

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-440/81-19(EIS); 50-441/81-19(EIS)

Docket Nos. 50-440; 50-441

Licenses No. CPPR-148; CPPR-149

Licensee: Cleveland Electric Illuminating Company
Post Office Box 5000
Cleveland, OH 44101

Facility Name: Perry Nuclear Power Plant, Units 1 and 2

Investigation Conducted: October 27, 1981 through March 19, 1982

Investigation At: Midland, MI, Glen Ellyn, IL, and Perry and Moscow, OH

Investigator: *C. H. Weil* 9/21/82
C. H. Weil Date

(Assisted by G. A. Phillip on
December 1, 1981; and J. E. Foster
on January 22, 1982)

Inspectors: *K. R. Naidu* 9/23/82
K. R. Naidu Date

C. D. Braund 9/22/82
C. D. Braund Date
Inspection Assistant

(Accompanied by C. C. Williams
on March 19, 1982)

Reviewed By: *C. C. Williams* 9/22/82
C. C. Williams, Chief Date
Plant Systems Section

R. F. Warnick 9/23/82
R. F. Warnick, Director Date
Enforcement and Investigation Staff

Investigation Summary

Investigation on October 27, 1981 through March 19, 1982 (Reports -
No. 50-440/81-19(EIS); 50-441/81-19(EIS))

Areas Investigated: Unannounced investigation into allegations pertaining to the L. K. Comstock Company (electrical subcontractor) and the Cleveland Electric Illuminating Company at the Perry Nuclear Power Plant, Units 1 and 2. The following areas were inspected in addition to the areas examined during the investigation: electrical hardware procurement, drawing control, electrical cable tray installation, electrical and instrumentation hanger installation, and installed switchgear. This investigation involved 711 man-hours, both on and offsite, by six NRC representatives.

Results: This investigation resulted in nine items of noncompliance with NRC requirements. (10 CFR 50, Appendix B, Criterion III, Design Control; Criterion V, Instructions, Procedures, and Drawings; Criterion VI, Design Control; Criterion VIII, Control of Purchased Material, Equipment and Services; Criterion X, Inspection; Criterion XIII, Handling, Storage, and Shipping; Criterion XV, Nonconforming Materials, Parts, or Components; and Criterion XVI, Corrective Action.) On November 16, 1981, as a result of joint observations by the NRC and the utility, the Cleveland Electric Illuminating Company directed the L. K. Comstock Company to stop all safety-related cable pulling activities. This was confirmed by Region III on November 18, 1981, with the issuance of a Confirmation of Action Letter.

REASON FOR INVESTIGATION

On October 27, 1981, Individual A provided information to Nuclear Regulatory Commission Region III (RIII) personnel concerning the performance of the L. K. Comstock Company (the electrical subcontractor) at the Perry Nuclear Power Plant. Individual A stated six allegations dealing with the L. K. Comstock Company's adherence to quality control procedures and the installation of electrical systems.

SUMMARY OF FACTS

An investigation was initiated into the L. K. Comstock Company activities at the Perry Nuclear Power plant as a result of the information provided by Individual A. As a result of joint observations by the NRC and the utility, the Cleveland Electric Illuminating Company directed the L. K. Comstock Company to stop all safety-related cable pulling activities. This was confirmed by RIII with the issuance of a Confirmation of Action Letter.

Individual B was interviewed during the course of the investigation regarding the electrical penetrations. Individual B stated his supervisor had threatened to fire him if he (Individual B) did not sign the penetration checklists. Subsequently, Individual B signed the checklists. Individual B's supervisor denied threatening Individual B. Also, Individual B stated signatures on four penetration checklists were not his; although he had accomplished the inspections and had found the inspected areas to be acceptable. The person signing Individual B's name to the penetration checklists was not identified.

During the investigation, Individuals C, D, E, and F, advised RIII they had been told not to write Nonconformance Reports on the performance of the L. K. Comstock Company. The persons, identified by Individuals C, D, E, and F, as telling them not to write Nonconformance Reports, denied the allegations. Review of Nonconformance Reports and Action Requests authored by Individuals C, D, or F did not disclose a trend by which it could be deduced that Individual C, D, or F stopped writing Nonconformance Reports or Action Requests. The investigation revealed that Individual E did not submit any Nonconformance Reports or Action Requests either before or after the alleged order to stop writing the reports. Individual E was known to former co-workers for not turning in any reports during his employment at Perry.

The investigation identified nine items of noncompliance with NRC requirements. The items of noncompliance dealt with 10 CFR 50, Appendix B, Criterion III, Design Control; Criterion V, Instructions, Procedures, and Drawings; Criterion VII, Control of Purchased Material Equipment and Services; Criterion X, Inspection; Criterion XIII, Handling, Storage, and Shipping; Criterion XV; Nonconforming Materials, Parts, or Components; and Criterion XVI, Corrective Action.

DETAILS

1. Persons Contacted

1.1. Cleveland Electric Illuminating Company (CEI)

°+D. R. Davidson, Vice President - Systems Engineering and Construction
°+*M. R. Edelman, Manager, Nuclear Engineering Department
°+R. L. Farrell, Manager, Quality Assurance Department
*B. L. Barkley, Nuclear Test Section
R. M. Bonner, Responsible Engineer
G. R. Leidich, Construction Quality Section
D. R. Green, Senior Project Engineer
*J. H. Bellack, Nuclear Design and Analysis Section
*R. L. Vondrasek, Project Quality Section
°+*E. Riley, Construction Quality Section
*J. G. Marjenin, Construction Quality Section
*J. A. Kline, Nuclear Construction Section
*B. D. Walrath, Nuclear Quality Analysis Section
T. B. Stear, Electrical Engineer
*H. Wall, Nondestructive Examinations Supervisor
*M. Lastovka, Nuclear Construction Engineering Department
*P. P. Martin, Training and Administrative Service
F. Pluebell, Nuclear Test Section
W. J. Wright, Nuclear Test Section
S. P. Tulk, Construction Quality Section
T. J. Thompson, Construction Quality Section

1.2 Westinghouse Electric Corporation

W. R. Lankenau, Senior Penetration Engineer

1.3 Gilbert Associates Incorporated (GAI)

C. Angstadt, Structural Engineer
K. Pech, Assistant Manager
J. G. Shingler, Electrical Engineer
*J. W. Mehaffey, QA Program Manager
H. R. Reppert, Field Mechanical Engineer

1.4 Kaiser Engineers

K. Cimorelli, Electrical Quality Control Inspector
*P. L. Gibson, Project Quality Assurance Manager
S. H. Halpin, Lead Electrical Operations Quality Control Inspector
J. M. Dagan, Associate Engineer
S. Armknecht, Industrial Relations Manager
W. J. Kacer, former General Supervising Quality Engineer
R. G. Peters, Electrical Quality Control Inspector
M. O. Roe, Electrical Quality Control Inspector

J. B. Metcalf, Construction Quality Engineering Inspector
Two former Quality Control Inspectors

1.5 L. K. Comstock Company

M. W. Confer, Engineer Squad Leader, Cable Tray Design Group
D. Dilelio, General Foreman
T. Dietsch, Foreman
E. Freeman, General Foreman
C. W. Hart, Quality Control Supervisor (Perry)
E. Luciano, Area Manager
R. E. Marino, Manager, QA/QC Services (Corporate)
C. Mitchell, Assistant Project Manager
*P. R. Merlin, Quality Assurance Manager (Perry)
W. L. Gilbert, Area Manager
W. Neuman, Field Engineer
R. Troff, Project Engineer
S. Valeriano, Vice President - Atlantic Region
*T. J. Woodman, Project Manager (Perry)
Thirteen Quality Control Inspectors
Two former Quality Control Inspectors
Twenty-five Craft-workers

1.6 Individuals

Individual A
Individual B
Individual C
Individual D
Individual E
Individual F

(+Denotes those present at management meeting on February 10, 1982 in Glen Ellyn, Illinois.)

