

May 2, 1983

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of)

THE CLEVELAND ELECTRIC ILLUMINATING)
COMPANY, et al.)

Docket Nos. 50-440
50-441

(Perry Nuclear Power Plant,)
Units 1 and 2))

APPLICANTS' TESTIMONY OF MURRAY R. EDELMAN AND
GARY R. LEIDICH ON THE CLEVELAND
ELECTRIC ILLUMINATING COMPANY'S
QUALITY ASSURANCE PROGRAM FOR CONTROL OF
SAFETY-RELATED CONTRACTORS AT PERRY
NUCLEAR POWER PLANT (ISSUE #3)

Q. 1 Please state your names, current positions, and
business addresses.

A. 1 (Mr. Edelman): My name is Murray R. Edelman. My
current position is Vice President, Nuclear Group, of The
Cleveland Electric Illuminating Company ("CEI"). My business
address is 10 Center Road, Perry, Ohio 44081.

(Mr. Leidich): My name is Gary R. Leidich. My current
position is Senior Engineer, Nuclear Construction Engineering
Section of CEI. My business address is 10 Center Road, Perry,
Ohio 44081.

May 2, 1983

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of)
THE CLEVELAND ELECTRIC ILLUMINATING) Docket Nos. 50-440
COMPANY, et al.) 50-441
(Perry Nuclear Power Plant,)
Units 1 and 2))

APPLICANTS' TESTIMONY OF MURRAY R. EDELMAN AND
GARY R. LEIDICH ON THE CLEVELAND
ELECTRIC ILLUMINATING COMPANY'S
QUALITY ASSURANCE PROGRAM FOR CONTROL OF
SAFETY-RELATED CONTRACTORS AT PERRY
NUCLEAR POWER PLANT (ISSUE #3)

Q. 1 Please state your names, current positions, and
business addresses.

A. 1 (Mr. Edelman): My name is Murray R. Edelman. My
current position is Vice President, Nuclear Group, of The
Cleveland Electric Illuminating Company ("CEI"). My business
address is 10 Center Road, Perry, Ohio 44081.

(Mr. Leidich): My name is Gary R. Leidich. My current
position is Senior Engineer, Nuclear Construction Engineering
Section of CEI. My business address is 10 Center Road, Perry,
Ohio 44081.

1 Q. 2 Please summarize your professional qualifications
2 and educational backgrounds.

3 A. 2 (Mr. Edelman): I joined CEI in 1961. Between 1961
4 and 1972 I occupied various non-nuclear engineering positions
5 in the CEI Civil and Mechanical Engineering Department,
6 including Engineering Assistant, Engineer and Senior Engineer.
7 During this period I was a Project Engineer on several CEI
8 fossil plant projects.

9 I began working on the Perry Nuclear Power Plant ("PNPP")
10 in 1972 as the CEI Senior Licensing Engineer responsible for
11 PNPP NRC licensing activities. In 1975 I was promoted to
12 General Supervising Engineer of the Licensing and Administra-
13 tion Section of the Nuclear Engineering Department. I retained
14 my licensing responsibilities and also became responsible for
15 other administrative areas.

16 In 1977 I was transferred from the Perry Project to the
17 Civil and Mechanical Engineering Department as a General
18 Supervising Engineer.

19 Between April 1978 and April 1981 I held the position of
20 Manager, CEI Nuclear Quality Assurance ("QA") Department. In
21 that capacity I was responsible for planning and directing the
22 PNPP quality assurance program. I reported directly to CEI's
23 Vice President, System Engineering and Construction Group.

24 In April 1981 I was appointed Manager, Nuclear Engineering
25 Department, a position I held until April 1982. In that
26 position I was responsible for PNPP engineering, construction,

1 testing, procedures, records, licensing and cost control and
2 reported to the Vice President, System Engineering and Con-
3 struction Group.

4 Between April 1982 and December 1982 I was CEI Division
5 Manager, Nuclear Engineering and Construction Division,
6 responsible for all PNPP nuclear engineering, construction,
7 licensing, fuel management, and cost administration. I
8 continued to report to the Vice President, System Engineering
9 and Construction Group.

10 Since December 1982 I have held the position of CEI Vice
11 President, Nuclear Group. I have responsibility for all areas
12 of the Perry Project including Construction, Engineering, Plant
13 Operation and Quality Assurance, and report to CEI's Senior
14 Vice President.

15 I obtained a Bachelor of Science in Mechanical Engineering
16 from Case Institute of Technology in 1961, and Juris Doctor
17 from Cleveland Marshall Law School in 1965.

18 My professional memberships include the American Society
19 of Mechanical Engineers, Cleveland Engineering Society, and the
20 American Nuclear Society. In addition, I am currently Chairman
21 of the Atomic Industrial Forum's Committee on Reactor Licensing
22 And Regulation.

23 (Mr. Leidich): I joined CEI in January 1974. In 1974 and
24 1975 I held various fossil plant electrical engineering
25 positions in the Plant and Substation Engineering Department.
26

1 In 1975 I joined the Perry Project. My first position at
2 PNPP was that of Responsible Engineer for procurement of plant
3 electrical equipment. I was also responsible for the electri-
4 cal system design calculations, voltage and short circuit
5 studies, and transmission system interface criteria for the
6 Perry Project. In 1978 I was promoted to Lead Electrical
7 Engineer with responsibility for CEI's overall field engi-
8 neering in the electrical area of the Project, including
9 technical overview of all electrical contractor work. I held
10 that position until September 1980.

11 From September 1980 to October 1982 I held the position of
12 Supervisor, Construction Quality Engineering Unit. My respon-
13 sibilities included monitoring construction contractors'
14 quality assurance performance. I was one of three unit
15 supervisors reporting to the General Supervisor of the
16 Construction Quality Section. Personnel under my supervision
17 performed procedure reviews, surveillance, inspection and
18 auditing for the 16 safety-related contractors employed at that
19 time on the Perry Project.

20 Since October 1982 I have been a Senior Engineer in CEI's
21 Nuclear Construction Engineering Section. I supervise 30
22 engineers who provide construction support for electrical,
23 civil, structural and chemical disciplines. I report to the
24 General Supervising Engineer, Nuclear Construction Engineering
25 Section.
26

1 I earned a Bachelor of Science in Electrical Engineering
2 at the University of Toledo in 1972, and Master of Science in
3 Engineering Science at the University of Toledo in 1974. I am
4 a registered Professional Engineer in the State of Ohio. I am
5 a member of the Cleveland Engineering Society, and have served
6 as Chairman of that organization's Public Utilities Division.

7 In addition to the above, I have been a member of the
8 Institute of Electrical and Electronic Engineers ("IEEE") since
9 1969. IEEE is an international professional society of
10 electrical engineers and scientists. I am currently serving an
11 appointment as Secretary, and Executive and Administrative
12 Committee Member, of the Nuclear Power Engineering Committee
13 ("NPEC") of the Power Engineering Society of IEEE. The NPEC
14 full committee includes approximately 40 engineers and
15 scientists from industry, university and governmental back-
16 grounds. NPEC is responsible for overseeing those subcommit-
17 tees and working groups which develop nuclear electrical
18 standards for IEEE.

