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

Report Nos. 50-413/80-09, 50-414/80-09, 50-369/80-08, 50-370/80-05, 50-491/80-07, 50-492/80-06, and 50-493/80-06

Licensee: Duke Power Company
422 South Church Street
Charlotte, NC 28242

Facility Names: McGuire, Catawba and Cherokee Nuclear Power Stations

Docket Nos. 50-369, 50-370, 50-413, 50-414, 50-491, 50-492, and 50-493

License Nos. CPPR-83, CPPR-84, CPPR-116, CPPR-117, CPPR-167, CPPR-168 and CPPR-169

Inspection at Engineering Design Offices, Charlotte, North Carolina

Inspectors: Virgil L. Brownlee — 7-18-80
V. L. Brownlee — Date Signed

L. Modenos — 7-18-80
L. Modenos — Date Signed

Virgil L. Brownlee for — 7-18-80
T. E. Burdette — Date Signed

J. J. Lenahan, P.E. — 7-18-80
J. J. Lenahan — Date Signed

D. K. Walters — 7-18-80
D. K. Walters — Date Signed

Approved by: T. E. Conlon — 7-18-80
T. E. Conlon, Section Chief, RCES Branch — Date Signed

SUMMARY

Inspection on May 19-23, 1980

Areas Inspected

This special, announced inspection involved 169 inspector-hours on site in the areas of QA program, design control, procurement control, QA records, Part 21, audits, training, and licensee action on previous inspection findings.

Results

Of the eight areas inspected, no items of noncompliance or deviations were identified in four areas; seven items of noncompliance were found in four areas (Infraction - Temporary record storage facilities - fire protection, paragraph 6.f(4); Infraction - Procedures implementing ANSI N45.2.9 for the Corporate records vault, paragraph 6.f(5); Infraction - corporate system of audits of all aspects of the QA program, paragraph 6.e(4) and 6.f(6); Infraction - Use of curing compound on construction joints, paragraph 3; Infraction - Errors/ommissions in civil design calculations, paragraph 6.c(2)(c); Infraction - Nonconformance procedures, paragraph 5.b(2); Deficiency - Cable termination sheets, paragraph 6.c(3)(c).

DETAILS

1. Persons Contacted

Licensee Employees

*L. C. Dail, Vice President - Engineering Design
*J. R. Wells, Corporate QA Manager
*W. H. Bradley, QA Manager Engineering & Services
*S. K. Blackley, Chief Engineer, Mechanical & Nuclear Division
*C. J. Wylie, Chief Engineer, Electrical Division
*S. B. Hager, Chief Engineer, Civil-Environmental Division
*D. Z. Hathcock, Lead Auditor, Audit Division QA Department
*M. R. Crews, Staff Engineer, Electrical Division
*T. R. Mathis, Staff Engineer, Civil-Environmental Division
*A. M. Segrest, Mechanical & Nuclear Division
*C. D. Jennings, II, Manager, Office Services Division
*G. D. Rowland, Design Engineer, Staff Engineer
K. R. Carraway, Catawba Project Engineer, Power Systems Section
D. W. Murdock, Supervisor, Control Systems Project Group
J. M. Surratt, Assistant Design Engineer, Power Equipment Engineering Group
J. L. Crenshaw, Design Engineer, Power Equipment Engineering Group
T. J. Al-Hussaini, Design Engineer, Power Equipment Engineering Group
P. M. McBride, Engineer, Power Equipment Engineering Group
R. H. Waltman, Head, Electrical Design Section
T. McMeekin, Principal Engineer, Control Systems Section
R. G. Mallaney, Technical Specialist, Technical Support Group
B. Foley, Principal Engineer, Power Systems Section
E. M. Weaver, Staff Engineer
C. L. Sansburry, Systems Group Engineer
R. L. Misenheimer, Design Engineer
R. C. Bucy, Assistant Design Engineer
P. R. Herran, Equipment Group, Engineer
J. L. Elliott, Stress Analysis Section Head
C. L. Ray, Support/Restraint Group Engineer
B. L. Peele, Stress Analysis Group Engineer
R. M. Sandifer, Project Design Group (Engineer)
D. M. Collings, Materials Group (Engineer)
J. L. Ritchie, Materials Management
R. L. Williams, Materials Engineering
I. W. Pearce, Principal Engineer, Civil Projects Section
C. Q. Reeves, Senior Engineer, Civil Projects Section
J. B. Reeves, Senior Engineer, Civil Projects Section
J. A. Lee, Civil Engineer
D. K. Morton, Civil Engineer
N. G. Awadalla, Senior Engineer, Structural Section
A. H. Zadi, Structural Engineer
R. G. Wagstaff, Structural Engineer

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on May 23, 1980 with those persons indicated in Paragraph 1 above.

3. Licensee Action on Previous Inspection Findings

(Closed) Unresolved Item 491/79-05-01, 492/79-05-01 and 493/79-05-01: Use of curing compound on surfaces to which concrete is to be bonded. The licensee has discontinued use of curing compound on construction joints. The inspector discussed the past use of curing compound on construction joints at Cherokee and its effect on bond with civil design engineers. These discussions disclosed that adequate testing has not been performed to demonstrate that the curing compound would not affect bond. The licensee is currently evaluating the effect of the past use of curing compound on bond by reanalyizing the construction joints by use of shear friction methods. ACI 301-72, referenced in Duke specifications P81S-1109.00-00-0001, specifies that curing compound is not to be used on any surface against which additional concrete is to be bonded, unless it is proved that the curing compound will not prevent bond, or unless the curing compound is removed. The curing compound was not removed. This item is closed as Unresolved Item 491, 492, 493/79-05-01 and upgraded to Infraction number 491/80-07-06, 492, 493/80-06-06, "Use of curing compound on Construction Joints".