(*Denotes those present at Exit Meeting on March 19, 1982, at the Perry site.)

(°Denotes those present at an enforcement meeting on June 16, 1982, in Glen Ellyn, Illinois.)

2. Introduction

The Perry Nuclear Power Plant, Units 1 and 2, are under construction by the Cleveland Electric Illuminating Company CEI) in Perry Township, Ohio. Gilbert Associates, Inc. is the architect-engineering firm. The facility will utilize boiling water reactors (BWR) supplied by the General Electric Corporation.

The L. K. Comstock Company has been designated to provide and install the electrical systems for the Perry plant. The systems serve both safety-related and nonsafety-related areas of the plant.

10 CFR Part 50, Appendix B, sets forth eighteen quality assurance criteria applicable to nuclear power plant construction activities.

CEI and its contractor organizations, among them Gilbert Associates, Kaiser Engineering, Inc. and L. K. Comstock Company have prepared Quality Assurance/Quality Control (QA/QC) Manuals and Procedures setting forth the specific requirements applicable to their activities at the Perry site. These documents also specified that certain activities will meet specific industry codes and standards.

The following documents, applicable to the electrical installations were examined during this investigation and were used as a basis for determining compliance or noncompliance with NRC requirements:

CEI Corporate Nuclear Quality Assurance Program Procedures;
CEI Specification No. SP-33, Procurement Specification for Electrical Installations;
CEI Specification No. SP-660, Procurement Specification of the Containment Liner Plate;
CEI Specification No. SP-667, Procurement Specification for Miscellaneous Embedded Steel;
L. K. Comstock Company Quality Assurance Manual and Quality Control Procedures;
Westinghouse Electrical Corporation Instruction Book for Electrical Penetrations, Revision IV, February 3, 1981;
American Society of Mechanical Engineers (ASME) Material Specifications No. SA-333 and No. SA-530;
ASME Section IX;
American Welding Society (AWS) D1.1; and;
Institute of Electrical and Electronics Engineers (IEEE) Nuclear Standards.

3. Receipt of Allegations

On October 27, 1981, Individual A contacted RIII. Individual A stated he was quite concerned with the performance of the L. K. Comstock Company, the electrical subcontractor, at the Perry Nuclear Power Plant construction site. Individual A provided six allegations, detailed in Paragraphs 3.1 through 3.6, regarding L. K. Comstock Company activities at the site.

3.1 Intimidation of Comstock Quality Control Inspectors

3.1.1 Allegation

During August 1981, Thomas Woodman, the L. K. Comstock Project Manager, and Clarence Hart, the L. K. Comstock QA/QC Manager, held a meeting with the L. K. Comstock Quality Control Inspectors. During this meeting Woodman threatened to terminate all of the inspectors for "being unprofessional and for not being "team players." Woodman told the inspectors their job was to inspect for acceptance, not rejection." Individual A stated the purpose of the meeting was to intimidate the inspectors.

3.1.2 Findings

3.1.2.1 On December 2, 1981, Woodman provided the following information:

Prior to August 1981, he had become increasingly concerned with the conduct of the inspectors and the effect of their actions upon production. Most notable were their poor time and attendance and their delay in responding to field inspection points. Woodman felt the inspectors were wasting time, as he had observed the inspectors taking almost thirty minutes in the morning and after lunch before reporting to their work assignments. Many times groups of 2-3 inspectors would gather and would do nothing but talk to each other for excessive periods of time. Also, he had observed inspectors coming into the office from their field assignments for coffee, when coffee was available to them in the field. Woodman felt the inspectors' activities contributed to slowing production and had so informed Hart.

During August 1981, a group of prospective customers toured the L. K. Comstock facilities. While in the Comstock offices, the visitors passed through the Quality Control Section. The inspectors had left the field approximately one half hour before quitting time, had congregated in the office, and were quite rowdy. The group was boisterous with two inspectors flying paper airplanes, while several others hung professional football pennants on the office walls. One of the prospective customers commented to Woodman about the conduct of L. K. Comstock employees, and these comments embarrassed Woodman. Woodman informed Hart the inspectors' behavior could not be tolerated any longer. Hart and Woodman called the inspectors to a meeting, also attended by the Assistant Production Manager and the Production Area Managers. Woodman addressed the group about his concerns. He readily admitted he was forceful in his speech and mannerisms. Woodman stated he did not single out any individual during the meeting. His intention was not to intimidate anyone, but to motivate the group. Woodman advised he was concerned with the inspector's tardiness, creating disturbances and "doing a fair job for fair money." He stated he told the group that "clerks in the office were conducting themselves more professionally than they," that they should "get aboard

ship," and they should become more productive and "inspect for acceptance." Woodman reiterated his speech was "not meant to belittle anyone."

- 3.1.2.2 On December 2, 1981, Hart was interviewed and provided essentially the same information as Woodman regarding the August 1981 meeting with the inspectors. Hart continued, he was distressed by Woodman's forceful presentation and discussed the matter with Robert Marino, the L. K. Comstock Company's Manager of QA/QC Services. The following day, Marino came to the Perry site and discussed the problems with Hart and Woodman. Marino later discussed the problems with inspectors. Hart stated that no one was singled out during the inspectors' meeting with Woodman and no one was intimidated. Hart stated Woodman has never approached him to terminate the employment of any inspector.
- 3.1.2.3 During the period December 1-3, 1981, 13 of the 22 Comstock Quality Control inspectors were selected at random and interviewed. Each recalled the August 1981, meeting with Woodman. Many felt Woodman had been too forceful and determined in his approach to the meeting. Some were embarrassed to have Woodman make the presentation to the inspectors in the presence of production supervisors. Others felt some of Woodman's remarks were unnecessary, especially the comparison of the inspectors to clerks. While others felt Woodman's comments were necessary to motivate other inspectors. All agreed that no one was singled out during the meeting, and none felt his/her job was in jeopardy due to Woodman's remarks. None felt Woodman's remarks affected the performance of his/her inspection activities. All agreed they have not been harrassed or intimidated while working for the L. K. Comstock Company.

No items of noncompliance with NRC requirements were identified.

3.2 Support of Conduit

3.2.1 Allegation

The L. K. Comstock Quality Assurance/Quality Control program does not provide specific guidance concerning situations involving the issuance of Audit Finding Reports (AFR). As an example, Conduit No. 1R33R660A on the 574' elevation of the Unit 1 Auxiliary Building, exits the back of a junction

box, goes through the wall to Room One, and climbs to the ceiling for the length of the conduit run. The installation criteria required all conduits to be supported within two feet of a junction box. Conduit No. 1R33R660A was not supported in this manner. The project and field engineers, as well as the Comstock Quality Control Manager, were apprised of the problem. None could agree on the proper means (AFR or Nonconformance Report) to document this problem; therefore, the problem was never documented. Also, similar conditions could be found with other conduits installed in the vicinity of Room One, north hallway, elevation 574' of the Unit 1 Auxiliary Building.