19 Q. 3 What is the purpose of your testimony?

20 A. 3 (Panel): The purpose of our testimony is to address
21 the four issues of material fact under Issue #3, as admitted by
22 the Atomic Safety and Licensing Board in this proceeding.
23 These four issues, which relate to CEI's QA program applicable
24 to safety-related contractor work at PNPP, are as follows:
25
26

1 The existence, cause, severity, duration
2 and extent of an alleged instance in which
3 applicant's quality assurance program failed by
4 not properly controlling its electrical con-
5 tractors.

6 Whether the alleged deficiencies in
7 properly controlling electrical contractors
8 extend to the proper control of other con-
9 tractors.

10 Whether deficiencies in the control of
11 contractor activities have resulted in unsafe
12 conditions at Perry.

13 Whether applicant has an adequate system
14 for periodically reviewing its program for
15 assuring the quality of contractor performance
16 and ascertaining and correcting deficiencies
17 that have arisen, particularly in systems
18 essential to safe plant operation.

19 See Memorandum and Order (Concerning Summary Disposition:
20 Quality Assurance, Corbicula and Scram Discharge Volume
21 Contentions), December 22, 1982, at 9-10, 16.

22 In addressing the first two issues of material fact, our
23 testimony discusses CEI's control of electrical contractor work
24 performed at PNPP, including CEI's response to the NRC's 81-19
25 investigation. The testimony demonstrates that CEI's QA
26 program has properly controlled the work performed to date by
27 the electrical and other PNPP contractors.

28 With respect to the third issue of material fact, the
29 testimony describes how CEI's QA program assures the proper
30 documentation and correction of all nonconforming contractor
31 construction work.

32 In addressing the fourth issue of material fact, the
33 testimony explains the QA systems used for periodically

1 reviewing CEI's program for controlling safety-related
2 contractor work, and shows how deficiencies are identified and
3 corrected under CEI's QA program.

4 Q. 4 Describe CEI's project management system for the
5 Perry Project.

6 A. 4 (Mr. Edelman): CEI's management organization for
7 control of PNPP is shown on Attachment 1 hereto. CEI manages
8 the Perry Project through an organization referred to as the
9 Project Organization. The Project Organization consists of all
10 CEI and consultant personnel at the Perry site responsible for
11 the design, procurement, installation, construction, inspection
12 and testing of PNPP. This includes approximately 650 CEI per-
13 sonnel supplemented by approximately 700 consultants. Consul-
14 tants are used to provide specific expertise or short-term
15 support to CEI, and they are fully integrated into the Project
16 Organization. Contractors are not part of the Project
17 Organization.

18 As depicted on Attachment 1, overall responsibility for
19 the Perry Project is that of the CEI Vice President, Nuclear
20 Group. I work exclusively on the Perry Project and am the
21 senior Project Organization official. There is a close
22 organizational and day-to-day working relationship between my
23 office and those of other senior CEI executives. The Senior
24 Vice President and I have offices on-site, and at CEI's
25 Cleveland corporate offices adjacent to the offices of the
26 President and Executive Vice President. There are weekly and

1 often daily communications among these four senior CEI
2 executives concerning Perry Plant issues.

3 Q. 5 Generally describe the current QA organization and
4 staffing at Perry.

5 A. 5 (Mr. Edelman): CEI's current Nuclear Quality
6 Assurance Department organization is depicted on Attachment 2.
7 The Department is headed by the CEI QA Department Manager. He
8 reports to me and has organizational status and authority equal
9 to the managers of the Construction, Engineering, and Perry
10 Plant (Operations) Departments.

11 Under the QA Department Manager are various quality
12 sections headed by CEI General Supervisors responsible for
13 quality assurance activities for the procurement, construction,
14 and operations phases of the Project. Procurement and adminis-
15 tration QA is the responsibility of the Procurement and
16 Administration Quality Section. Construction QA is under the
17 Construction Quality Section. Testing and operations QA is
18 under the Operational Quality Section. Separate from these
19 three sections is a Quality Auditing Unit responsible for
20 auditing Project Organization and contractor activities.

21 The CEI QA organization shown on Attachment 2 is located
22 entirely on the construction site. CEI in 1978 was one of the
23 first nuclear utilities to reorganize its QA organization so as
24 to consolidate all QA activities at the site. Other utilities
25 have since undergone similar reorganizations with the endorse-
26 ment of the Nuclear Regulatory Commission. CEI has found that

1 this close proximity increases the ability of the QA Department
2 to monitor other Project Organization departments and
3 effectively to implement the day-to-day QA program.

4 Since 1978 CEI's QA Department has increased from fewer
5 than 50 to approximately 200 CEI and consultant personnel. It
6 is one of the largest nuclear plant QA departments in the
7 country, according to a June 1982 NRC Staff comparison of QA/QC
8 staffing at 35 nuclear plants under construction. The Staff's
9 compilation also indicated that in June 1982 Perry had the best
10 (lowest) ratio of craft personnel to QA/QC personnel (a 4.6 to
11 1 ratio) of any plant under construction.

12 The QA Department includes quality control ("QC")
13 inspectors, quality engineers ("QEs"), supervisors and clerical
14 support. The QC inspectors perform field surveillance and
15 inspection, as an overview to the contractors' "first-line"
16 inspections, to ensure that contractor construction activities
17 are being performed consistent with specified requirements.
18 The quality engineers, who generally have greater technical
19 training and experience than inspectors, are responsible for
20 reviewing, approving, and interpreting QA program requirements.

21 CEI's professional QA staff has a large number of cer-
22 tified inspectors and auditors. For example, there are 24 CEI
23 auditors and 23 CEI lead auditors certified under American
24 National Standards Institute ("ANSI") requirement N45.2.23
25 "Qualifications for QA Auditing Personnel for Nuclear Power
26 Plants." There are 44 CEI QC inspectors qualified under ANSI

1 N45.2.6 "Qualifications of Inspection, Examination, and Testing
2 Personnel for the Construction Phase of Nuclear Power Plants."

3 These inspectors also hold 43 certifications in various
4 nondestructive examination techniques such as radiographic
5 testing, ultrasonic testing, magnetic particle testing,
6 penetrant testing, and visual weld inspection. Of special
7 significance, ten of CEI's inspectors have passed the American
8 Welding Society ("AWS") national examination, thereby certify-
9 ing the inspectors as AWS weld inspectors. Thirteen inspectors
10 have also passed a State of Ohio examination for inspection of
11 pressure piping systems and are certified as Special Inspectors
12 by the State of Ohio.

13 The turnover of these CEI QA professionals has been
14 extremely low. Since 1978, only six CEI QA employees have left
15 the Project. CEI has been able to retain an experienced and
16 qualified QA staff for a number of reasons. CEI's salary
17 structure for QA personnel is identical to the salary structure
18 used for personnel in engineering and construction, a clear
19 indication from senior management that quality assurance at
20 Perry has co-equal status with construction and engineering
21 functions. CEI's record of training and promoting inspectors
22 has also contributed to CEI's ability to retain these person-
23 nel. Another factor has been CEI's ability to attract experi-
24 enced personnel with local community ties.