4. Unresolved Items

Unresolved items were not identified during this inspection.

5. Independent Inspection Effort

a. IE Bulletin No. 80-11

The inspector discussed the requirements for IE Bulletin No. 80-11 with licensee civil design engineers and reviewed a draft of the procedure which will be used to identify and document masonary walls and equipment within their proximity as required by the bulletin.

No deviations or items of noncompliance were identified.

b. Part 21 - IE Information Notice 79-30 Followup

(1) Documents Examined:

DPC Design Engineering Department (DED) QA Manual (QAM) Procedure PR-290, "Nuclear Regulatory Commission Reporting Requirements", Rev. 2, October 16, 1978

DPC DED QAM Procedure PR-290, "Nuclear Regulatory Commission reporting requirements", Rev. 3, (Draft)

DPC Construction Department QA Program Procedure R-5, "Nuclear Regulatory Commission Reporting Requirements", Rev. 0, December 20, 1977

DPC Construction Department QA Program Procedure R-5, "Nuclear Regulatory Commission Reporting Requirements", Rev. 1

W. S. Lee's letter to directors and officers dated October 25, 1977

DPC QA Department QA Program Procedure QA-121, "Nuclear Regulatory Commission Reporting Requirements", Rev. 1, September 27, 1978

DPC Steam Production Department Administrative Policy Manual Section 2.8, "Reporting", Rev. 15, December 12, 1977

DPC Construction Department QA Program Procedure Q-1, "Control of Nonconforming Items", Revision 12, May 23, 1978

DPC DEP QA Program Procedure PR-302, "Procurement"

(2) Information Notice Followup

DPC Construction Department QA Program Procedure R-5 has been revised and issued to be more responsive to Part 21 requirements. DPC Design Engineering Department Procedure PR-290 is in final draft to be issued shortly.

DPC Steam Production and QA Departments have not completed the revisions to their respective procedures in order to be more responsive to Part 21 evaluation and reporting requirements.

During review of Part 21 matters within the Design Engineering Department it was noted that procedure PR-220, "Nonconforming Item Reports" does not provide for the identification and disposition of nonconformances with procedures for the preparation and control of drawings, specifications, and other design documents within Design Engineering. PR-220 addresses Nonconforming Item Reports generated by others and provides instructions for processing controlling, approving and clearing those Nonconformances Item Reports within the Design Engineering Department. Regulatory Guide 1.64, Rev. 2, paragraph C.4 amends ANSI N45.2.11-1974, paragraphs 4.3, 4.4, and 4.5 to require that procedures be established to document nonconformances with procedures for the preparation and control of drawings, specifications and design documents.

This failure to implement the committed to Regulatory Guide and standard is identified as an item of noncompliance 369/80-08-07, 370/80-05-07, 413, 414/80-09-07, 491/80-07-08, 492, 493/80-06-08 (Nonconformance procedures).

6. Overall Review and Inspection of Engineering Design QA Program Implementation

a. General

The purpose of this inspection was to complete an overall review of the implementation of the DPC QA program for control of Engineering Design activities.

Duke Power Company (DPC) Topical Report, Quality Assurance (QA), Duke-1-A, Rev. 4 was accepted by the Quality Assurance Branch, Division of Project Management, NRR by letter dated June 29, 1978. The Duke QA Program commits to applicable regulatory requirements such as 10 CFR 50, Appendix B and to approved industry standards such as ANSI N45.2-1971 and corresponding daughter standards, or to equivalent alternatives. The DPC QA program commits to the regulatory position of the NRC Regulatory Guides listed in Table 17.0-1 of Duke-1-A with the exception of the clarifications, modifications, and alternatives stated in the table.

b. QA Manuals, Inspection and Enforcement History

The procedures for control of QA/QC activities within DPC Design Engineering, Construction, QA and Steam production Departments are embodied within the respective department QA manuals.

The inspectors performed a review of the QA manuals and docket files to include the following: inspections relative to QA programs and site; enforcement correspondences and responses; and the construction deficiency and Part 21 report file.

The review findings indicate that in general DPC has developed and is executing a QA program consistent with the SAR commitments relative to design control, procurement control, enforcement response and reporting requirements.

c. Design Control

(1) Mechanical Engineering Design Review

(a) Documents Examined

DPC procedure PR-101 "Engineering Calculations"

DPC procedure MPR-101 "Design Documents for Mechanical Systems"

DPC procedure MPR-130 "Mechanical Systems Support/Restraint Design"

DPC procedure MPR-131 "Mechanical Systems Flow Diagrams, Drawings and Change Orders"

DPC PR-140 "Engineering Correspondence"

DPC PR-901 "Document Control"

DPC PR-301 "Specifications"

DPC PR-302 "Procurement"

DPC PR-360 "Transfer of Items"

DPC PR-220 "Nonconforming Item Reports"

DPC MPR-140 "As-Built Verification of Duke Class A, B, C and F Systems"

DPC, Design Engineering - Mechanical Systems Group Handbook

DPC, Network Pressure Drop Computer Program

DPC, Procedure P26PR-260 "Nuclear Station Problem Report"

DPC, Procedure PR-150 "Alteration on Repair of ASME III Code Stamped Items"

Pipe Specification: CNS-1206.00-2.2 "Specification for the Procurement of Power Piping Systems Materials and Components"

Pipe Stress Specification: CNS-1206.02-01-0001 "Design Specification, ASME Sect. III Class 2 and 3 Piping"