3.2.2 Findings

- 3.2.2.1 L. K. Comstock Company Procedure No. 4.11.1, Nonconformance Control, was reviewed. Paragraph 4.1 of this procedure states in part, "...Comstock Quality Control Department is responsible for: ...Assuring that nonconforming items or activities are identified and reported. Nonconformance Reports are reserved for hardware deficiencies. Program or procedural deficiencies are reported and resolved using the Audit Finding Report."
- 3.2.2.2 The drawing applicable to the installation of conduit and electrical boxes (Drawing No. 40-4549-SS-215-007, Sheet No. 21, Revision E, dated September 29, 1981) was reviewed. Note No. 12 of this drawing states, "All conduits attaching to boxes shall be supported at a maximum distance of 2'0" from the face of the box..."
- 3.2.2.3 Nonconformance Report No. LKC-767, dated October 12, 1981, was reviewed. This nonconformance report pertained to the installation of four conduits, including Conduit No. 1R33R660A, installed on the 574' elevation of the Unit 1 Auxiliary Building. The description of the nonconformance was listed as, "the following conduits were installed per latest revisions of approved drawings, but does not meet the 2' support distance as specified in Drawing SS 215 007 SH. 21...1R33660A..." The cause of the nonconformance was described as, "hanger support mounting problem." The proposed disposition of the nonconformance was "conduit... cannot be supported within the two foot criteria. 'Use-as-is' - consider box connection as a support." The step to prevent recurrence was listed as, "Future cases such as these will be

brought to the attention of engineering before installation." This Nonconformance report was revised on November 12, 1981, to include a sketch of the problem. The revised Nonconformance Report was accepted by the Gilbert Associates engineer on November 23, 1981.

- 3.2.2.4 RIII personnel made numerous trips into the various structures at the Perry site, including the Unit 1 Auxiliary Building, throughout the investigation. During these field trips, numerous conduits were examined (including those in the vicinity of Room One and the North Hallway on the 574' elevation of the Auxiliary Building) and were found to meet the attachment criteria. Conduit No. 1R33R660A (located along the North Hallway on the 574' elevation of the Auxiliary Building) was examined by RIII personnel.

The conduit was two feet long and ran between two junction boxes. The junction boxes were mounted on either side of a wall, which was two feet thick. The conduit was between the boxes inside the wall. Since the conduit was inside the wall, it could not be fastened in the normal manner on the surface of the concrete. The conduit was supported by fastening it to the back and each junction box; effectively supporting the conduit within two feet of either box.

No items of noncompliance with NRC requirements were identified.

3.3 Cable Pulling

3.3.1 Allegation

During the period September 28-30, 1981, numerous safety-related cables were pulled from Manhole No. 1 through Manhole No. 2 to the Emergency Service Water Pumphouse.

One circuit consisted of three separate 4/0 cables. A Raceway Change Installation Modification (RCIM), which gives the maximum cable pulling tension, was not provided in advance of this cable pull. The L. K. Comstock Quality Control Inspectors assigned to this cable pull were not trained in the methods for calculating the maximum tension requirements. Since the inspectors were not trained, they located a RCIM for a similar cable pull (three, triplexed, 4/0 cables). The inspectors used the cable pull tension calculation from the RCIM for the triplexed cable for the pulling tension of the three, separate, 4/0 cable.

3.3.2 Findings

3.3.2.1 Engineers from CEI and Gilbert Associates, the Kaiser Project Engineer, the L. K. Comstock QA/QC Manager, and the L. K. Comstock Lead Cable Design Group Engineer were interviewed. Each advised triplex cables were never installed by the L. K. Comstock Company, except for temporary lighting. Calculating the maximum cable pulling tension for ductbank pulls (i.e., between the manholes and the Emergency Service Water Pumphouse) was the responsibility of the Project Engineer. The L. K. Comstock Company was required to notify the Project Engineer a minimum of forty-eight hours in advance of a ductbank pull in order for the Project Engineer to have sufficient time to complete the Maximum cable pulling tensions calculations for the upcoming cable pull. The L. K. Comstock Company Cable Design Group Engineer was responsible for the calculations of individual conduit pulls.

During these interviews RIII personnel learned the Project Engineer was calculating the maximum cable pulling tensions at 100% and 125%. The engineer explained the calculation at 100% was an optimum value for cable tension and the Quality Control Inspectors had been instructed to write a Nonconformance Report when this value was exceeded. The 125% value was a point where damage to the cable could be anticipated and the point where cable would be scrapped. Only the 100% of cable tension was communicated to the Quality Control Inspectors in order "to insure a measure of conservatism."

3.3.2.2 L. K. Comstock Cable Pull Inspection Checklists were reviewed for the period September 28-30, 1981. This review determined only one circuit of three 4/0 cable, Circuit No. 1R23F15B, pulled from Manhole No. 1 to the Emergency Service Water Pumphouse during this period. The Raceway and Cable Installation Modification (RCIM) for Circuit No. 1R23F15B was dated September 23, 1981, and indicated a maximum pulling tension of 1200 pounds for the three cables involved (Cables No. 1R33H2011B, 1R33H2008B and 1R33H2006B). The Cable Pull Inspection Checklist indicated the Cable Pull Slips for Circuit No. 1R23F15B were released on September 25, 1981. The inspection checklist also indicated "pre-pull inspections

complete and released for cable pull" on September 30, 1981. The Cable Pull Inspection Checklist for this circuit showed the maximum cable pulling tension of 1200 pounds was exceeded by 2000 pounds. Nonconformance Report No. 760 was prepared as a result of the excessive tension and the Perry Project Organization (CEI and Gilbert Associates) was notified on October 1, 1981, of this nonconforming condition.

3.3.2.3 The training records of the L. K. Comstock Quality Control Inspectors, including those responsible for inspecting Circuit No. 1R23F15B, were reviewed. This review indicated all inspectors had received training on L. K. Comstock Procedure 4.3.3, Cable Pulling. Within Procedure No. 4.3.3 were the instructions for calculating the maximum cable tensions. During November 1981, the L. K. Comstock QA/QC Manager administered an examination to the Quality Control Inspectors, including questions on maximum cable tension calculations. The Quality Control Inspectors involved in the inspection of Circuit No. 1R23F15B on September 30, 1981, received passing scores on the examination and they correctly answered the cable tension calculation questions.

No items of noncompliances with NRC requirements were identified.

3.3.3 Review of Cable Pulling Nonconformance Reports

L. K. Comstock documents for cables pulled through the ductbank from Manhole No. 1 to the Emergency Service Water Pumphouse were reviewed. Numerous Nonconformance Reports were generated to document instances where cable pulling tensions were exceeded. In all instances a Raceway and Cable Installation Modification (RCIM) was issued in advance of each cable pull with the project engineer providing the maximum cable pulling tension for each cable on the RCIM. Many of the Nonconformance Reports identified errors in the rigging of the dynamometer to measure the tension placed on the cable. The following Nonconformance Reports were reviewed:

3.3.3.1 Report No. LKC-759, dated September 25, 1981, concerning four circuits (No. 1P45C13C, 1P45C2, 1R25C7C and 1R22A9C). RCIM No. 821, dated September 19, 1981, had a maximum pulling tension calculated at 535 pounds. The corrected tension for using a dynamometer at a 90° angle was 573

pounds. The calculation for 125% pulling tension was placed at 716 pounds. The Nonconformance Report indicated the 573 pounds requirement had been exceeded, but not the 716 pounds requirement. Interviews of the project engineers disclosed the two values were given in order to provide a conservative margin by which the cable pull could continue (the lesser number, 573 pounds) without damage to the cable (the greater number, 71 pounds). The proposed disposition of Nonconformance Report No. LKC-759 was to "use-as-is." The justification was that RCIM-824, dated September 24, 1981, had been issued and it superseded the original RCIM (No. 821). RCIM 821 specified 535 pounds, and upon re-examination it was determined the correct value was 553 pounds; therefore, RCIM 824 was issued to show the correct value of 553 pounds. In turn, RCIM changed the dynamometer correction to 779 pounds at the 100% reading and 973 pounds at the 125% reading. The Nonconformance Report indicated the steps to prevent recurrence was to "use accurate data in preparing cable pull tensions."

