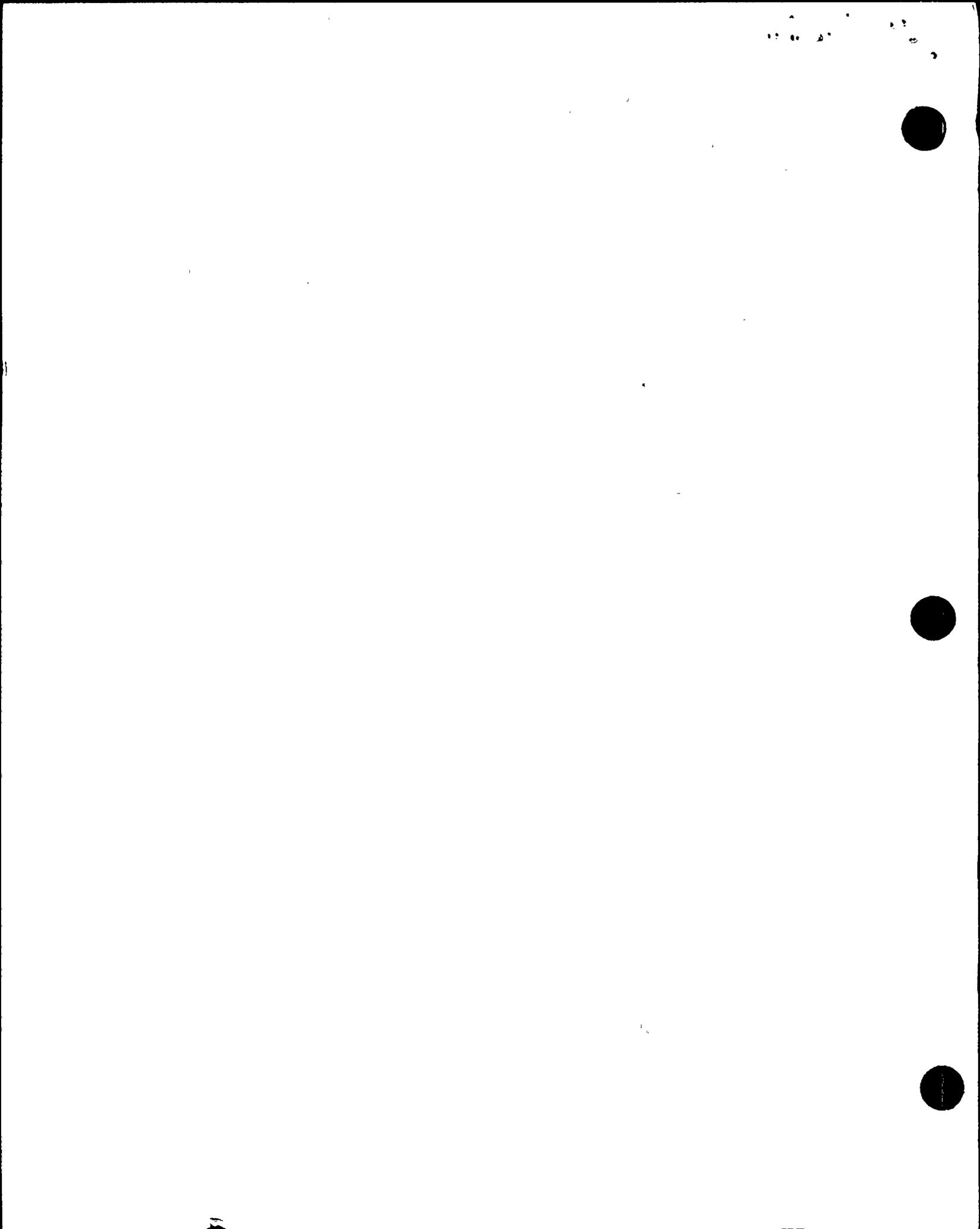
After the NRC inspector discussed this matter with site personnel, the licensee prepared a revision to SQP 47. This revision provides a description of what constitutes cold springing for the benefit of craftsmen and inspectors. It also provides instructions on how to avoid cold springing by fitup of complete pipe runs, control of weld sequence, planning of swing pieces, and approved modification of spools.

- (3) During an interview with Combustion Engineering (CE) site personnel, it was noted that CE had identified 8 Target Rock Valves, furnished to FP&L for specific locations, which had a potential for cracking of the discs and/or seats. This determination was based on similar conditions noted at another facility that experienced the cracking problem. EPP confirmed that CE had identified all applicable valves. However, EPP had not requested Ebasco to determine if similar problems could be experienced by other valves ordered by Ebasco for FP&L. EPP subsequently committed to have Ebasco accomplish the review.

d. Interview With Site Personnel

Interviews were conducted with the SRE, discipline engineers, field engineers, ESSE engineers, QC supervisors, QC inspectors (US Testing Company), Union Boiler supervisors and foremen, and Union Boiler mechanics. The following items were noted:

- (1) No adverse pressure on QC inspectors was noted.
- (2) QC inspectors appeared to know the requirements. However, a common comment was that the quantity of inspections required exceeded the number of QC inspectors. Normally there were only two mechanical inspectors available per building during the day and one per building during the night. US Testing Company is in the process of recruiting inspectors and is attempting to correct the situation.
- (3) Mechanical QC had approximately a 50% turnover rate in the last six months. US Testing conducted a survey to determine the causes but no definitive corrective action was identified.



