## U. S. NUCLEAR REGULATORY COMMISSION OFFICE OF INSPECTION AND ENFORCEMENT REGION IV

Report No. 99900398/79-01

Program No. 51400

Company: General Electric Company Wire and Cable Business Department 1285 Boston Avenue Bridgeport, Connecticut 06602

Inspection Conducted: November 13-16, 1979

Inspector: B. M. Aumicutt W. E. Foster, Contractor Inspector Components Section II Vendor Inspection Branch

Approved by: D. M. Hunnicutt, Chief

Components Section II Vendor Inspection Branch

12/11/79

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Summary

Reactive inspection on November 13-16, 1979 (99900398/79-01)

Areas Inspected: Implementation of 10 CFR 50, Appendix B criteria, and applicable codes and standards, including a cursory review of the quality assurance manual; and control of conductor splicing and insulation/jacket patching activities. The inspection involved twenty and one-half (20.5) inspectorhours on site.

Results: In the two (2) areas inspected, no deviations were identified. The following unresolved item was identified in one area.

Unresolved Item: An apparent conflict exists regarding splicing requirements (Details Section, paragraph D.3.b.).

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#### DETAILS SECTION

### A. Persons Contacted

\*A. C. Bruhin, Manager, Product Development Engineering
\*\*D. G. Connelly, Manager, Quality Control
\*\*J. W. Fillmore, Manager, Bridgeport Cable Plant
\*\*W. J. Gartin, General Manager
\*\*S. B. Hamilton, Manager, Engineering
\*\*C. Haynes, Manager, Manufacturing
\*\*R. W. Mathewson, Manager, Marketing
\*\*L. S. Skorzewski, Manager, Test and Quality Assurance
\*\*J. E. Sweeney, Engineer, Senior Quality Control

\*Attended exit interview.

\*\*Attended initial management meeting and exit interview.

# B. Initial Management Meeting

1. Objectives

An initial management meeting was conducted to acquaint the vendor's management with the NRC responsibility to protect the health and safety of the public and to inform them of certain responsibilities imposed on vendors by the "Energy Reorganization Act of 1974" (Public Law 93-438). Those in attendance are denoted in paragraph A.

2. Methods of Accomplishment

The preceding objectives were accomplished by:

- a. Describing the historical events that indicated the need for the Vendor Inspection Program.
- b. Explaining the inspection base and how the inspections are conducted.
- c. Describing how inspection results are documented and how proprietary items are handled, including the vendor's opportunity to review the report for the purpose of identifying items considered to be proprietary.
- d. Describing the vendor's responsibility in responding to identified enforcement items relating to:

(1) Correction of the identified deviation.

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- (2) Action to be implemented to prevent recurrence.
- (3) The dates when (1) and (2) above will be implemented or completed.
- e. Explaining that all reports and communications are placed in the Public Document Room.
- f. Explaining the publication and function of the Licensee Contractor and Vendor Inspection Status Report, NUREG-0040.
- g. Identifying the reason for this particular inspection.
- 3. Findings

There were two (2) active contracts to supply insulated wire and cable. Some product is supplied by the plant located at Lowell, Massachusetts. The Quality System Manual applies to both plants.

### C. QA Manual Review

1. Objectives

The objectives of this area of the inspection were to verify that the QA Manual addressed the eighteen (18) criteria of Appendix B to 10 CFR 50 and had been endorsed by management as an authoritative Jocument.

#### 2. Methods of Accomplishment

The preceding objectives were accomplished by:

- a. Review of Southern California Edison Company Purchase Order No. D4103051, dated March 4, 1976, to verify that a requirement for a documented quality program had been invoked.
- b. Cursory review of Wire and Cable Business Department Quality System Manual, Revision A, dated June 9, 1978, to verify the quality program had been documented, the eighteen (18) criteria of Appendix B to 10 CFR 50 had been addressed and the document had been endorsed by management.

#### 3. Findings

The Purchase Order identified above (C.2.a) require documented quality program. A cursory review of the Quality System Manual revealed the eighteen (18) criteria of Appendix B to 10 CFR 50 had been addressed and the document had been endorsed by management.

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### D. Conductor Splicing and Insulation/Jacket Repairing (Patching)

1. Objectives

The objectives of this area of the inspection were to determine whether or not conductors and cables were spliced and insulation/jackets were repaired (patched) during the manufacturing process. Performance of splicing and patching required verification that controls were in place. Also, it was necessary to verify that type tests had been performed on splices and patches to assure that conductor and insulation integrity had not been compromised.

## 2. Methods of Accomplishment

The preceding objectives were accomplished by:

- a. Review of the following Wire and Cable Departments Manufacturing Instructions for the Bridgeport Plant to verify that controls for splicing conductors and patching insulation were in place:
  - Number 1, dated November 17, 1970, entitled, Clerical Procedures and Routines-Non-Conforming Material Disposition Procedure,
  - (2) Number 6, dated March 20, 1958, entitled, Wire Drawing -Brazing, and
  - (3) Number 13, dated April 9, 1968, entitled, Repairing and Rereeling - Standard Patching; pages twelve through fifteen (12-15) are dated November 2, 1973, entitled, 1855-EPR Vulcanized Patching.
- b. Review of Southern California Edison Company Purchase Order (PO) No. D4103051, dated March 4, 1976; associated PO changes, contingent PO Releases; and attendant specifications to ascertain acceptance/prohibition of conductor splicing and insulation patching; and type test requirement.
- c. Review of General Electric Company's QUICKWIRES dated June 30, 1978, September 28, 1978, and March 28, 1979, related to PO No. 4103051 to ascertain acceptance/prohibition of conductor splicing and insulation patching.
- d. Observation of brazing, insulating jacketing, and vulcanizing on a seven (7) conductor cable to be used as a test sample, to verify implementation of the controlling document.