- 3.3.3.2 Report No. LKC-755, dated September 23, 1981. During ductbank pulls of 13 cables the dynamometer reading exceeded 125% of the maximum allowable cable tension. The RCIM designated a straight line tension of 1038 pounds. The dynamometer correction factor at 90° and at 125% was calculated to be 1802 pounds. During the course of the cable pull the dynamometer indicated a tension of 1850 pounds. At that point the cable pull was stopped by L. K. Comstock Quality Control. Revised dynamometer mounting instructions were given, as well as instructions to scrap the cable if the 125% calculated value was exceeded with the dynamometer in the new position.

No items of noncompliance with NRC requirements were identified.

3.3.4 Observation of Cable Pulling Activities

- 3.3.4.1 On November 16, 1981, RIII personnel, accompanied by CEI's Lead Electrical Quality Engineer, observed L. K. Comstock employees pulling Cable No. 1R24F3C inside the Emergency Service Water Pumphouse. The design length of this cable was 1340 feet. Approximately 1200 feet of cable had already been installed in the ductbank when RIII personnel observed the L. K. Comstock cable pulling crew

had pulled the length of the cable to Motor Control Center No. 124S0030 without using the installed pullboxes as interim cable pulling points. The total number of degrees of angle had not been calculated prior to starting the cable pull. The total of the degrees of angle exceeded the 270° maximum specified in Note 13 of Drawing No. 04-4549-D-215-01, Electrical Conduit Layout - Legend, Notes and References by at least 160°. This is considered to be an item of noncompliance contrary to 10 CFR 50, Appendix B, Criterion V. (440/81-19-01; 441/81-19-01).

3.3.4.2 The CEI Quality Control Inspector accompanying the RIII personnel observed the following deficiencies in the pulling of Cable No. 1R24F3C:

A nonconforming condition was not identified and cleared prior to commencing the cable pull.

The maximum sidewall pressure was not calculated and the designated pull points were not utilized.

The maximum cable pulling tension was not calculated and documented prior to commencing the cable pull. The maximum cable pulling tension was verbally given to the Comstock Quality Control Inspector overseeing the cable pull, and this tension requirement was violated;

The L. K. Comstock Quality Control inspector did not walk-down the conduit prior to the beginning of the cable pull, and the inspector did not insure the conduit had all of the required identification markings attached to it.

Also, it was noted the dynamometer used during the cable pull ranged from 0 pounds to 10,000 pounds in 2000 pounds increments. The maximum pull tension for this cable had been calculated at 747 pounds; therefore, the tension could not be accurately determined with the dynamometer employed during this cable pull.

3.3.4.3 Based upon the above factors the CEI Lead Quality Engineer decided "L. K. Comstock's QA program was no longer effectively controlling their cable pulling activities." On November 16, 1981, CEI Corrective Action Request (CAR) No. 81-08, was issued to the L. K. Comstock Company. CAR No. 81-08 resulted in CEI issuing Stop Work

Notification No. 81-02 on November 16, 1981, to the L. K. Comstock Company. The L. K. Comstock Company was directed to stop "all cable pulling activities for Specification SP-33 (Class IE)." Subsequently, RIII issued a Confirmation of Action Letter, dated November 18, 1981 (Exhibit I), confirming CEI's stopping the work of the L. K. Comstock Company. The Stop Work Notification was released on January 7, 1982 (Paragraph 6.6 of this report).

3.3.5 Violation of Cable Pulling Stop Work Notification

3.3.5.1 On December 1, 1981, while reviewing L. K. Comstock Nonconformance Reports, RIII personnel discovered Nonconformance Report No. LKC-821, dated November 25, 1981, in the L. K. Comstock "Open" Nonconformance Report files. The description of the nonconforming condition was, "After Stop Work Notification 81-02 was issued on all safety cable pulls, cables (1P45C3A and 1P45C4A) were pulled through conduit (1R33C1230A) without QC notification and issuance of final route pull cards." The L. K. Comstock QA/QC Manager advised this NR was open and CEI had not been notified. Subsequently, RIII personnel notified CEI of the violation of their Stop Work Notification 81-02.

3.3.5.2 On December 2, 1981, RIII personnel inquired into the reasons for the violation of the CEI Stop Work Notification and the RIII Confirmation of Action Letter. The L. K. Comstock Project Manager advised he had informed his cable pulling crews to cease all safety-related cable pulling activities. However, he had forgotten that cable termination crews "final routed" (pulled) the last few feet of cable prior to making the cable termination. On November 20, 1981, a cable termination crew pulled the final 13' 4-1/4" of cables 1P34C3A and 1P45C4A for termination. On November 23, 1981, the L. K. Comstock Cable Engineer reviewed the cable termination crew's Daily Termination Report and discovered the two cables had been pulled in violation of the CEI Stop Work Notification. The Cable Engineer notified the L. K. Comstock Quality Control Section and Nonconformance Report No. LKC-821 was prepared.

The Comstock Project Manager readily admitted he was in error for not notifying the cable termination crews. He stated this was not a willful act on his

part, but an oversight. The oversight was caused by Comstock's accepted work practice allowing the termination crews to final route the last few feet of a cable, rather than having the cable final routed by the cable pulling crew. The Project Manager advised that to preclude a repetition of this event, all Cable Termination Slips for safety-related cables had been retrieved from the cable termination crews.

This appeared to be an isolated instance and since the Comstock Production Manager had already taken the necessary corrective action and the action to prevent recurrence, this matter was not considered to be an item of noncompliance with NRC requirements.

3.3.6 Partially Pulled Cables

3.3.6.1 Several cables in the Emergency Service Water Pump-house had been partially pulled with the free length of the cable coiled, pending final routing through the conduits. The coils were tied and suspended, by a single tiwrap with a rag between the cable and the tiwrap, from either cable tray hanger supports or from Seismic Category 1 conduits. The diameters of the inner turns of the coils for Cable Nos. 1M32R8B, 1M32R9B and 1M32R11b were measured and were less than the minimum training bend radius specified in Attachment L of L. K. Comstock Procedure No. 4.3.3, Cable Pulling Procedure. All had a measured training radius of 3", which is below the required minimum training radius of 3.2".

3.3.6.2 This is considered to be another example of an item of noncompliance contrary to the requirements of 10 CFR 50, Appendix B, Criterion V. (440/81-19-01; 441/81-19-01).

3.3.7 Review of Cable Pulling Procedures

L. K. Comstock Procedure No. 4.3.3, Cable Pulling Procedure, was reviewed. This review indicated this L. K. Comstock Procedure had not received an adequate review by Gilbert Associates, Inc., the architect-engineers, as the following errors were not identified and corrected:

3.3.7.1 Paragraph 3.1.1 of Procedure No. 4.3.3 incorrectly references Paragraph 3.2.22 of that procedure instead of Paragraph 3.2.24 for requirements to store partially pulled cables.

3.3.7.2 Paragraph 3.2.24 of Procedure No. 4.3.3 states in part, "When cable pulling is completed, the cable shall be coiled and supported to keep cable off the floor to prevent cable damage and safety hazards. The coil shall be tied so that the tie does not damage the cable jacket...Care shall be exercised in supporting coil to prevent kinking or exceeding the minimum bend training radius. Coils shall bear distinct cable identification on the coiled portion."

3.3.7.2.1 The above requirement is incorrect. There would not be any problem if the minimum bending radii was exceeded. However, there would be permanent damage to the cable conductors if the inner turns of the coiled cables were below, rather than exceeding, the minimum bending radii.