25 CEI's management personnel understand and support the PNPP
26 quality assurance program. As noted earlier in the testimony,

1 I previously held the position of QA Department Manager.
2 Similarly, the CEI Manager of the Perry Project Services De-
3 partment, and the CEI General Supervisors of the Nuclear Con-
4 struction Engineering, Nuclear Project Training, and Admini-
5 stration and Special Projects Sections formerly occupied QA
6 Department management positions. CEI benefits from having
7 management personnel across the Project with strong QA back-
8 grounds.

9 The primary consultants assisting CEI's QA staff in the
10 overview of contractor QA programs are Gilbert Associates, Inc.
11 ("GAI") and Raymond Kaiser Engineers ("RKE"). GAI's support
12 role is predominately in the quality engineering area. This
13 includes evaluation of construction and equipment specification
14 requirements, review of contract proposals, and review of
15 contractor QA programs. RKE primarily provides inspectors for
16 surveillance of contractor QC activities, and also furnishes
17 clerical support in the records storage area. As with CEI's QA
18 personnel, none of the consultants' QA personnel perform first-
19 line inspection of safety-related construction activities.
20 First-line inspection is the responsibility of each contractor
21 performing safety-related work.

22 Currently safety-related contractors at Perry have over
23 300 QA/QC personnel providing first-line inspection and QA
24 audit coverage of all safety-related work being performed at
25 the Project. For each such contractor the QA organization and
26 staffing, as well as the written QA program, are carefully

1 reviewed by CEI's QA Department prior to implementation. CEI
2 reviews personnel qualifications of every QA/QC auditor and
3 inspector proposed by the contractor to assure that he or she
4 has the required education and experience. CEI follows up its
5 review with a letter to the contractor accepting or rejecting
6 the individual.

7 Q. 6 Generally describe the scope and content of CEI's
8 quality assurance program requirements for the control of
9 safety-related construction work at Perry.

10 A. 6 (Panel): CEI's QA program for safety-related work
11 is structured in accordance with the 18 criteria set forth in
12 10 CFR Part 50, Appendix B, of the Nuclear Regulatory
13 Commission's regulations. The "quality assurance" activities
14 covered by the program, as defined in Appendix B, include "all
15 those planned and systematic actions necessary to provide
16 adequate confidence that a structure, system, or component will
17 perform satisfactorily in service." Quality assurance includes
18 "quality control," defined in Appendix B as "those quality
19 assurance actions related to the physical characteristics of a
20 material, structure, component, or system which provide a means
21 to control the quality of the material structure, component, or
22 system to predetermined requirements." CEI's QA program also
23 follows the QA requirements set forth in various industry codes
24 and standards, such as the American Society of Mechanical
25 Engineers ("ASME") Boiler and Pressure Vessel Code, and ANSI
26 Standards.

1 CEI's QA program requires, among other things, sufficient
2 QA authority and organizational freedom to identify and respond
3 to quality problems, including the necessary access to manage-
4 ment; proper documentation of the QA program in written
5 policies, procedures, or instructions; an adequate inspection
6 program to verify conformance with the documented program
7 requirements; regular management review of the status and ade-
8 quacy of the QA program; and the necessary training and
9 qualification of all personnel.

10 CEI retains the ultimate responsibility for the develop-
11 ment, approval, application, administration, and control of the
12 total quality assurance program for the Perry Plant. Every
13 safety-related contractor is required by CEI to have a QA
14 program for accomplishing the specific scope of work covered by
15 their contract. CEI's Corporate Nuclear Quality Assurance
16 Program Manual and all implementing procedures and instructions
17 set out the details of the QA program to be implemented by all
18 site personnel. Safety-related construction is only performed
19 at PNPP after CEI carefully reviews and approves the con-
20 tractor's quality assurance program, and after Project
21 Organization QA and engineering personnel fully review all
22 procedures, instructions, and specifications. During program
23 implementation, CEI reviews and approves all changes to the
24 contractor's program and procedures, and verifies, by checking,
25 auditing, and surveillance, that contractor activities affect-
26 ing the safety-related functions have been correctly performed.

1 Later in our testimony we will discuss in greater detail how
2 this overview function is performed at Perry.

3 CEI's executive commitment to a strong, independent QA
4 program meeting all regulatory and industry requirements is
5 recorded in a written QA policy statement signed by the
6 President of CEI, a copy of which has been included in CEI's
7 Corporate Nuclear Quality Assurance Manual since the Manual's
8 original issuance in 1978. The current policy statement, which
9 differs in only minor respects from the original version, is
10 included as Attachment 3 to this testimony. The policy
11 statement emphasizes the importance of the Perry QA program to
12 the safe design, construction and operation of the Perry Plant.
13 The policy statement recognizes that the QA program requires
14 the support of all Project disciplines and groups. The
15 statement assigns responsibility for ensuring the establishment
16 and implementation of CEI's QA program to the office of the
17 senior Perry Project official, the Vice President, Nuclear
18 Group. The CEI QA Department is given the responsibility and
19 requisite authority, including stop work authority, to identify
20 and resolve all quality problems. Finally, the policy state-
21 ment makes all employees responsible for informing their
22 superiors of any potential QA program deviations, "including
23 the right of direct appeal to upper management of the Company."

24 CEI executives repeat this quality message at many
25 management meetings held throughout the year. The importance
26 of every PNPP worker to the quality program, including ready

1 access to management, is also explained and emphasized in
2 posters on Company bulletin boards and in various printed
3 material distributed by CEI senior management to Project
4 employees.

5 Q. 7 Please summarize the major QA program changes at
6 Perry since 1978.

7 A. 7 (Panel): As with any nuclear QA program, Perry's QA
8 program has grown and evolved as activities on the Project have
9 increased in scope and complexity. We have been able to make
10 the QA program increasingly effective over time.

11 In response to items of concern in a February 8, 1978
12 immediate action letter issued by NRC Region III, CEI reviewed
13 each letter item and performed a comprehensive management
14 evaluation of all Project QA/QC activities. CEI determined
15 that the underlying causes of the QA deficiencies identified in
16 the immediate action letter included: the lack of a single,
17 all-encompassing QA manual defining corporate QA controls and
18 responsibilities; the limited number of CEI personnel physi-
19 cally located at the Perry site (the majority were based in
20 CEI's Cleveland offices); inadequate definition of surveil-
21 lance/inspection and audit responsibilities of CEI's QA/QC
22 personnel following the 1977 merger of CEI's QA and QC organi-
23 zations; and inadequate integration of CEI's and contractors'
24 QA programs.

25 In response, CEI instituted the QA department consolida-
26 tion discussed previously in this testimony. This was part of

1 an overall site consolidation of all CEI QA, engineering and
2 purchasing personnel. In addition, CEI made the following
3 programmatic changes. CEI's QA manual was revised to address
4 all QA-related project activities and procedures; and a series
5 of related administration, procedure and instruction manuals
6 were issued to address overall project QA/QC requirements;
7 programs for quarterly QA management reviews were implemented;
8 a QA advisory committee was established to assist CEI's Vice
9 President, System Engineering and Construction Group (now the
10 Vice President, Nuclear Group) on key QA program issues; CEI's
11 audit program was restructured; and an integrated inspection/
12 surveillance program of site contractors was established by
13 CEI. In addition, important senior management administrative
14 controls were instituted by CEI, such as formal monthly vice-
15 president meetings and quarterly management meetings with the
16 Chief Executive Officer and President. Finally, CEI instituted
17 a project matrix system under which every safety-related
18 contractor is assigned a construction quality engineer,
19 responsible design engineer, and contract administrator from
20 the Project Organization.