- (4) The site engineering organization was complex and involved FP&L, Ebasco and CE. However, the personnel involved generally appeared to be aware of their responsibilities and functioned accordingly. The interface between the varied organizations involved appeared to be satisfactory.

e. Conclusions

The interfacing and coordination between the numerous groups (FP&L, Ebasco, CE, US Testing, Union Boiler) involved in the construction of St. Lucie Unit 2, appeared to be good. The engineers and QC inspectors in those groups appeared to be knowledgeable and competent in the area of their responsibilities. However, the number of relatively minor nonconforming conditions noted showed a lack of attention to details. This trend, if left uncorrected, could lead to potentially more significant conditions. The lack of attention to details could possibly be attributed to an apparent shortage of QC mechanical inspectors.

FP&L has just completed a three month long indepth investigation to determine causes of high turnover rates. This included numerous interviews with inspectors and craftsmen to determine working relationships. Reportedly, the licensee found little problem in that area. The licensee has been recruiting very actively for QC inspectors and has reporting dates for about twelve.

11. Electrical Construction Activities

The inspector examined the construction activities and records related to the installation of electrical equipment. This inspection included examination of procedures, observation of activities, discussions with craftsmen, engineers, QC inspectors, QA and management personnel.

a. References

The following procedures were reviewed:

- (1) Site Quality Procedure (SQP) 22, Cable Termination
- (2) SQP-24, Cable Pulling
- (3) SQP-26, Inspection Status Safety-Related Equipment during Plant Construction
- (4) SQP-53, Raceway Installation
- (5) SQP-54, Electrical Construction Testing
- (6) SQP-21, Corrective Actions
- (7) Quality Procedure 15.1, Control of Nonconforming Material, Parts or Components - Plants Under Construction

b. Electrical (Cables and Terminations I) - Observation of Work and Work Activities

- (1) Cable Installation and terminations

The inspector observed the pulling operation of single and grouped cables. These cable pulls were accomplished both by hand and mechanical methods. It was noted that during mechanical pulling operation, the readings of the stress gages were closely observed to insure that the pulling force did not exceed the predetermined (calculated) value. On one occasion, excess pulling force was applied. The cable pull was stopped and a nonconforming report prepared requiring an evaluation before the cables could be accepted for use. It was decided that cables would be removed and a different routing was developed to reduce the pulling tension. During hand pulling operations, the QC inspector was always present. Additionally, on two occasions a QA inspector also was present performing a periodic surveillance of the operation.

The inspector examined several cables that had been pulled and were being terminated. The crimping tools in use had been inspected and calibration stickers indicating when the next inspection is due were attached. The inspector noted that the drawings in use were current.

