



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

FEB 3 1993

Report Nos.: 50-413/93-02 and 50-414/93-02

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

Docket Nos.: 50-413 and 50-414 License Nos.: NPF-35 and NPF-52

Facility: Catawba 1 and 2

Inspection Conducted: January 4-6, 1993

Inspector:

G. MacDonald
G. MacDonald

2/2/93
Date Signed

Accompanying Personnel: N. Salgado

Approved by:

Candle Jackson for
Milton B. Shymlock, Chief
Plant Systems Section
Engineering Branch
Division of Reactor Safety

2/2/93
Date Signed

SUMMARY

Scope:

This special announced inspection was conducted to investigate the licensee's identification and analysis of an undetected circuit card component failure in the NSSS Process Instrumentation and Control System.

Results:

The component failure was the result of an incorrectly sized fuse installed in the circuit card by the manufacturer, Westinghouse. The licensee initiated a generic review of all plant 7300 series circuit cards, and identified other cards with similar deficiencies attributable to manufacturer's error. Corrective action to identify and replace improper fuses had been completed on Unit 1. The licensee had not completed their corrective action to identify and replace all improper fuses on Unit 2 and warehouse stock. There was no apparent safety challenge resulting from the presently installed circuit cards on Unit 2. The inspectors concluded that the licensee's actions, to date, have been appropriate regarding this issue. An URI was identified to address the licensee action resulting from further inspections on Unit 2 and warehouse stock and for updating the vendor Bill of Materials (BOM).

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REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *B. Finch, Component Engineer
- *J. Forbes, Manager, Engineering Division
- *J. Lowery, Regulatory Compliance
- J. McCart, Design Engineer
- *T. Van Deven, Component Engineer

Westinghouse

T. Puryear, Vendor Representative

NRC Employees

- *W. Orders, Senior Resident Inspector
- *J. Zeiler, Resident Inspector

*Attended Exit Meeting

Acronyms and abbreviations used throughout this report are listed in the last paragraph.

2. Description of Component Failure

On April 29, 1992 an I&E technician working in a process control cabinet noted a smoking printed circuit card in an adjacent cabinet. The circuit card was identified as a Westinghouse 7300 Signal Comparator card, part number 2837A1301, in control cabinet No. 7 which was related to PORVs 2NC-32B and 36B. Further inspection of the card indicated that capacitor C21-1 and resistor R424-1 had overheated which emitted the smoke and it was noted that an adjacent MA fuse was charred, but had not opened. The MA fuse was sized to protect the part of the circuit that had experienced the overheating. Fuse MA was found to be incorrectly sized with a 5 amp rather than a 0.5 amp fuse.

The Westinghouse Process Instrumentation and Control System's circuit cards are designed to activate an alarm when a fuse opens. Because the fuse did not open, no alarm was initiated to alert the operators of the impending process card failure. The licensee replaced the failed circuit card.

3. Component Failure Analysis

The circuit card was sent to Westinghouse for a detailed failure analysis. Westinghouse concluded that the capacitor C21-1 failed to a low resistance value, which pulled between 2 to 5 amps current through C21-1 and R424-1. Due to the improperly sized fuse, resistor R424-1 and capacitor C21-1 experienced high current and smoked after a short period of time. PIR 2-C92-0371 which was issued on this failure concluded that

Westinghouse had installed the improper fuse. The comparator card was replaced, functionally tested prior to installation, and the PORVs were returned to an operable condition within an hour.

4. Review of Problem Identification Report

The operability evaluation part of the PIR concluded that there was no operability concern, since the circuits within the 7300 Control Cabinets are design to fail in the safe direction upon loss of system power. The inspector reviewed the operability evaluation and agreed with the licensee's operability determination for this particular circuit card component failure.

5. Licensee's Generic Corrective Actions

PIR 2-C92-0371 recommended that I&E inspect all 7300 series circuit cards in Unit 1, Unit 2, and warehouse stock, to identify and replace incorrectly sized fuses. The Unit 1 fuse inspection had been completed per work request NO. 92031010, "Unit 1 Fuse Inspection" during the Unit 1 RFO. An estimated 1,000 cards were inspected and 56 fuses improperly sized were identified and replaced. The inspectors reviewed work request No. 92031013, "Warehouse Fuse Inspection," which was near completion. The inspectors independently inspected several cards in the warehouse and determined that although the improperly sized fuses had been identified, they had not been replaced. This was identified to the licensee. The Unit 2 fuse inspection will be conducted during the upcoming RFO. This will be reviewed as part of URI 93-02-01.

6. Errors in the Bill Of Materials (BOM)

During the licensee fuse inspection and in correspondence with Westinghouse it was identified that the BOM CNM 1399.03-252, for the circuit cards contained errors. The BOM is a controlled document that contains vendor information regarding all 7300 series printed circuit cards.

Westinghouse indicated in a letter to the licensee dated October 22, 1992 that they routinely upgrade printed circuit cards returned to them for repair. The cards are upgraded to the current revision level at the time of the repair. These upgrades may include replacement of components and fuses with increased amperage ratings. Although Westinghouse performed these upgrades on some of the cards returned to the licensee, the BOM had not been updated to reflect these changes. This deficiency was documented in PIR-0-C92-0813.

The inspector reviewed the BOM and noted that it contained errors due to its not being updated. It was also noted that the BOM sections for particular cards were missing a revision history as it related to the information in the book. Design Engineering was assigned the responsibility for updating the BOM. During the inspection it was noted that no corrections to the BOM had been accomplished.

The scope of maintenance activities being performed on the 7300 series cards by Catawba was limited to just the replacement of fuses. They do not repair failed cards. Resolution of errors between installed cards and the BCM will be reviewed as part of unresolved item URI 93-02-01.

7. Review of Incoming Repaired Cards

The inspector reviewed several incoming repaired circuit card packages from Westinghouse. Each package contained the purchase order, quality release, certificate of conformance (on which the revision level was given), and a shipping order. Upon arrival at the site, the repaired cards were visually inspected.

The inspector determined that Westinghouse provided documentation indicating which circuit card components were replaced and indicated the new revision level. However, updated circuit card drawing, bulletins or BOM for the card were not provided. The licensee maintains configuration control over the 7300 circuit cards down to the group level only. The card group reflected design differences such as number of outputs and voltage level for a given card type. The licensee does not control serial numbers and revision levels for a particular type and group of card. The vendor maintained control over design revisions and issued certification that circuit card form, fit and function were not affected. The licensee considered different revisions of a particular type/group of card to be interchangeable. The inspectors concluded that updates should be recognized and controlled in a more formal manner. Without control of revision level it would not be possible to utilize the correct circuit card drawings for maintenance or troubleshooting should it be required.

8. Exit Interview

The inspection scope and findings were summarized on January 6, 1992 with those persons identified in paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection finding listed below. Although reviewed during the inspection, proprietary information is not contained in this report.

Item Number Description/Reference Paragraph

93-02-01	URI - Incorrect Fuse Sizing of Westinghouse 7300 Process Control System Cards and Failure to Control Vendor Manual/BOM.
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9. Acronyms and Abbreviations

Amps	Amperes
BOM	Bill of Materials
I&E	Instrumentation and Electrical
NSSS	Nuclear Steam System Supplier
PIR	Problem Identification Report
POKV	Power Operated Relief Valves
RFO	Refueling Outage
URI	Unresolved Item