FORM M-41B	REVISION 1

Sheet 1 of 4

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT Catawba

Serial no. 9
Revision no. 0

A-46
11/17/83

SUPPLEMENTAL INSPECTION INSTRUCTIONS

EQUIPMENT DESCRIPTION Cable

TYPE OF INSPECTION Routing Installation

DOCUMENTATION REQUIRED Cable Data Card

INSPECTION INSTRUCTIONS:

The following steps numbered 1 through 7 are designated as inspection points which shall be verified prior to the signing of the cable data card by the inspector.

1. Prior to pulling cable, main cable tray systems shall be continuous and junction points in the route shall be identified.

2. Raceways shall be marked with Safety Related/color code designations at each end and at all entrances and exits to rooms in addition to being marked at intervals not to exceed 15 feet.

3. Verify that the correct cable type and color has been installed as specified on the cable data card. Cables shall be color coded in accordance with CNS 1390.01-00-0024.

4. Cable shall be installed in accordance with the junction point sequence specified on the applicable cable data card.

5. Cable ends are protected from damage due to construction activities or water.

6. Ensure that Cable Termination and Temporary Identification Tags are inserted in plastic envelopes and attached to both ends of the cable.

7. Verify that the correct reel number has been entered on the card and sign the card on the space provided.

The information compiled below is taken from installation specifications to provide the inspector with accessible reference data. This information is not intended to replace approved Design Engineering or Quality Assurance procedures.

CNS 1390.01-00-0018

1. Minimum separation criteria between class 1E and non-class 1E equipment without the use of barriers shall be:

   A: General Plant Area:
      1. horizontally - 3 feet
      2. vertically - 5 feet

☒ NUCLEAR SAFETY RELATED ☐ NON SAFETY RELATED

PREPARED Richard A Ewy DATE 8/2/78

CONST. APPROVAL D K Fuez DATE 8-11-78

Q. A. APPROVAL R A Morf DATE 8-14-78

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT Catawba

Serial no. 9
Revision no. 0

SUPPLEMENTAL INSPECTION INSTRUCTIONS

EQUIPMENT DESCRIPTION Cable

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NOT FOR CONSTRUCTION

TYPE OF INSPECTION Routing Installation

DOCUMENTATION REQUIRED Cable Data Card

SUPERSEDED

INSPECTION INSTRUCTIONS:

B. Control Complex Area
   1. horizontally - 1 foot
   2. vertically - 3 feet

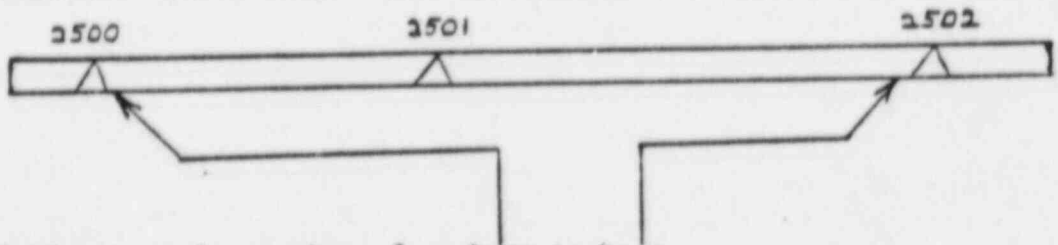
Where plant arrangement precludes meeting the minimum separation criteria as outlined above, isolation barriers may be used to preserve system integrity. Barrier acceptance will be handled on an individual basis.

2. Power cable spacing shall be at least 1/4 or the diameter of the largest adjacent cable. Tie wraps shall be installed to maintain minimum spacing requirements.

CNS 1390.01-00-0020

Cable entering or exiting from a cable tray at a junction point may enter or exit anywhere from the specified junction point up to but not including the previous or next junction point. See example below:

Example: Cable sheet says cable exits from cable tray at point 2501.



Cable may exit anywhere from here to here.

CNS 1390.01-00-0022

1. Cable should enter and exit tray from the bottom and between the rungs so that the tray may be covered if necessary.

☒ NUCLEAR SAFETY RELATED ☐ NON SAFETY RELATED

PREPARED [signature] DATE 8/2/78

CONST. APPROVAL [signature] DATE 8-11-78

C. A. APPROVAL [signature] DATE 8-14-78

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT Catawba

Serial no. 9
Revision no. 0

SUPPLEMENTAL INSPECTION INSTRUCTIONS

EQUIPMENT DESCRIPTION Cable

TYPE OF INSPECTION Routing Installation

DOCUMENTATION REQUIRED Cable Data Card

INSPECTION INSTRUCTIONS:

2. Cable may exit the top of a tray provided:

   A. Tray is run under a concrete floor where the cables are protected from damage and no cover is required.

   B. The cable is run to equipment on the floor above through sleeves or slots in the floor.

   C. Where Power cables would violate their minimum bending radius while making a transition from horizontal to vertical trays.