DPC, Procedure MN-SAG-Analytical procedure-79-8 "Procedure for determining Math Model Boundaries for Rigorously Analyzed Piping"

Support/Restraint Base Plate and Anchor Bolt Design Procedure - Letter No. SRG-80-100

Specification No. CNS-1206.00-4-1 "Design Specification for Nuclear Safety-Related Pipe Supports"

"Alternate Criteria for Reactor Building and Auxiliary Building Pipe Supports" Specification No. CNS-1206.02-4.0

(b) QA Program

Duke Power Company QA Program Topical Report Sections 17.1.3, 17.1.4, 17.1.5, 17.1.6 and 17.1.7 specifies QA program commitments for Design Control; Procurement Document Control; Instructions, Procedures, and Drawings; Document Control; and Control of Purchased Material, Equipment and Services respectively. Duke's Topical commits to ANSI N45.2.11-1974. Various Duke Engineering Department procedures provide instructions for the above commitments.

(c) Implementation

The mechanical and Nuclear Division Design Engineering Department is divided into four sections; Systems and Equipment Section, Analysis Section, Station Support Section and Mechanical Design Section. Discussions were held with all the disciplines of each section with persons listed above. The following documents were reviewed by the inspector for compliance with the commitments and procedures as listed above:

1. Mechanical Systems Group for Catawba Units 1 & 2

Component cooling system heat loads
Calculation No. CNC-1223.23-00-0005 Rev. 2
Component cooling system drawing No. CN-1573-1.0, Rev. 4

Vacuum Breaker
Flow Diagram No. CN-1573-1.1
System file CN-1223-23
Preliminary Design Document No. CNC-1223-23-00-0004

Safety Relief Data on Component Cooling Flow
Diagram No. CN-1573-1.9

2. Mechanical Design Group for Catawba Units 1 and 2

Reactor Building Component Cooling System
Drawing No. CN-1491-KC008 Rev. 6
CN-1491-KC015 Rev. 6
CN-1491-KC016 Rev. 4

Mechanical Design Hold List

Design Change Authorization (DCA) no. A153-S
Piping Isometric Drawing No. CN-2492-N1025 Rev. 3
Add stress loop

DCA No. A68S
Piping Isometric No. CN-1492-N1006 Rev. 5

Variation Notice (VN) No. 10810
Piping Isometric Drawing No. CN-1492-ND024 Rev. 7

VN No. 7424
Piping Isometric Drawing No. CN-1491-NV052 Rev. 8

3. Stress Analysis Group for Catawba Units 1 & 2

Stress Isometric for "Aux. Bldg. Component Cooling System"
Drawing No. KCF Rev. 1

Verification of Preliminary Design Document No. JKM-3-6-79

Calculation folder and source information entitled "Problem KCF- Fuel Pool Cooling HX's and Letdown HX to Component Cooling Pump Station"

Computer Stress run No. 04/17/79 13.12.18

Aux. bldg. "Chemical and Volume Control System" Problem NVR Drawing No. NVR-1 Rev. 4, NVR-2 Rev. 3

Preliminary Design Documents - Calculation and References used for Letdown Heat Exchanger Discharge (Problem NVR) Identifying No. RCD-4-19-78 Rev. 1

4. Support Group for Catawba Unit 1 & 2

Rigorous Analysis - Support Design Title "Design of Support/Restraint" in Stress Analysis Problem No. FWA-1 Rev. 6

ITT Grinnell Pipe Hanger - Load Capacity Data Sheets

Hanger Isometric Drawing No. CN-1492-GS006A Rev. 1 Title "Alternate Analysis Piping Qualification Calculation No. CNC-1206.12-A

5. Materials Group for McGuire Units 1 & 2

"Specification for the procurement of Power Piping Systems, Materials and Components" Rev. 57

Technical Changes to pipe specs

Purchase or transfer Requisition
No. 8336-1206.00-02-1455-00
8336-1206.00-02-1457-00
8336-1206.00-02-1459-00

Wall thickness calculations for Seamless Pipe for system WE, Calculation No. MC-1232-00-1

Maximum Design Pressure for ASTM/ASME S/A 213-Tp 304 S. S. Tubing, Calculation No. MC-1232.00-3

40" Main stem Guard Pipe Wall Thickness Calculation No. MCC-1232.00-82

6. Equipment Group for McGuire Units 1 & 2

Specification "Carbon Steel Code Feedwater Isolation Valves", Spec. No. MCS-1205.00-6, Rev. 7. Correspondence Between Duke and Borg-Warner Corp., Manufacturer of FWIV - reference addendum No. 2.

Specification, "Auxiliary Feedwater Pumps", No. MCS-1201.05-02 Rev. 9

Transfer Requisition No. 1205.01-00-0033-01 for Valves transferred from Catawba Nuclear Station to the McGuire Nuclear Station

Nonconforming Item Reports, 10927, 10835 and 10801

(d) Conclusions

The inspector has concluded that the Mechanical and Nuclear Division Design Engineering has met the commitments of the Topical Report sections as mentioned above and it appeared that the engineering staff has an effective organization.

No items of noncompliance or deviations were identified.