21 Q. 8 Which elements of CEI's organization are most
22 directly involved in oversight of site contractor activities?

23 A. 8 (Panel): The primary responsibility for the Project
24 Organization's daily QA oversight of contractors rests with the
25 QA Department's Construction Quality Section ("CQS"), shown on
26 Attachment 2. CQS is divided by discipline into four units.

1 These include a Civil/Structural Unit, a Mechanical/Piping
2 Unit, an Electrical Unit, and a Program and Records Unit. Each
3 unit is headed by a Unit Supervisor, who reports to the CEI
4 General Supervisor in charge of CQS.

5 The CQS units include quality engineers and QC inspectors
6 organized by contractor area. The unit supervisor assigns a
7 responsible QE to each contractor. He is supported by a staff
8 of QC inspectors and, in some cases, by other QEs. Each such
9 group is responsible for reviewing the contractor's QA program
10 documentation and monitoring the contractor's implementation of
11 its QA program requirements. The inspectors spend the majority
12 of their time performing field surveillance and inspection of
13 contractor work to verify the contractor's compliance to
14 installation and quality specifications, drawings and technical
15 requirements. The results of these are documented in
16 Surveillance Inspection Reports ("SIRs"). The QEs primarily
17 review and approve QC surveillance and inspection reports, and
18 contractor and Project Organization QA program documentation
19 such as procedures, instructions, specifications, nonconfor-
20 mance reports, and design change documents.

21 The size of the various CQS units has increased with the
22 increase of construction activity at the site. For example,
23 the CQS Electrical Unit has grown from two individuals in 1977,
24 to six in 1979, to a current level of 12. The Unit has
25 generally had an equal number of QC inspectors and QEs. The
26 other CQS units have undergone similar growth over time. In

1 addition, CQS was reorganized in August 1981 to consolidate
2 separate QE & QC inspector units. The result was more involve-
3 ment in field activities by QEs and more involvement in program
4 activities by the QC inspectors. The overall result was a
5 better coordinated overview of contractor activities by CQS.

6 The responsible QE from CQS is the primary contact between
7 the contractor and the Project Organization with respect to all
8 QA matters relating to that contractor. That same QE is also a
9 member of a Project Organization contract team assigned to the
10 contractor. This contract team, which includes the QE, the
11 contract administrator, and a responsible design engineer from
12 the Nuclear Construction Engineering Section, is the vehicle
13 for implementing the Project matrix system approach which CEI
14 instituted in 1978. Each contract team QE is supported by his
15 CQS staffs as needed. The contract teams meet regularly, often
16 on a daily basis, to discuss the status of the contractor's
17 program. In these meetings the QE brings any contractor QA
18 problems to the immediate attention of his contract team
19 counterparts. Normally the QE emphasizes potential pro-
20 grammatic QA issues that merit action or followup by
21 Construction or Engineering. Any of these QA-related issues
22 that cannot be resolved at the contract team level are brought
23 to the attention of Project management for decision or manage-
24 ment action.

25 The other Project Organization entity with direct respon-
26 sibility for contractor overview is the Quality Auditing Unit,

1 shown on Attachment 2. This Unit was created in 1980 to
2 conduct annual independent audits of each safety-related
3 contractor's QA program. Prior to 1980, these audits were
4 performed by the CQS quality engineers along with their other
5 overview responsibilities. The creation of a separate Quality
6 Auditing Unit allowed the quality engineers to increase their
7 involvement in the daily CQS overview activities. In addition,
8 this organizational change created a direct reporting line
9 between the auditors and the QA Department Manager. The number
10 of certified QA auditors in the Project Organization has grown
11 from 30 in 1978 to 90 at present.

12 CEI management also uses the Quality Auditing Unit to
13 perform periodic internal audits of the Project Organization's
14 implementation of CEI's corporate QA program. The Quality
15 Auditing Unit is also responsible for compiling information
16 used by the QA Department Manager in his quarterly report,
17 "Assessment of Quality Assurance Program Effectiveness." The
18 use of this quarterly report is discussed later in our testi-
19 mony.

20 Q. 9 What are the principal QA/QC mechanisms used by the
21 Project Organization in the day-to-day review of safety-related
22 contractors? When and how extensively are these mechanisms
23 utilized to control contractor activities at Perry?

24 A. 9 (Panel): The process of reviewing and approving the
25 contractor's work procedures and instructions is the first step
26 in CEI's overview of contractor activities. This review is an

1 ongoing process, since contractors' QA procedures and
2 instructions are continually updated and supplemented as the
3 Project progresses. Implementation of the contractor's
4 approved program is then closely monitored and documented by
5 the Construction Quality Section using a variety of QA program
6 mechanisms.

7 The most basic and widely used mechanism is the nonconfor-
8 mance report ("NR"). These are used by QC inspectors to
9 document any structural or equipment installation conditions
10 that do not meet specified requirements. NRs are issued by
11 both the Project Organization and the contractor. An NR Coordi-
12 nator in CEI's QA Department tracks all NRs issued by the
13 Project Organization and contractors using a computerized
14 tracking system. NRs can be dispositioned through repair,
15 rework, or scrap of the nonconforming item, or through a "use-
16 as-is" disposition after engineering review and acceptance. In
17 general, when the nonconforming condition identified by Project
18 Organization personnel involves an area or system which has not
19 yet been turned over by the contractor, CQS personnel will
20 direct the contractor to initiate the NR. After turnover, the
21 NR would be initiated by the Project Organization. To date,
22 over 18,000 NRs have been issued in safety-related construction
23 areas by Project Organization and contractor personnel.
24 Approximately 2000 NRs have been issued in the electrical area.

25 If Project Organization QA personnel identify contractor
26 programmatic or procedural deficiencies not involving plant

1 "hardware," these will be documented by CQS personnel as
2 observation or surveillance Action Requests ("ARs"), or by the
3 Quality Auditing Unit as audit ARs. The Quality Auditing Unit
4 is responsible for the tracking and followup of all ARs. A
5 computerized tracking system is used for this purpose. Each
6 unit is responsible for closing out ARs which it generates. If
7 in reviewing an AR the unit that generated it determines that a
8 serious programmatic problem is involved, that unit changes the
9 AR to a Corrective Action Request ("CAR"). The purpose of the
10 CAR is to assure that the problem receives increased management
11 attention until close-out. All open CARs are identified to
12 Project Organization managers and the Vice President, Nuclear
13 Group, on a monthly basis. To date, the Project Organization
14 has issued approximately 140 CARs and 3900 ARs at the site.
15 Seventeen CARs and 267 ARs have been issued in the electrical
16 area.

17 Stop Work authority may be exercised by CQS to stop work
18 pending correction of an identified condition adverse to
19 quality, where continued work would lead to a serious violation
20 of CEI's QA program. To date CEI has issued 48 Stop Work
21 Notifications ("SWNs") on the Project. CEI has issued 3 SWNs
22 in the electrical area. Though not utilized often, the Stop
23 Work Notification is an essential element in any QA program.
24 The history of CEI's use of SWNs demonstrates our commitment to
25 use whatever steps are necessary to assure effective imple-
26 mentation of our QA program. The use of SWNs reflects a QA
program at work, rather than one not working.