   D. Where cables enter or exit within 30 inches of the end of a vertical or horizontal tray and will not block the path of cables running straight through the tray.

   E. Where it is necessary to maintain minimum separation of redundant safety related cables.

3. Unsupported lengths shall not exceed the following guidelines:

ARMORED CABLE SUPPORT INTERVALS

Cable Diameter Range (Inches)	Maximum Allowable Unsupported Distarce (Inches)	
	VERTICAL	HORIZONTAL
Less than 1/2 (Note 1)	24	18
1/2 thru 1	42	24
1 thru 2	42	36
2 thru 3	60	48
Greater than 3	72	60

☒ NUCLEAR SAFETY RELATED ☐ NON SAFETY RELATED

PREPARED [signature] DATE 8/2/78

CONST. APPROVAL [signature] DATE 8-11-78

Q. A. APPROVAL [signature] DATE 8-14-78

Sheet 1 of 4

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT Catawba

Serial no. 9
Revision no. 0

SUPPLEMENTAL INSPECTION INSTRUCTIONS

EQUIPMENT DESCRIPTION Cable

UNCONTROLLED COPY
NOT FOR CONSTRUCTION

TYPE OF INSPECTION Routing Installation

DOCUMENTATION REQUIRED Cable Data Card

SUPERSEDED

INSPECTION INSTRUCTIONS:

Note 1: When installing cables of 1/2" diameter or less, runs of more than 24" vertical or 18" horizontal require continous support.

4. Minimum bending radius does not exceed the following limits:

A. POWER CABLE	MINIMUM BENDING RADIUS
Shielded Interlocked Armor	12 times O.D.
Shielded Non-Armored	12 times O.D.
Flat Taped or Submarine Wire Armor	12 times O.D.
Interlocked Armor	8 times O.D.
Non-Armored	6 times O.D.

B. CONTROL/INSTRUMENTATION CABLE	MINIMUM BENDING RADIUS
Interlocked Armor	8 times O.D.
Braided Armor	6 times O.D.
Non-Armored	6 times O.D.

CNS 1390.01-00-0024

1. Cable shall be painted at intervals not to exceed 5 feet. The painted area should be a minimum of 3 inches in length to cover approximately 120° of the cable O.D.

☒ NUCLEAR SAFETY RELATED ☐ NON SAFETY RELATED

PREPARED Michael L. Crow DATE 8/2/78

CONST. APPROVAL D. L. Freye DATE 8-11-78

Q.A. APPROVAL R. A. Hedgepeth DATE 8-14-78

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Sheet 1 of 2

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT Catawba

Serial no. 1
Revision no. 2

SUPPLEMENTAL INSPECTION INSTRUCTIONS

EQUIPMENT DESCRIPTION Electrical Cabinet/Panel Assembly and Wiring

CUSTOMER COPY
NOT FOR CONSTRUCTION

TYPE OF INSPECTION Fabrication

DOCUMENTATION REQUIRED M-41B-1A

SUPERSEDED

INSPECTION INSTRUCTIONS:

Reference CP-147 which shall provide a control mechanism throughout the fabrication process.

1. For all nuclear safety related welds, ensure that the specified inspections have been performed by a certified welding inspector. In the case of the requirement for a visual weld inspection, the check by an electrical inspector shall consist of verifying the Welding inspector's "Visual O.K." initials approving welds before painting.

2. In addition to checking all welded connections, the inspector shall also verify that all of the metal fabrication, seismic bracing, and mounting channels etc. have been installed in accordance with Design drawings.

3. The electrical inspector shall perform or witness a complete point to point continuity check of all wiring which Duke Power personnel install in field fabricated panels. Form CP-147A shall be used to document this inspection in accordance with the procedure outlined in the construction procedure.

4. In addition to the point to point continuity check, the inspector shall visually check all connections in order to determine that the wire stripping, crimping, and termination connection meet acceptable standards.

5. Except for protective type relays, verification of all components and inspection for obvious damage shall be conducted. This shall include manual operation of all switches and relays with mechanical contacts to ensure free operation and to check for proper contact arrangement.