(2) Civil Engineering Design Review

(a) Documents Examined

PR-101, "Engineering Calculations"
PR-130, "Engineering Drawings"
PR-140, "Engineering Correspondence"
PR-301, "Specifications"
PR-302, "Procurement"
PR-840, "Internal Audits"
PR-901, "Document Control"
CPR-101, "Reinforcing Steel Bill of Materials

(b) QA Program

Duke Power Topical Report 1-A describes the quality assurance program for all phases of design, construction, and operation of Duke's nuclear power plants. Section 17.1.3 through 17.1.7 of the Topical report specifies the QA requirements for design control; procurement document control, instructions, procedures and drawings; document control; and control of purchased material, equipments, and services. The Topical Report commits to the requirements of NRC Regulatory Guide 1.64 and ANSI Standard N45.2.11-1974. The procedures listed in paragraph 6.c(2)(a), above, are the controlling procedures and documents for control of civil engineering design and procurement activities in accordance with the requirements of NRC, industry standards, and the Duke Topical Report.

(c) Implementation

The inspector reviewed various civil design documents and held discussions with responsible engineers in the Civil - Environmental Division of the Duke Design Engineering Department to verify that civil design activities were being accomplished in accordance with the procedures listed above. Documents examined were as follows:

Calculation number P81C-1144.03-07, "Cherokee - Primary Shield Wall Analysis"

Calculation number P81C-1144.03-17 "Cherokee Primary Shield Wall Design"

Calculation number P81C-1144.03-12 "Verification of Concrete Design Program for Strudl Results"

Cherokee drawing numbers P81-1060-01 through P81-1060-05, P81-1061-01, P81-1061-02, and P81-1061-06 through P81-1061-08. These drawings show the primary shield wall concrete and reinforcement details.

Cherokee Reinforcing Bill of Materials, Sheet number CK-1061-01 a through CK-1061-01h. This reinforcing bill of materials lists the rebar size, length, and quantities for the Cherokee primary shield wall.

Duke Specification P81S-1109.00-00-0001, "Specification for Concrete for Category I Structure"

Duke Specification CKS-1162.00-00-0001, "Reinforcing Steel"

Duke form 130.1, "Waiver of signature requirements on reinforcing steel drawings by Mechanical and Electrical engineers, dated March 7, 1974".

Calculation number 1144.02-06 "Cherokee Reactor Building Complex - Design of Outside Shield Wall and Dome"

Cherokee drawing number P81-1082-01, Sheets 1-4,

Reactor Building - Shield Wall - Developed Elevation - Concrete Details and drawing numbers P81-1083-01, Sheets 1-4, Shield Wall Reinforcing Details

Calculation number MCC-1112.06-00-0004, "McGuire Reactor Refueling Water Storage Tank - Missile Wall"

McGuire drawing numbers MC-1385-17 and MC-1385-18, "Reactor Refueling Water Storage Tank Missile Wall Concrete and Reinforcing Details"

Duke specification number MCS-1109.00-1, "Concrete procurement requisition number 1196.00-0066-00, "SCS-200 Rock Bolts". These rock bolts were specified on drawing numbers MC-1385-18 to anchor reinforcing steel to existing concrete in the foundation of the reactor refueling water storage tank.

Calculation number CKC-1112.12-02, "Cherokee NSW Electrical Equipment Building"

Cherokee drawing number CK-0358-10, "NSW Electrical Equipment Building, concrete, plans, Sections and Details"

Audit numbers E-79-3 and E-79-7, "Civil QA Audits of the Civil and Environmental Division"

Review of the above documents and discussions with responsible engineers disclosed the following examples of failure to follow engineering design QA procedures:

Paragraph 1.1.19 of Design Engineering procedure PR-101 requires complete presentation of the calculation such that anyone appropriately qualified could review the calculation. In calculation number CKC 1112.12-02 the concrete and reinforcing steel strength used in design of the Cherokee NSW electrical equipment building was not documented. Without knowledge of this information, the calculation can not be adequately reviewed, nor can the construction drawings be adequately reviewed to assure that the proper strength concrete and reinforcing steel grade is specified for construction.

Paragraph 2.2.1 of procedure PR-101 requires the checker to review data and design method used and to check the calculation step by step. In calculation number MCC-1112.06-00-0004, the design shear values for wall numbers 8 and wall numbers 7 and 9 were transposed. In calculation number P81-C-1144.03-17, an incorrect value was used for the coefficient of friction in computation of the shear friction reinforcement requirements at a construction joint. These errors were not detected by the checkers and appear to be a result of inadequate review of the calculations by the checkers.

Paragraph 2.3 of procedure PR-101 requires the approver to sign and date the calculation certification page. The certification page for Revision 2 to calculation number P81C-1144.03-17 was not signed by the approver. The design documents (drawings) generated from this calculation had already been released by engineering for construction. The above examples of failure to follow procedures were identified to the licensee as items of noncompliance of the Infraction level:

369/80-08-06, 270/80-05-06, 413, 414/80-09-06, 491/80-07-07, 492, 493/80-06-07, "Errors/ommissions in Civil Design Calculations". However, the correction of the above errors will not result in any changes to final construction drawings. This is due to the fact that during preparation of drawings, wall thicknesses, reinforcement requirements, etc, had been increased beyond the design requirements.

(d) Conclusions

The inspector concluded that civil design engineering procedures meet the requirements of NRC, industry standards, and the Duke Topical Report. The procedures are an effective method of controlling civil design activities. However, the inspector expressed concern to the licensee design engineering management regarding the apparent inadequate review being performed by checkers in their review of design documents. Several examples of this apparent inadequate review were cited in the noncompliance discussed in paragraph 6.c(2)(c) above. No deviations were identified.