1 Another significant review mechanism is the process audit,
2 which is performed by the CQS quality engineers. Process
3 audits are conducted to provide a limited, detailed review of a
4 defined contractor work activity. They are conducted either in
5 response to previously identified problems, or in areas deemed
6 to be especially complex or critical from a safety standpoint.

7 With respect to all of the Project Organization in-line
8 QA/QC review mechanisms which we have just described, we would
9 like to emphasize that these are in addition to comprehensive
10 QA/QC inspections and audits of work activities conducted by
11 each contractor. CEI's surveillance and inspection of a
12 contractor involves a number of techniques ranging from
13 reinspection of a contractor's work, to verification of a
14 contractor's QC activities, to performing process audits of
15 field installation activities. The frequency and extent of
16 field surveillance and inspection by the Project Organization
17 in a given area, at a particular time, is based on a number of
18 considerations, such as the safety significance of the area
19 under construction, the level of construction activity
20 involved, previous contractor performance, and the extent to
21 which the activity involves a new type of work or procedure.

22 Q. 10 Describe CEI's system for periodically reviewing
23 its program for assuring the quality of contractor performance.
24 Discuss in your answer how this system ascertains and corrects
25 deficiencies that have arisen in safety-related areas.
26

1 A. 10 (Panel): CEI's system consists of a number of
2 elements. CEI management trends CEI quality engineer findings
3 through the use of monthly Performance Analysis Reports
4 ("PARs") and QA Department quarterly Assessment of Quality
5 Assurance Program Effectiveness reports. In addition, CEI
6 management uses contractor and internal audits performed by
7 CEI's Quality Auditing Unit, as well as periodic reviews by the
8 Quality Assurance Advisory Committee ("QAAC"), to overview the
9 status and adequacy of the PNPP QA program.

10 PARs, along with any other special statistical trend
11 analyses which are performed by the QE, constitute the first
12 principal component of CEI's contractor trending/overview
13 system. PARs are standard CEI internal reports used throughout
14 the Company to communicate to upper management. CQS PARs
15 discuss the QA performance of each safety-related contractor at
16 Perry. They are based on input from the responsible quality
17 engineer. In preparing this input the QE reviews the results
18 of CQS inspectors' surveillance and inspections, including
19 SIRs, NRs, ARs, CARs and SWNs. In addition to considering this
20 quantitative data, the QE also considers other qualitative
21 information obtained from the inspectors and directly from the
22 contractor's QA organization. Emphasis is given to problem
23 areas receiving special attention from CQS. Significant
24 information in the CQS PARs is included in monthly QA
25 Department PARs; and these are summarized in PARs prepared by
26 the Vice President, Nuclear Group, for executive management.

1 As we have previously testified, any specific nonconforming
2 conditions or program deficiencies identified in the con-
3 tractor's area will have been documented in accordance with the
4 formal QA corrective action system.

5 The next component of CEI's trending/overview program is
6 the QA Department Manager's quarterly report. This report,
7 compiled by the Quality Auditing Unit, includes input from all
8 Project departments and summarizes overall contractor QA
9 performance for the quarter. The report includes a separate
10 section on contractor performance. The quarterly report is
11 reviewed in a quarterly CEI Chief Executive meeting attended by
12 the executive staff and chaired by the President.

13 In addition to these overview mechanisms, the Vice
14 President, Nuclear Group, receives consultation and advice on
15 significant QA policy issues from the QAAC. The QAAC includes
16 four senior CEI management representatives, the corporate QA
17 managers of GAI and RKE, and an outside QA consultant. The
18 QAAC provides periodic assessments of the effectiveness of the
19 Perry QA program implementation. These assessments are based
20 on reviews of the PARs, QA Department quarterly reports,
21 selected internal QA audits, NRC inspection reports, signifi-
22 cant NRs, ARs, CARs, and SWNs, and corrective action taken or
23 planned. The Committee members also observe site activities
24 and interview site personnel involved in quality-related
25 activities to evaluate the effectiveness of QA program imple-
26 mentation.

1 Lastly, CEI regularly reviews the adequacy of its overview
2 program for monitoring safety-related contractors through
3 contractor and internal audits performed by the QA Department
4 Quality Auditing Unit, as discussed earlier in our testimony.

5 The objective of all the overview mechanisms which we have
6 described is to provide multiple communication channels to
7 assure that CEI management has the necessary information to
8 evaluate and direct the QA program. These reviews and reports
9 are tools which CEI management uses to stay close to, and
10 involved in, the daily QA activities at the site. They are not
11 used as a substitute for CEI's formal inspection and corrective
12 action program. Any formal corrective action which management
13 believes is required to address QA program deficiencies is
14 achieved through the NR/AR/CAR/SWN mechanisms which we pre-
15 viously described. We would emphasize that periodic QA reports
16 to CEI management are not generally for the purpose of detail-
17 ing those program areas that are working well. Instead,
18 management expects the reports to highlight problem areas and
19 to set forth the corrective actions underway to resolve those
20 problems.

21 Q. 11 Briefly describe CEI's initial review and selection
22 of the electrical contractor at Perry.

23 A. 11 (Panel): In 1977 the Project Organization conduc-
24 ted extensive reviews of proposals submitted for the safety-
25 related electrical work to be performed at PNPP. This included
26 a thorough review of the corporate quality assurance programs

1 of all the bidders. Included among the bidders was a joint
2 venture proposal submitted by E.C. Ernst & L.K. Comstock. The
3 Ernst-Comstock proposal provided for L.K. Comstock to perform
4 project management, field engineering and quality assurance/
5 quality control, with E.C. Ernst in a limited role providing
6 field craft supervision. L.K. Comstock had significantly more
7 nuclear plant electrical experience than any other bidder. The
8 results of the proposal evaluations indicated that the Ernst-
9 Comstock joint venture was well qualified to meet the Perry
10 Project quality assurance requirements. Their proposal was
11 also the most responsive to the CEI specified technical
12 requirements. After careful consideration of all proposals, in
13 November 1977 CEI awarded the electrical contract to the Ernst-
14 Comstock joint venture. In mid-1980 the joint venture was
15 dissolved and L.K. Comstock assumed responsibility for the
16 entire electrical construction scope of work.

17 Q. 12 Please summarize CEI's QA overview of the imple-
18 mentation of L.K. Comstock's program for the period prior to
19 November 1981.

20 A. 12 (Panel): After the award of the electrical
21 contract and prior to the commencement of safety-related
22 electrical work, L.K. Comstock's QA program and procedures for
23 PNPP were thoroughly reviewed to assure full compliance with
24 CEI's QA program. Electrical work was limited to non-safety
25 related areas until CEI's review was completed. In August 1978
26 CEI released L.K. Comstock to perform limited safety-related
civil excavation work.

1 Until mid-1980, safety-related work performed in the
2 electrical area was primarily underground civil ductwork, cable
3 tray hanger installation, and field placement of equipment.
4 Very little complex electrical installation was performed
5 during this initial period. For example, less than 5% of the
6 safety-related conduit had been installed. Both L.K. Comstock
7 and CEI QA/QC personnel issued NRs and ARs that were typical in
8 number and severity compared to findings issued against other
9 contractors during comparable initial work activities. These
10 problems were appropriately documented; procedures were revised
11 to provide additional instructions when necessary; and formal
12 training sessions were conducted for L.K. Comstock personnel.