6. All components installed in the field fabrication process shall be checked to ensure that they are the correct component as listed on the appropriate Bill of Materials list.

7. Final inspection of cabinets shall include a verification that the separation criteria outlined in CNS 1390.01-00-0018 has been maintained along with all safety train/channel identification.

☒ NUCLEAR SAFETY RELATED ☐ NON SAFETY RELATED

PREPARED Michael R. Fox DATE 1/30/79

CONST. APPROVAL D. Jones DATE 2-6-79

Q. A. APPROVAL for R. L. Gill DATE 2-8-79

FORM M-41B	REVISION 1

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DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT Catawba

Serial no. 1
Revision no. 2

SUPPLEMENTAL INSPECTION INSTRUCTIONS

EQUIPMENT DESCRIPTION Electrical Cabinet/Panel Assembly and Wiring

TYPE OF INSPECTION Fabrication

DOCUMENTATION REQUIRED M-41B-1A

INSPECTION INSTRUCTIONS:

8. Verify, on a sampling basis, that torque requirements specified on appropriate drawings are met. The type torque device and its serial number shall be recorded on form CP-147A.

☒ NUCLEAR SAFETY RELATED ☐ NON SAFETY RELATED

PREPARED Michael R. Bare DATE 1/30/79

CONST. APPROVAL DL Price DATE 2-6-79

Q. A. APPROVAL for RA Morgan DATE 2-6-79

Sheet 1 of 1

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT Catawba

Serial no. 1
Revision no. 1

SUPPLEMENTAL INSPECTION INSTRUCTIONS

EQUIPMENT DESCRIPTION Electrical Cabinet/Panel Assembly and Wiring

TYPE OF INSPECTION Fabrication

DOCUMENTATION REQUIRED M-41B -1A

INSPECTION INSTRUCTIONS:

1. For all nuclear safety related welds, verify that the specified inspections have been completed by a certified welding inspector.

2. Location, and anchoring of all equipment, seismic bracing, blank cutouts, mounting channels, etc. shall be verified in accordance with the appropriate drawings.

3. All wiring shall be examined for required [illegible], correct termination (proper wire skinning, insulation crimp, proper tool, etc.) and conformance to the applicable separation criteria in CNS 1390.01-00-0018.

4. Except for protective type relays, verification of all components and inspection for obvious damage shall be conducted. This will include manual operation of all switches and relays with moveable contacts to insure free operation and to check for proper contact arrangement.

5. Verify, on a sampling basis, that torque requirements specified on appropriate drawings are met. The type torque device and its serial number shall be recorded on form CP-147A.

6. Inspect all component and wire identifications for conformance to design document requirements.

7. Except for protective type relays, a certified electrical inspector shall perform or witness a point to point continuity check of all electrical circuits using appropriate drawings.

☒ NUCLEAR SAFETY RELATED ☐ NON SAFETY RELATED

PREPARED Michael K. Brose DATE 2/13/78

CONST. APPROVAL DL Fuez DATE 2-17-78

Q. A. APPROVAL JA Mohr DATE 2-17-78

Sheet 1 of 1

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT Catawba

Serial no 1
Revision no 0

SUPPLEMENTAL INSPECTION INSTRUCTIONS

EQUIPMENT DESCRIPTION Electrical Cabinets **NUCLEAR SAFETY RELATED**

TYPE OF INSPECTION Fabrication

DOCUMENTATION REQUIRED M-41A [redacted]

INSPECTION INSTRUCTIONS:

1. Inspect nuclear safety related welds in accordance with QA Procedure M-21.
2. Verify that materials specified by design drawings are used in fabrication.
3. Verify that components, equipment, and wire (size and type) specified by Design drawings are used.
4. Verify that location of equipment, seismic bracing, blank cutouts, mounting channel, etc. is in accordance with design drawings. This will be to "eyeball" accuracy, calibrated instruments are not required.
5. Examine on a sampling basis, terminations for proper wire skinning, insulation crimp, lugs, tightness, etc.
6. Verify on a sampling basis that the proper tool (T & B type WT-145) is being used for terminations.
7. Verify that all wiring conforms to applicable separation criteria.
8. Verify that grounding is in accordance with applicable Design drawings.
9. Check components for obvious damage and free operation.
10. Check wiring for obvious damage (nicks, breaks, etc.).
11. Inspect component and wire identification for comformance to Design requirements.
12. Verify on a sampling basis that specified torque requirements are met. Record type of device and serial number in remarks section of M-41A when torquing is inspected.
13. Verify correctness of wiring by point to point continuity test.
14. Inspection of items 2 thru 13 shall be documented by sign-off of the "QC Inspector/Elec. blank of the M-41A for each cabinet. The inspection of item 1 shall be documented by sign-off of the "QC Inspector/NDE" blank of each M-41A.