(3) Electrical Division Design Review

(a) Documents Examined

QA Manual Procedures

PR-101, R3	Engineering Calculations
PR-130, R9	Engineering Drawings
PR-140, R1	Engineering Correspondence
PR-160, R0	SAR Commitment Control
PR-201, R6	Variation Notices
PR-220, R5	Nonconforming Item Reports
PR-260, R0	Nuclear Station Problem Report
PR-301, R10	Specifications
PR-901, R12	Document Control
EPR-101, R13	Nuclear Safety-Related System Description Control
EPR-130- R2	Electrical Division Special Drawings
EPR-131, R0	Design Completion Verification of Nuclear Safety-Related Systems
EPR-302, R1	Electrical Division Procurement of Electrical Safety Standard Equipment/ Material

Electrical Design Procedures

EDP-3.2, R0	Engineering Information Package/System Description Transmittal
EDP-3.4, R1	Transmittals - Specifications and Amendments
EDP-3.9, R2	Electrical Installation Specifications - Generating and Usage
EDP-3.21, R0	Design Revision Control Procedures - Catawba Nuclear Station

EDP-5.1, R2	Engineering Calculations
EDP-4.1.1, R2	Load Assignments and Miscellaneous Revisions to Power & Control Systems
EDP-5.1, R2	Engineering Calculations
EDP-6.1, R3	Standard Specification Format and Usage

Electrical Design Manual Design Criteria

DC-1.02, R3 Separation - Catawba
DC-1.03, R2 Separation - Preferred Power Circuits - Catawba

Engineering Criteria Manual

FO-1.02, R5 Format - System Descriptions - Power

(b) QA Program

DPC Topical Report DUKE-1, Section 17.0.2 states that the licensee's quality assurance program conforms to the requirements of Regulatory Guide 1.64, R2. "Quality Assurance Requirements for the Design of Nuclear Power Plants" and RG 1.123, R1, "Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants". RG 1.64 incorporates the requirements of ANSI N45.2.11-1974 as modified by the RG 1.64, section C regulatory position. RG 1.123, R1, incorporates the requirements of ANSI N45.2.13-1976 as modified by the RG 1.123, section C regulatory position. DPC Topical Report Section 17.1 describes the licensee's quality assurance program to be implemented during design. The procedures listed in 6.c(3)(a) above were reviewed for compliance with Topical Report DUKE-1 commitments.

(c) Implementation

The licensee's Design Engineering Department Electrical Division consists of an electrical Projects Section, a Control Systems Engineering Section, a Power Systems Engineering and Station Support Section, and an Electrical Design Section. The division is responsible for the engineering, design and procurement of original items associated with electrical power systems, control complexes, associated switching and transformer stations, and environmental monitoring and control systems. These responsibilities include preparation, verification and control of design calculations, design drawings, and procurement and design specifications.

The inspector reviewed selected design output documents and discussed their preparation, verification and control with Electrical Division personnel to assure compliance with the

procedures and commitments identified in paragraphs 6.c(3)(a) and 6.c(3)(b). The design output documents selected for review are listed below:

System Descriptions (Catawba)

1 CNSD-0010-01, R0, 230 KV Switchyard Physical Layout (EBA)

2 CNSD-0194-01, R0, Unit Main Power Systems

3 CNSD-0116-01, R1, 6.9 KV Normal Auxiliary Power System

4 CNSD-0115-01, R1, 4.16KV Essential Auxiliary Power System, Class IE Diesel Protective Relaying and Metering System (EPC and ERN)

Drawings (Catawba)

1 CN-1702-05.01, R3, One Line Diagram, Normal Auxiliary Power Systems, 6.9 KV/600v

2 CN-1702-05.02, R3, One Line Diagram, Essential and Blackout Auxiliary Power Systems, 4.16 KV/600v

3 CN-1702-02.01, R9, One Line Diagram, 4160 volt Essential Auxiliary Power Systems (EPC), 4160 volt Switchgear No. 1ETA

4 CN-1702-02.02, R9, One Line Diagram, 4160 volt Switchgear No. 1ETB

5 CN-1200-8.5, R16, General Arrangement/Architectural-Switchgear Room Plans, Auxiliary Building Units 1 & 2, Floor Elevation 560' + 0"

6 CN-1200-9.5, R10, General Arrangement/Architectural-Switchgear Room Plans; Auxiliary Building Units 1 & 2, Floor Elevation 577' + 0"

7 CN-1896-01, R15, Electrical Equipment Layout, Auxiliary Building, Electrical Penetrations and Switchgear Room Below elevation 577' + 0"

8 CN-1897-01, R15, Electrical Equipment Layout, Auxiliary Building, Electrical Penetrations and Switchgear Room below elevation 594' + 0"

9 CN-1214-01, R20, Auxiliary Building, Electrical Equipment Seismic Mounting Plans, Sections and Details

10 CNEE-0115-01.14, R3, Elementary Diagram 4160v Switchgear 1ETA Unit 14, Nuclear Service Water Pump Motor 1A (1PMTR0155)

11 Cable Termination Sheet No. 1*EPC 511, R0

12 Cable Termination Sheet No. 1*EPC 512, R0

13 Cable Termination Sheet No. 1*EPC, 513, R0

14 CNS B/M NO. CKBM-1899-14, Rigid Steel Conduit and Fittings

15 CNRS-0115-01.02, Unit 1, 4.16KV Essential Auxiliary Power System Relay Settings

Drawings (Project P81-Cherokee, Perkins)

1 81LO-1710-64-11-01, R2, Cable Tray Layout, Auxiliary Building, Area 6 Battery Room Annex, Elevation 69' + 0", Col 30-34 and GG-LL

2 81LO-1710-64-12-01, R2, Cable Tray Layout, Auxiliary Building, Area 6 Battery Room Annex, Elevation 69' + 6", col 30-34 and L-QQ