3.3.7.2.2 Minimum bending radii should be used instead of minimum bend training radii. Minimum bend training radii are used when cable is trained through cable boxes or during cable training in panels or switchgear where no excessive pressure is used.

3.3.7.2.3 The procedure does not specify the ways of storing partially pulled cables. For example, the use of a cable saddle, or suspending the cable at two points so that the inner turns are above the minimum bending radii. As a matter of routine, partially pulled cables were coiled and suspended by a single tie wrap. A piece of rag was routinely placed between the tie wrap and the cable jacket to protect the jacket. However, a piece of rag between a single tie wrap and the cable jacket does not mitigate the permanent deformation of the conductor strands.

These were considered to be additional examples of noncompliance with the requirements of 10 CFR 50, Appendix B, Criterion V. (440/81-19-01; 441/81-19-01).

3.3.7.3 Paragraph 5:08.15.3 of Specification SP-33-4549, Electrical Installations, Revision II, states in part, "All conduit sloping to equipment and embedded conduits shall have their ends covered with capped bushings containing a blank insert (penny). Insert to remain in place until cable is pulled." The Conduit Installation Checklist,

Form No. 82, attached to Comstock Procedure No. 4.3.1, Cable Pulling Procedure, also required the capping of installed conduits. The RIII inspectors observed vertical Conduit No. 1R33R517A in the Unit 1 Auxiliary Building without a cap. CEI was notified of the missing cap and stated the contractor would be instructed to cap the conduit.

The above requirement was for the installation of indoor conduit and outdoor conduit above grade. Paragraph 5:03.16 of Specification SP-33-4549 covered the requirements for conduit installations in ductbanks and manholes. A requirement did not exist to protect the ends of embedded conduit. The inspectors observed that Conduits No. 1R33C2006B, 1R33C2003B and 1R332009B in manhole No. 2 were not capped with blank inserts. The rationale for the lack of adequate requirements to protect outdoor embedded conduits, especially where it is being exposed to construction debris and inclement weather was questioned. The licensee stated that this matter will be reviewed with the architect engineers. This matter was considered unresolved. (440/81-19-02; 441/81-19-02)

3.4 Electrical Penetrations

3.4.1 Allegation

The electrical penetrations between the Unit 1 Containment and Intermediate Buildings were improperly installed. Most of the penetrations were either misaligned or "jammed through without concern for the 0.04" seismic tolerance required by the installation procedure.

3.4.2 Findings

3.4.2.1 Twenty-nine electrical penetrations, manufactured by Westinghouse Electric Corporation, were installed in Perry Unit 1. The electrical penetrations consisted of an annulus tube assembly bridging the three feet (annulus) between the walls of the Containment and Shield Buildings. The annulus tube assemblies were attached to containment vessel nozzles, supplied by Newport News Industrial Corporation, on the Containment Building wall. The annulus tube assemblies were attached to embedded steel, supplied by Pittsburgh Bridge and Iron, on the Shield Building wall.

3.4.2.2 The following information was obtained from a review of the Westinghouse Electrical Corporation

Instruction Book for Electrical Penetrations:

"Insert the Annulus Tube Assembly (long) through the containment building nozzle and into the shield building nozzle such that the end containing the Fixed Point Locking Nut touches the Shield Tube Assembly.

"Align the outboard end of the Annulus Tube Assembly with the Shield Tube Assembly such that there will be minimum interference at the assembly interface when the Secondary Seal and cable is pulled through the tubes.

"Finger tighten the two Fixed Point Nuts and one Sliding Nut.

"Center the inboard end in the nozzle by adjusting the three inboard Sliding Nut Supports. Loosen the two top inboard Sliding Nut Supports and place a .04" shim on top of each pad. Tighten the two top pads until both shims touch the nozzle. Lock in place with the lock nuts. Remove the shims.

"Secure the outboard end by tightening the two Fixed Point Nuts (12-15 ft. lbs.). Lock the two pointed nuts and the flat pad in place using the locking nuts."

3.4.2.3 The Westinghouse Penetration Engineer was interviewed. He advised the 0.04" tolerance was to allow movement within the electrical penetration during a seismic event. The original Westinghouse calculations used 0.03" as the tolerance, but it was determined 0.04" would be more practical for installation. By using a 0.04" tolerance a readily available 0.04" "feeler guage" could be used during installation. The Penetration Engineer continued, if the annulus tubes were "jammed through" or if a "perfect fit" were not achieved, the effect of either would not be significant, even in a seismic event. The annulus tubes were designed to move during a seismic event without damaging the cables inside the tubes. In a subsequent letter to CEI, dated December 22, 1981, the Westinghouse Engineer stated, "Movement between the Containment Building and the Shield Building in the installation described (The support tube (annulus tube) of the cable support tube assembly in contact with the outboard end of the containment sleeve) may cause the support tube to deform. This would not cause a disruption in operation, provided the insulation

of the cable inside the tube support was not damaged. Cable insulation damage would not occur at the combined maximum accumulative vertical or horizontal displacement of 1.4" described in Table 12 of Technical Specification SP-563-4549-00."

3.4.2.4 The installed penetrations were examined by the Westinghouse Engineer and RIII personnel on December 10, 1981. The tolerance between interior components of the penetrations could not be measured. The Westinghouse Engineer was requested to postulate the "as installed" measurements. In correspondence to CEI on December 22, 1981, and received by RIII on January 14, 1982, the Westinghouse Engineer stated:

"Question: How much clearance would there be between the upper two legs of the Sliding Nut Support and the sleeve I.D. after removing a 0.04" shim from between the bottom leg and sleeve I.D.?"

"Comment: The relationship is such that the distance between the top two legs would be 1/2 the distance set between the lower leg and the I.D., therefore 0.02" in this case.

"A clearance of 0.03" to 0.12" between the bottom leg and sleeve I.D. or 0.02" to 0.06" between the top two legs and sleeve I.D. would be acceptable.

"In reviewing the installation instructions it was noted that Section B-B of E-40047 is not a true representation of the installation or the installation instructions. The 0.03" clearance should be as described in 111A. and 111B. of PEN-TR-78-17 at the Sliding Nut Supports, not at the Fixed Point Support.

"The installation instructions will be revised to include the tolerances on the sliding nutsleeve I.D. spacing and a revised E-40047."

3.4.2.5 The L. K. Comstock Company Area Manager, General Foreman, Foreman, and Field Engineer responsible for electrical penetration installations were interviewed. Each advised they could not recall encountering any significant problems during the

actual installation of the penetrations. None recalled any penetrations being "jammed through." However, it was noticed the alignment of the containment penetration nozzle and their corresponding embedment pipes was incorrect. Comstock personnel reported the misalignment to the site engineers using "Field Question" sheets. (Field Question Nos. 12159, 12173, 12230, 12249 and 12295 dated January 23 - February 2, 1981.) Each Field Question concerned whether "variation in penetration sleeve dimensions" was acceptable. The site engineer's response was that with the exception of a few, most were acceptable; the unacceptable penetrations required further review with Westinghouse, the manufacturer. The Field Engineer authoring the Field Questions advised the meaning of the "variation in penetration sleeve dimensions" was intended to communicate the misalignment between the containment vessel nozzles and the embedment pipe.

3.4.2.6 The RIII personnel could not determine the dimensions of the containment vessel nozzles from either the Field Questions, the weld records generated by Pullman Power Products (who welded the penetration to the nozzle), or through visual inspection. Specification No. SP-33-4549-00 Procurement Specification for Electrical Installation, Paragraph 5:08.1.4.a, Page V-23 states in part:

"Before welding, the contractor shall inspect the inside diameter of the containment vessel nozzle and the concrete shield wall penetration to assure concentricity and/or dimensional tolerances within the limits established by the manufacturer."