PREPARED KS Kinsler DATE 1/28/77

Q.A. APPROVAL RA Mar DATE 11/31/77

Sheet 1 of 1 [redacted] DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT Catawba

Serial no. [redacted]
Revision no. 0

SUPPLEMENTAL INSPECTION INSTRUCTIONS [redacted]

148 Martin Hemphill

EQUIPMENT DESCRIPTION Cable Tray

TYPE OF INSPECTION Installation

DOCUMENTATION REQUIRED M-41A

INSPECTION INSTRUCTIONS:

1. Verify, on a sampling basis, that cable tray which has been cut, is free of burrs.
2. Verify, that cable tray is grounded where applicable.
3. Verify that the cable tray is the correct size, the correct configuration, at the correct elevation, and the correct location as specified on the design drawings.
4. Verify that the splice plates are of the correct material and are installed on the outside of the cable tray side rails utilizing the required number of round head knurled/spline bolts with nuts and captive washers.
5. Verify that there are no devices being hung from the cable tray or cable tray hangers which are not shown on the design drawings.
6. Verify that there is no apparent physical damage.
7. Verify that the cable tray has been secured to every cable tray hanger utilizing the proper connection device applied to both side rails.
8. Verify that the nuts and bolts used to assemble the cable tray are snug.

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[redacted]

SUPERSEDED

☒ NUCLEAR SAFETY RELATED ☐ NON SAFETY RELATED

PREPARED M R Hemphill DATE 11/29/77
CONST. APPROVAL DL Freeze DATE 12-1-77
Q. A. APPROVAL RA O'Neal DATE 12-5-77

[redacted]

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Sheet 1 of 1

DUKE POWER COMPANY
CONSTRUCTION DEPARTMENT
PROJECT Catawba

Serial no. 2
Revision no. 2

SUPPLEMENTAL INSPECTION INSTRUCTIONS

EQUIPMENT DESCRIPTION Cable Tray Hangers

TYPE OF INSPECTION Installation

DOCUMENTATION REQUIRED M-41A

NUCLEAR SAFETY RELATED

INSPECTION INSTRUCTIONS:

1. Verify that the correct item is installed in the correct location.
2. Verify that the hangers are constructed of the correct materials (unistrut, angles, and bolts) as required by the drawings by grade or series (A-36, P-1001, etc.).
3. Verify that the hangers are of the correct dimensions specified on the design drawings.
4. Verify that the hanger assembly connections are as specified on the design drawings.
5. The Electrical Inspector shall visually inspect or verify the visual inspection of all structural hanger assembly welds.
6. Verify, on a sampling basis that unistrut bolt torque requirements are met.
7. Verify that the hangers are correctly anchored. Expansion anchors shall be inspected in accordance with QA Procedure M-52 and utilizing specification information. Bolting to embedded unistrut and welding to embedded plate shall be in accordance with design drawings.
8. Verify that the seismic bracing is constructed from the correct materials as required by the drawing by grade or series (A-36, P-1001, etc.), is of the correct dimensions, and is installed properly as required by the design drawings.
9. Verify, on a sampling basis, that the torque requirements for concrete expansion anchors 5/8 inch in diameter and less are met.
10. Verify that all expansion anchor nuts have full thread engagement. A portion of the threads shall be sufficiently visible on all anchors in order to verify thread engagement and distinguish between wedge and sleeve anchors.
11. Record the serial number of the calibrated torque wrench used to verify the torque values.

☒ NUCLEAR SAFETY RELATED ☐ NON SAFETY RELATED

PREPARED M.R. Hemphill DATE 12/15/77

CONST. APPROVAL D.L. Freeze DATE 12-20-77

Q.A. APPROVAL R.A. Mahaffey DATE 12-20-77

NUCLEAR REGULATORY COMMISSION

Docket No. 50-413 OL Official Exh. No. 416

In the matter of Catawba

Staff ____ IDENTIFIED ✓

Applicant ✓ RECEIVED ✓

Intervenor ____ REJECTED ____

Cont'n Cnty ____

Contractor ____ DATE 11/7/83

Other ____ Witness ____

Reporter Ben Graham