3 81LO-1710-64-21-02, R1, Grid Hanger Details, Auxiliary Building, Area 4 and 6, Elevation 69' + 6", 89' + 6", and 104' + 6"

4 81LO-1899-14, R1, Electrical Embedment Layout, Auxiliary Building, Plan Below Elevation 89' + 6", Area 4

Calculations (Catawba)

1 CN-1381-05-5, Essential Auxiliary Transformers - Impedance Calculations

2 CN-1381.05-14, Essential Load Center Transformer Feeder Relay Settings and Essential Load Center Breaker Coordination

3 CN-1381.05-12, EPC 4.16Kv Essential Power System Relay Setting Calculation

Specifications (Catawba)

1 CNS 1312.02-01, R2. 4160v Essential Auxiliary Metalclad Switchgear

2 CNS 1390.01-00-0015, R2, Phasing: Sequence and Conductor Color Coding

3 CNS 1390.01-00-0035, R5, Cable Grounding and Termination Sealing

4 CNS 1390.01-00-0040, R0, Elastimold Stress Cone Termination for 4.16Kv and 6.9KV Application on Shielded Jacketed Power Cable in Dry Locations

Specifications (Project P81)

1 P81S-1312.02-00-0001, R1, 4160v class IE Auxiliary Metalclad Swtichgear

Procurement Documents (Project P81)

1 Purchase Requisition No. 8339/1312.02-00-0001, R0.

2 Purchase Order No. E-29711-21

DPC's Design Engineering Department QA Manual procedure EPR-130, paragraph 1.5 requires preparation of cable termination sheets to show cable terminations by color code for each cable and provides an example of a cable termination sheet as Enclosure 7. Review of the Catawba cable termination sheets for cables 1*EPC511, 512 and 513 resulted in the following.

1 The cable termination sheets do not provide the required cable terminations. Cable terminations to 4160v panel 1ETA and to diesel generator number 1 are identified as spare. Additionally, the required terminations were not provided by drawing CN-1702-02.01 which was referenced by the cable termination sheets. Discussions with responsible personnel from the licensee's Power System Design and Technical Support Group revealed that Catawba installation specification number CNS 1390.01-00-0015 did provide standard terminations for power cables.

2 The cable termination sheets were not of the enclosure 7 form authorized by the procedure. The licensee has revised the cable termination sheet preparation method from manual to computer, but had not revised procedure EPR-130 to reflect the new method.

3 The failure to provide cable terminations on cable termination sheets and the use of cable termination sheets which were not authorized by procedure was identified to the licensee as deficiency 413/80-09-08 and 414/80-09-08.

(d) Conclusions

With the exceptions of the deficiency discussed in paragraph 6.c(3)(c), it was felt that the licensee's Design Engineering Department Electrical Division has an effective organization with adequate procedures and personnel (for current work loads) which meets the commitments discussed in paragraph 6.c(3)(b).

Within the areas inspected, there was one item of noncompliance and no deviations identified.

d. Procurement

(1) Documents Examined:

DPC Corporate QA Program Chapter 4, "Procurement Document Control", Rev. 0, March 1, 1977

DPC Corporate QA Program Chapter 7, "Control of Purchased Material, Equipment, and Services"

DPC DED QA Program Procedure PR-301, "Specifications," Rev. 11, April 30, 1980

DPC DED QA Program Procedure PR-302, "Procurement" Rev. 16, April 30, 1980

DPC DED QA Program procedure PR-303, "Procurement of Services", Rev. 6, April 30, 1980

DPC QA Department QA Program Procedure QA-403, "QA Specification Review", Rev. 6, September 7, 1978

DPC QA Department QA Program procedure QA-410, "Processing of QA Records for purchased Items", Rev. 5, May 11, 1979

DPC QA Department QA Program Procedure QA-411, "Filing of QA Records for Purchasing Items", Rev. 4 October 30, 1979

DPC QA Department QA program procedure QA-601, "Vendor Evaluation", Rev. 1, March 7, 1979

DPC QA Department QA Program procedure QA-602, "Vendor Surveillance procedure", Rev. 5, October 26, 1978

(2) QA Program

DPC Topical Report Quality Assurance Program, Duke-1-A, Table 17.0-1 commits to implement Regulatory Guide 1.123 Rev. 1 which endorses ANSI N45.2.13-1976 without exceptions. The controlling

procedures as noted in paragraph 6.c(4)(a) above are the controlling documents within DPC Design Engineering and QA Departments for control of engineer procurred items. Design Engineering has the responsibility for originating and approving the engineering and technical portions of the specification. QA Engineering and Services has the responsibility for inputing QA requirements. Approval of purchase requisitions for safety-related items is performed by the Chief Engineer within the Design Division or his authorized representative. The QA manager, Engineering and Services or his designee reviews and approves purchase requisitions for inclusion of QA requirements. Mill-power Supply Company prepares the purchase order based on the purchase requisition.

(3) Implementation

The inspector reviewed the DPC procedures, held discussions with QA, Vendor and file room personnel relative to the following purchase orders and contracts:

1. PO C13961-11
2. PO A63028-21 A4
3. Oconee 1980 In-Service Contract
4. Catawba 1979 In-Service Contract
5. Catawba, Oconee and McGuire Hartford Insurance 1980 Contract
6. EDS 1978 and 1980 Job Scope for the EDS Mechanical Engineering Services Contract.

Additionally the inspector reviewed the approved vendors list and performed a selected supplier record file review.

No items of noncompliance or deviations were identified.