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- e. Observation of brazing a nineteen (19) conductor cable (non-nuclear) to verify implementation of the controlling document.
- f. Review of Bechtel Power Corporation memorandum dated October 22, 1979, referencing a meeting conducted in Bridgeport on September 27, 1979, regarding 600 volt Power Cable at San Onofre Nuclear Generating Station, Units 2 and 3.
- g. Review of two (2) General Electric Company's documents identified as:
  - (1) Program for Evaluating Patched and Joined Cable in a LOCA condition, and
  - (2) Program for Evaluating Patched and Joined Cable in a Thermal Condition.
- 3. Findings
  - a. Deviations

None.

b. Unresolved Item

Splicing of conductors by brazing is routinely performed during the manufacturing process to lengthen individual strands of a cable. This practice results because spools of conductors are not depleted simultaneously during the stranding operation. Splicing is also used to lengthen cables and effect repairs to damaged conductors and/or cables.

The Wire and Cable Department's Manufacturing Instruction for the Bridgeport Plant, No. 6 dated March 20, 1958, is the procedure used to perform splicing. Southern California Edison Company's PO No. D4103051, dated March 4, 1976, associated PO Changes, and attendant specifications do not prohibit splicing. The controlling specification (S023-304-11) identifies American Society for Testing and Materials (ASTM) Standards B8-72 and B33-74 as applicable requirements. Paragraph 4.1 of ASTM B8-72 permits joints by welding or brazing with exceptions; distance is the only exception that applies to the product furnished by General Electric. Paragraph 4.6 of ASTM B33-74 permits necessary joints made in accordance with the best commercial practice. Bechtel furnishes to General Electric Contingent Purchase Order Release (CPOR) documents which identify hardware to be shipped and pertinent conditions.

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A CPOR dated June 24, 1976, with approvals dated July 14, 1976, contains Note No. 8 which states, "Each reel length shall be continuous. Spicing of reel lengths is unacceptable." General Electric QUICKWIRES that pertain to the referenced PO also contain a note which prohibits splicing of reel lengths.

QUICKWIRES are electrically transmitted messages from the Sales Office to suppliers wire and cable; these documents generally reflect information contained in the Purchase Order. Contingent Purchase Order Releases provides authorization to ship designated quantities. Neither of these documents can change purchase order requirements.

Splicing of conductors or cables prior to the extrusion operation are not detectable; while splicing after extrusion and/or jacketing may or may not be detectable. Records of splicing (brazes) are initiated and maintained; however, the records do not identify the location of splices (brazes).

The inspector observed that splicing of single conductors in a multi-conductor cable are individually spliced by using a torch, silver solder and flux (brazing). The inspector also observed that operators indicate, on processing records, the number of splices made in a length of cable but this information is not traceable to a particular reel of cable. The location of splices is not recorded. As a result, the number of splices in a reel of cable can't be determined with any accuracy and identifying the location of the splices in a given reel of cable is almost impossible. Inasmuch as splicing is routinely performed in the manufacturing process, there is no doubt that cables containing splices have been shipped to the San Onofre site. It has been estimated that cables sent to San Onofre contained two-hundred and seventy-seven (277) splices. With the exception of GE QUICKWIRES and the Bechtel CPOR, dated June 24, 1976, that authorized a particular shipment, the inspector was unable to identify in the purchase order a prohibition of splicing.

As a result of this apparent conflict in requirements, the inspector was unable to determine whether or not splices (joints) were prohibited.

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### 4. Other Related Findings

a. Repairing (patching) of insulation and jacket is performed to correct defects resulting from damage, and/or process problems.

The Wire and Cable Department's Manufacturing Instruction for the Bridgeport Plant, No. 13 dated April 9, 1968, with pages twelve through fifteen (12-15) dated November 2, 1973, is the procedure used to perform repairing of insulation. Paragraph 3.5 of Insulated Power Cable Engineers Association (IPCEA) Publication No. S-19-81 permits repairs to insulation. The NRC inspector telephoned Mr. J. E. Sweeney on November 19, 1979, and confirmed that the controlling specification (S023-304-11) identified IPCEA No. S-19-81 and IPCEA No. S-68-516 permits repairs to insulation.

- b. A Bechtel Power Corporation memorandum dated October 22, 1979, indicates a meeting was held at the Bridgeport Plant on September 27, 1979. The purpose of the meeting was to review General Electric Company's Cable Repair Procedures. Attendees represented Bechtel Power Corporation (Agent), General Electric Company Wire and Cable Department (Supplier), and Southern California Edison Company (Purchaser). The conclusion reached was - "GE's splicing and repair method and procedures are technically acceptable."
- c. On November 12, 1979, the customer authorized General Electric to proceed with the task of evaluating patched and joined cable in a (1) Loss of Coolant Accident (LOCA) condition, and (2) Thermal condition. Estimated completion dates are the first week of April 1980 for the LOCA condition, and mid-December 1979 for the Thermal condition.
- d. Wire and cable has also been furnished to the Detroit Edison Company for use at the Enrico Fermi Power Plant, Unit 2.

# E. Exit Interview

- 1. The inspector met with management representatives denoted in paragraph A. at the conclusion of the inspection on November 16, 1979.
- 2. The following subjects were discussed:
  - a. Areas inspected.
  - b. Findings, including the unresolved item.
  - c. NRC follow-up of the type test program.
  - d. Contractor response to the report.
- Management representatives acknowledged the comments made by the inspector.
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