13 As the more complex electrical installation work began to
14 increase in the last half of 1980, the emphasis of CEI's QA
15 overview was shifted from program and procedure development and
16 review to surveillance of procedure implementation and field
17 installation activities. Review by CEI's QA/QC personnel
18 documented that L.K. Comstock was experiencing conduit install-
19 ation problems that required closer monitoring. Immediate
20 corrective actions taken to resolve conduit installation
21 problems included increased CEI surveillance of the installa-
22 tion, and increased, better defined in-process inspections by
23 L.K. Comstock. This corrective action had direct results. As
24 L.K. Comstock increased its in-process inspections, the number
25 of L.K. Comstock NRs increased, reflecting a more active
26 contractor QA/QC program. In December 1980, CEI quality

1 engineers analyzed these NRs and identified a trend of L.K.
2 Comstock craft misinterpretations of drawings and specifica-
3 tions. L.K. Comstock responded by instituting a comprehensive
4 training program for craft in order to correct the problem and
5 prevent its recurrence. As a result, L.K. Comstock NRs were
6 reduced in the first quarter of 1981. Since that time L.K.
7 Comstock has spent significant resources in the development and
8 use of its craft training program. For example, from January
9 1981 to July 1982 L.K. Comstock spent approximately 15,000
10 hours training craft and QA/QC personnel.

11 The QA sequence which we have just described illustrates
12 how CEI's QA program has controlled safety-related contractor
13 work at PNPP. CEI required increased inspection, which led to
14 increased identification of deficiencies, which in turn allowed
15 CEI and the contractor to understand and correct a program
16 problem before that problem led to installation problems. This
17 QA process of identifying and correcting deficiencies during
18 construction is a continual and iterative process that proceeds
19 until plant construction is complete.

20 In 1980 and 1981, as the more complex electrical construc-
21 tion accelerated, CEI identified the need for increased numbers
22 of L.K. Comstock QC personnel. During this period, the nuclear
23 industry in general was experiencing a shortage of qualified
24 electrical inspectors due to significant nuclear construction
25 activity and a general strengthening of QA/QC requirements in
26 the nuclear electrical discipline. As a result of L.K.

1 Comstock's difficulty in hiring additional qualified inspection
2 personnel, and with increased attention being given by the
3 contractor to in-process inspection, final inspection backlogs
4 increased. This was a periodic problem during 1980 and 1981.
5 L.K. Comstock did increase its staff throughout 1981; in
6 addition, CEI increased its field surveillance of construction
7 activities in the last half of 1980 and in 1981 in order to
8 assure sufficient overview of installation. Increased con-
9 tractor QC staffing resulted in a reduction of the final
10 inspection backlog by mid-1981.

11 During the summer of 1981 safety-related cable pulling
12 activities began to increase. Through October 1981, cable
13 pulling deficiencies were identified and documented by the QA
14 programs of the contractor and CEI. Most of these deficiencies
15 were procedural in nature and were attributable to initial
16 program implementation of this complex safety-related construc-
17 tion activity. However, in November 1981, because the number
18 and types of discrepancies identified by CEI and L.K. Comstock
19 had not decreased, and because of concerns raised during the
20 81-19 inspections, CEI QA issued a Stop Work Notification for
21 safety-related cable pulling. The SWN required L.K. Comstock
22 to review thoroughly its safety-related cable pulling program,
23 and to make the programmatic changes necessary to reduce
24 implementation deficiencies. L.K. Comstock significantly
25 revised its cable pulling procedure prior to restart of work in
26 January 1982.

1 Q. 13 Please summarize CEI's QA overview of L.K.
2 Comstock's program since November 1981, including CEI's
3 responses to NRC Region III's investigation of the PNPP
4 electrical area, conducted between October 1981 and March 1982.

5 A. 13 (Panel): As indicated in Region III's report on
6 the investigation (the "81-19 Report"), allegations were made
7 directly to the NRC in October 1981 concerning the performance
8 of the PNPP electrical contractor. The NRC found no noncompli-
9 ances with respect to those allegations. In addition to
10 investigating the allegations, the NRC conducted a general
11 inspection of electrical construction activities taking place
12 at that time. As a result of extensive inspections (711 hours
13 of inspection by six NRC representatives), the NRC identified
14 nine items of noncompliance. Deficiencies identified in the
15 noncompliances involved: an inadequate switchgear drawing
16 review; instances of incomplete procedures and procedure
17 implementation difficulties; a failure to return six voided
18 drawings to a central file; control and storage of nuts, bolts
19 and cable mounting bases; three instances of incomplete
20 inspections; two instances of inadequate housekeeping; a
21 missing switchgear hold tag; eight instances of inadequate
22 conduit separation; and a failure to trend eight NRs. The
23 81-19 Report assigned all of the noncompliances comparatively
24 low (level IV or V) severity levels. The Report identified no
25 significant hardware deficiencies. CEI took prompt corrective
26 action in each of the noncompliance areas.

1 In February and March of 1982, CEI met with Region III to
2 discuss preliminary findings from the NRC's inspections. In
3 response to those meetings, CEI performed an extensive review
4 and evaluation to re-examine the effectiveness of its QA
5 program for safety-related contractors.

6 As part of this review, CEI conducted a special safety-
7 related contractor QA evaluation. In the special evaluation,
8 conducted in February and March 1982, CQS quality engineers and
9 QC inspectors separately evaluated each safety-related con-
10 tractor. Factors considered included: scope of work;
11 outstanding NRs and ARs; QA/QC staffing level; responsiveness
12 to CEI concerns; organizational independence; contractor
13 internal auditing performance; and status and adequacy of
14 documentation. The evaluation teams were directed to focus on
15 contractor weaknesses, to identify deficiencies, and to
16 recommend action items for improvement. Although NRs and ARs
17 were identified and documented during the evaluation, the
18 review was oriented to the management aspects of the QA program
19 and was independent of CEI's formal ongoing QA program. In
20 addition to the special evaluation, interviews were conducted
21 concerning the general use of the PNPP nonconformance system.

22 The overall conclusion of these evaluations was that there
23 was no indication of a quality assurance breakdown in any area,
24 and that CEI's QA program was adequately controlling safety-
25 related construction. However, a number of areas for improve-
26 ment were identified, including the need for increased emphasis

1 on timely resolution of findings, more training in the
2 utilization of NRs, and clearer procedures.

3 L.K. Comstock's QA program, including the contractor's
4 responses to the various inspections and reviews just
5 described, continues to be under the close scrutiny of CEI CQS
6 personnel. In addition, CEI's Project management has been
7 closely monitoring the status of the electrical QA program.
8 This has included frequent management level discussions and
9 meetings between CEI and L.K. Comstock. L.K. Comstock has
10 concentrated on addressing and closing out the various findings
11 which we have previously discussed. For example, in 1982
12 alone, the contractor doubled the size of its QA/QC staff and
13 significantly increased the training and qualifications of its
14 QA/QC personnel. In June 1982, L.K. Comstock in conjunction
15 with the National Electrical Contractors Association and the
16 International Brotherhood of Electrical Workers held a special
17 two day training workshop for L.K. Comstock craft personnel
18 working at Perry. The workshop emphasized conduit installation
19 and cable pulling requirements and reviewed applicable QA
20 requirements. Also during 1982, L.K. Comstock hired personnel
21 with experience in program and procedure development, to give
22 special attention to procedure interpretation problems
23 identified in the earlier reviews. Management representatives
24 from L.K. Comstock's corporate offices have spent significant
25 effort, including time on-site, in assuring that the contractor
26 is properly responding to outstanding issues and to all CEI QA
program requirements.