The Dimensional tolerances for the above as stated in Paragraph No. 3:06.6 of Specification No. SP-660-4549-00, the Specification for the Procurement of the Containment Vessel Nozzles, are as follows:

"The material for penetration sleeves in nominal sizes up to and including 20" in diameter inclusive shall be SA-33, Grade 6, in accordance with ASME Code Section II."

ASTM-A-333 refers to ASTM-A-530, Table 1, which specifies the permissible variations in the outside diameter of nominal 8" to 18",

inclusive, diameter pipe size should not be over 3/32" or under 1/32".

Based on the above requirements, the penetration inspection reports were reviewed. The available documentation did not reflect the above inspections had been performed.

- 3.4.2.7 The failure to inspect the containment vessel nozzles and embedded pipe to ascertain whether the requirements of the specifications were met is an item of noncompliance contrary to the requirements of 10 CFR 50, Appendix B, Criterion X. (440/81-19-03; 441/81-19-03)

3.4.3 Review of Electrical Penetration Checklists

- 3.4.3.1 The electrical penetrations were to be installed to L. K. Comstock Procedure No. 4.3.10, Installation of Electrical Penetrations, which reflected the manufacturer's recommendations. The inspection results were to be documented in a checklist attached to the procedure.
- 3.4.3.2 The Penetration Installation Checklist was reviewed and it was found the inspector signoff on several of the line items on the checklist did not adequately specify what was inspected. The inspector's signature on certain checklist paragraphs contained multiple inspection steps and it could not be determined which steps had been completed and which remained to be finished.
- 3.4.3.3 The inspectors discussed this matter with the Westinghouse representative. He agreed to provide a list of attributes with acceptance/rejection criteria which would specifically reflect the acceptability of an electrical penetration installation. Pending receipt of this information from Westinghouse this matter is considered unresolved. (440/81-19-04; 441/81-19-04)

3.4.4 Alleged Forgery of Inspector's Signature

- 3.4.4.1 ~~the~~ The Penetration Installation Checklists were reviewed with the four Quality Control inspectors conducting the penetration inspections. In a written statement (Exhibit II) one inspector, Individual B, advised although his name appeared on Item No. 6 (Hole Verification) on four of the checklists (Penetration Nos. 1R72-S011, 1R72-S017, IR72-S027 and IR72-S028), it was not his signature.

Individual B stated he had conducted the inspections, verified the hole location, but he had never signed the checklists. Individual B continued, he had on one occasion given his permission to an inspector he was training to sign his (Individual B's) name. Individual B explained, both he and Phil Romano (the trainee) were inspecting the penetrations. Individual B was on one side of a wall and Romano on the other side. The inspection checklists were in Romano's possession, and Individual B told Romano to sign for Individual B to save either of them the effort of climbing down from the scaffolding. In a written statement Romano (Exhibit III) denied signing Individual B's name to the Penetration Installation Checklists. On December 9 and 19, 1981, the other inspectors responsible for penetration inspections were interviewed. Both were formerly employed by L. K. Comstock Company at the Perry site and have since departed. Both stated they had not signed Individual B's name to the Penetration Installation Checklists. Also, both stated had they needed to sign a checklist, they would have signed their own name not Individual B's. Additionally, the Comstock QA/QC Manager at the Perry site was interviewed and stated he had not signed either Individual B's or any other inspector's name to any checklists.

- 3.4.4.2 The CEI Manager of Nuclear Quality Assurance at the Perry site stated all four electrical penetrations would be reinspected for hole verification. Pending receipt of this information from CEI this matter is considered unresolved. (440/81-19-05; 441/81-19-05)
- 3.4.4.3 Individual B further advised that near the beginning of 1981 another instance arose where someone had signed a document for him. Individual B continued, an Audit Finding Report had been generated for a "punchlist" of items needing correction prior to final acceptance by quality control. Someone had initialed the punchlist for Individual B. Individual B was certain the Audit Finding Report and punchlist involved either Conduit Nos. 1R33C1014A or 1R33C1021A on the 599' elevation of the Unit 1, Auxiliary Building. Individual B notified the L. K. Comstock QA/QC Manager of this problem, and in turn the L. K. Comstock Project Manager was apprised. The Project Manager, the QA/QC Manager, the foreman for the area involved, and Individual B met to try to resolve the question of who initialed the

punchlist. Both the foreman and Individual B denied entering Individual B's initials on the punchlist, and the matter was never resolved.

3.4.4.3.1 The L. K. Comstock Production Manager and QA/QC Manager were interviewed. Both recalled the incident involving Individual B's initials on a punchlist for an Audit Finding Report. Neither could recall the Audit Finding Report involved or any of the specifics of the punchlist.

3.4.4.3.2 The Conduit Installation Checklists were reviewed for Conduit Nos. 1R33C1014A and 1R33C1021A. From this review it was determined the L. K. Comstock Company had not installed a conduit bearing either number. A review of checklists for variations of these numbers indicated an installation in the Emergency Service Water Pumphouse. The Conduit Installation Checklist for this conduit was reviewed, and did not indicate either a punchlist or an Audit Finding Report having been prepared against the installation.

3.4.4.3.3 All Audit Finding Reports prepared by Individual B for the entire period of his employment were reviewed. All of the initials on these Audit Finding Reports and attached punchlists appeared to similar to those of Individual B.

3.4.5 Review of Electrical Penetration Quality Assurance Records

3.4.5.1 Documents were reviewed for the containment vessel nozzles (CVN) and embedded steel in the shield wall to which the electrical penetration were attached. The CVNs attached to the containment liner plate were fabricated by Newport News Industrial Corporation. This document review indicated:

3.4.5.1.1 CVN, QC No. 77, (E-225) NNI-035; NNIC 300.

Certificate of Compliance, supplied by Capitol Pipe, dated January 6, 1976, indicated that 12 3/4' OD x S 80 ASME SA 333 Grade 6 pipes with heat Nos. 152758, A03480 and 152744 conforming to ASME Code Section III (1974 Edition, including

addenda through Summer 1974) and ASME Section III (1974 Edition, including addenda through Summer 1974) for class MC materials. U.S. Steel Corporation certified that 12.75" OD pipe, wall thickness 0.688 with heat No. A03480 conformed to ASME SA 333 had been supplied. The minimum average value of the impact tests was above 20 foot pounds.

3.4.5.1.2 CVN, QC No. 77, (E-225), NNI-035, Assembly 93.7.

Capitol Pipe had provided the Certificate of Compliance for the pipe supplied by Armco Steel Corporation. Armco furnished the Material Test Certificates for heat Nos. 134872 and 134879. The physical and chemical test results met the applicable requirements. The impact test values for heat number 134872 did not meet the requirements when erroneously tested at -50°F. However, Pittsburgh Testing Laboratory repeated the impact tests at the correct temperature of 0°F and the test results were acceptable.

The average impact test values for heat number 134879 were below the specified 20 foot pounds. This condition was contrary to the following: Cleveland Electric Illuminating Specification SP-660-4549-00, Paragraph 3:06.6 which states in part: "All sleeves shall be impact tested in accordance with the requirements of ASTM E 23-72. The minimum average value of the specimens shall be 20 foot pounds with no more than one specimen below 15 foot pounds in which case the other two specimens shall absorb at least 20 foot pounds. The test temperature shall be the same as used for the containment vessel plate."

3.4.5.2 At the NRC inspector's request, CEI audited the vendor's documentation on the CVNs. The inspectors reviewed the CEI audit and determined all sleeves were impact tested and met the requirements. The audit concluded that the sleeve with

the heat number 134879 had not been delivered to the Perry site.