(4) Conclusion

DPC has developed and implemented a procurement control program that is consistent with the committed to requirements.

e. Audits and Surveillance

(1) Documents Examined:

QA-160, Revision 0, Performance of Corporate Quality Assurance Audits

QA-210, Revision 9, Departmental Audit Procedure

QA-230, Revision 6, Departmental Audit Scheduling and Follow up

QA-300, Revision 7, Construction Surveillance

QA-412, Revision 6, Surveillance of Design Activities

PR-840, Revision 8, Internal Audits

Audit C-79-1, McGuire Document Control, dated February 1, 1979

Audit C-79-4, McGuire Mechanical Activities (Piping), dated April 30, 1979

Audit C-78-1, Catawba Document Control/Nonconforming Items, dated February 14, 1978

Audit C-78-4, Catawba Storage and Receiving, dated May 22, 1978

Corporate audit - 1979, Duke QA Department, dated October 12, 1979

Corporate Audit - 1978, Duke QA Department, dated October 6, 1978

ANSI N45.2.12, Draft 3, Revision 4, 2/74, Requirements for Auditing of Quality Assurance Programs for Nuclear Power Plants

Duke Topical QA Program Manual, Section 17.1.18, audits

(2) QA Programs

Duke Power Company QA Program Topical Report Section 17.1.18 specifies QA Program commitments for audits. Duke's Topical commits to ANSI N45.2.12 - Draft 3, Revision 4, February 1974. Duke Corporate Quality Assurance Program Chapter 18 delineates requirements for audits. Various Duke QA Department and Design Engineering Department procedures provide instructions for audits and surveillances.

(3) Implementation

The inspector reviewed the referenced documents and held discussions with personnel responsible for audits. The inspector reviewed the six referenced audits to ensure audits are scheduled, prepared, and performed in accordance with established requirements. Corrective action for conditions adverse to quality was reviewed to ensure proper actions. The inspector identified one item of noncompliance and one inspector follow up item relative to audits discussed in paragraph (4) and (5) respectively.

(4) Comprehensive System of Audits of all Aspects of the QA Program

Criterion XVIII of 10 CFR 50, Appendix B requires that a comprehensive system of periodic audits be conducted to verify compliance with all aspects of the quality assurance program. Duke Topical Report commits the licensee to following ANSI N45.2.12, Draft 3,

Revision 4 dated 2/74. ANSI N45.2.12 specifies the periodicity of annual for audits of applicable elements of the quality assurance program. A review of Duke procedures revealed no requirement or procedures implementing a comprehensive system of audits to assure all activities affecting quality are audited on an annual basis. A detailed review of construction audits for three sites for a three year period revealed that applicable elements of the QA program may not have been audited on an annual basis. The inspector concluded that the lack of procedures requiring annual audits of QA program elements and detailing the comprehensive system to assure annual audits of applicable elements is the contributing cause. This failure to develop a comprehensive system of audits to assure coverage of all aspects of the QA program on an annual basis is identified as an infraction 369/80-08-03, 370/80-05-03, 413, 414/80-09-03, 491/80-07-03, 492, 493/80-06-03, Comprehensive System of Audits for all Aspects of the QA Program.

(5) Audit Distribution and Audit Replies

Duke QA Topical Section 17.1.18.2 states that the Senior Quality Assurance Supervisor, Audit Division, send the audit report to the Corporate Quality Assurance Manager for information and forwarding to the responsible Department Vice-President. Also section 17.18.2 states after receipt of the audit report the responsible Vice-President replies in writing to the Corporate Quality Assurance Manager. Discussions with audit personnel and a review of audits and replies revealed that procedures for distribution of audits and audit replies have been changed. Department Vice-Presidents receive copies of audits and audit replies are provided at a lower level, usually at the audited organization level. Pending changes to the Duke QA Topical to reflect current practices on audit distribution and audit replies, this item will be identified as an inspector follow-up item 369/80-08-04, 370/80-05-04, 413, 414/80-09-04, 491/80-07-04, 492/80-06-04, 493/80-06-04, Audit Distribution and Audit Replies.

(6) Conclusion

Duke has developed and implemented procedures for an audit program to verify compliance and to determine the effectiveness of the Duke QA program. In audits, the auditors are effective in determining system deficiencies. However, the inspector has concern with the limited site time allocated by corporate auditors to construction activities due to current manning. The inspector notes that a negative impact on quality will occur if site audit time is not proportionally increased with expanding construction activities to assure that all aspects of the QA program are audited annually.

f. Quality Records

(1) Documents Examined:

QA-101, Revision 1, Quality Assurance Records Storage Vault (General Office)

QA-111, Revision 1, Interdivisional Transfer of QA Records

QA-301, Revision 0, Management of Construction QA Records

QA-410, Revision 5, Processing of QA Records for Purchased Items

QA-411, Revision 4, Filing of QA Records for Purchased Items

PR-930, Revision 5, Supplier Quality Assurance Records, Review, Approval and Storage

PR-931, Revision 2, Design Quality Assurance Records Collection, Maintenance, and Storage

ANSI N45.2.9-1974, Requirements for Colletion, Storage; and Maintenance of Quality Assurance Records for Nuclear Power Plants

Duke Topical QA Program Manual, Section 17.1.17, Quality Assurance Records

Duke Power Company Corporate Quality Assurance Program Manual chapter 17-A, Quality Assurance Records Management Program

(2) QA Program

Duke Power Company QA Program Topical Report Section 17.1.17 specifies QA Program commitments for quality records. Duke Topical Section 17.1.17.4 commits to ANSI N45.2.9-1974. Duke Corporate Quality Assurance Program Chapter 17 delineates requirements for quality records. Various Duke QA Department and Design Engineering Department procedures provide instructions for quality records.