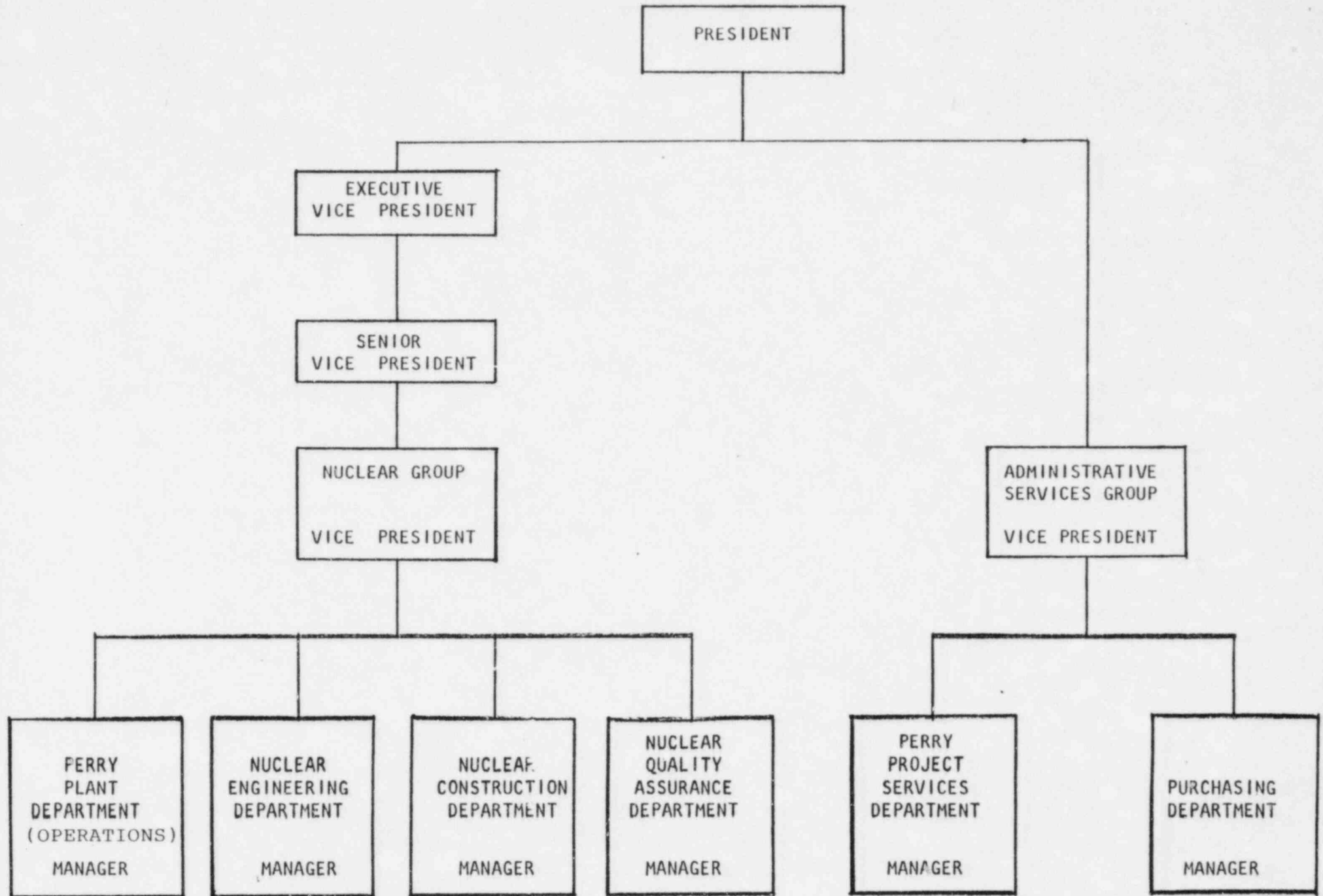
1 The most significant current QA issue is the number of
2 outstanding final inspections to be completed. Part of the
3 current final inspection backlog is attributable to the QA
4 resources devoted by L.K. Comstock in response to the inspec-
5 tions and reviews which we have described. CEI has required
6 L.K. Comstock to reduce the final inspection backlog in
7 accordance with an agreed schedule. CEI management and CEI's
8 CQS personnel are closely monitoring the backlog to assure that
9 it has no adverse impact on the safety of completed and
10 in-process electrical construction.

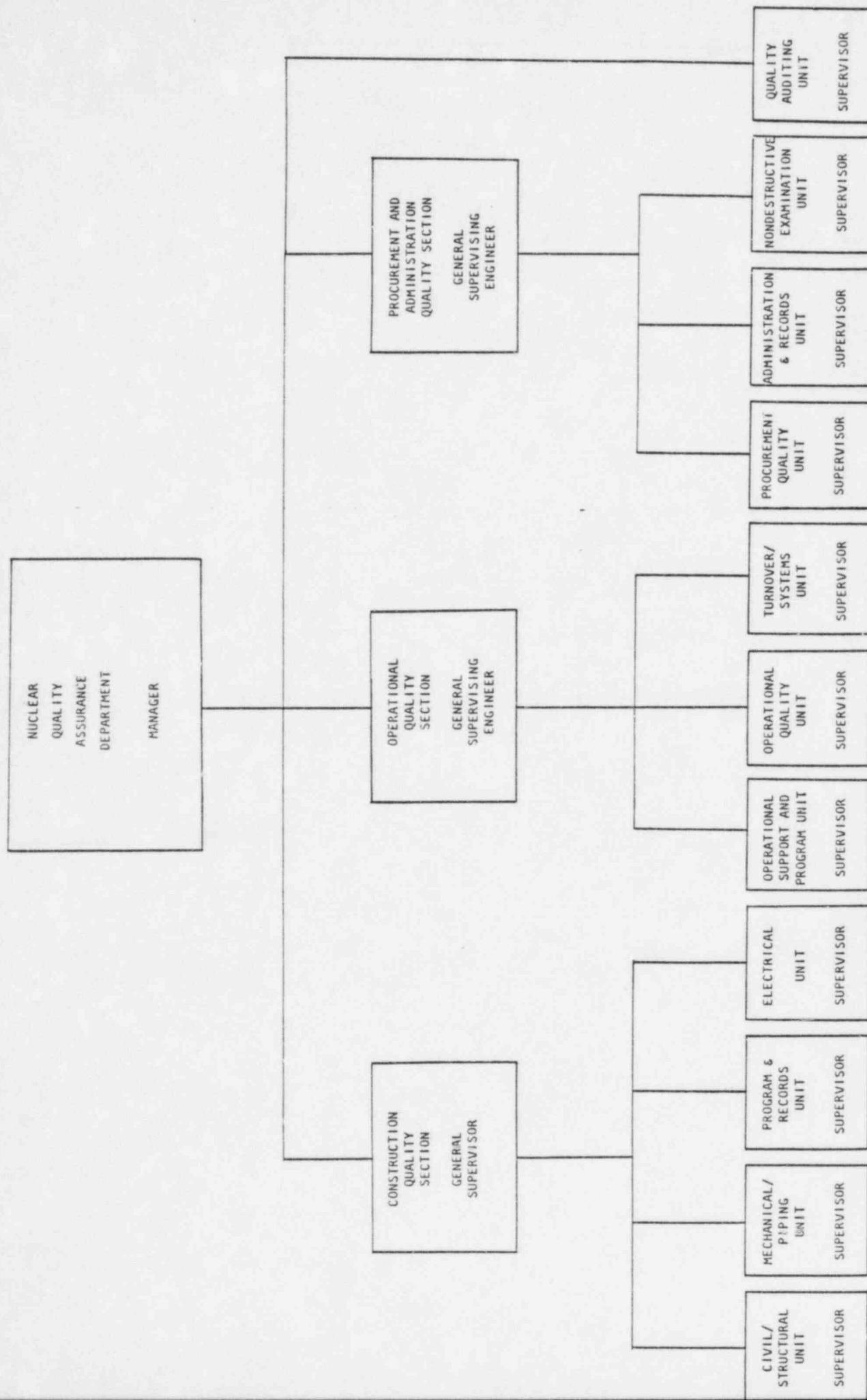
11 Q. 14 What assurance do you have that CEI's QA/QC program
12 has identified and corrected deficiencies in contractor
13 programs at Perry, and that contractor programs have not
14 resulted in unsafe conditions at Perry?