3.4.5.3 At the RIII inspectors request, CEI performed an audit of the vendor documentation for the sleeve assemblies embedded in the shieldwall. A typical sleeve assembly consisted of a seamless pipe welded to a plate as shown in GAI Drawings S-422-012 and S-422-001. The sleeves were supplied by Pittsburgh Bridge and Iron (PBI). CEI Audit Report No. 637 indicated the audit was performed on December 8 and 9, 1981. The documentation package, identified as MR No. 1539, PBI shipment No. 30, was verified against the requirements of the relevant CEI Specification (No. SP-667, Procurement Specification for Miscellaneous Embedded Steel) which required the material to conform to ASTM A-36 and A-53. The inspectors reviewed a typical test report supplied by Youngstown Sheet and Steel. The Mill Certificate, including additional certification, confirmed the plate conformed to ASTM A-36-51. The certificate on a 12" diameter pipe, 2' 11 7/8" long, with heat Nos. 27510 and 31562 confirmed that the material conformed to ASTM A-53.

3.4.5.4 The RIII inspectors requested CEI to audit the welding records of Pullman Power Products (PPP), as PPP had welded the electrical penetrations to the CVN. The audit was performed to ascertain how mismatches between the CVN and the penetrations were corrected. The question of the mismatches arose from the CVN diameters documented in the five field questions identified in Paragraph 3.4.2.5 of this report. A review of the dimensions on the field questions indicated they were not within the tolerances of ASTM A-333. Subsequent discussions with L. K. Comstock craft workers, who had documented the dimensions, indicated accurate measurements had not been made. The CEI audit, dated December 3, 1981, concluded that the fit-up requirement of 1/8" ±1/32" and the PPP weld procedure, SPS IT-12A, were not violated. RIII personnel concurred with the CEI audit findings.

3.4.5.5 The following information was obtained from a review of the typical weld history sheet for penetration No. 1R71-S027:

PPP Weld Procedure Specification (WPS) 1T-12A was used to weld the penetration to the CVN.

Bare wire E-70S-2 was used for the root pass. E-7028 type electrode was used for the weld.

Inspections were performed at the identified "hold points."

Liquid penetrant and ultrasonic tests were performed on the completed weld. Test records were available.

Material requisition records on the weld rod withdrawals were available.

The material certifications on the purchased material (i.e., CVNs, embedded sleeves) and inspection records of the welding performed did not indicate the nonconforming conditions, concerning the CVN diameters described in the Field Questions.

- 3.4.5.6 The CEI Manager of Nuclear Quality Assurance stated a suitable explanation will be attached to the "Field Questions" to reflect the interpretations and to update the QA records with pertinent information contained in the Field Questions. This matter will be reviewed further and is considered unresolved. (440/81-19-06; 441/81-19-06)

3.5 Conduit Installed Disregarding Design Location

3.5.1 Allegation

L. K. Comstock conduit installation procedures allowed the installation crews to relocate conduit ± 2 " vertically/horizontally from the design location to allow for physical obstructions. The procedure also permitted a variation of 12" from the design location to allow for physical obstructions. Many conduits have been installed without regard for the design location and the 12" variance for obstructions was claimed as the reason for moving the conduit from the design location. One such instance was Conduit No. 1R33C4226B.

3.5.2 Findings

- 3.5.2.1 Drawing No. 04-4549-SS-215-011, Sheet 1, Revision C, Electrical Tolerance for Avoiding Interferences During Conduit Installation, dated September 1, 1981, was reviewed. Note 1 of this drawing stated in part, "A horizontal and vertical installation tolerance of ± 12 inches for conduit... may be used to avoid physical interferences with installed equipment and supports...The tolerance

may be used at the contractor's discretion to install offsets in the conduit plan." Note 2 of the drawing provides, in part..."Installation tolerance for conduit runs supported from engineer designed conduit support hangers shall be ± 2 inches horizontal and vertical for the GAI (Gilbert Associates, Inc.) designed supports."

- 3.5.2.2 L. K. Comstock Audit Finding Report No. 816, dated August 4, 1981, was reviewed. A Punchlist attached to this Audit Finding Report indicated Conduit No. 1R33C4226B was "2-3/4" west of CC/2 not 6" west of CC/2 as the DWG shows...conduit moved to miss physical obstruction." Audit Finding Report No. 816 was still open as of December 10, 1981.
- 3.5.3.3 On December 10, 1981, RIII personnel inspected Conduit No. 1R33C4226B (located above the 679' elevation of the Control Complex) and reviewed Drawing No. 04-459-SS-215-162, Sheet 501, Revision A, Conduit Layout Control Complex West - Elevation 679'6". The conduit was installed within the allowed tolerance to circumvent a physical obstruction and was in accordance with the drawing specifications, including the tolerances permitted.

3.6 Storage of Motor Control Centers

3.6.1 Allegation

The Field Storage Maintenance Requirements required motor control centers to be stored indoors and within a temperature range of 40°F to 140°F. During the Summer 1981, the motor control center heat strips remained energized and the temperature range was exceeded.

A Nonconformance Report was written on this matter. However, all temperature readings for the Nonconformance Report had been taken in ambient air within 7" of the heat strip and these temperature readings did not represent an "as-is" condition.

3.6.2 Findings

- 3.6.2.1 CEI Nonconformance Report No. CQC-2290, dated June 9, 1981, was reviewed. The description of the nonconformance was "MCC's listed on the MPL attachment are in violation of uniform heat and temperature control for Level B equipment storage..." "Improper storage" was given as the cause of the nonconformance. The proposed dis-

position of the nonconformance was, "the space heaters shall be de-energized until September 15, 1981. At such time a determination shall be made to see if the building climate control system is adequate to discontinue the use of space heaters." On July 28, 1981, this Nonconformance Report was reviewed by the CEI Electrical Quality Engineer, who commented, "Building heat is currently being maintained in the area that the equipment is stored between 40°-140°F. Place NR in long term file until September 15. At that time submit Revision 1 of NR for ENG to review whether heat can be left off." On September 15, 1981, Nonconformance Report No. CQC-2290 was revised to read, "...Re-issued because (1) no evaluation was made on MCC's as to possible damage from temperature; (2) since compartment temperatures vary, does the 40°F to 140°F limit apply to all locations inside MCC's? (i.e., can temperature right on or above heat strip exceed 140°F?)..." As of December 1, 1981, Nonconformance Report No. CQC-2290 was still open and a review by the Quality Engineer remained to be done.

- 3.6.2.2 On December 1, 1981, the CEI Quality Control Inspector authoring Nonconformance Report No. CQC-2290 advised the temperatures were taken at these locations within the motor control centers. Metal contact thermometers were placed at the top, the center, and near the heat strips inside the control centers. The motor control center doors were closed, the heat strips energized, and the centers were covered with tarpaulins to simulate the "as stored" condition. Temperature readings were taken after a three hour interval. Of the five motor control centers involved, only one had temperatures within the 40°F to 140°F range. The temperature range of three motor control centers was exceeded at the thermometer located nearest the energized heat strip. The temperature range was not exceeded at the other thermometer locations within these control centers. The remaining motor control center had temperatures exceeding the prescribed range at all thermometer locations. This matter is considered unresolved. (440/81-19-07; 441/81-19-07)

4. Preparation of Nonconformance Reports

4.1 Former Quality Inspectors Alleged they had been Prevented from Preparing Nonconformance Reports

- 4.1.1 On December 9, 1981, Individual C, an Electrical Quality Control Inspector previously employed by Kaiser Engineers, Inc., provided the following information:

From approximately June 1979 until November 1980 his primary function was to perform electrical inspections of the L. K. Comstock Company. During April or May 1980 his supervisor, Steve Halpin, told him to stop writing Nonconformance Reports involving the Comstock Company, as "Comstock was going under." When Individual C questioned Halpin about this decision, Halpin stated he "was up against a wall" and "it was a political decision." Individual C assumed the decision to not write Nonconformance Reports was made by either Stu Tulk or Bill Kacer, supervisors in the Quality Engineering Section, and this decision was given to Halpin by them. Individual C said two other electrical inspectors, Individuals D and E, were also told not to write Nonconformance Reports involving the Comstock Company. Individual C stated that the instruction to stop writing Nonconformance Reports adversely affected his work performance and led to his decision to terminate his employment with Kaiser Engineers.