(3) Implementation

The inspector reviewed the referenced documents and held discussions with personnel responsible for quality records. The inspector performed a walk-thru inspection of the corporate records vault and temporary record storage locations in the QA and Design Department.

As a result of the above implementation inspection activities, three items of noncompliance were identified. These items are discussed in paragraphs (4), (5), and (6).

(4) Failure of Temporary Record Storage Facilities to Meet ANSI N45.2.9-1974 - Fire Protection

Duke Power Company Topical Report Section 17.1.17.4 states that record storage facilities are constructed, located, and secured in accordance with ANSI N45.2.9. ANSI N45.2.9 paragraph 5.6 specifies requirements for temproary and permanent record storage facilities. Completed quality records are stored in the Design Department and Engineering and Services Division temporary storage locations. However, both temporary storage locations fail to meet ANSI N45.2.9 paragraph 5.6. For example, paragraph 5.6 requires fire protection provision which both temporary storage locations fail to meet. This item is identified as an infraction 369/80-08-01, 370/80-05-01, 413, 414/80-09-01, 491/ 80-07-01, 492, 493/80-06-01, Temporary Record Storage Facilities - Fire Protection.

(5) Failure of Departmental Procedures to Implement ANSI N45.2.9-1974 - for Corporate Records Vault

10 CFR 50, Appendix B, Criterion V implemented by Duke Power Company Topical Report section 17.1.5 states in part: "Activities affecting quality shall be prescribed by procedures...". ANSI N45.2.9 provides various minimum requirements on record storage. The inspector found that departmental procedures failed to implement various minimum requirements of ANSI N45.2.9 for the corporate records vault. As examples not to be considered as all inclusive, ANSI N45.2.9 requirements for receipt of records, preservation, and facility features were not procedurally implemented in all cases for design and QA records to be stored in the corporate records vault. This item is identified as an infraction 369/80-08-02, 370/80-05-02, 413, 414/80-09-02, 491/80-07-02, 492, 493/80-06-02, Procedures Implementing ANSI N45.2.9 for the Corporate Records Vault.

(6) Audits of Quality Assurance Record Storage Systems per ANSI N45.2.9, Paragraph 5.7

Duke Power Company Topical Report, Table 17.0-1, states that the program conforms to ANSI N45.2.9 - 1974. ANSI N45.2.9-1974 paragraph 5.7 requires audits of the quality assurance records storage system and specifies minimum requirements regarding audits of records storage systems. The inspector found that no procedures have been developed to require audits to be performed of the minimum requirements specified by ANSI N45.2.9, paragraph 5.7. In certain cases, surveillances were required by procedures for various aspects of the QA records system. Also, periodic audits were required by procedures for QA records control. This item is combined with the finding in paragraph 6.e(4) as infraction 369/80-08-03, 370/80-05-03, 413, 414/80-09-03, 491/80-07-03, 492, 493/80-06-03, Audits per ANSI N45.2.9, Paragraph 5.7.

(7) Conclusions

Duke has developed and implemented Procedures for quality records. However, procedures have not been developed at the departmental level to fully implement ANSI N45.2.9-1974 for the corporate records vault. Departmental procedures (QA-301) have been developed for construction site records rooms for which the ANSI N45.2.9 requirements have been implemented.

g. Training

(1) Documents Examined:

QA-112, Revision 1, Certification of quality Assurance analysts

QA-130, Revision 4, Qualification and Training of Lead Auditors

QA-131, Revision 1, Quality Assurance Training

QA-140, Revision 0, Quality Control Inspector Training

PR-860, Revision 4, Quality Assurance Training

ANSI N45.2.12, Draft 3, Revision 4, 2/74, Requirements for Auditing of Quality Assurance Programs for Nuclear Power Plants

Duke Topical QA Program Manual, Section 17.1.2, Quality Assurance Program

(2) QA Program

Duke Power Company QA Program Topical Report Section 17.1.2 specifies QA Program commitments for training. Duke Topical commits to ANSI N45.2.6-1973. Duke Corporate Quality Assurance Program Chapter 2 Section 2.7 delineates requirements for QA training. Various Duke QA Department and Design Engineering procedures provide instructions for QA training.

(3) Implementation

The inspector reviewed the referenced documents and held discussions with personnel responsible for quality assurance indoctrination of design and QA employees. The inspector also reviewed the qualification and training of auditors. The inspector selected training records for ten personnel (Design and QA) to assure that QA indoctrination had been performed as required. The inspector reviewed auditor qualification and training records for three personnel. The inspector identified one inspector follow-up item discussed in paragraph (4) below.

(4) Records for Qualification and Training of Auditors

The inspector noted that Duke procedures failed to specify training and qualification records requirements for auditors. Discussions were held with audit personnel regarding current practices with auditors training and qualification. With the exception of one individual, lead auditors are utilized for audits and lead auditor records are properly retained in accordance with QA-130. The one non-lead auditor is expected to be qualified as a lead auditor in the near future. Discussions with responsible personnel revealed that auditor procedures will be revised to clarify auditor training/qualification requirements. Pending changes to procedures, this item will be identified as an inspector follow-up item, 369/80-08-05, 370/80-05-05, 413, 414/80-09-05, 491/80-07-05, 492, 493/80-06-05, Procedures for Records on Qualification and Training of Auditors.

(5) Conclusions

Duke has developed and implemented procedures for QA indoctrination of Design Department and QA Department personnel. Procedures have been developed and implemented for lead auditor training/qualification.

No items of noncompliance or deviations were identified.