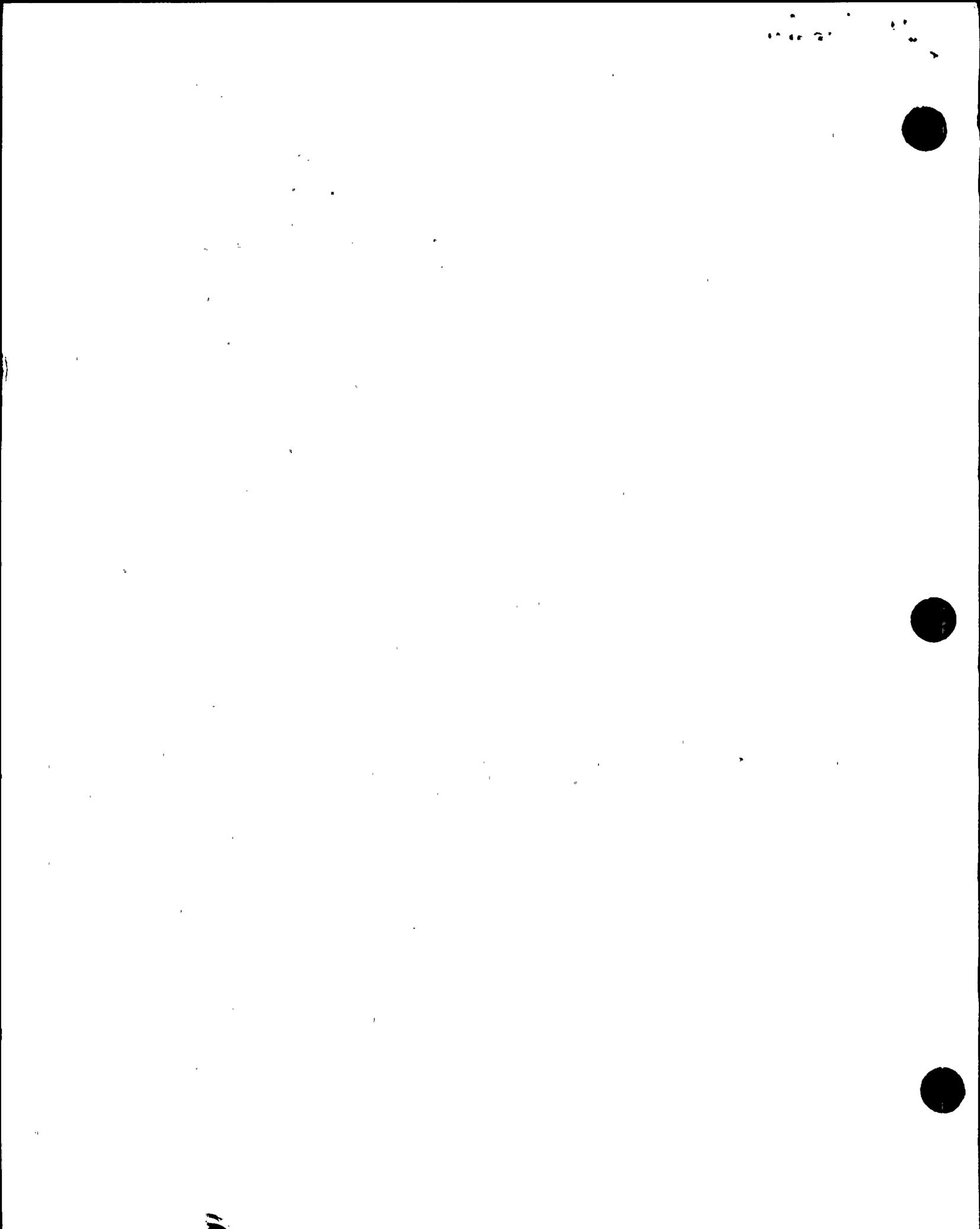
During these observations it was noted that several cables were not completely pulled. The cables were tied in coils and suspended above the floor as required by procedures. In areas where welding activities were in progress, the coiled cables were wrapped in fire retardant blankets for protection.

Discussions with the QA staff, the QC inspectors, area engineers and craftsmen revealed that partial pulling of cables is permitted under certain conditions, the main reasons being economical. A check of records regarding five partially pulled cables revealed that all actions had been documented in accordance with SQP-24. The inspector was advised that no partial pulls could be resumed without contacting the electrical QC inspection group.

Due to the method of record keeping, if a pull was completed without proper QC coverage the deficiency would be identified and the cable nonconformed.

The inspector expressed concern that later in the project, the pressure to get cables installed would increase and some partially completed pulls may be completed without adequate QC inspection. As a result of these discussions, a revision to QCI-24, to strengthen the QC notification requirement, was being prepared.

The inspector noted that termination verification was being made in accordance with SQP-22. However, cable continuity tests were being conducted afterward by the construction test crews in accordance with SQP-54. The licensee representatives advised the inspector that they were aware of this condition and expected to resolve the issue shortly. The inspector attended a licensee



meeting regarding this condition during the inspection and concluded that adequate steps are being taken to resolve the problem. Since the continuity testing program has yet to reach its peak, provisions for backfitting should not present a problem.

(2) Cable Tray Restraints

During this inspection the inspector examined class IE cable tray supports in various areas. The inspector was informed that in crowded areas the cable tray restraints had not been completed but were verified to be in compliance with the requirements of SQP-24, which requires that the restraints be adequate to support the weight of the cable trays and cables. The additional bracing that is required will be added after the cables are pulled, thus permitting better access to the cable trays during pulling operations.

The inspectors noted that a seismic cable tray restraint (1336) for 4 safety-related cable trays had been modified to accommodate a non-safety related tray. There were no records requesting or giving authorization for the cutting of a diagonal brace to allow installation of a 90° cable tray fitting. The cable tray support had been inspected and accepted before the tray was installed. This modification appears to be in violation of SQP-17, Design Control, which requires changes or deviations in design requirements to be identified. This item is identified as 389/81-04-05, Unauthorized Modification of Seismic Cable Tray Support 1336. The licensee issued nonconforming report 1710-E immediately.

(3) Nonconforming Reports

The inspector reviewed approximately 50 closed electrical nonconforming reports. The NRC's cover a period of 18 months and covered various deficiencies. Several involved drawing changes which, in each case, referenced a Design Change Notice (DCN). Review of the drawings revealed that the DCN's had been listed against the applicable drawings in accordance with procedures. Those NCR's requiring rework were properly closed in accordance with procedures. In all the NCR's examined, available information provided assurance that the disposition had been adequately reviewed and approved, and the corrective actions were inspected and accepted by the appropriate QC group.

c. Conclusions

Within the areas inspected the inspector found one isolated case where procedures had not been followed. (Cited in paragraph b(2) above). There were two areas of concern both related to procedures which are now being addressed by the licensee. It appears that the over all

organization, while a combination of consulting, contracting and licensee personnel, is functioning in a manner that should product a quality product if procedures are followed and the existing cooperation continues.