- 4.1.2 On January 11-12, 1982, Individuals D and E were interviewed and provided essentially the same information as Individual C. Individual D was employed by Kaiser Engineers during the period February - November 1980, and Individual E was employed from December 1979 until June 1980.

4.2 Findings

4.2.1 Interview of Lead Electrical Quality Control Inspector

On January 14, 1982, Steven H. Halpin, Lead Electrical Operations Control Inspector, provided the following information:

During the period July 1979 - November 1980, he was the Lead Electrical Construction Quality Control Inspector and the supervisor of Individuals C, D, and E. He described Individuals C and D as good inspectors and Individual E as lazy (i.e., Individual E submitted only one Daily Inspection Report in the six months Individual E was employed at the Perry site). All three individuals had prior experience as "first line" quality control inspectors; however, each of the three were having difficulty adjusting to "second line," or performance surveillance inspections of a contractor.

He stated he never told anyone, including Individuals C, D, and E not to write Nonconformance Reports. He felt Individuals C, D and E had misunderstood the site policy to have the contractor (i.e., L. K. Comstock) write the Noncon-

formance Reports on the contractor's problems, rather than having the Project Organization (CEI, Gilbert Associates, or Kaiser) prepare Nonconformance Reports for the contractor.

Halpin indicated the L. K. Comstock Company started installing safety-related conduits during the first half of 1980. At that time the L. K. Comstock procedure specified a Nonconformance Report would be prepared after the conduit had been fully installed and their procedure did not allow for the preparation of a Nonconformance Report during the installation process. The Comstock procedure was later changed to allow the preparation of a Nonconformance Report while a conduit was being installed.

Halpin believed the reason the L. K. Comstock Company did not prepare Nonconformance Reports during conduit installation was the lack of sufficient numbers of qualified quality control inspectors. Comstock eventually hired additional inspectors after CEI placed "pressure" on Comstock. He believed the pressure to hire additional personnel was the "political pressure" to which Individuals C, D, and E had referred.

He indicated he was never under pressure from Stuart Tulk, the Lead Electrical Quality Engineer, in either his job performance or decision making process.

Additionally, Halpin provided a signed sworn statement (Exhibit VII).

4.2.2 Interview of Lead Electrical Quality Engineer

On January 13 and 14, 1982, Stuart P. Tulk, CEI's lead Electrical Quality Engineer, provided the following information:

Tulk stated he has never told anyone, including Individuals C, D, or E not to write Nonconformance Reports. He indicated his personal philosophy was to allow anyone working on the Perry site to prepare Nonconformance Reports. This philosophy was stated in Project Administration Procedure No. 1502, Project Nonconformance Control, Paragraph 1.2, Responsibilities and Requirements: "All Project Organization personnel shall have the authority to identify a nonconformance condition and report the nonconforming condition to their immediate supervisor by initiating an NR (Nonconformance Report)."

Steven Halpin never worked for him. Rather, Halpin was his point-of contact with the Kaiser electrical quality control inspectors. Halpin and he mutually agreed to foster a good working relationship, as there had been friction between

their predecessors in quality control. He did not have direct contact with Individuals C, D, or E, as his interface with the Kaiser employees was Halpin.

He recalled Halpin had difficulties with Individual C over the submission of Daily Inspection Reports. Tulk recalled that each of the Individuals (C, D, and E) felt that Halpin was not qualified for his position; also, none of the three individuals particularly liked him (Tulk).

Tulk provided a signed, sworn statement (Exhibit VIII).

4.2.3 Interview of former General Supervising Engineer

On January 22, 1982, William J. Kacer, former General Supervising Engineer, provided the following information:

He never told anyone, including Individuals C, D, or E not to write Nonconformance Reports. The Perry site policy allowed anyone on the site to prepare a Nonconformance Report, and to cease writing Nonconformance Reports would be a violation of the policy.

Kacer provided a signed, sworn statement (Exhibit IX).

4.2.4 Interview of Kaiser's Project Quality Assurance Manager

On January 14, 1982, Patrick L. Gibson, the Project Quality Assurance Manager for Kaiser Engineers, Inc., provided the following information:

He has been employed at the Perry Nuclear Power Plant construction site since May 3, 1976. In January 1979 he was appointed Quality Assurance Manager.

On June 16, 1980, Individual E resigned. In his letter of resignation, Individual E wrote to Gibson and complained about Halpin's qualifications as a supervisor, Halpin's "instructions to bypass procedures," and other matters within the Quality Control Program. Gibson conducted an investigation into Individual E's concerns and documented the results in a memorandum dated June 19, 1980 (Exhibit X). Gibson did not find any substance to Individual E's allegations. (These areas were later reviewed and found to be acceptable by the NRC Resident Inspector at the Perry site and documented in IE Inspection Reports No. 50-440/80-16; 50-441/80-15, and 50-440/80-25; 50-441/80-23.) Gibson noted Individual E had not raised any issues or concerns with the Quality Control program while still employed at the Perry site. It was not until Individual E resigned that Individual E voiced any concerns.

Individuals C and D were interviewed by Gibson during the course of Gibson's inquiry into Individual E's concerns. During these interviews neither Individual C nor Individual D identified any problems with the Quality Control Program.

All three Individuals had prior "first line" inspection experience before starting work at the Perry site. All three were good first line inspectors. However, all three had difficulty in adjusting to their positions as "second line" inspectors where they inspected a contractor's program performance and not the contractor's hardware. Second line inspection included helping a contractor implement the contractor's Quality Control Program by pointing out nonconforming conditions to the contractor and having the contractor prepare the Nonconformance Report. In the instance where the contractor refused to acknowledge a nonconforming condition, the second line inspectors (Individuals C, D, and E) were to prepare the Nonconformance Report.

Individuals C, D, and E felt they should write Nonconformance Reports as soon as they identified a problem, using their Nonconformance Report to notify the contractor; rather than identifying the nonconforming condition to the contractor and having the contractor's quality control section prepare a Nonconformance Report. They were told on numerous occasions to pursue a nonconformance through the contractor's quality control program, rather than writing their own Nonconformance Reports.

Gibson considered Halpin to be a poor supervisor. Halpin would give incomplete directions to his subordinates by not explaining problems or his decisions in sufficient depth. Other times he would not back his employees in their decisions. Therefore, the subordinates did not have faith in Halpin, as the people were not sure that Halpin would follow a problem through to its resolution. Similarly, Halpin thought Individuals C, D, and E were "knit-pickers."

Gibson considered the problems between Halpin and Individuals C, D, and E to be "people problems" caused by "lack of communication." In retrospect Gibson felt Halpin and the three Individuals were correct in their evaluation of each other (Halpin saw the Individuals as "knit-pickers" and the individuals saw Halpin as a poor supervisor).

Gibson stated Halpin never worked for Tulk. In fact, many arguments occurred between Tulk and Halpin and Tulk and Gibson. These arguments were philosophical in nature over the manner in which things were to be accomplished. The arguments never involved questioning the technical competence of the other party or the other party's technical decision in a matter.