15 A. 14 (Panel): Our testimony describes in detail how
16 CEI's QA/QC program thoroughly overviews safety-related
17 contractors at Perry. CEI's overview process begins with pre-
18 award QA reviews and continues through program development and
19 implementation. At every stage, Project Organization QA
20 personnel perform sufficient QA reviews, including procedure
21 reviews and field surveillance, to assure CEI that the con-
22 tractor is meeting CEI QA program requirements. We have
23 demonstrated, using the example of the electrical area program,
24 how CEI's QA program identifies deficiencies in the con-
25 tractor's program, analyzes the underlying causes of the
26 deficiencies, and corrects the deficiencies and their
 underlying causes.

1 In a nuclear project of the size and complexity of PNPP,
2 indeed in any construction project of this scope, the goal is
3 perfect compliance with all project procedures and require-
4 ments. However, there will invariably be deviations and
5 noncompliances found by the utility, its contractors and NRC
6 inspectors. The purpose of CEI's QA program is to assure that
7 procedural and substantive problems at PNPP are adequately
8 identified and properly addressed. We are committed to a
9 program that will accomplish this purpose. CEI's senior
10 management is actively involved in seeing that this commitment
11 is met. Our QA program has assured, and will continue to
12 assure, that unsafe conditions in the Perry facility do not
13 exist.

CEI NUCLEAR ORGANIZATION CHART







THE CLEVELAND ELECTRIC ILLUMINATING CO.

P.O. BOX 97 ■ PERRY, OHIO 44081 ■ TELEPHONE (216) 259-3737 ■ ADDRESS-10 CENTER ROAD

Serving The Best Location in the Nation

PERRY NUCLEAR POWER PLANT

NUCLEAR QUALITY ASSURANCE PROGRAM POLICY

The Cleveland Electric Illuminating Company recognizes the need for a formal and comprehensive Nuclear Quality Assurance Program for the Perry Nuclear Power Plant. This program is considered vital to the safety, security and well-being of the public, our customers, employees and shareholders. As agents for the owners, we maintain ultimate responsibility for the development and implementation of a program that contributes to the safe and reliable design, construction and operation of the Perry Nuclear Power Plant.

It is the policy of this Company that such a program fully comply with the regulatory requirements of 10CFR50, Appendix B; ASME Section III, Article NA 4000; ASME Section XI, Article IWA 1000, as applicable, and any additional regulatory guides, codes and standards which address quality assurance requirements that are set forth in the Safety Analysis Reports for the Perry Nuclear Power Plant.

An evaluation of the philosophy, policies and general requirements disclose that the ASME and CEI Quality Assurance Programs are completely compatible in scope, purpose and intent.

The Cleveland Electric Illuminating Company has the responsibility for the accumulation and retention of all required records and documentation. In addition, CEI is committed to ASME Section III, Article NA 3230, and has contracted with Hartford Steam Boiler Inspection and Insurance Company as its authorized inspection agency. The inspection agency is granted access and freedom to the project to perform all required inspections and audits. The Cleveland Electric Illuminating Company agrees to comply with ASME Section III, Article NA 3270 by preparing, certifying and filing the required N-3 Data Report.

Quality assurance is recognized as a most demanding function in terms of the interdisciplinary efforts that are required. Therefore, the program will define specific individual and organizational responsibility and authority. It will also prescribe procedures for compliance with regulatory requirements and establish appropriate guidelines for implementation of these procedures.

All Company and other associated personnel involved in or responsible for the quality of the Perry Nuclear Power Plant shall comply with this program. All Company personnel are responsible for implementation of those portions of the Nuclear Quality Assurance Program pertinent to their respective areas of responsibility.

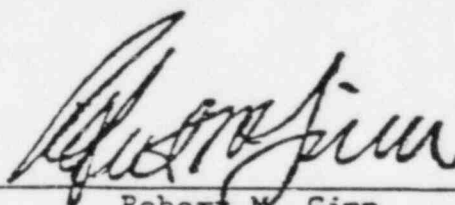
The Vice President, Nuclear Group, is assigned the responsibility for assuring that the Nuclear Quality Assurance Program is established and implemented. He shall periodically review the overall effectiveness of the Nuclear Quality Assurance Program and has authority to administer corrective action to improve its effectiveness or to avoid potential problem areas.

The Nuclear Quality Assurance Department Manager is responsible for assuring the development of the Nuclear Quality Assurance Program. He is responsible for assuring through audit, or other quality assurance techniques, that established systems are implemented, adequate, and are in fact, effective methods which will provide management with confidence that we are proceeding according to plan. He is further responsible for verifying and documenting that we have met all regulations, commitments and other established requirements with respect to safety-related activities, systems and equipment.

The Nuclear Quality Assurance Department has the responsibility to identify quality problems, initiate, recommend or provide solutions and verify implementation of solutions. To accomplish these tasks, the Nuclear Quality Assurance Department is hereby given the authority to stop unsatisfactory work or control further processing, delivery or installation of nonconforming material pending resolution of identified quality-related problems.

Any Company employee who at any time believes that The Cleveland Electric Illuminating Company's Nuclear Quality Assurance Policy or Program is not being fully complied with has the right and indeed the obligation to so inform his or her superiors of any such deviations, including the right of direct appeal to upper management of the Company.

The Corporate Nuclear Quality Assurance Program as described in this manual has my unqualified support. All differences of opinion concerning quality assurance which cannot be resolved by the Vice President, Nuclear Group, and Vice President, Administrative Services Group, will be referred to me for final resolution.



Robert W. Ginn
President

February 25, 1983